FAX 810-231-4295
PHONE 810-231-1000

Hamburg Township

P.O. Box 157
10405 Merrill Road
Hamburg, Michigan 48139

A GREAT PLACE TO GROW

HAMBURG TOWNSHIP PLANNING COMMISSION
SPECIAL MEETING
WEDNESDAY, DECEMBER 12, 2018 7:00 P.M.
HAMBURG TOWNSHIP HALL BUILDING
10405 MERRILL ROAD, HAMBURG, MICHIGAN

1. CALL TO ORDER

2. PLEDGE TO THE FLAG

3. APPROVAL OF AGENDA

4. APPROVAL OF MINUTES

November 28, 2018 Planning Commission Minutes

5. CALL TO THE PUBLIC

6. OLD BUSINESS

Public hearing to continue the review of the preliminary site plan application for an Open Space Planned Unit Development, commonly known as Waters Edge Village, (OSPUD 18-001) on the properties at 4715-14-400-008 and 4715-23-100-002. This project was tabled at the November 28, 2018 Planning Commission hearing.

- The Planning Commission Chair opens the public hearing;
- The applicant presents the project to the Commission;
- The Planning Department representative presents the consultant review;
- The project is open to public comments (3 minutes maximum comment period per person);
- The Planning Commission Chair closes the public hearing portion of the meeting; and
- The Planning Commissioners review the application and project materials, the review prepared by the planning consultant, and the comments and any other materials presented at the hearing, and make a decision on project.

** Throughout the hearing process the Planning Commission can ask questions of any persons (Township staff, the development team, and the public) about the project.*
*** All questions should be asked through the Planning Commission Chair.*

7. NEW BUSINESS

8. ZONING ADMINISTRATOR'S REPORT

9. ADJOURNMENT

FAX 810-231-4295
PHONE 810-231-1000

P.O. Box 157
10405 Merrill Road
Hamburg, Michigan 48139

Planning Commission
Hamburg Township
10405 Merrill Rd., P.O. Box 157
Hamburg Township, Michigan 48139
November 28, 2018
(moved from November 21, 2018 due to holiday)
7:00p.m.

1. CALL TO ORDER:

Present: Goetz, Hamlin, Leabu, Menzies, Muck, Muir & Priebe
Absent: None
Also Present: Amy Steffens, Planning & Zoning Administrator; Scott Pacheco, Township Planner; Brittney Stein, Zoning Coordinator; John Jackson, McKenna Associates

2. PLEDGE TO THE FLAG:

3. APPROVAL OF THE AGENDA:

Motion by Menzies, supported by Priebe

To approve the agenda as presented

Voice vote: Ayes: 7 Nays: 0 Absent: 0 MOTION CARRIED

4. APPROVAL OF MINUTES:

a. September 19, 2018 Planning Commission Minutes

Motion by Muir, supported by Priebe

To approve the September 19, 2018 minutes as presented

Voice vote: Ayes: 7 Nays: 0 Absent: 0 MOTION CARRIED

5. CALL TO THE PUBLIC:

Chairman Goetz opened the call to the public for any item not on the agenda. Hearing no public comment, the call was closed.

6. **OLD BUSINESS:** None

7. NEW BUSINESS:

A. Site Plan (SP18-005) and Special Use Permit Applications (SUP 18-001) to consider a 4,800 square foot addition to the existing 6,720 square foot shop building on the southeast corner of the property at 7750 East M-36 (4715-25- 200-065). The project is considered a major amendment to the Special Use Permit granted in 2014 which allowed CEI an architectural sheet metal and roofing company, to be located on the subject property because the proposed addition will increase the buildings usable floor area by more than twenty five percent (25%) (Section 3.5.8 (A)(1)).The proposed addition is also considered a major amendment to the original approved site plan the addition because the project is larger than 2,000 square feet. (Section 4.9.4 (B)(1)).

Kristine Cook, applicant, stated that CEI is a roofing and architectural sheet metal operation and is applying to add a 60'x80' addition to the existing warehouse. They had a special use permit granted 2014. The additional square footage is to house a larger composite panel machine that they would like to purchase. The additional square footage is only cold storage. It is going to have metal racks for storage of flat metal sheet. They need it for the increase inventory that they will need for the additional business the new machine will generate. It will be attached to the warehouse and accessible through an interior garage door, and access from the outside will be on the west side. It will extend the profile from the southeast corner 60 feet and 80 feet to the west. It is not the entire length of the warehouse. They would be moving the existing downward directional LED lights that are currently in place to the south side of the building and a couple more lighting features will be added to the west and east sides, again pointing downward. The east side access to the building along Hall Road will be enclosed. They have never used the Hall Road entrance as access. Therefore, they are asking for a revised Special Use Permit to allow them to continue to do what they have been doing for the past four years and permit them to add the square footage. They have read through the report which included a number of recommendations. Their only question relates to the motion sensor lighting. They currently have four light poles which are not motion sensor. The other exterior lighting is the flag, the sign and two downward directional lights at the front door which are flanked by walls, and the same on the door on the north side of the building facing M-36. If it needs to go on motion sensor after 11:00 p.m. then they can do that. They would like to have their sign and flag lit all night. The only other issue is the eight-foot wide bike path. As part of the original Special Use Permit, they were given five years to figure out the path because of the proximity of the trees and the MDOT right-of-way. They have had it staked, but this fall, they missed the window for the concrete but it will be installed in the spring of 2019. The question is if the lighting is going to go off at 11:00 p.m., it is going to be very dark for anyone using the path.

Township planner Pacheco asked if all of the lights are on after 11:00 p.m. Ms. Cook stated that they are set on timers and go on at dusk. Pacheco stated that was not addressed on the original permit, and we do have lighting requirements that the lighting be shut-off at 11:00 or at the end of the business day or put on a motion sensor. He stated that the Planning Commission can issue waivers for those lighting requirements under our ordinance.

Pacheco gave a project description. He stated that it does meet most of the development review standards. There were a few things under the lighting section that have been brought up. We did not receive a lighting report with the site plan. There are requirements for footcandles at the property line. Prior to issuance of a building permit, they would need to submit that report. He stated that we have not received any complaints regarding the existing lighting, however this building does extend further to the south and closer to the residences on Hall Road. They do have an eight-foot fence between the edge of the property and the building. A light study should be done to make sure that it meets the footcandle requirement at the property line. They will be adding two lights to the east side of the new building, which is the most concerning. The lights on the south and the interior west side are far from the property line. Pacheco gave a history of the property. In 2014 CEI moved into the building and was granted a Special Use Permit. As a condition of project approval, an 8-foot multi-use path was required to be installed along the north portion of the site. At that time they were not changing any of the exterior structures. In 2015 they added a cold-storage barn in the back of the lumber yard area which was approved through site plan review. They are now coming and asking for a 60'x80' addition being added on to an existing paved area. No new drainage will be created as a result of the project. They are replacing an existing machine with a new machine that can do more. There will not be a net increase of employees so the existing parking is all that is required. He described the existing surrounding uses. He stated that he is recommending five conditions. The only condition the applicant had concern with is the lighting recommendations.

Pacheco reviewed the five conditions:

1) The final site plan shall include a note that states “All outdoor lighting shall be turned off between 11:00pm and sunrise and that all light fixtures used for security purposes are to be on motion detection devises
2) Prior to issuance of a land use permit by the Zoning Department, a lighting study shall be submitted that shows that light within a site shall not exceed ten (10) footcandles or one (1) footcandle at any property line, except where it abuts a residentially used or zoned site whereby a maximum of 0.5 footcandles is permitted. The only exception is with gas station canopy and automobile dealership lighting, where a maximum of twenty (20) footcandles is permitted within the site but the above standards shall apply to intensity at the property line. He discussed the light study. It was stated that because of the 8-foot fence, hopefully the study should show 0 footcandles at the property line.
3) Prior to issuance of a building permit the building department will verify that all Federal and State requirements regarding handicapped parking, loading and access 18 are met.
4) As a part of the project the Zoning Permit shall include the removal of the driveway approach off of Hall Road. Once the approach is removed the area shall be graded and landscaped to match the rest of the shoulder along Hall Road. There is an existing apron on Hall Road from where the lumber yard used as access. They have closed that off with an 8 foot fence but they left the apron and you cannot plant landscaping along the drainage ditch like the rest of the site.
5) Prior to issuance of a land use or building permit all local, county and state regulations will need to be reviewed and approved for this project. A list of the agencies that may be required to review this project including but are not limited to; the Livingston County Drain Commission, Road Commission, Building Department, Health Department, and Water Authority, and the Hamburg Township Utilities and Fire Departments. We do have a letter from the Fire Department that has two common requirements dealing with fire lane and knox box.

Pacheco stated that the project appears to meet all of the zoning requirements which he has outlined in his report and meets all of the Standards for Approval of the Special Use Permit and Standards for Site Plan Review and for the additional Approval Standards for the Village Center requirements.

Chairman Goetz opened the call to the public. Hearing no public comment, the call was closed.

Menzies stated that with the fence, you can barely see the lighting. He stated that after the study, he feels that they can keep the lights on and not have the motion sensors. He stated that there is adequate land and will not require any variances and would not require additional parking.

It was stated that the parking lot lights were existing. The applicant did not add any poles. Leabu stated that you have to have a light on the flag or the flag cannot fly. He stated that he does not have a problem with the architecture or roof line. However as it relates to the lights, he has a problem with the new lights on the south. There is a difference between the light hitting the ground and just a light that you can see. He would like to see the new lights on the south and the east be put on a motion sensor after 11:00 p.m. Furthermore, if that is done, then you don’t really need a study. The new lights on the west side are not an issue because of the distance from the property line.

Muir asked if the soil erosion and sedimentation sign-off should be included as a condition. Pacheco stated that is covered by the Livingston County Drain Commission and would be required prior to the issuance of a building permit. It was stated that there is no new impervious surfaces.

The question was asked if the Commission can approve the plan versus recommending approval. Pacheco stated that this is Planning Commission approval because it is an amendment to an existing site plan. Our code allows the Commission to approve the amendment and Special Use Permit.

Motion by Priebe, supported by Leabu

The Planning Commission approves the Special Use Permit and Site Plan Amendments (SUP18-001 and SP18-005) to allow the new 4,800 square foot addition to be built on the south side of the existing shop

building at 7750 E- M-36 (TID15-25-200-065); because the project with the following recommended conditions will meet all the discretionary standards for Special Use Permits under Article 3 , Site Plan Review under Article 4, Projects within the Village Center Area under Article 7 as described at this hearing and as presented in the November 28, 2018 Staff Report.
Conditions of Approval:
1) The final site plan shall include a note that states "all new outside lights on the east and south side used for security purposes shall be on motion detection devices."
2) Prior to issuance of a building permit the building department will verify that all Federal and State requirements regarding handicapped parking, loading and access are met.
3) As a part of the project, the Zoning Permit shall include the removal of the driveway approach off of Hall Road. Once the approach is removed the area shall be graded and landscaped to match the rest of the shoulder along Hall Road.
4) Prior to issuance of a land use or building permit all local, county and state regulations will need to be reviewed and approved for this project. A list of the agencies that may be required to review this project including but are not limited to: the Livingston County Drain Commission, Road Commission, Building Department, Health Department, and Water Authority; and the Hamburg Township Utilities and Fire Departments.

Voice vote: Ayes: 7 Nays: 0 Absent: 0 MOTION CARRIED

B. Preliminary Site Plan Application for an Open Space Planned Unit Development (OSPUD 18-001) to allow construction a 154 unit single family housing development on the properties at 4715-14-400-008 (8.5 Acres) and 4715-23-100-002 (77.19 Acres). This development proposes a mix of property sizes and types that will be clustered on the site in order to help preserve the existing wetlands and other sensitive areas of the site.

Mr. Rob Wagner, Civil Engineer from Midwestern Consulting stated that they have been working on this project for almost a year. He stated that the developer is Winans Lake Development. He introduced Ted Hirsh, Project Engineer. He stated that Todd Hallet from TK Design Associates is the architect, King & McGregor delineated the wetlands and the habitat species study and G2 Consulting Group did the geotechnical investigation.

Mr. Wagner presented a slide presentation which included:

Site Location – 92.5 acre site on Winans Lake Road east of Chilson Rd. west of Hamburg Road.
Define the Project – Clustered Single Family Residential with definable benefits to the community, interconnected open space for a cohesive neighborhood with active and passive recreation facilities and features. They are proposing to preserve wetlands and woodlands, consistent with the Township Master Plan which encourages open space communities.
Site Analysis – Gill Lake and the Huron River and preserving quality woodlands. They are not proposing to fill in any wetlands and proposing walking paths along the woodlands and access points to the river.
Master Plan – Future Land Use shows medium density with surrounding high density to the west.
Zoning Map – Existing zoning is Waterfront residential with Natural River zoning along the south end of the property.
Water's Edge Layout – Mr. Wagner stated that they came in back in February, and at that time they proposed a permanent connection at Huron Highlands and at Lake Crest. However, after hearing the opposition, they changed the plan to an emergency access only, to Huron Highlands as which the Fire Department has approved. They are proposing access onto Winans Lake and their site distance has been approved by Livingston County.
Private Roadways – They are proposing 20 foot alleys to minimize the amount of pavement and 26 foot wide roads to meet the Fire Code
Open Space Calculation – They are proposing 56% open space when 40% is required by the Open Space ordinance. 25% is required to be upland and they have 89% of the open space as upland.
Utilities-Water – Mr. Wagner stated that during their pump tests, they did affect some neighboring wells. They could pump at a lower rate and get a permit from the DEQ for the community well. The developer has decided to pursue a public water main which is currently located next to the Hamburg Professional Center which would be

brought to the site. That would be in accordance with the Township's Utilities Master Plan for water and would also benefit future development.
Exemplary Project Items – They would be preserving natural features, providing natural river walking path, observation gathering points along the trail and overlook, three points of access to the Huron River for kayaks, canoes and paddle boats, three parks along Gill Lake, Gill Lake look-out area, and optional dock, not for motor boats but kayaks and canoes. They are preserving 3.68 acres of forest and adding a walking path through it. Extending three million dollars worth of water main to the site. Their storm water best management practices include infiltration, possible permeable parking areas next to the river. They will be providing more detention than the ordinance or the Livingston County Drain Commissioner requires.
Exemplary Project Items 2 –They are proposing a public sanitary sewer and forced main. Instead of proposing grinder pumps at every home, they are proposing a lift station. With the tap fees, the Township would see $390,000 worth of fees and $462,000 water. They are proposing a diverse mixture of housing options and lot sizes. They are proposing 150 foot transition buffer around the development with a small exception. There are a number of community amenities including two fountains, large gazebo, pickle ball courts, picnic tables and benches throughout the site. There are a parks with dog waste stations and extensive landscaping along Huron River Highland and Winans Lake
Justification of Density – They are asking for a density bonus. There was a project recently approved with a 100 density bonus. They are seeking a 95% bonus and feel that their project is more exemplary than that one. He further reviewed the project features as well as the benefit to the homeowners to have reduced insurance rates because of the fire hydrants. He stated that the 56% open space calculates to 1/3 of an acre per unit and 4.2 miles of path ways or 140 feet of path per unit. They are proposing 43 acres of community park area or ¼ acre per unit. They have 25 acres of preserved woodlands or .15 acres per unit. They have mixed home typeology. Density allows opportunity for these unique design features. He showed the density bonus calculation.
Socio-Economics – The developer is not selling this as an empty-nester community, but that may be just who will buy it and may have disposable income to spend here. This is a $50 million project that may take 5-10 years to build. They believe that when communities such as this are constructed, it actually increases neighbor's property values because the sales price will impact neighbors.

Todd Hallet of TK Design, a residential design firm out of South Lyon, stated that they have been commissioned to design the houses for Water's Edge. He presented a slide show presentation which included:

Inspiration – Community, lifestyle & retreat. They wanted to provide a retreat to go home to as opposed to just going to a house. They are targeting empty nesters and active adults, not necessarily young families. They are not restrictive, but that is who they are seeking. They have to make the site affordable and make it a leisure site that is walkable and provide recreation not just for people in the development, but the entire community. The homes and property are maintenance free. The association would take care of the house on the outside as well as the yards. They also want to provide social connectivity and the ability to walk around the site and talk to neighbors. He further reviewed the site features. They are providing a variety of different lot sizes and units. He reviewed the park features. He reviewed the home placement and design. He discussed the area at the river. He stated that they are not touching one tree along the river and plan to keep it as a natural barrier. They are trying to keep it as untouched as possible while still allowing the community to enjoy it by providing walking paths. The idea is connectivity whereby people can walk to this site and have access to the special things that make the site exemplary. He further discussed access to Gill Lake.
Home Design - They want to create designs in line with what they see in Hamburg. The style is craftsman, farmhouse and costal look, primarily one-story but also two-story. He stated that the open-space ordinance looks for innovation and greater flexibility in design. They feel like this is a very unique idea. The site will provide private roads and alleys. They want to put two fronts on the same home so it looks great from both the alley and the road. This will allow consistent aesthetic throughout the whole site. He provided some examples.
Lot Orientation – He provided an example of a high-density subdivision. He stated that they want to make sure that everyone who lives on the perimeter will see long views and vistas all the way around the site. He provided a sample lot diagram.
Open Space Community Ordinance: 1) Assuring permanent preservation of open space and other natural resources. He reviewed the open space throughout the site. 2) Provide recreational facilities within reasonable distance of residents in the development. He discussed the interconnection of their recreation/parks. 3) Allowing

innovation and greater flexibility in design. He discussed the two-front concept. He stated that they are working on defining that. They want everyone throughout the site to both look good and see the vistas. 4) Ensuring compatibility of design and use between neighboring properties. He stated that there are no neighboring properties that have this connectivity or open space properties, but they can make the architecture in context. 5) Encouraging a less sprawling type of development thus preserving open space. This site is the opposite of sprawl. He stated that this is the most interconnected site he has ever seen.

Mr. Hallet thanked the Commission and respectfully requested that the request be tabled to give them time to respond to the review.

John Jackson of McKenna, Planning Consultant, stated that the Township has had the open space option in their ordinance since 1992. It is an incentive based zoning approach. If a developer uses the option, they get a density bonus in exchange for providing a benefit to the Township. Since 1992, the vast majority of benefit provided by developments is the preservation of open space. That was the primary objective of the township. The Township has been recognized nationally for being innovative and creative in how they achieve objectives of the Master Plan and preserving the things that define the township, the natural features, open space, views, river areas, etc. The Township's Master Plan recognizes that we need a product that would appeal to empty nesters. As a result, we started to introduce alternative types of housing. As an option, developers can develop Elder Cottage Housing Option (ECHO). These are smaller homes clustered together at higher density. We have one of those developments, and that option has been in the ordinance for over 20 years. Another option is providing accessory dwelling units and yet we have very few. We don't have a lot of options for people who want to age in place nor do we have a lot of options for young families who want to move out here. We also don't have many options that appeal to young professionals. It is a goal of the Township to provide a greater range of housing options. People were not taking advantage of the open space option either. Now we are in a position to look at that approach to provide an alternative housing. The demographics show that the number of seniors and empty nesters is growing drastically. The ordinance allows the Planning Commission and Township Board to grant modifications to the zoning standards that result in an increase in density to encourage these types of housing. That is one of the first things we discussed with the developer. We are looking for multiple types of homes on multiple size lots. We are continuing to work with the developer and we are not there yet. We have identified a number of areas the developer still needs to work on. We have met with the developer to try to get them to a project that is acceptable to the Township. There have been a lot improvements since we first met and a lot of progress has been made. They have asked for more time to respond to the review letter.

Chairman Goetz opened the public hearing and asked that anyone wishing to speak should limit their comments to three minutes.

A number of residents spoke regarding the project:

Michelle Ormanian, 9497 Huron Rapids Drive, stated that she would like to correct the statement that Huron River Highlands is high density. It is not. It is medium density residential with water front as the lots are zoned Waterfront Residential and Natural Riverfront Residential. She presented a petition opposing the proposed 154 high-density housing development. They represent 552 property owners. She stated that the proposal is not consistent with the Hamburg Township Master Plan and not consistent with the Township Zoning Ordinance. The property is zoned for medium density housing with a maximum of 79 dwelling units. She further discussed their opposition and concern over the proper lot size, width and setbacks required. She discussed their calculation of the density bonus and other concerns about density. They demand that the Township Board and Planning Commission uphold its Master Plan and enforce its zoning ordinance.

Charles Simpson, 6182 Oak Valley, presented a petition by 162 residents of Huron River Highlands representing 89 of the 93 homes opposing a plan making the two cul-de-sacs becoming cut-through roads from the proposed high-density development. He stated that these roads are not consistent with the Township's Master Plan or Zoning Ordinance. He further discussed the Master Plan and the recently approved developments. He discussed the impact of traffic from the proposed development. He stated that the proposed development is detached condominiums.

Judy Urban, 8720 Tamarack Drive, stated that she likes the efforts that the developer has made to save the perimeters, ponds, etc. She stated that she does not think that trying to mix the single family and senior housing is going to work. Seniors do not want to live next to homes with families and children. We need to be concerned about the density, beauty and quality.

Lynn Riehl, 5842 Winans Drive, stated that she has lived here for 26 years. All she has heard about is the quality of life for the people who move into this subdivision. What about the quality of life for the rest of them? The traffic on Winans Lake Road is terrible and this development will only increase it and cause more trouble. They don't want to see the fountains, etc. What they care about is the wildlife and what they see now. She stated that she understands why Huron River Highlands does not want access through their subdivision, but that means it is all going to go through Winans Lake Road. She cannot see any benefit to the community.

Ellen Babas, 5476 Arapaho, stated that she is not a neighbor to this development, however she is a resident who is opposed to the development partially because of the traffic. She questioned how many empty-nesters and baby boomers are going to be able to afford these homes. Further, she stated that she can see promises similar to those we have received before and not realized.

Simon Ren, 8790 Hendricks Drive, stated that he has driven by this area for the past 25 years. He is in favor of the development. It is quite appropriate. Something is going to go there and this looks as good as anything we can expect. To him this is medium to low density with ½ acre lots.

Jeff Yeakey, 9305 Huron Rapids Drive, stated that he has been a resident in the area for 48 years. He lives at the cul-de-sac where they want to bring in the driveway. At the time he bought his house, he did his due diligence and talked to neighbors as well as the owner of the 100 acre parcel. For many years it has been leased to farmers. He looked at the Master Plan and knew that the worst thing that could happen would be medium density similar to Huron River Highlands. If this goes in, he will have a steel gate at the end of his drive-way and the "busy area" including the pickle ball courts in his backyard.

Jim Clement, 9361 Silver Maple, stated that it is not the intent of the open space ordinance to trump the existing zoning. He would like to see if they have tried to consider a conventional site, and if not explain why they did not. There is no mandate about who can buy there so it is just another subdivision and not worthy of changing the character of that area. He stated that there is already vacant land elsewhere for this type of high-density development. He discussed the vacant property next to the fire station designated for senior living. He discussed the purchase price and economics of the site. He stated that he went through the same due diligence when he purchased his home. He does not think this is a bad development, but does not feel that this is the place for it.

Mike Angell, 9017 Buckhorn Lane, stated that his subdivision is directly across from the proposed grand entrance. They have a small subdivision at a medium density setting. Across the street from his subdivision is a 95 acre producing farm with wildlife, etc. Although they would like to see it remain a farm, they don't expect that. They expect to have a development there, but let's make it reasonable and consistent with what is around it and in Hamburg. He does not want to live in Canton or that environment. It is not a good fit, and if you think that it is, then take out ½ of the lots and make it the density that it's rated for. Further, if not for the residents of Huron River Highlands, he would not have known that this was proposed.

Ron Brandt, 9429 Huron Rapids Dive, stated that if this goes through, we are going to be setting a precedent. He stated that he lives approximately 10 homes from a pickle ball court, and he can hear them playing from his home.

Bob Finn, 8610 Tamarack, stated that he is opposed to this development for environmental and economic reasons. He stated that the river has been designated by both the Township and the DNR as a natural river and with that designation comes certain restrictions. He reviewed those restrictions. The whole development will impact the river and violates the ideals the Township wants to uphold. He stated that the idea of a PUD is to cluster the homes to maintain natural features. This development clusters the homes, but almost doubles the number of homes allowed and clusters it around as if it were not an open space PUD. He expressed his concern over the increase in impervious surfaces and runoff draining into the river and Gill Lake. He expressed his concern over the increase in traffic and air pollution, leakage from cars, etc. This is going to be costly to the township with other infrastructure costs and Township services that the tax increase will not cover adequately.

Diane Henry, 8024 Branch Drive, stated that the Huron River highly impacts her property. They flooded in February and May this year. She is wondering what type of flood mitigation plan will be put in place. She further stated that the river is contaminated to the point that you cannot fish in it anymore.

Jerry Bennett, 8820 Hendricks, stated that according to the Township numbers, this is not 95 acres, but rather 85 acres. He asked if there will be turn lanes installed.

Kevin Guthrie, 9421 Huron Rapids Drive, stated that he agrees with a lot of the points made by the residents. He questioned the home prices. He stated that ideal senior housing is close to shopping and hospitals. He questioned what is going to happen if the market doesn't sustain and people do not buy these homes.

Mark Latendriesse, 9175 Eagle Run Drive, stated that he and his wife are opposed to the proposed high-density development. The property is zoned for medium density. He stated that this type of development is seen in large communities such as Novi, Canton and Ann Arbor who have the infrastructure to handle it. Hamburg Township does not. He discussed the number of people using the amenities. He discussed Winans Lake Road not being able to be widened to handle the additional traffic. He stated that he believes this developer has no vested interest in our community. Long-term repercussions may occur as a result of this development. One example is the current residents suffering as a result of the testing of the wells. He stated that he demands that the Township stand firm in developing this property as medium density and use the open space ordinance as intended.

Ron Medere, 5846 Winans View Ct., stated that when he was looking for his home and found Winans Woods, he saw what a true open space subdivision was and thought that it is something that exemplifies what we should be proud of. The Township 2011 Master Plan sites the criteria for a development and what the guidelines are for open space, which is not intended to ignore zoning. This developer has decided that he does not need to follow that. They are not opposed to development, but they are opposed to impact to natural resources and density. He further discussed the 2020 Master Plan meetings where there was resounding opposition to this type of development.

Robin Huhn, 6736 Winans Lake Road, stated that his home is next to this development. When they purchased their home, they knew that Winans Lake had a fair amount of traffic and they knew that this property was for sale and would be developed. They are concerned about the possible placement of a house next to theirs. They are concerned about the additional road noise and additional lights that will result in the homes.

Lorraine LaValley, 6701 Winans Lake Road, stated that her family has lived here since 1978. Looking at the plan, it appears that the road will be directly across from their home. This is a main artery to the expressway. She discussed the current traffic and stated that there are already two large developments on Winans Lake in Green Oak. She further questioned one entrance with that number of homes. There are too many homes for this property, and at the very least, it needs two entrances.

Mike Mcquire, 9110 Eagle Run, stated that his family moved here from Ann Arbor for two reasons, one being the school district and number two was the less crowded, more rural setting. They knew that the farm someday would be developed, but they were hoping for something similar to Eagle Run with big lots and less homes.

Katherine Lipp, 9463 Huron Heights Drive, stated that she moved out here from high-density Oak Park for the rural character of the area and natural resources, not only the river but also open spaces for the wildlife. She would expect that the Township to uphold the medium-density zoning, and if you don't she would expect there to be a statement to the public why these people's concerns are overridden and the high-density proposal would need to be approved.

Catherine Burke, 5890 Winans View Ct., stated that she is a senior and widow who lives in a home that is too big. Although it is a beautiful development, she does not feel that Hamburg is the place.

Austin Ormanian, 9497 Huron Rapids Drive, stated that clearly this is important to a lot of people and should be taken into consideration. There are places that have homes like this in Canton, Livonia, etc. He discussed the development in Brighton and the progression and precedent from one development to the next. He stated that they knew this would not stay a field forever. The only thing they are asking is to make it reasonable. Why does it have to be doubling the amount of houses. The infrastructure is not there to handle the number of people. He does not feel that this should be tabled. There should be some type of acknowledgement or sense of direction for this.

Mary Anne Britton, 6167 Cowell Road, stated that the developer has mentioned 55 foot lots, but they don't say how many houses. There are many questions that have not yet been answered. The Planning Commission and Board should take into consideration how many people are here.

Chairman Goetz closed the public hearing.

Commissioner Hamlin questioned the correct size of the parcel. It was stated that there are actually two parcels. Hamlin asked if Huron River Drive was a County Road. It was stated that it is a County Road and it would be up to them to approve a connection.

Hamlin questioned the calculation of the density bonus. He stated that his understanding of the ordinance is the same as the first speaker.

Commissioner Muir stated that he was part of the group that did the site walk, and does agree that it is a beautiful piece of property. They spent a lot of time identifying sections that should not be changed. Where we are is determining what is going to make this an exemplary PUD.

Commissioner Priebe stated that there seems to be a lot of comparison between this and Regency Village. She is not seeing the same trade-off with this particular development. The density seems excessive.

Commissioner Leabu stated that he has visited the site a couple times. Our ordinance makes you protect the natural river area. Originally, they wanted to build in that area and we said no you cannot build anything within 100 feet to the top of the bluff. He is glad to see that people realize that it is not going to be left a corn field. The question is density. He has lived on Winans Lake for 40 years. He does not think the concept is wrong, there is a need for it. The average lake front lot in Hamburg is ¼ acre. He discussed the sewers that were added around the lakes. Because of our ordinance, this will have to have sewers which is good for the environment. He further stated that this is some of the best architecture he has seen. He stated that if you read the Planner's letter, there is work to be done.

Commissioner Menzies stated that there are some discrepancies and some concerns, which is why project should be tabled. You are not going to stop development, but you can control it, and that is why we are here. He stated that in a parallel plan you would see bigger lots, but they would be "cookie cutter" lots and it would look like Canton. They would be on the river and they would be on the lake.

Commissioner Muck stated that he would echo the other commissioners. He is torn on this development. The Planner did an excellent job outlining the concerns. It is clear that there are too many questions and he commends the developer for recognizing that and saying we need to go back to the table and work with the Planner and staff. We have all heard the residents loud and clear.

Commissioner Leabu stated that a lot of prep work has been done to get to this point. It was stated that over 1500 trees have been tagged.

Planner Jackson stated that they will be meeting with the developer very shortly. Chairman Goetz stated that the density needs to be looked at very closely.

Motion by Muck, supported by Hamlin

To table Preliminary Site Plan Application for an Open Space Planned Unit Development (OSPUD 18-001)

Voice vote: Ayes: 7 Nays: 0 Absent: 0 MOTION CARRIED

8. **ZONING ADMINISTRATOR'S REPORT:**

Planning & Zoning Administrator Steffens stated that the Commissioners have received a letter from the Livingston County Planning Department regarding the adoption of the Livingston County 2018 Master Plan. She would encourage the Commission to go on their site and look at the plan. It is nicely done, and Hamburg Township is mentioned multiple times throughout the plan as being an example of planning best practices.

Steffens stated that the 2019 dates are in your folder. The Commission does not need to take action unless you choose to. The meetings are the third dates of every month assuming there is an agenda.

Motion by Muir, supported by Priebe

To approve the 2019 Planning Commission meeting dates

Voice vote: Ayes: 7 Nays: 0 Absent: 0 MOTION CARRIED

Steffens stated that there is a December 5th presentation of the Livingston County Transit Plan at the Livingston County Emergency Management Building in Howell.

Steffens stated that in February we will again hold our joint meeting with the Township Board, Planning Commission, ZBA and Parks and Recreation. A date has not yet been set, but if there are topics you would like on the agenda, please let her know in the next few weeks. It is a year in review so you will see a list of all the permits, variances, site plan reviews, etc. from 2018 and then going forward what staff has identified as being things we need to work on.

Steffens stated that there is also a Livingston County Transit Plan survey that takes just a couple minutes to complete. They are trying to get a handle on what we see as the transit needs in Livingston County.

9. ADJOURNMENT:

Motion by Menzies, supported by Priebe

To adjourn the meeting

Voice vote: Ayes: 7 Nays: 0 Absent: 0 MOTION CARRIED

The Regular Meeting of the Planning Commission was adjourned at 9:42 p.m.

Respectfully submitted,

____
Julie C. Durkin
Recording Secretary

The minutes were approved
As presented/Corrected:_________________________

____
Fred Goetz, Chairperson

FAX 810-231-4295
PHONE 810-231-1000

Hamburg Township
a great place to grow

P.O. Box 157
10405 Merrill Road
Hamburg, Michigan 48139

Public hearing to continue the review of the preliminary site plan application for an Open Space Planned Unit Development, commonly known as Waters Edge Village, (OSPUD 18-001) on the properties at 4715-14-400-008 and 4715-23-100-002. This project was tabled at the November 28, 2018 Planning Commission hearing.

As of 3:00 pm, December 11, 2018, the review letter from McKenna Associates has not been received and as such is not available for publication. Following are documents received by the applicant on December 10, 2018: revised site plan, revised traffic impact study, and a response letter.. The website will be updated as additional documents are received.

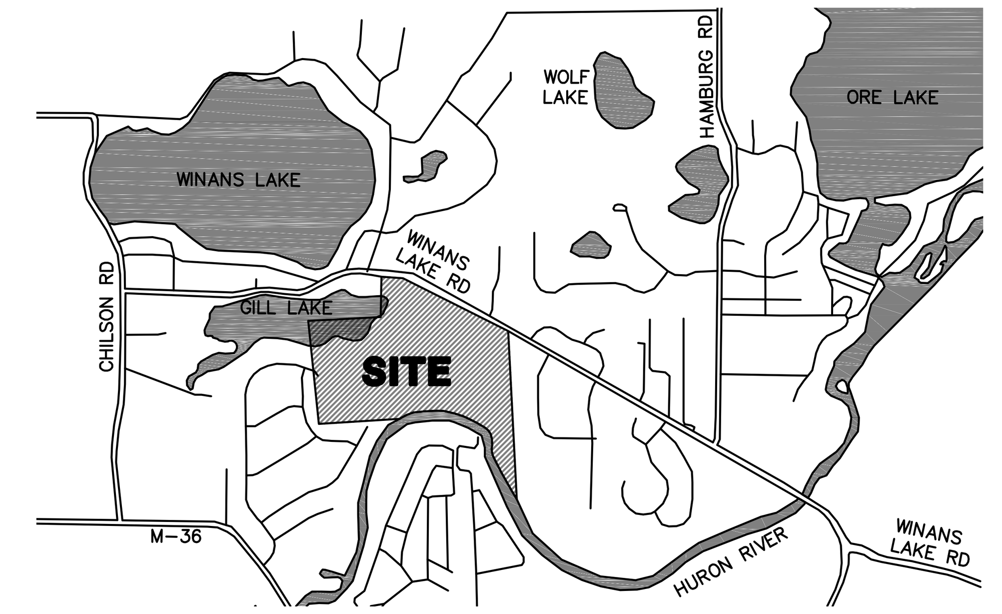
Please direct any questions to Michael Dolan, Township Clerk, at Mdolan@HAMBURG.MI.US or 810-222-1121.

WATERS EDGE

Exhibit B: December 10, 2018 Site plan

LOCATED IN THE N 1/2, SEC 23 & S 1/2, SEC 14, T1N, R5E, HAMBURG TOWNSHIP, LIVINGSTON COUNTY, MICHIGAN

PRELIMINARY SITE PLAN/PLANNED OPEN SPACE COMMUNITY



VICINITY MAP
SCALE: 1"=2000'

DEVELOPER
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301
ATTN: HAYTHAM OBEID
PH: (248) 220-6860

ARCHITECT
TK DESIGN & ASSOCIATES
26030 PONTIAC TRAIL
SOUTH LYON, MI 48178
ATTN: TODD HALLETT
PH: (248) 446-1960

ENGINEER/SURVEYOR
MIDWESTERN CONSULTING, L.L.C.
3815 PLAZA DR.
ANN ARBOR, MI. 48108
ATTN: ROBERT WAGNER, PE
PH: (734) 995-0200

LANDSCAPE ARCHITECT
MIDWESTERN CONSULTING, L.L.C.
3815 PLAZA DR.
ANN ARBOR, MI. 48108
ATTN: ROBERT WAGNER, PE
PH: (734) 995-0200

REQUIRED PERMITS & APPROVALS

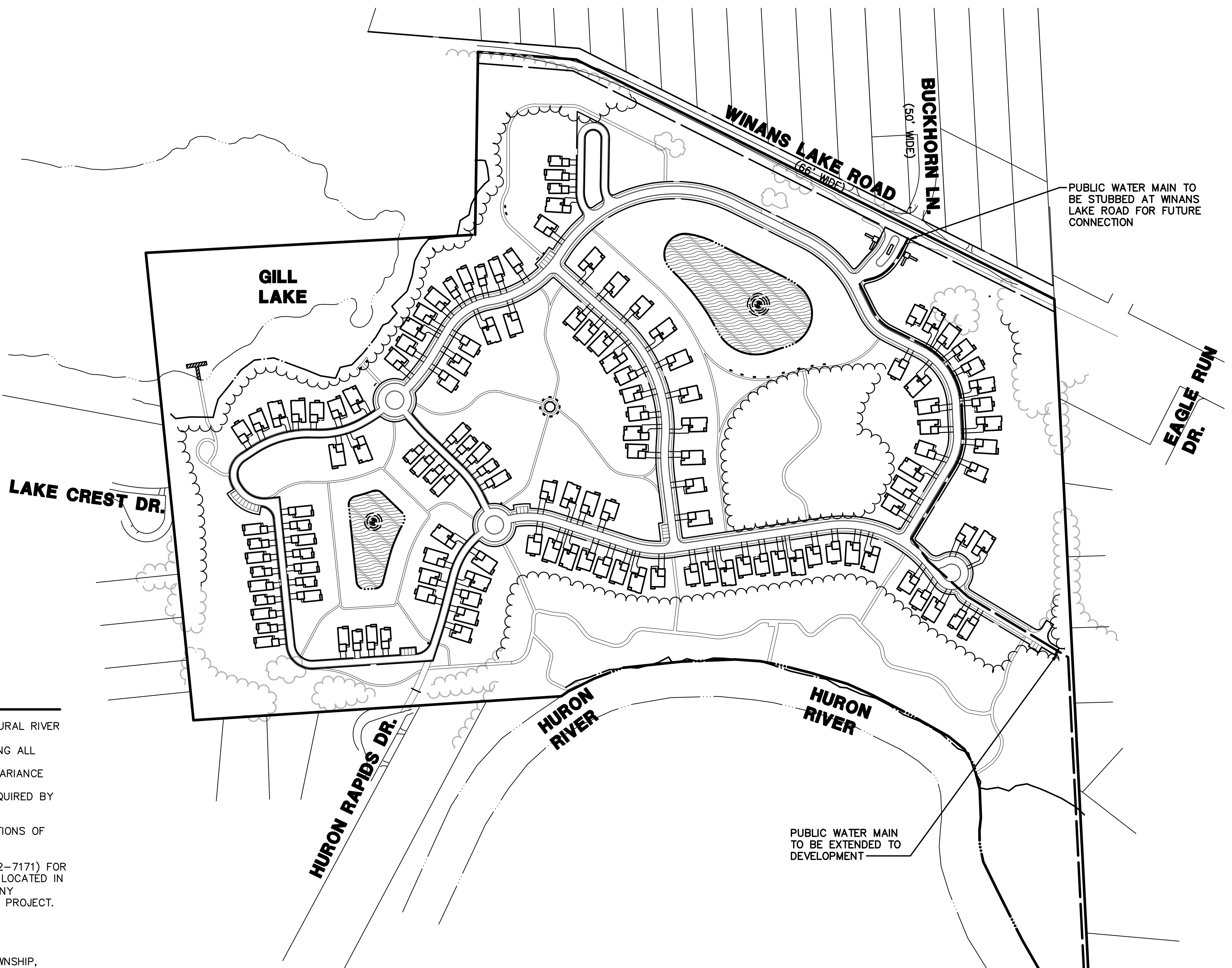
Approval/Permit	Agency	Submitted	Plans Approved	Approval Issued	Comment
Preliminary Site Plan/ Open Space PUD (Site Walk)	Hamburg Township Board of Trustees Pat Hohl, Township Supervisor 810-222-1116 pathohl@hamburg.mi.us 10405 Merrill Rd. Hamburg, MI 48139				Site Walk to be held on Novermber 7th, 2018
Final Site Plan	Hamburg Township Board of Trustees Pat Hohl, Township Supervisor 810-222-1116 pathohl@hamburg.mi.us 10405 Merrill Rd. Hamburg, MI 48139				
Fire Access	Hamburg Township Fire Department Jordan Zernick, Fire Marshal 810-222-1105 jzernick@hamburg.mi.us 10100 Veterans Memorial Dr. Hamburg, MI 48139				
Storm Water Management	Hamburg Township Engineer (Process Results) Ted Erickson 734-429-8900 ext. 151 terickson@processresults.com 201 S. Ann Arbor St. Saline, MI 48176				
Public Road Approach	Livingston County Road Commission Kim Hiller (517) 546-4250 khiller@livingstonroads.org 3535 Grand Oaks Drive Howell, MI 48843				Sight Distance Approval 1807-005 was granted on 7/21/2018
Engineering Plans	Hamburg Township Engineer (Process Results) Ted Erickson 734-429-8900 ext. 151 terickson@processresults.com 201 S. Ann Arbor St. Saline, MI 48176				
Soil Erosion	Livingston County Drain Commissioner (517) 546-0040 2300 E. Grand River Ave., Suite 105 Howell, MI 48843				
NPDES Notice of Coverage	Michigan DEQ				
Wetland, Lake, & River Impacts (Joint Permit - Parts 301 & 303)	Michigan DEQ				
Public Water Main	Michigan DEQ				
Traffic Study	Michigan DOT Wendy Ramirez 810-225-2626 ramirezw@michigan.gov 10321 E. Grand River Ave., Suite 500 Brighton, MI 48116				

GENERAL NOTES

- A MAJORITY OF THE PROPERTY IS ZONED WATERFRONT RESIDENTIAL, WITH A SMALLER PORTION ZONED NATURAL RIVER (BOTH SINGLE FAMILY MEDIUM DENSITY).
- CONTRACTOR IS RESPONSIBLE FOR PROTECTING ALL EXISTING AND PROPOSED UTILITIES FROM DAMAGE DURING ALL STAGES OF CONSTRUCTION.
- THE ENGINEER AND APPLICABLE AGENCY MUST APPROVE, PRIOR TO CONSTRUCTION, ANY ALTERATION, OR VARIANCE FROM THESE PLANS.
- UNDERGROUND DRY UTILITIES SHALL BE EXTENDED FROM EXISTING LOCATIONS TO SERVICE THIS SITE AS REQUIRED BY UTILITY COMPANIES.
- SEE EXISTING CONDITIONS PLAN FOR DESCRIPTION OF EXISTING SOIL TYPES.
- ALL CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH THE CURRENT STANDARDS AND SPECIFICATIONS OF HAMBURG TOWNSHIP AND LIVINGSTON COUNTY.
- THE CONTRACTOR SHALL TELEPHONE HAMBURG TOWNSHIP 72 HOURS PRIOR TO ANY CONSTRUCTION.
- THREE WORKING DAYS PRIOR TO ANY EXCAVATION, THE CONTRACTOR SHALL TELEPHONE MISS DIG (800-482-7171) FOR THE LOCATION OF UNDERGROUND UTILITIES AND SHALL ALSO NOTIFY REPRESENTATIVES OF OTHER UTILITIES LOCATED IN THE VICINITY OF THE WORK. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY AND/OR OBTAIN ANY INFORMATION NECESSARY REGARDING THE PRESENCE OF UNDERGROUND UTILITIES WHICH MIGHT AFFECT THIS PROJECT.
- SITE WETLANDS:
  - NEAR HURON RIVER: 149,543 SF
  - NEAR GILL LAKE: 97,733 SF

  -TOTAL: 247,276 SF = 5.68 ACRES
- FLOODPLAIN: THE SITE LIES WITHIN FLOOD ZONE "X" PER FLOOD INSURANCE RATE MAPS FOR HAMBURG TOWNSHIP, MICHIGAN. FLOOD ZONE "X" IS AN AREA DETERMINED TO BE OUTSIDE THE 500-YEAR FLOODPLAIN.
  - MAP NUMBERS: 26093C0452D 26093C0454D
- THE SITE'S STORMWATER WILL BE MANAGED BY UTILIZING TWO DETENTION PONDS WITH PERMANENT WATER LEVELS. OUTLETS WILL BE TO THE HURON RIVER AND GILL LAKE.
- THE WASTEWATER GENERATED ON SITE WILL BE COLLECTED AND CONVEYED THROUGH GRAVITY SANITARY SEWER. THE GRAVITY SANITARY SEWER WILL DISCHARGE TO A PUMP STATION(S) ON SITE. THE PUMP STATION(S) WILL THEN DISCHARGE THE WASTE WATER TO THE EXISTING SANITARY FORCE MAIN LOCATED WITHIN THE WINANS LAKE ROAD RIGHT OF WAY.
- PUBLIC WATER MAIN WILL BE EXTENDED TO THE SITE TO SERVE ALL LOTS FOR DOMESTIC WATER.
- NO HAZARDOUS MATERIAL WILL BE STORED ON SITE.

The underground utilities shown have been located from field survey information and existing records. The surveyor makes no guarantees that the underground utilities shown comprise all such utilities in the area, either in-service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated. Although the surveyor does certify that they are located as accurately as possible from the information available.



Sheet Index

TRAFFIC IMPACT STATEMENT

TRIP GENERATION FOR THE SITE IS ESTIMATED FROM THE EQUATIONS CONTAINED IN THE INSTITUTE OF TRANSPORTATION ENGINEER'S (ITE) TRIP GENERATION MANUAL (10TH EDITION). THE FOLLOWING TABLE SUMMARIZES THE LAND USE (ITE CODE 210 - SINGLE FAMILY HOUSING), DEVELOPMENT SIZE (NUMBER OF UNITS), AND NUMBER OF VEHICULAR TRIPS THAT THE SITE WILL GENERATE OVER THE COURSE OF A TYPICAL WEEKDAY, MORNING PEAK HOUR, AND AFTERNOON PEAK. WEEKDAY VOLUMES ARE ALWAYS 50% INBOUND AND 50% OUTBOUND TRIPS, WHILE THE MORNING AND AFTERNOON PEAK HOURS HAVE THEIR OWN INBOUND AND OUTBOUND PERCENTAGES.

		Size	24-Hour	AM Peak Hour			PM Peak Hour		
Land Use	ITE Code	(Units)	Volume	Enter	Exit	Total	Enter	Exit	Total
Proposed Development	210	144	1454	27	80	107	91	53	144

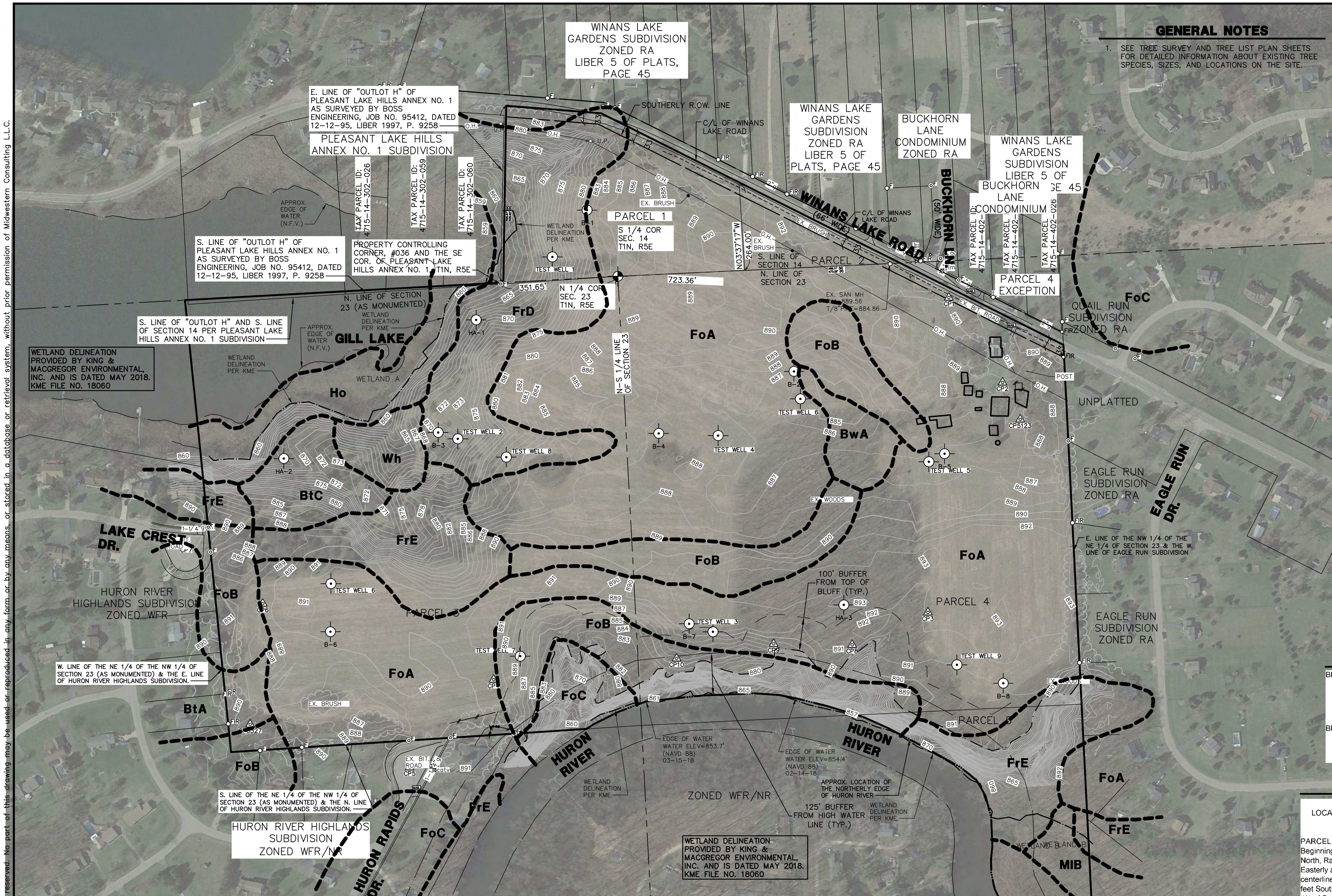
WATERS EDGE

JOB No. **18037**		DATE: 8/28/18	**1**
REVISIONS:	REV. DATE	SHEET 1 OF 19	
PER TOWNSHIP COMMENTS	11/19/18	CADD:	
PER TOWNSHIP COMMENTS	12/10/18	ENG: JCA, TPH	
		PM: RCW	
		TECH: RDW	
		18037CV1.DWG	

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

RELEASED FOR:	DATE

M:\Civil3d_Proj\18037\Preliminary Site Plan\18037CV1.dwg, 12/7/2018 4:34 PM, Ted P. Hirsch, COVER SHEET, MCLLC PDF.pc3



GENERAL NOTES

1. SEE TREE SURVEY AND TREE LIST PLAN SHEETS FOR DETAILED INFORMATION ABOUT EXISTING TREE SPECIES, SIZES, AND LOCATIONS ON THE SITE.

811 Know what's below. Call before you dig.

SCALE: 1" = 150'

0 150 300 450

LEGEND

838	EXIST. CONTOUR
836.2	EXIST. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
U.P.	EXIST. UTILITY POLE W/ TRANS.
	GUY WIRE
	ELEC. TRANSFORMER
OH	EXIST. OVERHEAD UTILITY LINE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
	EXIST. GAS VALVE
f.o.	EXIST. FIBER OPTIC LINE
r	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	END SECTION
	CULVERT
s	EXIST. SANITARY SEWER
	C/L OF DITCH OR EDGE OF WATER
	SIGN
	TELEPHONE RISER
catv	CABLE TELEVISION RISER
e	ELECTRIC METER
g	GAS METER
glm	GAS LINE MARKER
fiber	FIBER OPTIC MARKER
	POST
	WELL
	FENCE
	SINGLE TREE
	TREE OR BRUSH LIMIT
	SECTION CORNER
F	FOUND IRON PIPE
F	FOUND MONUMENT
FIR	FOUND IRON ROD
	CONTROL PT.

BENCHMARKS

BM#1: SPIKE IN NORTH FACE OF UTILITY POLE 130' SOUTHWEST OF THE INTERSECTION OF WIANS LAKE RD. AND BUCKHORN LN.

ELEV=892.31 (NAVD 88)

BM#2: SPIKE IN SOUTH SIDE OF 20" COTTONWOOD LOCATED 20' EAST OF LAKE CREST DR.

ELEV=891.71 (NAVD 88)

LEGAL DESCRIPTION

LEGAL DESCRIPTION OF A PARCEL OF LAND
LOCATED IN THE N 1/2 OF SECTION 23 AND SOUTH 1/2 OF SECTION 14, T1N, R5E
HAMBURG TOWNSHIP, LIVINGSTON COUNTY, MICHIGAN

PARCEL 1:
Beginning at a point 343.2 feet West of the 1/4 stake between Sections 14 and 23, in Town 1 North, Range 5 East, Hamburg Township, Livingston County, Michigan: running thence Easterly along the Section line 723.36 feet; thence North 2 degrees West 264 feet to the centerline of the highway; thence Northwest along said highway 747.12 feet; thence 535.92 feet Southwesterly to the place of beginning, being of the Southwest 1/4 of thence Southeast 1/4 of Section 14, Town 1 North, Range 5 East, Hamburg Township, Livingston County, Michigan.

PARCEL 2:
Commencing at the crossing on the Section line of Sections 14 and 23 with a road running Northwest and Southeast: thence running West on the Section line 473.22 feet: thence North 264 feet to the center of said road: thence Southeasterly along the center of said road to the place of beginning, being a part of the Southwest 1/4 of the Southeast 1/4 of Section 14, Town 1 North, Range S East, Hamburg Township, Livingston County, Michigan.

PARCEL 3:
The Northeast 1/4 of the Northwest 1/4 of Section 23, Town 1 North, Range 5 East, Hamburg Township, Livingston County, Michigan.

PARCEL 4:
The Northwest 1/4 of the Northeast 1/4 of Section 23, Town 1 North, Range 5 East, Hamburg Township, Livingston County, Michigan, excepting therefrom all that property lying North of the road running Northwest and Southeast.

PARCEL 5:
Commencing at a point 1,320 feet West of the 1/4 post on the Southeast 1/4 of the Northeast 1/4 of Section 23, Town 1 North, Range 5 East, Hamburg Township, Livingston County, Michigan; thence North 1320 feet: thence West to the corner post on the Huron River; thence on a Southeasterly course following the line of the River to the place of beginning.

SOIL TYPE LEGEND

BtA	BOYER-OSHTEMO LOAMY SANDS, 0-2% SLOPES
BtC	BOYER-OSHTEMO LOAMY SANDS, 6-12% SLOPES
BwA	BRONSON LOAMY SAND, 0-2% SLOPES
FoA	FOX SANDY LOAM, 0-2% SLOPES
FoB	FOX SANDY LOAM, 2-6% SLOPES
FoC	FOX SANDY LOAM, 6-12% SLOPES
FrD	FOX-BOYER COMPLEX, 12-18% SLOPES
FrE	FOX-BOYER COMPLEX, 18-25% SLOPES
Ho	HOUGHTON MUCK, 0-1% SLOPES
Lm	LINWOOD MUCK
MIB	METAMORA SANDY LOAM, 0-4% SLOPES
Wh	WASHTENAW SILT LOAM

The underground utilities shown have been located from field survey information and existing records. The surveyor makes no guarantees that the underground utilities shown comprise all such utilities in the area, either in-service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated. Although the surveyor does certify that they are located as accurately as possible from the information available.

WATERS EDGE VILLAGE NATURAL FEATURES DESCRIPTION (Prepared by King and MacGregor)

The following descriptions are of the approximate areas identified in Figure 1.

Area 1- Gut Lake Wetland Fringe
Emergent and scrub-shrub wetland on the east and south sides of Gut Lake. This area contains highly organic soils which are saturated year-round. It is dominated by a variety of wetland plants such as hybrid cattail *(Typha x glauca)*, marsh fern *(Thelypteris palustis)*, blue vervain *(Verbena hastata)*, tussock sedge *(Carex stricta)* and purple loosestrife *(Lythrum salicaria)*. The edge close to the wood line has some woody species such as glossy buckthorn (*Frangula alnus*), swamp rose *(Rosa palustris)*, buttonbush *(Cephalathus occidentalis)*, and white willow *(Salix alba)*.

Area 2 – Oak Hickory Woods along Gut Lake
This sloping forested area near Gut Lake is characteristic of an Oak-Hickory forest type. It is occurring on a moist, well-drained, loamy soils, located between row crops (soybeans) to the east and the Gut Lake wetland fringe. The canopy is dominated by red oak *(Quercus rubra)*, black locust *(Robinia pseudoacacia)*, white oak *(Quercus alba)*, pignut hickory *(Carya glabra)*, and shagbark hickory *(Carya ovata)*. The understory is comprised of invasive honeysuckle *(Lonicera morrowii)*, blackberry *(Rubus allegheniensis)*, poison ivy *(Toxicodendron radicans)* and smooth bromegrass *(Bromus inermis)*.

Area 3- Old Field Scrub
Located east of the hickory woods along Gut Lake, this area may have been an apple grove. It now has a mix of open spaces dominated by smooth bromegrass, Queen Ann's lace *(Daucus carota)*, gray goldenrod *(Solidago nemoralis)*, and a variety of thistles and clovers as well as areas dominated by shrubs and trees such as honeysuckle, glossy buckthorn, autumn olive *(Elaeagnus umbellata)*, red cedar *(Juniperus virginiana)* and apple trees *(Malus pumila)*.

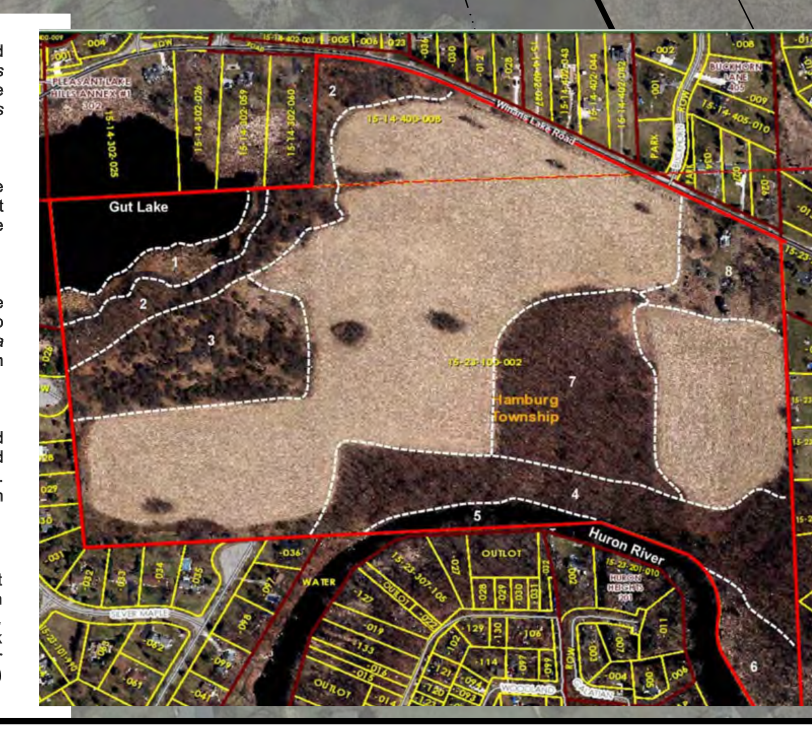
Area 4- Huron River Valley Hillside Woods
This woods on the south side of the property on the slope above the bank of the Huron River is comprised of black locust, American elm *(Ulmus americana)*, boxelder *(Acer negundo)* and black cherry *(Prunus serotine)*. The understory is dominated by invasive honeysuckles and multiflora rose *(Rosa multiflora)*. In the slightly more open areas of the forest there is motherwort *(Leonurus cardiaca)*, black raspberry (*Rubus occidentalis*), poison ivy (*Toxicodenron radicans*), and smooth bromegrass.

Area 5- Huron River
The stretch of the Huron River bordering the property has a sandy river bed, with very little gravel. The grade of the river here is low and the current is slow moving. There are some aquatic plants visible in the river but not dominating the river bed. Bluegill *(Lepomis macrochirus)* and some mussel shells were observed in the river bed.

Area 6- Huron River Floodplain Wetland
In the southern most portion of the property along the Huron River lies a floodplain wetland. The soils here are highly organic and saturated with ground water year-round. Trees growing in this area consist of swamp white oak (*Quercus bicolor)*, American elm, and red ash *(Fraxinus pennsylvanica)*. Water hemlock *(Cicuta maculata)*, skunk cabbage *(Symplocarpus foetidus)*, jewelweed *(Impatiens capensis)*, and sensitive fern *(Onoclea sensibillis)* were observed in the open areas.

Area 7- Central Woodlot
Surrounded by row crop on three sides, this stand's canopy contains sugar maple *(Acer saccharum)*, red oak, pignut hickory, northern pin oak *(Quercus ellispsoidalis)*, sycamore *(Plantanus occidentalis)* and boxelder. The understory is largely dominated by invasive honey suckle growing very dense in some areas. The understory also contains poison ivy, Virginia creeper *(Parthenocissus quinquefolia)*, burning bush *(Euonymus alatus)*, and riverbank grape *(Vitis riparia)*.

Area 8- Old Farmstead
In the far northeast portion of the property there is an abandon farmstead consisting of a house, a few out buildings, and a barn. This area is mostly open with a few trees. The open areas are dominated by smooth bromegrass, tall goldenrod *(Solidago altissima)*, field thistle *(Cirsium dicolor)*, red fescue *(Festuca rubra)*, and stickseed *(Hackelia virginiana)*. The trees include native and landscape species such as boxelder, black locust, black walnut (*Juglans nigra*), black cherry, eastern red bud *(Cercis canadensis)*, Douglas fir *(Pseudotsuga menziesii)*, common pear *(Pyrus communis)*, Chinese magnolia *(Magnolia x soulangenana)* and Scotch pine *(Pinus sylvestris)*.



MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

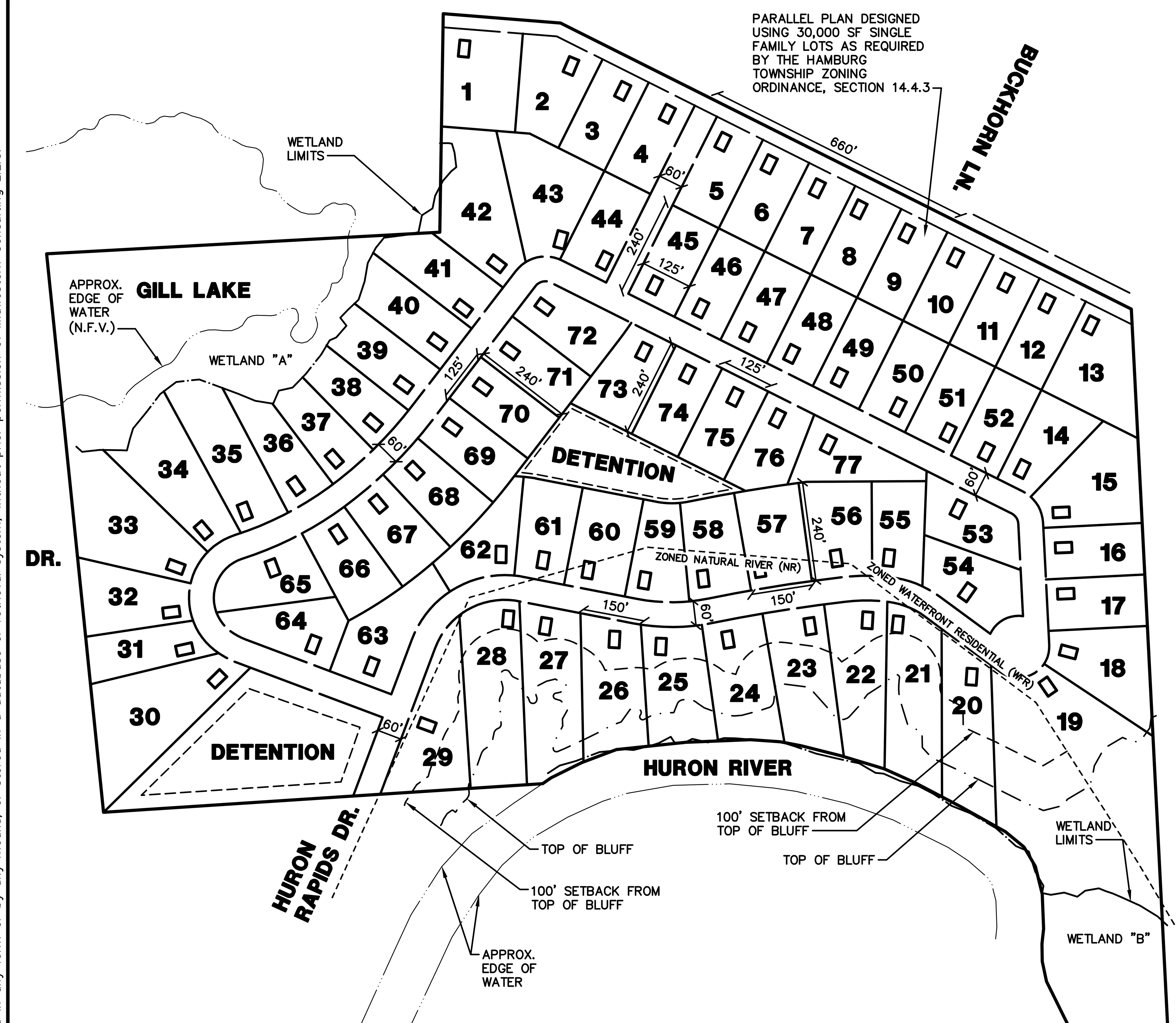
CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE
OPEN SPACE PUD DEVELOPMENT
EXISTING CONDITIONS

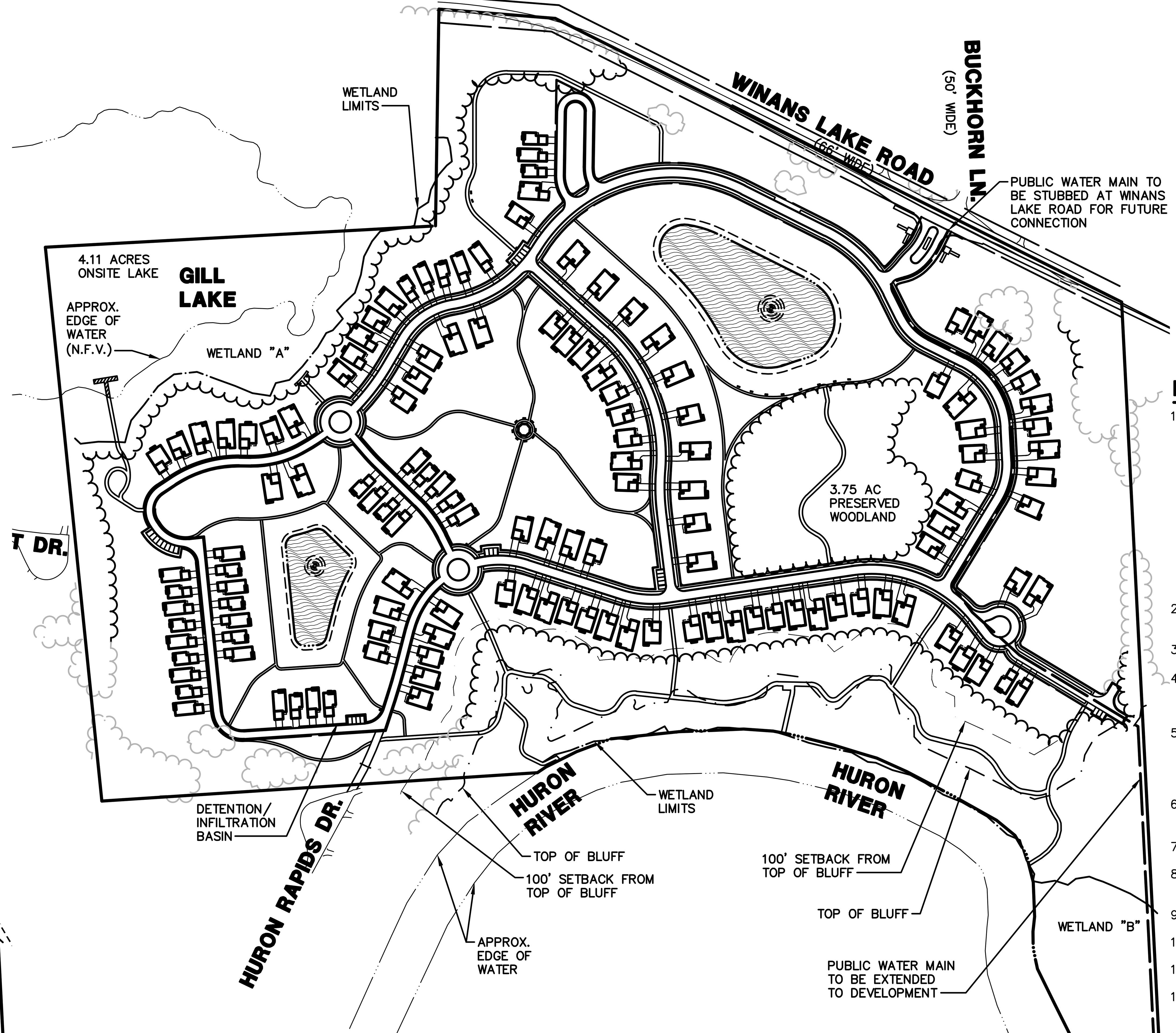
2

JOB No. 18037	DATE: 8/29/18	SHEET 2 OF 19
REVISIONS:	REV. DATE	CADD:
PER TOWNSHIP COMMENTS	11/19/18	ENG: JCA, TPH
PER TOWNSHIP COMMENTS	12/10/18	PM: RCW
		TECH: RDW
		18037EX1.dwg

M:\Civil3d_Proj\18037\Preliminary Site Plan\18037EX1.dwg, 12/7/2018 4:35 PM, Ted P. Hirsch, EX CON, MCLLC PDF.pc3



PARALLEL SITE PLAN - EXISTING WFR/NR ZONING



PROPOSED OPEN SPACE COMMUNITY PLANNED UNIT DEVELOPMENT SITE PLAN

SCALE: 1" = 200'

0 200 400 600

Know what's below. Call before you dig.

EXEMPLARY PROJECT ITEMS

1. PRESERVATION OF NATURAL FEATURES WITH AN EMPHASIS ON PROVIDING UNINHIBITED ACCESS AND ENJOYMENT OF THESE FEATURES, INCLUDING:
   - RIVER BLUFF WALKING PATH
   - RIVER BLUFF OBSERVATION/GATHERING POINT
   - RIVERSIDE ACCESS FOR KAYAKS, CANOES, AND A PADDLEBOAT
   - COMMON SHORELINE ACCESS TO GILL LAKE
   - GILL LAKE LOOKOUT AREA
   - OPTIONAL DOCK PROVIDING LAKE ACCESS FOR KAYAKS, CANOES, AND PADDLEBOATS
   - 3.75 ACRES PRESERVED WOODLAND WITH WALKING PATH THROUGH MIDDLE
2. EXTENSION OF WATER MAIN TO SITE PROVIDING PUBLIC SERVICE OPPORTUNITIES TO MORE OF HAMBURG TOWNSHIP.
3. STORMWATER BMPS INCLUDING PERMEABLE PAVEMENT PARKING AREAS (IF FEASIBLE).
4. STORMWATER DETENTION PONDS PROVIDING VOLUMES FAR EXCEEDING REQUIRED VOLUMES AND CONTROLLING RELEASE TO NATURAL WATER FEATURES.
5. ELIMINATING NEED FOR GRINDER PUMPS – SITE TO BE SERVED BY A COMBINATION OF GRAVITY SEWER AND PUMP STATION(S) TO CONNECT VIA ON–SITE FORCE MAIN TO EXISTING PUBLIC SANITARY FORCE MAIN.
6. BRINGING APPROXIMATELY $360,000 TO THE TOWNSHIP BY WAY OF SANITARY SEWER TAP FEES.
7. BRINGING APPROXIMATELY $432,000 TO THE TOWNSHIP BY WAY OF WATER TAP FEES.
8. EXTENSIVE WALKING PATHS THROUGHOUT DEVELOPMENT ENCOURAGING COHESIVE NEIGHBORHOOD.
9. INTEGRATED MIXTURE OF HOUSING OPTIONS AND LOT SIZES.
10. 10 UNITS INCORPORATING UNIVERSAL HOUSING DESIGN.
11. EXCEPTIONAL AND INNOVATIVE ARCHITECTURAL DESIGN.
12. 150–FOOT PERIMETER TRANSITION AREAS AROUND THE SITE WITH LANDSCAPE SCREENING BEYOND ORDINANCE REQUIREMENTS.
13. COMMUNITY AMENITIES INCLUDING:
    - OPEN WATER FEATURES AND FOUNTAINS WITH SURROUNDING BENCHES
    - LARGE GAZEBO
    - PICNIC AREA
    - BENCHES AT STRATEGIC LOCATIONS
    - ACTIVE OPEN SPACE AREAS
    - DOG WASTE STATIONS
    - EXTENSIVE WALKING PATHS THROUGHOUT DEVELOPMENT AND ALONG SCENIC FEATURES
14. EXTENSIVE LANDSCAPING SUPPLEMENTAL TO REQUIRED LANDSCAPING ALONG WINANS LAKE ROAD CORRIDOR.

Open Space Community PUD Development

Total Site:	92.55 Ac
Development Zone:	62.63 Ac (68% of total site)
Total Units:	144
Total Gross Density:	1.56 units per gross acre
Site Access:	Boulevard entrance at Winans Lake Road

The neighborhood development of Waters Edge will be constructed on approximately 63 acres across the overall 92.5-acre site. 62% of the site will be dedicated to providing a combination of common recreational amenities and preserved natural features. A series of walking paths will be established through the community, providing residents the chance to explore and connect in a low-impact way.

With 144 new homes to be constructed, a total gross density of only 1.56 units per acre across the site will be realized. The final site plan submission documents will provide internal property lines between each home in order to establish individual home sites and building envelopes consistent with the setback dimensions established in the Development Comparison Table.

Open Space Community PUD Eligibility Requirements – Section 14.3:
Water's Edge meets criteria to qualify as an Open Space Community Planned Unit Development.

A. Recognizable Benefit: One major benefit the Water's Edge development will provide is the extension of public water main from M-36, through the development, and to Winans Lake Road. The development will also provide a benefit to the community by creating a walkable neighborhood with community gathering spaces and preserved natural features including wooded areas, wetland adjacent to Gill Lake, and the natural bluff to the Huron River. 62% of the site is maintained as open space, benefitting the ecosystems of Gill Lake and the Huron River.

B. Open Space: 62% of the site will be preserved as open space, including the preservation of the existing bluffs along the Huron River and wetland ecosystems to the south. Approximately 3.75 acres of woods will be preserved within the central portion of the property and trees will be preserved adjacent to Gill Lake and the associated wetland as well as along the Winans Lake Road corridor. Stormwater management areas will be landscaped in a manner to create focal points within the proposed open space. Proposed recreation facilities include pedestrian walking paths throughout the community with benches in strategic locations, a walkable path along the Huron River bluff, several access points from the bluff path down to the riverside which include areas for kayak/canoe/non-motorized paddleboat access, an optional floating dock for recreational boats on Gill Lake, a lookout location near Gill Lake, a gazebo, and a picnic area.

C. Guarantee of Open Space: The approved PUD Site Plan as well as the Master Deed and By-laws will dictate the preservation of the natural features and open space.

D. Cohesive Neighborhood: The proposed neighborhood utilizes narrow streets, sidewalks and trails, varied home styles, and shared open space to foster a compact and cohesive community. The centrally located houses in the western-most park have front porches that face the community open space. There are several amenities proposed within the parks, such as a gazebo, benches overlooking ponds and fountains, walking paths, and 3.75 acres of preserved forest area with a pathway through the center. The development proposes to provide even more features to promote public enjoyment of the parcel's open space which includes a walkable path along the Huron River bluff with several access points, a platform on the path to provide a gathering and observation point, access to the riverside with areas for kayaks/canoes/non-motorized paddleboats, several wide areas of Gill Lake shoreline that are accessible to the community, a Gill Lake lookout area, and an optional floating dock on the lake for recreational boats. The collection of all of these amenities and natural features encourage active and passive recreation as well as interaction throughout the neighborhood.

E. Unified Control: The property is under single control of Winans Lake Development, LLC.

F. Density Impact: The proposed density of 1.56 units/acre (144 units) is considered a low to medium density and will not result in an unreasonable impact on public services or infrastructure. The neighborhood is primarily intended to be an "empty nest" community, and therefore will have a minimal impact on the local school system. The property is located within the future sanitary sewer service districts as identified in the Township Master Plan and will tap into the existing sanitary sewer at Winans Lake Road. Furthermore, an extension of water main to the site will provide public water service opportunities, present and future, to many other properties in Hamburg Township.

G. Twp. Master Plan: The proposed residential neighborhood development at this location is consistent with the Township Master Plan. The property is located in an area designated for Medium Density Residential (one dwelling unit per acre) and along the Natural River District along the edge of the Huron River to the south. Developments in the Medium Density Residential district are encouraged to take advantage of the Township's open space provisions. The preservation of the bluff along the Huron River and its walkable path, as well as the proposed lookout area to the Gill Lake ecosystem and the several common shoreline areas reflect the Master Plan's emphasis on scenic features within the Township.

Optional Provisions for Exemplary Projects – Section 14.5:
Waters Edge Village exceeds the requirements set forth for the Open Space Community PUD development and a density bonus is requested based on exemplary design elements noted below.

14.5.1 Density Bonus. The community will be served by public water main and sanitary sewer and meets the intent of the following elements:

A. *A high level of clustered development where a minimum of sixty percent (60%) of the Open Space Community is common open space.*
The proposed development meets the requirement of minimum 60% open space when excluding submerged land areas (i.e. Gill Lake and the detention ponds), as 62% of the upland areas and wetlands on the site will be preserved as open space. If the open water area along Gill Lake and the open water features with fountains in the stormwater management basins are included in the open space amenities on the site, the development would achieve 70% common/shared use areas on the site.

B. *Inclusion of an integrated mixture of housing types.*
A variety of lot sizes are provided within the development to encourage a mixture of home types. These include two sizes of smaller Cottage lots, medium-sized Village lots, and a few large Estate lots. The development also provides several lots that are restricted to units incorporating universal housing design.
Eight types of single family homes are proposed with the development creating variation in housing types throughout the development that respond to the open space and natural features on the site. The traditional front entry garage extensions in front of the homes are complemented by courtyard entry homes that have side entry to the garage. Additionally, recessed garages are proposed for a portion of the homes to emphasize front home facades that are closer to the road than the garage. Lastly, there are homes that have garages along alleys but the front entry of the house is along a central open space park encouraging pedestrian connectivity throughout the neighborhood.

C. *Providing perimeter transition areas around all sides of the development that are at least one hundred fifty (150) feet in depth.*
The one hundred fifty foot depth perimeter is proposed along the Winans Lake Road corridor, along the adjacent residential neighborhoods to the south, west, and east and along the Huron River bluff. The only exceptions to the one hundred fifty foot perimeter setback are along a small portion of the frontage along Gill Lake in the northwest corner of the site, and a very small corner of one of the universal housing lots in the southeast corner.

D. *Cleanup of site contamination.* – Not applicable.

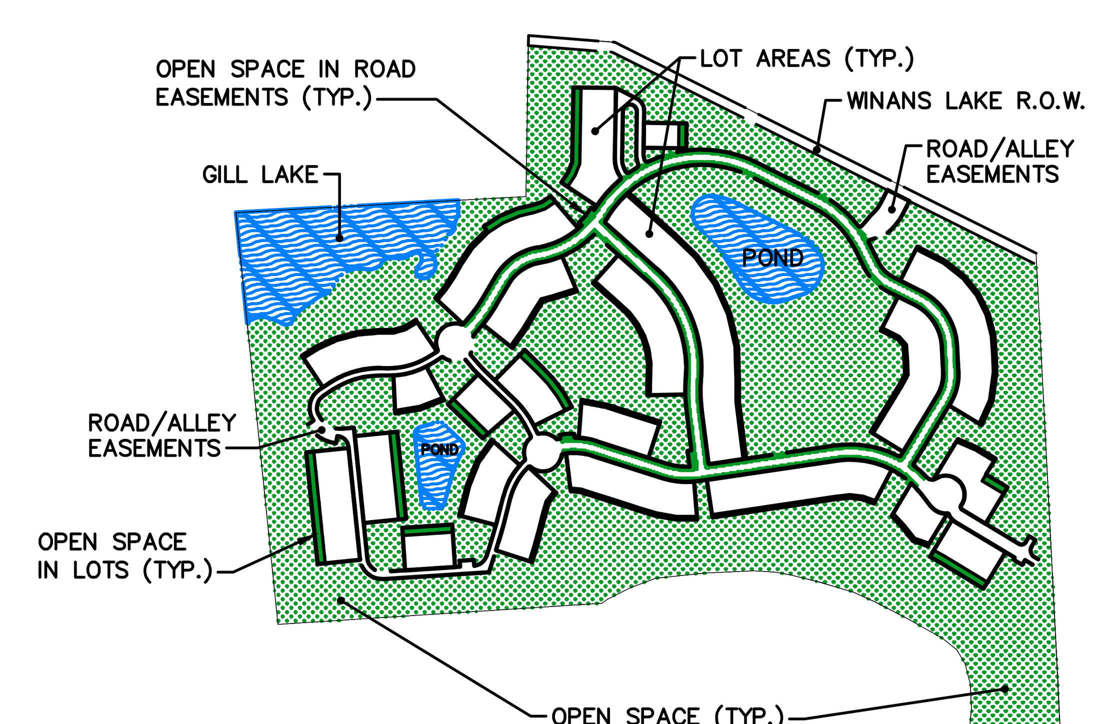
E. *Other similar elements as determined by the Planning Commission.*
The overall development places an emphasis on active recreation opportunities by including pedestrian linkages from residences to open space elements such as the open water features and fountains in the stormwater management ponds, and park areas internal to the road network. The paths also include an overlook area adjacent to Gill Lake and a path along the bluff to the Huron River, which responds to the Hamburg Township Master Plan emphasis on the preservation of natural features and scenic views. An optional floating dock for recreational boats can be placed in Gill Lake with a trail down from the scenic overlook area. There are also trail amenities proposed including benches in key locations, dog waste stations, and a picnic area. The development provides not only the required open space adjacent to existing residential areas but also extensive landscape screening to further reduce the impact of the proposed development on the adjacent neighborhoods. Additionally, supplemental landscaping is proposed along the Winans Lake Road corridor to define the entry to the neighborhood, provide screening, and to complement the aesthetic along Winans Lake Road in adjacent established residential areas.

REGULATORY FLEXIBILITY DATA

	Underlying WFR Zoning Dscictrict Maximums	Proposed Open Space PUD development
Zoning	WFR/NR	Open Space PUD
Lot Area	30,000 sf min	-
Setbacks:		
Front	25	23 from EOP
Rear	30	10
Side	10	5.5
Min. Frontage	150'/125' min	41'; 51'; 60'; 90'
ROW	60'	24' alleys & 50' roads
Road Width	-	20' alleys & 24' roads
Open Space	13%	62%
Proposed Homes	77	144
Proposed Density	0.85 units/acre	1.56 units/acre
Density Bonus	-	87%

OPEN SPACE CALCULATION

GROSS:	4,031,597 sf	92.55 ac
Gill Lake	178,961 sf	4.11 ac
Gill Lake Wetland	97,690 sf	2.24 ac
Road/Alley Easements	371,234 sf	8.52 ac
Pathways and green space in Road Easements	121,438 sf	2.79 ac
Lots	1,030,658 sf	23.66 ac
Open space w/in Lot Lines	111,772 sf	2.57 ac
Huron River Wetland	149,543 sf	3.43 ac
Winans ROW	60,546 sf	1.39 ac
Permanent Ponds	117,898 sf	2.71 ac



Total Open Space Provided	2,505,510 sf	57.52 ac	% of Gross Area	62%	(40% required for Open Space Community; 60% desired for density bonus)
Open Space Provided, excluding wetland area	2,258,277 sf	51.84 ac	% of Gross Area	56%	(calculation which does not count wetlands as open space)
		% of Provided Open Space that is exclusve of wetlands		90%	(Open Space excl. wetlands / Total Open Space; minimum 25%)

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

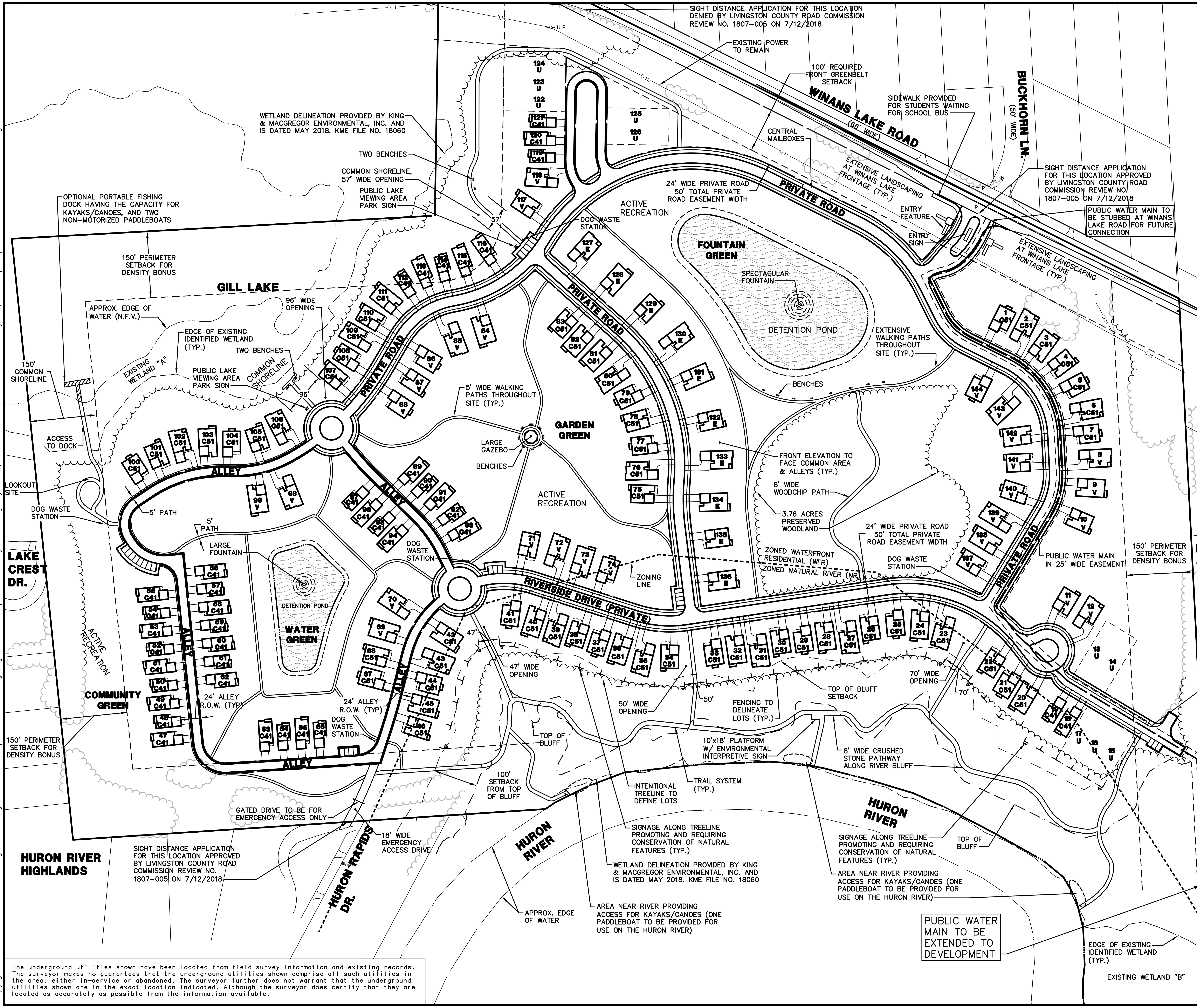
CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE
OPEN SPACE PUD DEVELOPMENT
OPEN SPACE DEVELOPMENT PLAN

3

DATE: 8/29/18	SHEET 3 OF 19	
REVISIONS:	REV. DATE	CADD:
PER TOWNSHIP COMMENTS	11/19/18	ENG: JCA, TPH
PER TOWNSHIP COMMENTS	12/10/18	PM: RCW
		TECH: RDW
		18037OS1.dwg

JOB No. 18037



The underground utilities shown have been located from field survey information and existing records. The surveyor makes no guarantees that the underground utilities shown comprise all such utilities in the area, either in-service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated. Although the surveyor does certify that they are located as accurately as possible from the information available.

Know what's below. Call before you dig. 811

SCALE: 1" = 100'

0 100 200 300

GENERAL NOTES

1. HOME MODELS SHOWN FOR EACH UNIT ARE PRELIMINARY AND ARE SUBJECT TO CHANGE DURING FINAL SITE PLAN APPROVALS.
2. LANDSCAPING, ROOFS, SIDING, EXTERIOR TRIM, GARAGE DOORS, FENCING, PATHWAYS, FOUNTAINS, PONDS, RECREATION FACILITIES, ROADS AND ALLEYS WILL BE MAINTAINED IN PERPETUITY BY THE HOMEOWNERS ASSOCIATION.
3. DEVELOPMENT ENTRANCE AND WINANS LAKE ROAD FRONTAGE ARE TO UTILIZE UPLIGHTING. THROUGHOUT THE DEVELOPMENT, LIGHTING SHALL BE PROVIDED BY PHOTOCELL LIGHTS ON EITHER SIDE OF THE GARAGE ON ALL UNITS.
4. ONE SINGLE REFUSE COMPANY WILL BE REQUIRED BY MASTER DEED.
5. SIDE YARD ENTRY OR RECESSED GARAGE PRODUCTS ARE PROPOSED FOR AT LEAST 20% OF THE ENTIRE DEVELOPMENT. AT LEAST 40% OF THE HOMES PROPOSED ALONG PRIVATE ROADS ARE TO BE SIDE YARD ENTRY OR RECESSED GARAGES.
6. PINCKNEY COMMUNITY SCHOOLS TRANSPORTATION SUPERVISOR, SUE MILLER, HAS INDICATED THAT SCHOOL BUSSES WILL PICK STUDENTS UP AT THE ENTRANCE TO THE DEVELOPMENT. A SIDEWALK HAS BEEN PROVIDED NEAR THE DECELERATION LANE FOR STUDENTS TO BE ABLE TO STAND AND WAIT FOR THE BUS.
7. DETAILS OF ENTRY SIGN TO BE PROVIDED AT A LATER DATE OR ON SIGN PERMIT APPLICATION.
8. TREE REMOVALS IN THE NATURAL RIVER (NR) DISTRICT WILL REQUIRE A PERMIT.
9. NO MITIGATION OF THE WETLANDS IS REQUIRED OR PROPOSED.
10. THE WOODCHIP PATH ALONG THE HURON RIVER IS TO BE MAINTAINED ANNUALLY.
11. CENTRAL MAILBOXES TO BE APPROVED BY THE PINCKNEY POST OFFICE.
12. LOTS WILL BE RESTORED WITH SOD AND THE ASSOCIATION WILL BE RESPONSIBLE FOR CUTTING THE LOTS.

Water's Edge
Key and Program

Lot/Home Type	Lot Width (ft)	Total # of Lots	River	Lake
Cottage 41	41	39	2	8
Cottage 51	51	57	27	12
Village Residential	61	28	0	2
Estate Residential	90	10	0	0
Universal	41	10	3	3
	TOTAL	144	32	25

ROAD & ALLEY DESIGN DATA

RIVERSIDE DRIVE & PRIVATE ROADS

RIVERSIDE DRIVE IS THE MAIN ROAD THROUGH THE DEVELOPMENT. THE PRIVATE ROADS CONSIST OF A 24' WIDE ROAD IN A 50' EASEMENT WITH UTILITIES AND A SIDEWALK ALONG EACH SIDE OF THE ROAD.

THE PRIVATE ROADS ALSO SERVE THE CONNECTIONS TO WINANS LAKE ROAD AND THE EMERGENCY CONNECTION TO HURON RAPIDS DRIVE. PARKING WILL BE ALLOWED ON ONE SIDE OF THESE ROADS.

ALLEYWAYS

THE ONSITE ALLEYS ARE QUIETER ROADS INTENDED PRIMARILY TO ACCESS GARAGES. THESE ALLEYS CONSIST OF A 20' WIDE ROAD IN A 24' EASEMENT AND WILL HAVE UTILITIES, BUT NOT SIDEWALKS.

MIDWESTERN CONSULTING

3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Surveying • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT

WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

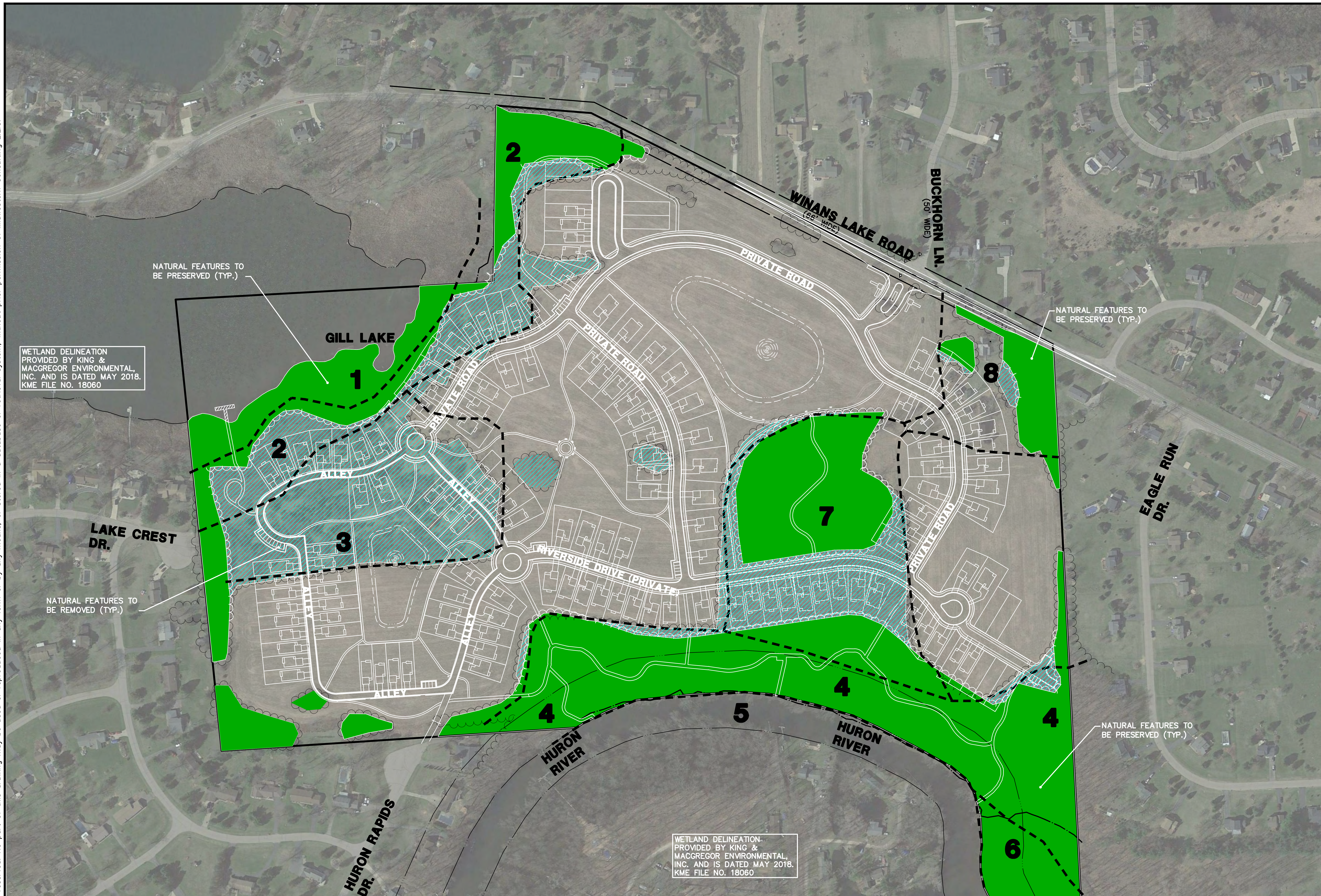
WATERS EDGE VILLAGE

OPEN SPACE PUD DEVELOPMENT
PRELIMINARY SITE PLAN

4

JOB No. 18037	DATE: 8/29/18
REVISIONS:	SHEET 4 OF 19
PER TOWNSHIP COMMENTS 11/19/18	CADD:
PER TOWNSHIP COMMENTS 12/10/18	ENG: JCA, TPH
	PM: ROW
	TECH: ROW
	18037SP1.dwg

M:\Civil3d_Proj\18037\Preliminary Site Plan\18037SP1.dwg, 12/7/2018 4:35 PM, Ted P. Hirsch, SITE PLAN, MCLLC PDF.pc3



Waters Edge Village Natural Features Description (Prepared by King and MacGregor)

The following descriptions are of the approximate areas identified in Figure 1.

Area 1- Gut Lake Wetland Fringe
Emergent and scrub-shrub wetland on the east and south sides of Gut Lake. This area contains highly organic soils which are saturated year-round. It is dominated by a variety of wetland plants such as hybrid cattail *(Typha x glauca)*, marsh fern *(Thelypteris palustis)*, blue vervain *(Verbena hastata)*, tussock sedge *(Carex stricta)* and purple loosestrife *(Lythrum salicaria)*. The edge close to the wood line has some woody species such as glossy buckthorn (*Frangula alnus*), swamp rose *(Rosa palustris)*, buttonbush *(Cephalathus occidentalis)*, and white willow *(Salix alba)*.

Area 2 – Oak Hickory Woods along Gut Lake
This sloping forested area near Gut Lake is characteristic of an Oak-Hickory forest type. It is occurring on a moist, well-drained, loamy soils, located between row crops (soybeans) to the east and the Gut Lake wetland fringe. The canopy is dominated by red oak *(Quercus rubra)*, black locust *(Robinia pseudoacacia)*, white oak *(Quercus alba)*, pignut hickory *(Carya glabra)*, and shagbark hickory *(Carya ovata)*. The understory is comprised of invasive honeysuckle *(Lonicera morrowii)*, blackberry *(Rubus allegheniensis)*, poison ivy *(Toxicodendron radicans)* and smooth bromegrass *(Bromus inermis)*.

Area 3- Old Field Scrub
Located east of the hickory woods along Gut Lake, this area may have been an apple grove. It now has a mix of open spaces dominated by smooth bromegrass, Queen Ann's lace *(Daucus carota)*, gray goldenrod *(Solidago nemoralis)*, and a variety of thistles and clovers as well as areas dominated by shrubs and trees such as honeysuckle, glossy buckthorn, autumn olive *(Elaeagnus umbellata)*, red cedar *(Juniperus virginiana)* and apple trees *(Malus pumila)*.

Area 4- Huron River Valley Hillside Woods
This woods on the south side of the property on the slope above the bank of the Huron River is comprised of black locust, American elm *(Ulmus americana)*, boxelder *(Acer negundo)* and black cherry *(Prunus serotine)*. The understory is dominated by invasive honeysuckles and multiflora rose *(Rosa multiflora)*. In the slightly more open areas of the forest there is motherwort *(Leonurus cardiaca)*, black raspberry (*Rubus occidentalis*), poison ivy (*Toxicodenron radicans*), and smooth bromegrass.

Area 5- Huron River
The stretch of the Huron River bordering the property has a sandy river bed, with very little gravel. The grade of the river here is low and the current is slow moving. There are some aquatic plants visible in the river but not dominating the river bed. Bluegill *(Lepomis macrochirus)* and some mussel shells were observed in the river bed.

Area 6- Huron River Floodplain Wetland
In the southern most portion of the property along the Huron River lies a floodplain wetland. The soils here are highly organic and saturated with ground water year-round. Trees growing in this area consist of swamp white oak (*Quercus bicolor)*, American elm, and red ash *(Fraxinus pennsylvanica)*. Water hemlock *(Cicuta maculata)*, skunk cabbage *(Symplocarpus foetidus)*, jewelweed *(Impatiens capensis)*, and sensitive fern *(Onoclea sensibillis)* were observed in the open areas.

Area 7- Central Woodlot
Surrounded by row crop on three sides, this stand's canopy contains sugar maple *(Acer saccharum)*, red oak, pignut hickory, northern pin oak *(Quercus ellispsoidalis)*, sycamore *(Plantanus occidentalis)* and boxelder. The understory is largely dominated by invasive honey suckle growing very dense in some areas. The understory also contains poison ivy, Virginia creeper *(Parthenocissus quinquefolia)*, burning bush *(Euonymus alatus)*, and riverbank grape *(Vitis riparia)*.

Area 8- Old Farmstead
In the far northeast portion of the property there is an abandon farmstead consisting of a house, a few out buildings, and a barn. This area is mostly open with a few trees. The open areas are dominated by smooth bromegrass, tall goldenrod *(Solidago altissima)*, field thistle *(Cirsium dicolor)*, red fescue *(Festuca rubra)*, and stickseed *(Hackelia virginiana)*. The trees include native and landscape species such as boxelder, black locust, black walnut (*Juglans nigra*), black cherry, eastern red bud *(Cercis canadensis)*, Douglas fir *(Pseudotsuga menziesii)*, common pear *(Pyrus communis)*, Chinese magnolia *(Magnolia x soulangenana)* and Scotch pine *(Pinus sylvestris)*.

WETLAND DELINEATION PROVIDED BY KING & MACGREGOR ENVIRONMENTAL, INC. AND IS DATED MAY 2018. KME FILE NO. 18060

811 Know what's below. Call before you dig.

SCALE: 1" = 150'

0 150 300 450

LEGEND

838	EXIST. CONTOUR
836.2	EXIST. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
U.P.	EXIST. UTILITY POLE W/ TRANS.
	GUY WIRE
	ELEC. TRANSFORMER
OH	EXIST. OVERHEAD UTILITY LINE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
	EXIST. GAS VALVE
f.o.	EXIST. FIBER OPTIC LINE
r	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	END SECTION
	CULVERT
s	EXIST. SANITARY SEWER
	C/L OF DITCH OR EDGE OF WATER
	SIGN
t	TELEPHONE RISER
catv	CABLE TELEVISION RISER
e	ELECTRIC METER
g	GAS METER
glm	GAS LINE MARKER
fiber	FIBER OPTIC MARKER
	POST
W	WELL
	FENCE
	SINGLE TREE
	TREE OR BRUSH LIMIT
	SECTION CORNER
F	FOUND IRON PIPE
F	FOUND MONUMENT
FIR	FOUND IRON ROD
	CONTROL PT.
	NATURAL FEATURES PRESERVATION
	NATURAL FEATURES REMOVALS

SITE ANALYSIS

1. THERE ARE APPROXIMATELY 25.6 ACRES OF PRESERVED UPLAND AREA, MOST OF WHICH HAS NOT BEEN EVALUATED FOR THE TREE SURVEY. APPROXIMATELY 14.7 ACRES OF THE SITE IS TO BE CLEARED.
2. FOR A COMPLETE LIST OF TREE REMOVALS, SEE THE TREE SURVEY PLAN ON SHEETS 9 – 13 AND THE TREE LIST PLAN ON SHEETS 14 – 16.
3. THE SIGNIFICANT NATURAL FEATURES ON THE SITE ARE AS FOLLOWS:
   - QUALITY WOODLANDS: SEE NATURAL FEATURES DESCRIPTIONS PROVIDED BY KING AND MacGREGOR ENVIRONMENTAL, THIS SHEET. THE AREAS IDENTIFIED AS WOODS ARE THE OAK HICKORY WOODS (AREA 2), THE HURON RIVER VALLEY HILLSIDE WOODS (AREA 4), AND THE CENTRAL WOODLOT (AREA 7). THESE AREAS CONTAIN THE MAJORITY OF THE TREES TO REMAIN ON–SITE.
   - TWO WETLAND AREAS HAVE BEEN DELINEATED ON–SITE BY KING AND MacGREGOR ENVIRONMENTAL. THE GILL LAKE WETLAND FRINGE (AREA 1) AND THE HURON RIVER FLOODPLAIN WETLAND (AREA 6) ARE TO BE PRESERVED IN THEIR ENTIRETY.
   - GILL LAKE AND THE HURON RIVER ARE TO BE PRESERVED.
4. RECREATION ACCESS IS TO BE PROVIDED TO ALL SIGNIFICANT NATURAL FEATURES FOR THE BENEFIT OF THE COMMUNITY.
   - PEDESTRIAN PATHS ARE PROPOSED NEAR OR THROUGH ALL WOODED AREAS TO BE PRESERVED.
   - MINOR DISTURBANCES TO THE WETLANDS AND WATER BODIES ARE PROPOSED AS A PART OF PROVIDING RECREATIONAL ACCESS TO THE WATER BODIES.
5. THE WOODED BUFFERS ALONGSIDE NEIGHBORING PROPERTIES ARE TO BE EXPANDED BY PLANTING TREES TO FILL IN GAPS IN THE EXISTING BUFFER. SEE THE LANDSCAPE PLAN (SHEET 6) FOR THE PRELIMINARY PLANTING LOCATIONS.

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE

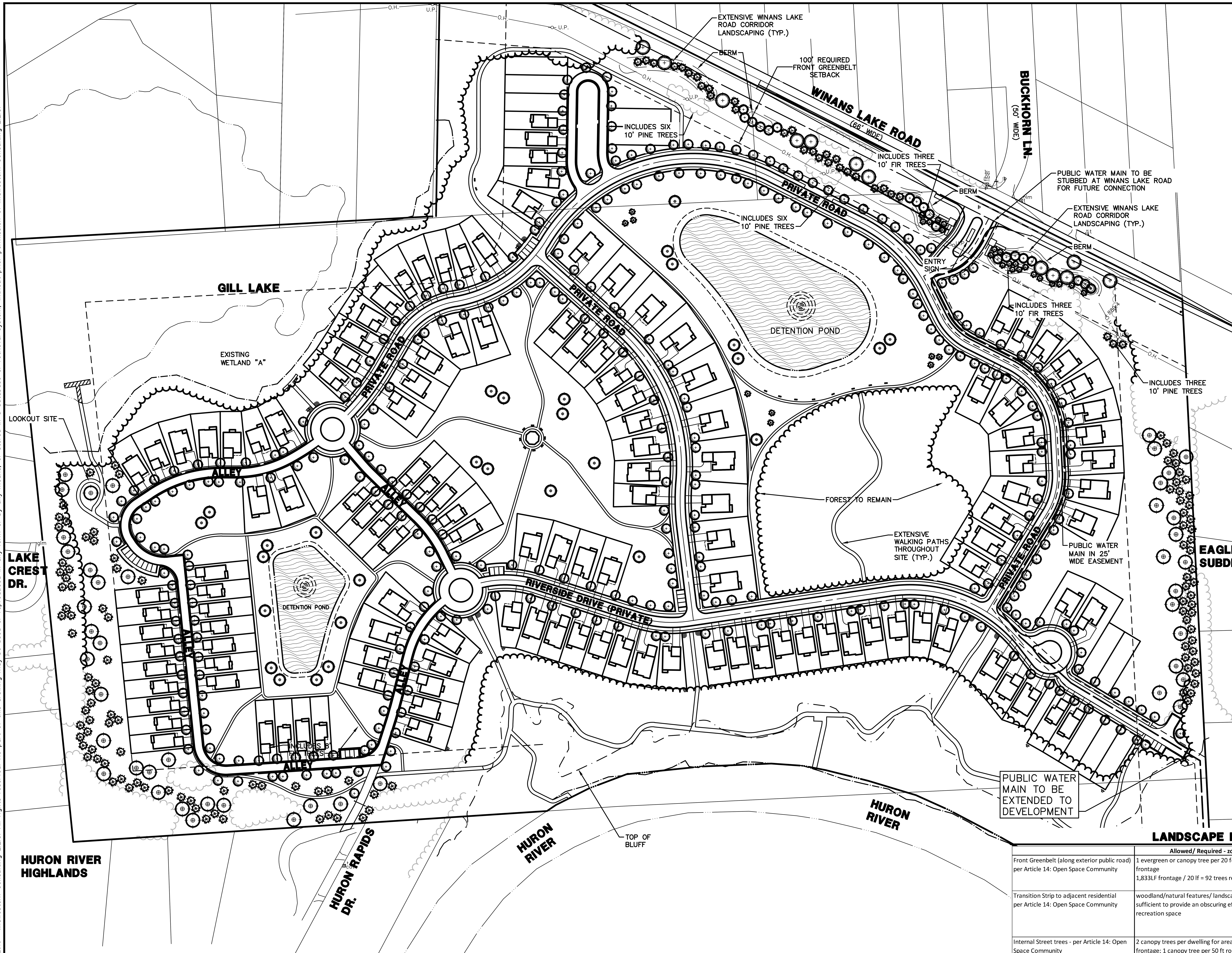
OPEN SPACE PUD DEVELOPMENT
SITE ANALYSIS PLAN

5

DATE: 11/19/18
SHEET OF 19
CADD:
ENG: JCA, TPH
PM: RCW
TECH:
18037SA1.dwg

JOB No. 18037

REVISIONS:	REV. DATE
PER TOWNSHIP COMMENTS	12/10/18



811 Know what's below. Call before you dig.

SCALE: 1" = 100'

0 100 200 300

LEGEND

- PROPOSED CANOPY TREE (INTERIOR STREET TREES)
- PROPOSED EVERGREEN TREE (INTERIOR STREET TREES)
- PROPOSED CANOPY TREE (FRONT GREENBELT)
- PROPOSED EVERGREEN TREE (FRONT GREENBELT)
- PROPOSED CANOPY TREE (TRANSITION STRIP)
- PROPOSED EVERGREEN TREE (TRANSITION STRIP)
- PROPOSED EVERGREEN TREE (SITE LANDSCAPING)

LANDSCAPING NOTES

1. GREENBELT PLANTINGS TO INCLUDE PERENNIALS AND ORNAMENTAL GRASSES.

LANDSCAPE REQUIREMENTS

	Allowed/ Required - zoning	Proposed	
Front Greenbelt (along exterior public road) per Article 14: Open Space Community	1 evergreen or canopy tree per 20 feet of road frontage 1,833LF frontage / 20 lf = 92 trees required	82 97	proposed trees existing trees preserved
Transition Strip to adjacent residential per Article 14: Open Space Community	woodland/natural features/ landscaped greenbelt sufficient to provide an obscuring effect OR open recreation space	min. 150 ft open space proposed adjacent to residential 17 deciduous, 42 evergreen proposed trees on east property line	
Internal Street trees - per Article 14: Open Space Community	2 canopy trees per dwelling for areas with lot frontage; 1 canopy tree per 50 ft road each side where not lot frontage; preserved trees w/in 5 ft of road can be credited (144 x 2 = 288) + (7,465/50 = 150 = 438 trees required	325 98 ~15	proposed street trees proposed transition strip trees on southwest property lines existing trees preserved along perimeter of woodland preservation area

The underground utilities shown have been located from field survey information and existing records. The surveyor makes no guarantees that the underground utilities shown comprise all such utilities in the area, either in-service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated. Although the surveyor does certify that they are located as accurately as possible from the information available.

M I D W E S T E R N C O N S U L T I N G
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE VILLAGE

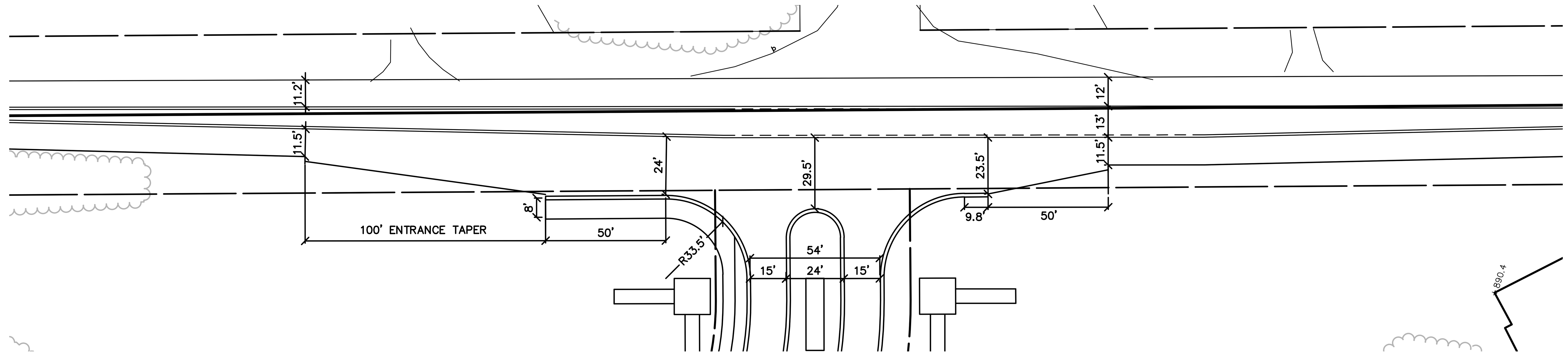
OPEN SPACE PUD DEVELOPMENT
LANDSCAPE PLAN

6

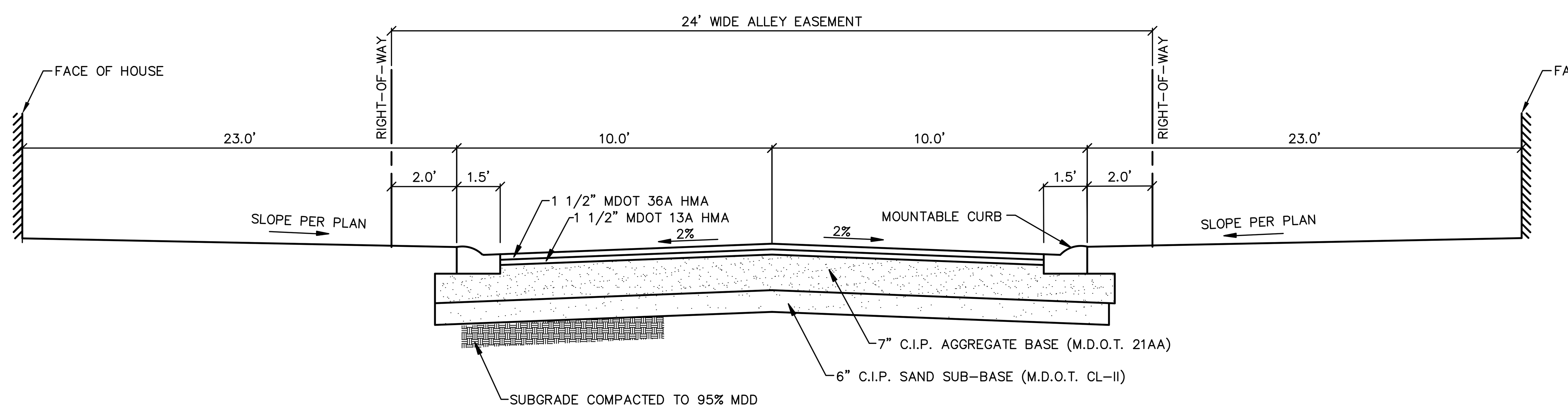
DATE: 8/29/18		
SHEET 6 OF 19		
REVISIONS:	REV. DATE	CADD:
PER TOWNSHIP COMMENTS	11/19/18	ENG: JCA, TPH
PER TOWNSHIP COMMENTS	12/10/18	PM: RCW
		TECH: TRF
		18037LP1.dwg

JOB No. 18037

M:\Civil3d_Proj\18037\Preliminary Site Plan\18037LP1.dwg, 12/7/2018 4:36 PM, Ted P. Hirsch, LANDSCAPE PLAN, MCLLC PDF.pc3

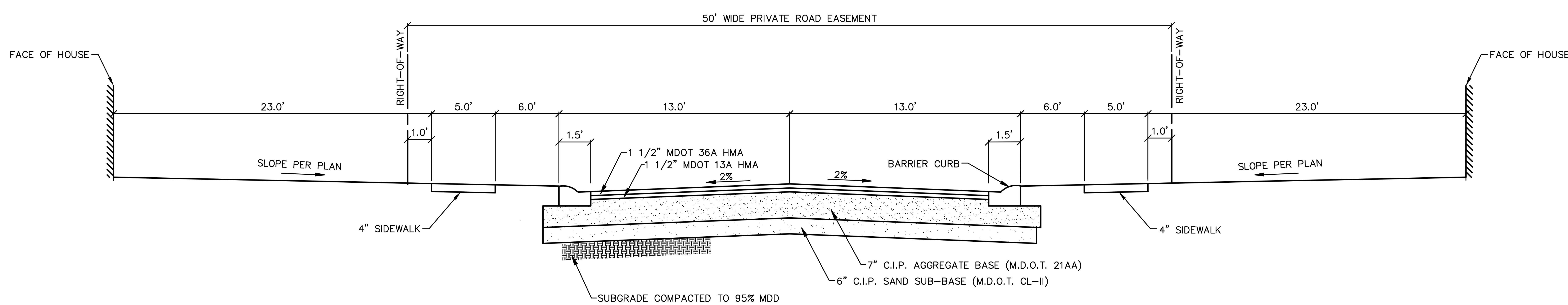


APPROACH DETAIL



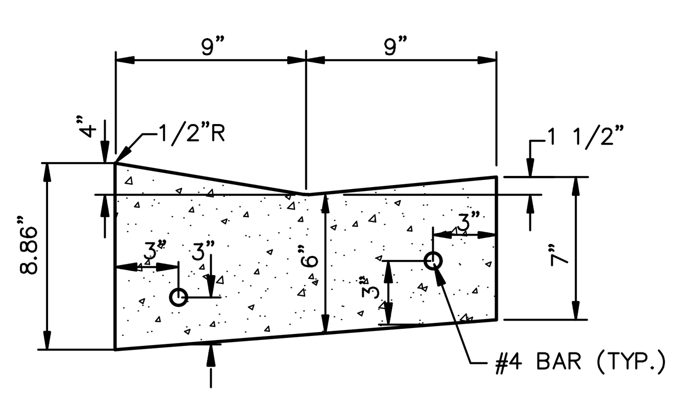
TYPICAL ALLEY CROSS SECTION

NOT TO SCALE



TYPICAL PRIVATE ROAD CROSS SECTION

NOT TO SCALE



MOUNTABLE CONCRETE CURB & GUTTER

NOT TO SCALE

M I D W E S T E R N
C O N S U L T I N G
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Surveying • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE
OPEN SPACE PUD DEVELOPMENT
SITE DETAILS

7

JOB No. 18037

REVISIONS:	REV. DATE
PER TOWNSHIP COMMENTS	11/19/18
PER TOWNSHIP COMMENTS	12/10/18

DATE: 8/29/18
SHEET 7 OF 19
CADD:
ENG: JCA, TPH
PM: RCW
TECH:
18037DT1

M:\Civil3d_Proj\18037\Preliminary Site Plan\18037DT1.dwg, 12/7/2018 4:36 PM, Ted P. Hirsch, MISC, MCLLC PDF.pc3

1000 Plan Elevations

1400 Plan Elevations

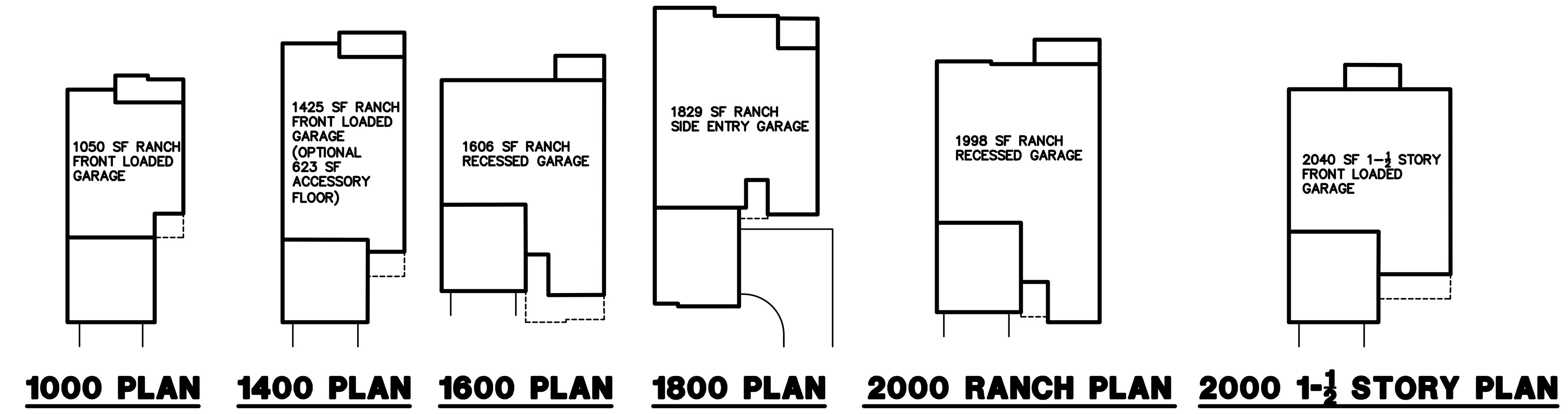
1600 Elevations

1800 Elevations

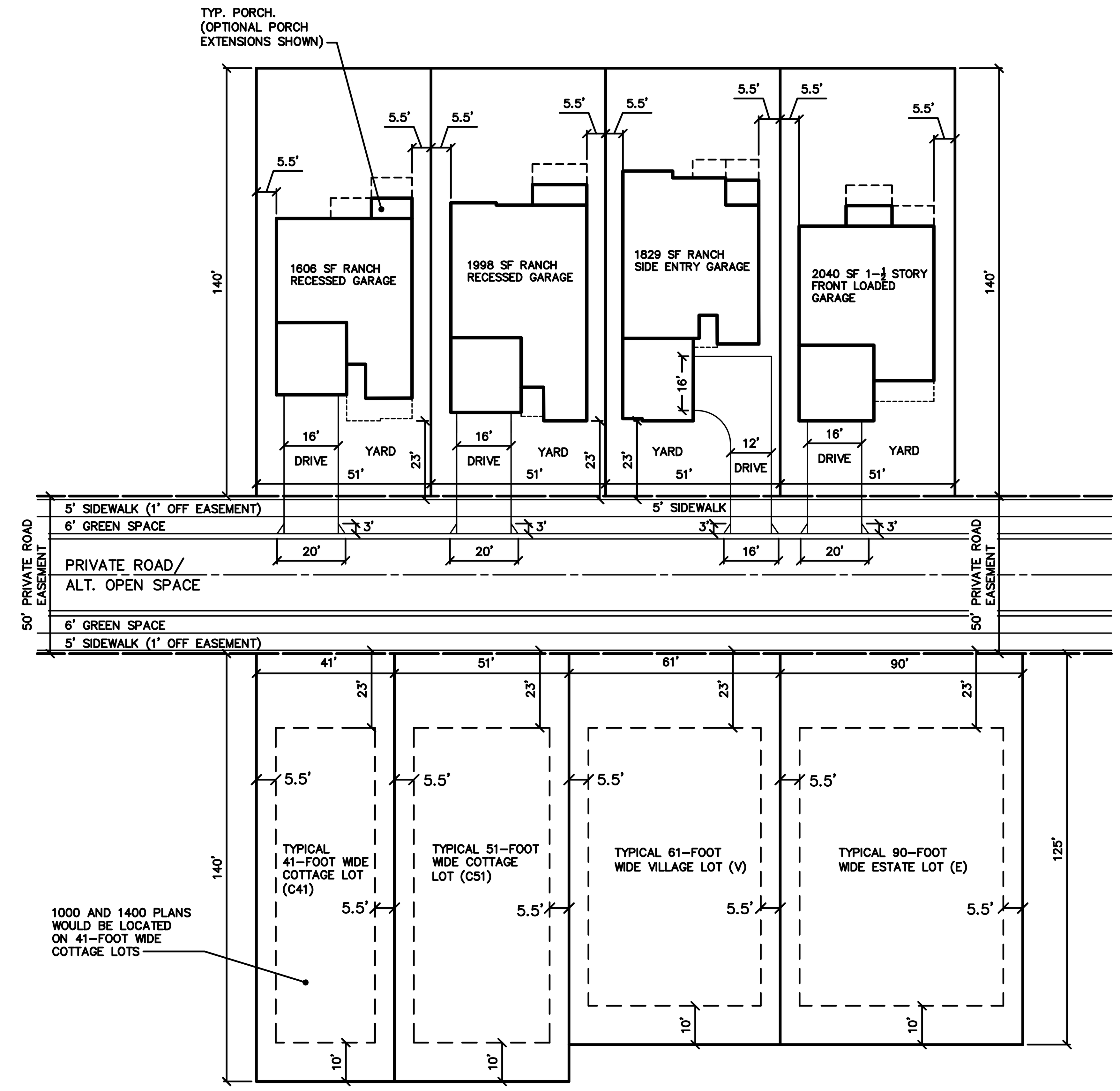
2000 Ranch Elevations

2000 1-1/2 StoryElevations

ARCHITECTURAL ELEVATIONS



*NOTE: BUILDING LAYOUTS AND DIMENSIONS ARE PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL SITE PLAN.



TYPICAL LOT CONFIGURATIONS

LOT DETAILS SHOWN FOR COTTAGE 51 LOTS

NOTES

1. THE CONFIGURATIONS SHOWN ABOVE INDICATE TYPICAL MINIMUM LOT WIDTHS, DEPTHS, AND SETBACKS.
2. ACTUAL LOT DIMENSIONS AND SETBACKS ARE GREATER THAN MINIMUM IN VARIOUS LOCATIONS.
3. WHERE SIDEWALKS EXIST, HOMES ARE SET A MINIMUM 23' FROM EDGE OF SIDEWALK. WHERE NO SIDEWALK EXISTS, HOMES ARE SET A MINIMUM 23' FROM BACK OF CURB.
4. HOMES ALONG ALLEYS ARE ALL SET A MINIMUM 23' FROM BACK OF CURB (NO SIDEWALKS EXIST ALONG ALLEYS).
5. BUILDING DIMENSIONS ARE PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL SITE PLAN.

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE

OPEN SPACE PUD DEVELOPMENT
CONCEPTUAL ARCHITECTURAL DETAILS

8

JOB No. 18037

REVISIONS:	REV. DATE
PER TOWNSHIP COMMENTS	11/19/18
PER TOWNSHIP COMMENTS	12/10/18

DATE: 8/29/18
SHEET 8 OF 19
CADD:
ENG: JCA, TPH
PM: RCW
TECH:
18037DT1

SCALE: 1" = 50'

0 50 100 150

811 Know what's below. Call before you dig.

LEGEND

838	EXIST. CONTOUR
836.2	EXIST. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
U.P.	EXIST. UTILITY POLE W/ TRANS.
	GUY WIRE
	ELEC. TRANSFORMER
OH	EXIST. OVERHEAD UTILITY LINE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
	EXIST. GAS VALVE
f.o.	EXIST. FIBER OPTIC LINE
r	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	END SECTION
	CULVERT
s	EXIST. SANITARY SEWER
	C/L OF DITCH OR EDGE OF WATER
	SIGN
t	TELEPHONE RISER
catv	CABLE TELEVISION RISER
e	ELECTRIC METER
g	GAS METER
glm	GAS LINE MARKER
fiber	FIBER OPTIC MARKER
	POST
	WELL
	FENCE
	SINGLE TREE
	TREE OR BRUSH LIMIT
	SECTION CORNER
F	FOUND IRON PIPE
F	FOUND MONUMENT
FIR	FOUND IRON ROD
	CONTROL PT.

MIDWESTERN CONSULTING

3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE

OPEN SPACE PUD DEVELOPMENT
TREE SURVEY PLAN 1

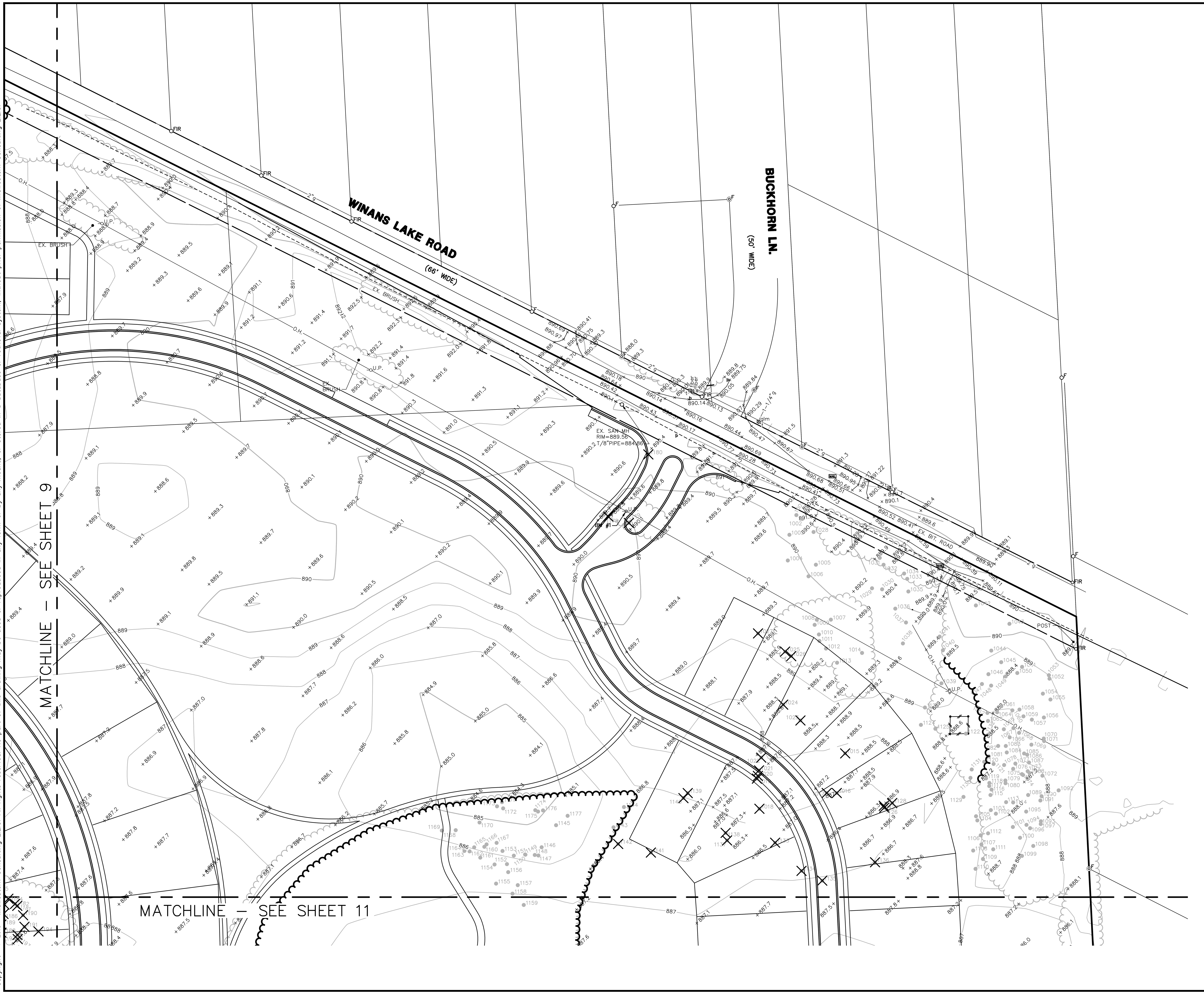
9

DATE: 8/29/18	SHEET 9 OF 19
CADD:	
ENG: JCA, TPH	
PM: RCW	
TECH:	
18037EX2.dwg	

JOB No. 18037

REVISIONS:	REV. DATE
PER TOWNSHIP COMMENTS	11/19/18
PER TOWNSHIP COMMENTS	12/10/18

M:\Civil3d_Proj\18037\Preliminary Site Plan\18037EX2.dwg, 12/7/2018 4:36 PM, Ted P. Hirsch, TREE SURVEY1, MCLLC PDF.pc3



SCALE: 1" = 50'

0 50 100 150

811 Know what's below. Call before you dig.

LEGEND

- 838 — EXIST. CONTOUR
- 836.2 — EXIST. SPOT ELEVATION
- U.P. — EXIST. UTILITY POLE
- U.P. — EXIST. UTILITY POLE W/ TRANS.
- GUY WIRE
- ELEC. TRANSFORMER
- OH — EXIST. OVERHEAD UTILITY LINE
- t — EXIST. TELEPHONE LINE
- e — EXIST. ELECTRIC LINE
- g — EXIST. GAS LINE
- EXIST. GAS VALVE
- f.o. — EXIST. FIBER OPTIC LINE
- r — EXIST. STORM SEWER
- EXIST. CATCH BASIN OR INLET
- END SECTION
- CULVERT
- s — EXIST. SANITARY SEWER
- C/L OF DITCH OR EDGE OF WATER
- SIGN
- t — TELEPHONE RISER
- catv — CABLE TELEVISION RISER
- e — ELECTRIC METER
- g — GAS METER
- glm — GAS LINE MARKER
- fiber — FIBER OPTIC MARKER
- POST
- WELL
- FENCE
- SINGLE TREE
- TREE OR BRUSH LIMIT
- SECTION CORNER
- F — FOUND IRON PIPE
- F — FOUND MONUMENT
- FIR — FOUND IRON ROD
- CONTROL PT.

MIDWESTERN CONSULTING

3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE
OPEN SPACE PUD DEVELOPMENT
TREE SURVEY PLAN 2

10

REVISIONS:	REV. DATE	DATE: 8/29/18
PER TOWNSHIP COMMENTS	11/19/18	SHEET 10 OF 19
PER TOWNSHIP COMMENTS	12/10/18	CADD:
		ENG: JCA, TPH
		PM: RCW
		TECH:
		18037EX2.dwg

JOB No. 18037

SCALE: 1" = 50'

0 50 100 150

811 Know what's below. Call before you dig.

LEGEND

838	EXIST. CONTOUR
836.2	EXIST. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
U.P.	EXIST. UTILITY POLE W/ TRANS.
	GUY WIRE
	ELEC. TRANSFORMER
OH	EXIST. OVERHEAD UTILITY LINE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
	EXIST. GAS VALVE
f.o.	EXIST. FIBER OPTIC LINE
r	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	END SECTION
	CULVERT
s	EXIST. SANITARY SEWER
	C/L OF DITCH OR EDGE OF WATER
	SIGN
t	TELEPHONE RISER
catv	CABLE TELEVISION RISER
e	ELECTRIC METER
g	GAS METER
glm	GAS LINE MARKER
fiber	FIBER OPTIC MARKER
	POST
	WELL
	FENCE
	SINGLE TREE
	TREE OR BRUSH LIMIT
	SECTION CORNER
F	FOUND IRON PIPE
F	FOUND MONUMENT
FIR	FOUND IRON ROD
	CONTROL PT.

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE

OPEN SPACE PUD DEVELOPMENT
TREE SURVEY PLAN 3

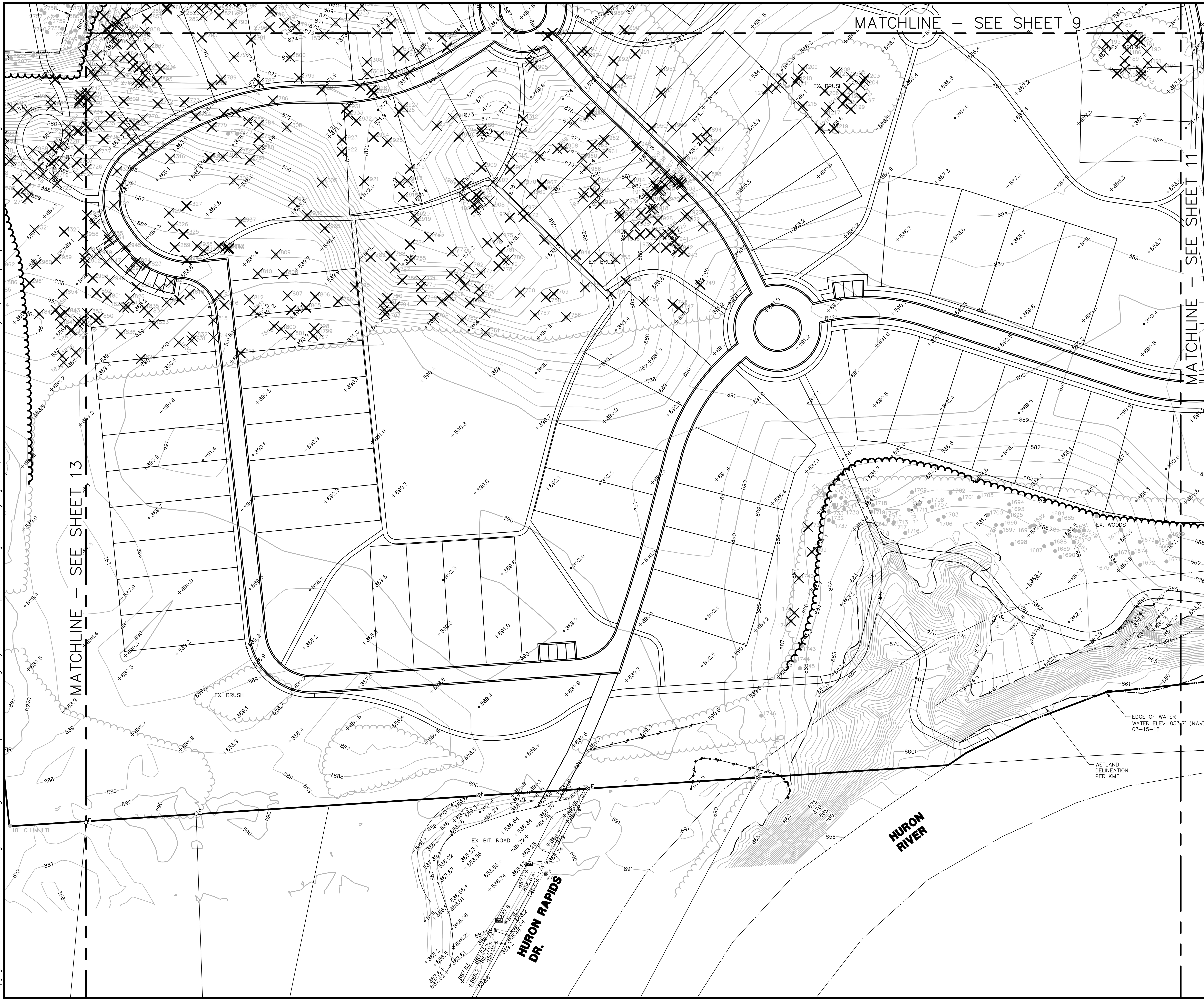
11

DATE: 8/29/18
SHEET 11 OF 19
CADD:
ENG: JCA, TPH
PM: RCW
TECH:
18037EX2.dwg

JOB No. 18037

REVISIONS:	REV. DATE
PER TOWNSHIP COMMENTS	11/19/18
PER TOWNSHIP COMMENTS	12/10/18

M:\Civil3d_Proj\18037\Preliminary Site Plan\18037EX2.dwg, 12/7/2018 4:37 PM, Ted P. Hirsch, TREE SURVEYS, MCLLC PDF.pc3



SCALE: 1" = 50'

0 50 100 150

811 Know what's below. Call before you dig.

LEGEND

838	EXIST. CONTOUR
836.2	EXIST. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
U.P.	EXIST. UTILITY POLE W/ TRANS.
	GUY WIRE
	ELEC. TRANSFORMER
OH	EXIST. OVERHEAD UTILITY LINE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
	EXIST. GAS VALVE
f.o.	EXIST. FIBER OPTIC LINE
r	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	END SECTION
	CULVERT
s	EXIST. SANITARY SEWER
	C/L OF DITCH OR EDGE OF WATER
	SIGN
t	TELEPHONE RISER
catv	CABLE TELEVISION RISER
e	ELECTRIC METER
g	GAS METER
glm	GAS LINE MARKER
fiber	FIBER OPTIC MARKER
	POST
	WELL
	FENCE
	SINGLE TREE
	TREE OR BRUSH LIMIT
	SECTION CORNER
F	FOUND IRON PIPE
F	FOUND MONUMENT
FIR	FOUND IRON ROD
	CONTROL PT.

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

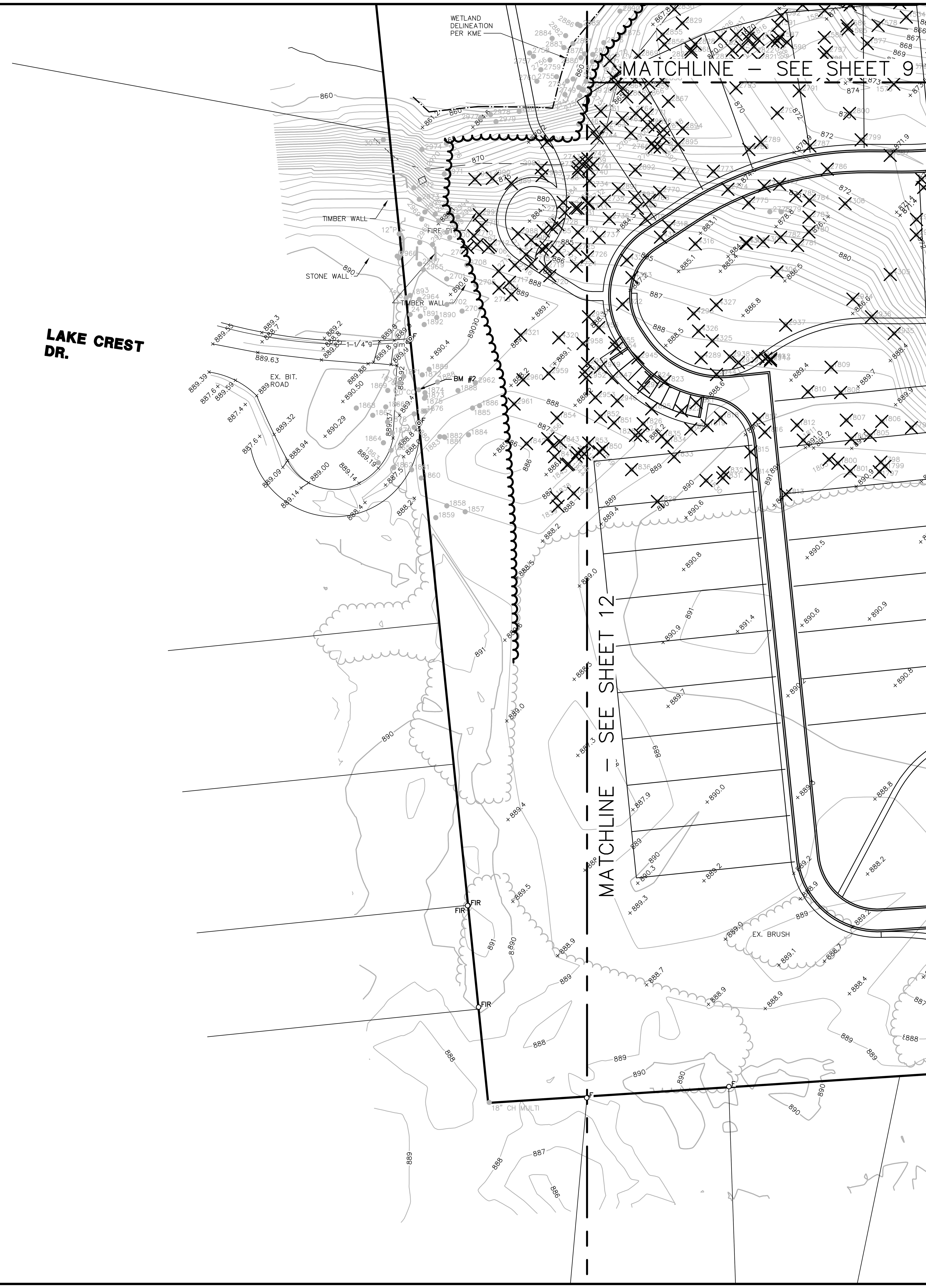
CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE

OPEN SPACE PUD DEVELOPMENT
TREE SURVEY PLAN 4

12

JOB No. 18037	DATE: 8/29/18	SHEET 12 OF 19
REVISIONS:	REV. DATE	CADD:
PER TOWNSHIP COMMENTS	11/19/18	ENG: JCA, TPH
PER TOWNSHIP COMMENTS	12/10/18	PM: RCW
		TECH:
		18037EX2.dwg



SCALE: 1" = 50'

0 50 100 150

811 Know what's below. Call before you dig.

LEGEND

838	EXIST. CONTOUR
836.2	EXIST. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
U.P.	EXIST. UTILITY POLE W/ TRANS.
	GUY WIRE
	ELEC. TRANSFORMER
OH	EXIST. OVERHEAD UTILITY LINE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
	EXIST. GAS VALVE
f.o.	EXIST. FIBER OPTIC LINE
r	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	END SECTION
	CULVERT
s	EXIST. SANITARY SEWER
	C/L OF DITCH OR EDGE OF WATER
	SIGN
t	TELEPHONE RISER
catv	CABLE TELEVISION RISER
e	ELECTRIC METER
g	GAS METER
glm	GAS LINE MARKER
fiber	FIBER OPTIC MARKER
	POST
W	WELL
	FENCE
	SINGLE TREE
	TREE OR BRUSH LIMIT
	SECTION CORNER
F	FOUND IRON PIPE
F	FOUND MONUMENT
FIR	FOUND IRON ROD
	CONTROL PT.

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE
OPEN SPACE PUD DEVELOPMENT
TREE SURVEY PLAN 5

13

JOB No. 18037

REVISIONS:	REV. DATE	
PER TOWNSHIP COMMENTS	11/19/18	
PER TOWNSHIP COMMENTS	12/10/18	

DATE: 8/29/18
SHEET 13 OF 19
CADD:
ENG: JCA, TPH
PM: RCW
TECH:
18037EX2.dwg

690	*Juglans nigra*	Black Walnut	6			Fair	no bud, leaf	
701	*Quercus rubra*	Red Oak	20			Good		X
702	*Ulmus americana*	American Elm	8			Good		X
703	*Quercus rubra*	Red Oak	9			Good		X
704	*Acer saccharum*	Sugar Maple	22			Good		X
705	*Carya glabra*	Pignut Hickory	7			Good		X
706	*Carya glabra*	Pignut Hickory	9			Good		X
707	*Prunus serotina*	Black Cherry	9			Good		X
708	*Acer saccharinum*	Silver Maple	14			Good		X
710	*Quercus velutina*	Black Oak	6			Good		X
711	*Carya ovata*	Shagbark Hickory	7			Good		X
712	*Acer* spp.	Maple	13			Good		X
713	*Prunus serotina*	Black Cherry	6			Good		X
714	*Acer negundo*	Boxelder	8			Fair		X
715	*Carya* spp.	Hickory	15			Good		X
716	*Ulmus americana*	American Elm	7			Good		X
717	*Quercus velutina*	Black Oak	7			Good		X
718	*Ulmus americana*	American Elm	9			Good		X
719	*Carya* spp.	Hickory	7			Good		X
720	*Carya* spp.	Hickory	10			Good		X
721	*Carya* spp.	Hickory	14			Good		X
722	*Quercus velutina*	Black Oak	21			Good		X
723	*Quercus rubra*	Red Oak	6			Good		X
724	*Prunus serotina*	Black Cherry	6			Fair		X
725	*Acer saccharinum*	Silver Maple	20			Fair		X
726	*Acer* spp.	Maple	10			Good		X
727	*Ulmus americana*	American Elm	19			Fair		X
728	*Ulmus americana*	American Elm	8			Fair		X
729	*Carya* spp.	Hickory	16			Good		X
730	*Ulmus americana*	American Elm	9			Good		X
731	*Acer* spp.	Maple	7			Good		X
732	*Acer* spp.	Maple	11			Good		X
733	*Carya* spp.	Hickory	9			Good		X
734	*Acer saccharinum*	Silver Maple	24			Good		X
735	*Carya* spp.	Hickory	8			Good		X
736	*Carya* spp.	Hickory	12			Good		X
737	*Carya* spp.	Hickory	8			Good		X
738	*Quercus velutina*	Black Oak	10			Good		X
739	*Prunus serotina*	Black Cherry	8			Good		
740	*Carya* spp.	Hickory	9			Good		
741	*Carya* spp.	Hickory	7			Good		
742	*Carya* spp.	Hickory	6			Good		X
743	*Acer* spp.	Maple	17			Good		X
744	*Ulmus americana*	American Elm	9			Good		X
745	*Carya* spp.	Hickory	10			Good		
746	*Carya* spp.	Hickory	10			Good		
747	*Carya* spp.	Hickory	8			Good		
748	*Prunus serotina*	Black Cherry	13			Very Poor		
749	*Ulmus americana*	American Elm	7			Good		
750	*Prunus serotina*	Black Cherry	8			Very Poor		
751	*Prunus serotina*	Black Cherry	13			Good		
752	*Carya* spp.	Hickory	10			Good		
753	*Carya* spp.	Hickory	10			Good		
754	*Acer saccharinum*	Silver Maple	34			Good		
755	*Ulmus americana*	American Elm	8			Fair		X
756	*Acer saccharinum*	Silver Maple	17			Good		
758	*Carya* spp.	Hickory	10			Good		
759	*Quercus velutina*	Black Oak	17			Good		
760	*Acer saccharum*	Sugar Maple	14			Good		
761	*Quercus rubra*	Red Oak	9			Good		
762	*Quercus velutina*	Black Oak	8			Good		
763	*Robinia pseudoacacia*	Black Locust	10			Fair		
764	*Robinia pseudoacacia*	Black Locust	10			Fair		
765	*Ulmus americana*	American Elm	9			Fair		
766	*Robinia pseudoacacia*	Black Locust	9			Fair		
767	*Robinia pseudoacacia*	Black Locust	6			Good		X
768	*Platanus occidentalis*	Sycamore	13			Good		
770	*Ulmus americana*	American Elm	7			Fair		
771	*Juglans nigra*	Black Walnut	9			Good		
772	*Quercus velutina*	Black Oak	9			Good		
773	*Quercus rubra*	Red Oak	10			Good		
774	*Prunus serotina*	Black Cherry	10			Fair		
775	*Ulmus americana*	American Elm	8			Fair		
776	*Ulmus americana*	American Elm	8			Fair		
777	*Juglans nigra*	Black Walnut	29			Fair		
778	*Prunus serotina*	Black Cherry	9			Fair		
779	*Ulmus americana*	American Elm	7			Fair		
780	*Carya* spp.	Hickory	7			Fair		
781	*Quercus velutina*	Black Oak	15			Fair		
782	*Carya* spp.	Hickory	7			Fair		
783	*Juglans nigra*	Black Walnut	9			Fair		
801	*Ulmus americana*	American Elm	11			Good		X
802	*Acer* spp.	Maple	28			Good		X
803	*Ulmus americana*	American Elm	8			Fair		X
804	*Ulmus americana*	American Elm	8			Fair		X
805	*Carya glabra*	Pignut Hickory	7			Good		X
806	*Prunus serotina*	Black Cherry	11			Good		X
807	*Ulmus americana*	American Elm	7			Poor		X
808	*Quercus alba*	White Oak	27			Good		X
809	*Carya ovata*	Shagbark Hickory	23			Good		X
810	*Quercus alba*	White Oak	20			Good		X
811	*Ulmus americana*	American Elm	9			Good		X
812	*Prunus serotina*	Black Cherry	8			Poor		
813	*Prunus serotina*	Black Cherry	8			Poor		
814	*Acer rubrum*	Red Maple	8			Good		
815	*Prunus serotina*	Black Cherry	16			Fair		
816	*Prunus serotina*	Black Cherry	6			Fair		
817	*Prunus serotina*	Black Cherry	8			Good		
818	*Prunus serotina*	Black Cherry	12			Fair		
819	*Prunus serotina*	Black Cherry	7			Good		
820	*Prunus serotina*	Black Cherry	10			Fair		X
821	*Quercus alba*	White Oak	28			Good		X
822	*Quercus alba*	White Oak	26			Good		X
823	*Prunus serotina*	Black Cherry	8			Fair		
824	*Ulmus americana*	American Elm	11			Good		X
825	*Juglans nigra*	Black Walnut	24			Good		X
826	*Quercus velutina*	Black Oak	28			Good		X
827	*Ulmus americana*	American Elm	13			Good		X
828	*Carya* spp.	Hickory	24			Good		X
829	*Prunus serotina*	Black Cherry	8			Fair		X
830	*Prunus serotina*	Black Cherry	14			Fair		X
831	*Prunus serotina*	Black Cherry	13			Fair		X
832	*Quercus* spp.	Oak	36			Poor		X
833	*Prunus serotina*	Black Cherry	10			Good		X
834	*Prunus serotina*	Black Cherry	14			Good		X
835	*Prunus serotina*	Black Cherry	8			Poor		X
836	*Ulmus americana*	American Elm	12			Fair		X
837	*Quercus velutina*	Black Oak	32			Good		X
838	*Prunus serotina*	Black Cherry	8			Good		X
839	*Prunus serotina*	Black Cherry	11			Good		X
840	*Prunus serotina*	Black Cherry	8			Poor		X
841	*Prunus serotina*	Black Cherry	12			Poor		X
842	*Ulmus americana*	American Elm	9			Good		X
843	*Prunus serotina*	Black Cherry	7			Fair		X
844	*Quercus alba*	White Oak	19			Good		X
845	*Ulmus americana*	American Elm	10			Good		X
846	*Quercus alba*	White Oak	28			Good		X
847	*Prunus serotina*	Black Cherry	8			Poor		X
848	*Quercus alba*	White Oak	4			Good		X
849	*Juglans nigra*	Black Walnut	21			Good		X
850	*Carya* spp.	Hickory	8			Good		X
851	*Ulmus americana*	American Elm	8			Poor		X
852	*Juglans nigra*	Black Walnut	23			Good		X
853	*Carya* spp.	Hickory	25			Good		X
854	*Juglans nigra*	Black Walnut	8			Good		X
855	*Quercus alba*	White Oak	20			Poor		X
856	*Prunus serotina*	Black Cherry	11			Fair		X
857	*Ulmus americana*	American Elm	7			Fair		X
858	*Juglans nigra*	Black Walnut	18			Good		X
859	*Juglans nigra*	Black Walnut	20			Good		X
860	*Ulmus americana*	American Elm	6			Fair		X
861	*Prunus serotina*	Black Cherry	10			Fair		X
862	*Prunus serotina*	Black Cherry	6			Fair		X
863	*Prunus serotina*	Black Cherry	9			Fair		X
864	*Prunus serotina*	Black Cherry	9			Fair		X
865	*Prunus serotina*	Black Cherry	8			Good		X
866	*Quercus velutina*	Black Oak	27			Fair		X
867	*Prunus serotina*	Black Cherry	10			Fair		X
868	*Quercus velutina*	Black Oak	21			Good		X
869	*Ulmus americana*	American Elm	7			Fair		X
870	*Prunus serotina*	Black Cherry	12			Fair		X
871	*Ulmus americana*	American Elm	7			Fair		X
872	*Quercus alba*	White Oak	13			Very Poor		X
873	*Ulmus americana*	American Elm	7			Fair		X
874	*Quercus alba*	White Oak	24			Good		X
875	*Ulmus americana*	American Elm	10			Fair		X
876	*Prunus serotina*	Black Cherry	9			Poor		X
877	*Quercus alba*	White Oak	28			Fair		X
878	*Carya* spp.	Hickory	13			Fair		X
879	*Quercus velutina*	Black Oak	28			Fair		X
880	*Prunus serotina*	Black Cherry	8			Fair		
881	*Prunus serotina*	Black Cherry	8			Fair		
882	*Prunus serotina*	Black Cherry	9			Fair		
883	*Ulmus americana*	American Elm	18			Fair		
884	*Prunus serotina*	Black Cherry	7			Fair		
885	*Quercus velutina*	Black Oak	28			Fair		
886	*Quercus alba*	White Oak	13			Poor		
887	*Quercus velutina*	Black Oak	20			Poor		
888	*Prunus serotina*	Black Cherry	7			Fair		
889	*Quercus alba*	White Oak	21			Fair		
890	*Quercus alba*	White Oak	14			Fair		X
891	*Quercus velutina*	Black Oak	28			Fair		
892	*Prunus serotina*	Black Cherry	9			Poor		X
893	*Ulmus americana*	American Elm	15			Fair		X
894	*Acer rubrum*	Red Maple	7			Good		
895	*Ulmus americana*	American Elm	8			Good		X
896	*Quercus alba*	White Oak	22			Good		X
897	*Prunus serotina*	Black Cherry	8			Fair		X
898	*Acer rubrum*	Red Maple	7			Good		X
899	*Prunus serotina*	Black Cherry	7			Fair		X
900	*Juglans nigra*	Black Walnut	8			Fair	no bud, leaf	
901	*Quercus* spp.	Oak	28			Good		X
902	*Euonymus alata*	Winged Wahoo	6			Good		X
903	*Quercus alba*	White Oak	23			Fair		X
904	*Carya glabra*	Pignut Hickory	11			Good		X
905	*Prunus serotina*	Black Cherry	8			Fair		X
906	*Prunus serotina*	Black Cherry	6			Fair		X
907	*Quercus alba*	White Oak	14			Poor		X
908	*Carya ovata*	Shagbark Hickory	22			Good		X
909	*Carya ovata*	Shagbark Hickory	20			Good		X
910	*Quercus alba*	White Oak	16			Poor		X
911	*Ulmus americana*	American Elm	7			Good		X
912	*Carya glabra*	Pignut Hickory	21			Fair		X
913	*Carya glabra*	Pignut Hickory	18			Good		X
914	*Ulmus americana*	American Elm	9			Good		X
915	*Acer saccharum*	Sugar Maple	9			Fair		X
916	*Quercus alba*	White Oak	20			Good		X
917	*Ulmus americana*	American Elm	6			Good		X
918	*Quercus alba*	White Oak	20			Fair		X
919	*Carya* spp.	Hickory	21			Good		X
920	*Carya ovata*	Shagbark Hickory	20			Good		X
921	*Quercus alba*	White Oak	18			Good		X
922	*Quercus alba*	White Oak	22			Good		X
923	*Quercus rubra*	Red Oak	38			Good		X
924	*Ulmus americana*	American Elm	6			Poor		X
925	*Quercus velutina*	Black Oak	33			Good		X
926	*Quercus velutina*	Black Oak	30			Poor		X
927	*Carya glabra*	Pignut Hickory	14			Good		X
928	*Carya glabra*	Pignut Hickory	24			Good		X
929	*Carya glabra*	Pignut Hickory	14			Fair		X
930	*Carya glabra*	Pignut Hickory	19			Good		X
931	*Carya glabra*	Pignut Hickory	11			Fair		X
932	*Quercus alba*	White Oak	25			Fair		X
933	*Quercus alba*	White Oak	24			Poor		X
934	*Carya glabra*	Pignut Hickory	22			Good		X
935	*Ulmus americana*	American Elm	6			Good		X
936	*Quercus alba*	White Oak	26			Fair		
937	*Carya glabra*	Pignut Hickory	18			Good		
938	*Carya ovata*	Shagbark Hickory	16			Fair		
939	*Quercus rubra*	Red Oak	36			Poor		
940	*Carya glabra*	Pignut Hickory	24			Very Poor		X
941	*Quercus* spp.	Oak	25			Poor		X
942	*Carya* spp.	Hickory	43			Poor		X
943	*Carya glabra*	Pignut Hickory	20			Good		X
944	*Carya* spp.	Hickory	14			Good		X
945	*Carya glabra*	Pignut Hickory	18			Poor		X
946	*Quercus* spp.	Oak	28			Poor		X
947	*Carya* spp.	Hickory	12			Good		X
948	*Carya glabra*	Pignut Hickory	31			Good		X
949	*Carya glabra*	Pignut Hickory	24			Fair		X
950	*Carya glabra*	Pignut Hickory	18			Fair		X
951	*Quercus rubra*	Red Oak	7			Good		X
953	*Quercus rubra*	Red Oak	8			Poor		X
954	*Carya glabra*	Pignut Hickory	19			Fair		
955	*Carya glabra*	Pignut Hickory	25			Fair		
956	*Acer saccharum*	Sugar Maple	8			Good		
957	*Quercus alba*	White Oak	20			Good		X
958	*Carya glabra*	Pignut Hickory	24			Good		X
959	*Quercus rubra*	Red Oak	22			Poor		X
960	*Quercus* spp.	Oak	28			Fair		X
961	*Quercus rubra*	Red Oak	27			Poor		X
962	*Quercus alba*	White Oak	13			Fair		X
963	*Quercus alba*	White Oak	33			Fair		X
964	*Carya glabra*	Pignut Hickory	21			Fair		X
965	*Quercus rubra*	Red Oak	22			Poor		X
966	*Quercus rubra*	Red Oak	26			Fair		X
967	*Quercus rubra*	Red Oak	25			Poor		X
968	*Acer saccharum*	Sugar Maple	9			Good		X
969	*Quercus rubra*	Red Oak	28			Poor		X
970	*Carya glabra*	Pignut Hickory	14			Fair		X
971	*Carya glabra*	Pignut Hickory	26			Good		X
972	*Quercus* spp.	Oak	7			Poor		X
973	*Quercus* spp.	Oak	7			Poor		X
974	*Quercus rubra*	Red Oak	7			Fair		X
975	*Acer rubrum*	Red Maple	8			Good		
976	*Acer rubrum*	Red Maple	8			Poor		
977	*Carya glabra*	Pignut Hickory	10			Poor		
978	*Quercus rubra*	Red Oak	32			Fair		
979	*Quercus* spp.	Oak	8			Fair		X
980	*Quercus rubra*	Red Oak	9			Fair		X
981	*Quercus rubra*	Red Oak	34			Fair		X
982	*Quercus rubra*	Red Oak	13			Fair		X
983	*Quercus rubra*	Red Oak	9			Poor		X
984	*Quercus rubra*	Red Oak	8			Poor		X
985	*Quercus alba*	White Oak	39			Fair		X
986	*Quercus alba*	White Oak	23			Poor		X
987	*Prunus serotina*	Black Cherry	7			Fair		X
988	*Carya glabra*	Pignut Hickory	7			Good		X
989	*Prunus serotina*	Black Cherry	7			Poor		X
990	*Quercus rubra*	Red Oak	8			Very Poor		X
991	*Prunus serotina*	Black Cherry	10			Good		X
992	*Prunus serotina*	Black Cherry	8			Fair		X
993	*Acer rubrum*	Red Maple	13			Good		X
994	*Quercus rubra*	Red Oak	8			Fair		X
995	*Quercus* spp.	Oak	8			Poor		X
996	*Quercus rubra*	Red Oak	9			Poor		X
997	*Thuja occidentalis*	White Cedar	11			Fair		X
998	*Quercus rubra*	Red Oak	7			Poor		X
999	*Quercus rubra*	Red Oak	8			Fair		X
1000	*Quercus rubra*	Red Oak	11			Fair		X
1001	*Ulmus americana*	American Elm	26			Good		
1002	*Ulmus americana*	American Elm	14			Fair		
1003	*Pyrus communis*	Common Pear	11			Fair		
1004	*Pyrus communis*	Common Pear	17			Good		
1005	*Aesculus glabra*	Ohio Buckeye	13			Fair		
1006	*Pyrus communis*	Common Pear	8			Fair		
1007	*Pyrus communis*	Common Pear	26			Fair		
1008	*Catalpa speciosa*	Northern Catalpa	10			Poor		
1009	*Juniperus virginiana*	Red Cedar	12			Fair		
1010	*Juniperus virginiana*	Red Cedar	12			Fair		
1011	*Juniperus virginiana*	Red Cedar	17			Fair		
1012	*Acer negundo*	Boxelder	17			Fair		
1013	*Salix alba*	White Willow	23			Very Poor		
1014	*Cercis canadensis*	Redbud	11			Good		
1015	*Juglans nigra*	Black Walnut	22			Good		X
1016	*Juglans nigra*	Black Walnut	22			Good		X
1017	*Juglans nigra*	Black Walnut	9			Fair		X
1018	*Prunus serotina*	Black Cherry	15			Good		X
1019	*Quercus alba*	White Oak	8			Good		X
1020	*Populus tremuloides*	Quaking Aspen	10			Good		X
1021	*Quercus alba*	White Oak	8			Good		X
1022	*Quercus alba*	White Oak	8			Good		X
1023	*Acer negundo*	Boxelder	6			Good		X
1024	*Prunus serotina*	Black Cherry	18			Good		X
1025	*Quercus rubra*	Red Oak	7			Good		X
1026	*Catalpa speciosa*	Northern Catalpa	13			Poor		X
1027	*Morus alba*	White Mulberry	45			Fair		X
1028	*Juniperus virginiana*	Red Cedar	15			Good		
1029	*Cercis canadensis*	Redbud	9			Fair		
1030	*Pseudotsuga menziesii*	Douglas Fir	20			Fair		
1031	*Juniperus virginiana*	Red Cedar	16			Good		
1032	*Juniperus virginiana*	Red Cedar	18			Good		
1033	*Juniperus virginiana*	Red Cedar	15			Good		
1034	*Juniperus virginiana*	Red Cedar	14			Good		
1035	*Catalpa speciosa*	Northern Catalpa	42			Poor		
1036	*Magnolia x soulangeana*	Chinese Magnolia	8			Good		
1037	*Catalpa speciosa*	Northern Catalpa	22			Poor		
1038	*Catalpa speciosa*	Northern Catalpa	21			Fair		
1039	*Juglans nigra*	Black Walnut	10			Fair		
1040	*Acer negundo*	Boxelder	13	7.5		Poor		
1041	*Acer negundo*	Boxelder	16			Poor		
1042	*Quercus velutina*	Black Oak	30			Good		
1043	*Juglans nigra*	Black Walnut	13			Good		
1044	*Pinus sylvestris*	Scotch Pine	8			Good		
1045	*Juniperus virginiana*	Red Cedar	6			Good		
1046	*Juglans nigra*	Black Walnut	8			Poor		
1047	*Acer negundo*	Boxelder	7			Poor		
1048	*Acer negundo*	Boxelder	9			Poor		
1049	*Juniperus virginiana*	Red Cedar	6			Good		
1050	*Acer negundo*	Boxelder	10			Fair		
1051	*Juniperus virginiana*	Red Cedar	6			Good		
1052	*Populus grandidentata*	Big-tooth Aspen	10			Fair		
1053	*Populus grandidentata*	Big-tooth Aspen	7			Fair		
1054	*Populus grandidentata*	Big-tooth Aspen	7			Fair		
1055	*Populus grandidentata*	Big-tooth Aspen	7			Fair		
1056	*Acer negundo*	Boxelder	16			Fair		
1057	*Juglans nigra*	Black Walnut	7			Very Poor		
1058	*Acer negundo*	Boxelder	7			Poor		
1059	*Acer negundo*	Boxelder	7			Poor		
1060	*Acer negundo*	Boxelder	7			Poor		
1061	*Acer negundo*	Boxelder	9	6.8		Fair		
1062	*Acer negundo*	Boxelder	6			Very Poor		
1063	*Juglans nigra*	Black Walnut	9			Fair		
1064	*Acer negundo*	Boxelder	15			Poor		
1065	*Prunus serotina*	Black Cherry	9			Poor		
1066	*Acer negundo*	Boxelder	8			Poor		
1067	*Acer negundo*	Boxelder	12			Poor		
1068	*Acer negundo*	Boxelder	7			Poor		
1069	*Juglans nigra*	Black Walnut	7			Poor		
1070	*Acer negundo*	Boxelder	8			Fair		
1071	*Acer negundo*	Boxelder	19			Fair		
1072	*Acer negundo*	Boxelder	8			Fair		
1073	*Acer negundo*	Boxelder	8			Very Poor		
1074	*Acer negundo*	Boxelder	6			Poor		
1075	*Acer negundo*	Boxelder	12	11.7		Poor		
1076	*Prunus serotina*	Black Cherry	7			Fair		
1077	*Quercus velutina*	Black Oak	11			Fair		
1078	*Acer negundo*	Boxelder	8			Dead		
1079	*Prunus serotina*	Black Cherry	6			Fair		
1080	*Juglans nigra*	Black Walnut	11			Good		
1081	*Acer negundo*	Boxelder	7			Poor		
1082	*Acer negundo*	Boxelder	10	6.1		Fair		
1083	*Acer negundo*	Boxelder	8			Poor		
1084	*Acer negundo*	Boxelder	6			Fair		
1085	*Acer negundo*	Boxelder	9			Poor		
1086	*Juglans nigra*	Black Walnut	6			Fair		
1087	*Acer negundo*	Boxelder	6			Very Poor		
1088	*Prunus serotina*	Black Cherry	9			Fair		
1089	*Acer negundo*	Boxelder	11			Fair		
1090	*Acer negundo*	Boxelder	12			Fair		
1091	*Acer negundo*	Boxelder	10	8.5		Fair		
1092	*Acer negundo*	Boxelder	16			Fair		
1093	*Acer negundo*	Boxelder	14	10.7		Good		
1094	*Acer negundo*	Boxelder	7			Poor		
1095	*Acer negundo*	Boxelder	10	7.4		Very Poor		
1096	*Acer negundo*	Boxelder	16			Fair		
1097	*Acer negundo*	Boxelder	19			Fair		
1098	*Acer negundo*	Boxelder	8			Fair		
1099	*Prunus serotina*	Black Cherry	8			Good		
1100	*Acer negundo*	Boxelder	7			Fair		
1101	*Acer negundo*	Boxelder	7			Poor		
1102	*Acer negundo*	Boxelder	10	6.2	6.2	Poor		
1103	*Acer negundo*	Boxelder	9			Poor		
1104	*Acer negundo*	Boxelder	8			Poor		
1105	*Acer negundo*	Boxelder	9			Fair		
1106	*Acer negundo*	Boxelder	10			Good		
1107	*Acer negundo*	Boxelder	9	8.1		Fair		
1108	*Acer negundo*	Boxelder	11	10.4		Fair		
1109	*Acer negundo*	Boxelder	8			Good		
1110	*Acer negundo*	Boxelder	25			Good		
1111	*Acer negundo*	Boxelder	11	7.6		Fair		
1112	*Acer negundo*	Boxelder	8			Fair		
1113	*Acer negundo*	Boxelder	10			Poor		
1114	*Acer negundo*	Boxelder	7			Poor		
1115	*Acer negundo*	Boxelder	8	7.0		Poor		
1116	*Acer negundo*	Boxelder	7			Very Poor		
1117	*Acer negundo*	Boxelder	10			Very Poor		
1118	*Acer negundo*	Boxelder	7			Poor		
1119	*Acer negundo*	Boxelder	8			Poor		
1120	*Acer negundo*	Boxelder	6			Very Poor		
1121	*Acer negundo*	Boxelder	10			Poor		
1122	*Morus alba*	White Mulberry	40			Fair		
1123	*Juglans nigra*	Black Walnut	12			Fair		
1124	*Juglans nigra*	Black Walnut	25			Fair		
1125	*Acer negundo*	Boxelder	18			Fair		
1126	*Acer negundo*	Boxelder	12	8.8		Fair		X
1127	*Acer negundo*	Boxelder	18	9.0		Fair		X
1128	*Acer negundo*	Boxelder	12			Good		X
1129	*Acer negundo*	Boxelder	22	14.9	13.0	Fair		
1130	*Acer negundo*	Boxelder	9			Fair		
1131	*Acer negundo*	Boxelder	25			Fair		
1132	*Acer negundo*	Boxelder	9			Poor		
1133	*Quercus alba*	White Oak	9			Good		X
1134	*Robinia pseudoacacia*	Black Locust	16			Good		X
1135	*Acer negundo*	Boxelder	24			Good		X
1136	*Acer negundo*	Boxelder	12			Good		X
1137	*Robinia pseudoacacia*	Black Locust	14			Fair		X
1138	*Acer negundo*	Boxelder	32			Good		X
1139	*Ulmus pumilia*	Siberian Elm	15			Fair		X
1140	*Juniperus virginiana*	Red Cedar	7			Good		X
1141	*Quercus velutina*	Black Oak	11			Good		X
1142	*Quercus velutina*	Black Oak	54			Fair		X
1143	*Prunus serotina*	Black Cherry	26			Fair		X
1144	*Quercus velutina*	Black Oak	9			Good		X
1145	*Quercus velutina*	Black Oak	17			Fair		X
1146	*Quercus alba*	White Oak	24			Fair		
1147	*Quercus alba*	White Oak	25			Fair		
1148	*Quercus alba*	White Oak	26			Fair		
1149	*Prunus serotina*	Black Cherry	8			Poor		
1150	*Quercus alba*	White Oak	33			Fair		
1151	*Quercus alba*	White Oak	25			Fair		
1152	*Quercus alba*	White Oak	24			Fair		
1153	*Quercus alba*	White Oak	27			Fair		
1154	*Prunus serotina*	Black Cherry	7			Fair		
1155	*Prunus serotina*	Black Cherry	9			Fair		
1156	*Prunus serotina*	Black Cherry	12			Fair		
1157	*Malus pumila*	Apple	9			Good		
1158	*Quercus alba*	White Oak	25			Fair		
1159	*Quercus alba*	White Oak	20			Fair		
1160	*Prunus serotina*	Black Cherry	11			Good		
1161	*Quercus alba*	White Oak	32			Fair		
1162	*Quercus alba*	White Oak	13			Fair		
1163	*Prunus serotina*	Black Cherry	7			Fair		
1164	*Prunus serotina*	Black Cherry	7			Very Poor		
1165	*Malus pumila*	Apple	6			Good		
1166	*Prunus serotina*	Black Cherry	6			Poor		
1167	*Ulmus americana*	American Elm	13			Good		
1168	*Quercus velutina*	Black Oak	33			Fair		
1169	*Carya ovata*	Shagbark Hickory	11			Good		
1170	*Quercus velutina*	Black Oak	30			Fair		
1171	*Quercus velutina*	Black Oak	8			Fair		X
1172	*Quercus velutina*	Black Oak	8			Good		X
1173	*Prunus serotina*	Black Cherry	6			Fair		X
1174	*Quercus velutina*	Black Oak	10			Good		X
1175	*Quercus velutina*	Black Oak	9			Fair		X
1176	*Quercus velutina*	Black Oak	7			Poor		X
1177	*Prunus serotina*	Black Cherry	6			Good		X
1178	*Prunus serotina*	Black Cherry	13			Poor		X
1179	*Ulmus americana*	American Elm	7			Fair		X
1180	*Robinia pseudoacacia*	Black Locust	13			Good		X
1181	*Prunus serotina*	Black Cherry	9			Fair		X
1182	*Morus alba*	White Mulberry	7			Poor		X
1183	*Prunus serotina*	Black Cherry	6			Fair		X
1184	*Acer negundo*	Boxelder	13			Poor		X
1185	*Acer negundo*	Boxelder	9			Fair		X
1186	*Acer negundo*	Boxelder	8			Good		X
1187	*Prunus serotina*	Black Cherry	7			Good		X
1188	*Acer negundo*	Boxelder	11			Fair		X
1189	*Robinia pseudoacacia*	Black Locust	13			Fair		X
1190	*Acer negundo*	Boxelder	7			Fair		X
1191	*Acer negundo*	Boxelder	7			Fair		X
1192	*Acer negundo*	Boxelder	7			Fair		X
1193	*Acer negundo*	Boxelder	8			Fair		X
1194	*Carya glabra*	Pignut Hickory	40			Poor	has heartrot	X
1195	*Carya glabra*	Pignut Hickory	69			Good		X
1196	*Prunus serotina*	Black Cherry	7			Good		X
1197	*Quercus velutina*	Black Oak	9			Fair		X
1198	*Prunus serotina*	Black Cherry	13			Fair		X
1199	*Prunus serotina*	Black Cherry	11			Fair		X
1200	*Acer negundo*	Boxelder	9			Fair		X
1201	*Prunus serotina*	Black Cherry	9			Fair		X
1202	*Prunus serotina*	Black Cherry	12			Fair		X
1203	*Acer negundo*	Boxelder	6			Fair		X
1204	*Quercus velutina*	Black Oak	8			Fair		X
1205	*Prunus serotina*	Black Cherry	11			Fair		X
1206	*Acer negundo*	Boxelder	21			Poor		X
1207	*Prunus serotina*	Black Cherry	9			Fair		X
1208	*Acer negundo*	Boxelder	13			Fair		X
1209	*Acer negundo*	Boxelder	9			Fair		X
1210	*Quercus velutina*	Black Oak	13			Fair		X
1211	*Ailanthus altissima*	Tree-of-Heaven	12			Fair		X
1212	*Robinia pseudoacacia*	Black Locust	10	6.7		Fair		X
1213	*Platanus occidentalis*	Sycamore	11	9.9		Good		X
1214	*Robinia pseudoacacia*	Black Locust	6			Fair		X
1215	*Prunus serotina*	Black Cherry	12			Fair		X
1216	*Robinia pseudoacacia*	Black Locust	7			Fair		X
1217	*Prunus serotina*	Black Cherry	12			Fair		X
1218	*Prunus serotina*	Black Cherry	8			Fair		X
1219	*Robinia pseudoacacia*	Black Locust	18			Good		X
1220	*Prunus serotina*	Black Cherry	15			Fair		X
1221	*Acer negundo*	Boxelder	7			Fair		X
1222	*Carya ovata*	Shagbark Hickory	13			Good		X
1223	*Quercus ellipsoidalis*	Northern Pin Oak	39			Good		X
1224	*Quercus velutina*	Black Oak	7			Good		X
1225	*Quercus alba*	White Oak	26			Good		
1226	*Ulmus americana*	American Elm	16			Fair		
1227	*Carya glabra*	Pignut Hickory	58			Fair		
1228	*Juniperus virginiana*	Red Cedar	13			Good		
1229	*Morus alba*	White Mulberry	14			Good		
1230	*Prunus serotina*	Black Cherry	12			Fair		
1231	*Morus alba*	White Mulberry	13			Poor		
1232	*Ulmus americana*	American Elm	32			Good		
1233	*Quercus ellipsoidalis*	Northern Pin Oak	8			Fair		
1234	*Populus deltoides*	Cottonwood	9			Fair		
1236	*Quercus ellipsoidalis*	Northern Pin Oak	22			Fair		
1238	*Malus pumila*	Apple	11	10.3		Fair		
1239	*Acer negundo*	Boxelder	14			Fair		
1240	*Prunus serotina*	Black Cherry	11			Good		
1241	*Acer negundo*	Boxelder	25			Fair		
1242	*Morus alba*	White Mulberry	10			Fair		
1243	*Acer negundo*	Boxelder	16			Poor		
1244	*Juniperus virginiana*	Red Cedar	16			Good		
1245	*Quercus ellipsoidalis*	Northern Pin Oak	24			Fair		
1246	*Carya glabra*	Pignut Hickory	12			Good		
1247	*Carya glabra*	Pignut Hickory	16			Good		
1248	*Carya glabra*	Pignut Hickory	11			Fair		
1249	*Carya glabra*	Pignut Hickory	7			Good		
1250	*Morus alba*	White Mulberry	7			Fair		
1251	*Juniperus virginiana*	Red Cedar	9			Good		
1252	*Juniperus virginiana*	Red Cedar	10			Good		
1253	*Carya glabra*	Pignut Hickory	8			Fair		
1254	*Quercus alba*	White Oak	11			Fair		
1255	*Quercus ellipsoidalis*	Northern Pin Oak	20			Fair		
1256	*Quercus ellipsoidalis*	Northern Pin Oak	8			Poor		

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Surveying • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE
OPEN SPACE PUD DEVELOPMENT
TREE LIST 1

14

JOB No. 18037
DATE: 8/29/18
SHEET 14 OF 19

REVISIONS:	REV. DATE
PER TOWNSHIP COMMENTS	11/19/18
PER TOWNSHIP COMMENTS	12/10/18

CADD:
ENG: JCA, TPH
PM: RCW
TECH:
18037EX2.dwg

1257	*Quercus ellipsoidalis*	Northern Pin Oak	29			Good		
1258	*Quercus ellipsoidalis*	Northern Pin Oak	23			Good		
1259	*Quercus ellipsoidalis*	Northern Pin Oak	19			Fair		
1260	*Carya glabra*	Pignut Hickory	8			Fair		
1261	*Carya glabra*	Pignut Hickory	13			Fair		
1262	*Carya glabra*	Pignut Hickory	6			Fair		
1263	*Carya glabra*	Pignut Hickory	8			Good		
1264	*Malus pumila*	Apple	11			Good		
1265	*Carya glabra*	Pignut Hickory	6			Fair		
1266	*Carya glabra*	Pignut Hickory	12			Good		
1267	*Carya glabra*	Pignut Hickory	8			Fair		
1268	*Carya glabra*	Pignut Hickory	8	7.6		Fair		
1269	*Carya glabra*	Pignut Hickory	11			Fair		
1270	*Carya glabra*	Pignut Hickory	9			Fair		
1271	*Carya glabra*	Pignut Hickory	10			Fair		
1272	*Carya glabra*	Pignut Hickory	10			Fair		
1273	*Carya glabra*	Pignut Hickory	6			Fair		
1274	*Carya ovata*	Shagbark Hickory	13			Good		
1275	*Carya glabra*	Pignut Hickory	14			Good		
1276	*Carya glabra*	Pignut Hickory	9			Good		
1277	*Carya ovata*	Shagbark Hickory	9			Good		
1278	*Malus pumila*	Apple	15			Good		
1279	*Carya glabra*	Pignut Hickory	14			Good		
1280	*Carya glabra*	Pignut Hickory	23			Good		
1281	*Acer ginnala*	Amur Maple	12	8.1		Good		
1282	*Carya glabra*	Pignut Hickory	32			Good		
1283	*Quercus ellipsoidalis*	Northern Pin Oak	22			Fair		
1284	*Carya glabra*	Pignut Hickory	16			Fair		
1285	*Carya glabra*	Pignut Hickory	9			Fair		
1286	*Carya glabra*	Pignut Hickory	9			Fair		
1287	*Carya glabra*	Pignut Hickory	20			Fair		
1288	*Carya glabra*	Pignut Hickory	11			Fair		
1289	*Juniperus virginiana*	Red Cedar	7			Good		
1290	*Juniperus virginiana*	Red Cedar	8			Good		
1291	*Juglans nigra*	Black Walnut	14			Good		
1292	*Juglans nigra*	Black Walnut	17			Good		
1293	*Juglans nigra*	Black Walnut	7			Good		
1294	*Carya glabra*	Pignut Hickory	32			Good		
1295	*Quercus ellipsoidalis*	Northern Pin Oak	13			Fair		
1296	*Quercus alba*	White Oak	9			Poor		
1297	*Carya glabra*	Pignut Hickory	7			Fair		
1298	*Juniperus virginiana*	Red Cedar	8			Good		
1299	*Quercus alba*	White Oak	7			Poor		
1300	*Quercus alba*	White Oak	8			Poor		
1301	*Quercus alba*	White Oak	7			Fair		
1302	*Prunus serotina*	Black Cherry	7			Fair		
1303	*Quercus ellipsoidalis*	Northern Pin Oak	26			Fair		
1304	*Prunus serotina*	Black Cherry	7			Fair		
1305	*Quercus alba*	White Oak	45			Good		
1306	*Carya glabra*	Pignut Hickory	27			Good		
1307	*Malus pumila*	Apple	9			Good		
1307	*Prunus serotina*	Black Cherry	20			Good		
1308	*Rhamnus cathartica*	Common buckthorn	11			Good		
1309	*Quercus ellipsoidalis*	Northern Pin Oak	16			Fair		
1310	*Quercus ellipsoidalis*	Northern Pin Oak	7			Very Poor		
1311	*Carya glabra*	Pignut Hickory	16			Fair		
1312	*Carya glabra*	Pignut Hickory	24			Fair		
1313	*Carya glabra*	Pignut Hickory	7			Fair		
1314	*Carya glabra*	Pignut Hickory	15			Fair		
1315	*Prunus serotina*	Black Cherry	26			Good		
1316	*Carya glabra*	Pignut Hickory	13	11.9	11.3	Fair		
1317	*Quercus ellipsoidalis*	Northern Pin Oak	20			Good		
1318	*Prunus serotina*	Black Cherry	19			Good		
1319	*Juniperus virginiana*	Red Cedar	13			Good		
1320	*Juglans nigra*	Black Walnut	7			Fair		
1321	*Prunus serotina*	Black Cherry	8			Fair		
1322	*Quercus alba*	White Oak	12			Fair		
1323	*Prunus serotina*	Black Cherry	6			Fair		
1324	*Juniperus virginiana*	Red Cedar	7			Good		
1325	*Prunus serotina*	Black Cherry	17			Fair		
1326	*Juniperus virginiana*	Red Cedar	11			Good		
1327	*Malus pumila*	Apple	26			Good		
1328	*Acer ginnala*	Amur Maple	18			Good		
1329	*Juniperus virginiana*	Red Cedar	6			Fair		
1330	*Acer platanoides*	Norway Maple	13			Good		
1331	*Prunus serotina*	Black Cherry	13			Fair		
1332	*Prunus serotina*	Black Cherry	10			Fair		
1333	*Acer negundo*	Boxelder	7			Poor		
1334	*Quercus ellipsoidalis*	Northern Pin Oak	8			Poor		
1335	*Quercus ellipsoidalis*	Northern Pin Oak	24			Fair		
1336	*Carya glabra*	Pignut Hickory	7			Fair		
1337	*Carya ovata*	Shagbark Hickory	14			Fair		
1338	*Carya glabra*	Pignut Hickory	6			Fair		
1339	*Carya glabra*	Pignut Hickory	9			Good		
1340	*Carya glabra*	Pignut Hickory	7			Fair		
1341	*Carya glabra*	Pignut Hickory	16			Fair		
1342	*Carya glabra*	Pignut Hickory	8			Good		
1343	*Quercus ellipsoidalis*	Northern Pin Oak	25			Fair		
1344	*Carya glabra*	Pignut Hickory	10			Good		
1345	*Carya glabra*	Pignut Hickory	9			Good		
1346	*Malus pumila*	Apple	10			Fair		
1347	*Carya glabra*	Pignut Hickory	14			Good		
1348	*Carya glabra*	Pignut Hickory	6			Fair		
1349	*Quercus ellipsoidalis*	Northern Pin Oak	16			Fair		
1350	*Carya glabra*	Pignut Hickory	9			Fair		
1351	*Carya glabra*	Pignut Hickory	7			Fair		
1352	*Carya glabra*	Pignut Hickory	12			Fair		
1353	*Carya glabra*	Pignut Hickory	11			Fair		
1354	*Malus pumila*	Apple	7			Good		
1355	*Malus pumila*	Apple	7			Good		
1356	*Malus pumila*	Apple	9	8.7		Good		
1357	*Juniperus virginiana*	Red Cedar	13			Good		
1358	*Malus pumila*	Apple	7			Good		
1359	*Acer negundo*	Boxelder	10			Fair		
1360	*Acer negundo*	Boxelder	9			Fair		
1361	*Acer negundo*	Boxelder	9			Fair		
1362	*Robinia pseudoacacia*	Black Locust	11	11.0	9.0	Fair		
1363	*Robinia pseudoacacia*	Black Locust	14			Fair		
1364	*Juglans nigra*	Black Walnut	6			Fair		
1365	*Robinia pseudoacacia*	Black Locust	9			Fair		
1366	*Acer negundo*	Boxelder	7			Fair		
1367	*Juglans nigra*	Black Walnut	6			Poor		
1368	*Quercus ellipsoidalis*	Northern Pin Oak	36			Good		
1369	*Acer negundo*	Boxelder	15			Good		
1370	*Acer negundo*	Boxelder	24			Fair		
1371	*Acer negundo*	Boxelder	15			Fair		
1372	*Juglans nigra*	Black Walnut	11			Fair		
1373	*Acer negundo*	Boxelder	10	9.4	7.0	Poor		
1374	*Acer negundo*	Boxelder	8			Poor		
1375	*Juglans nigra*	Black Walnut	7			Good		
1376	*Acer negundo*	Boxelder	11	7.7		Fair		
1377	*Prunus serotina*	Black Cherry	12			Good		
1378	*Acer negundo*	Boxelder	10			Good		
1379	*Juglans nigra*	Black Willow	37			Poor		
1380	*Acer negundo*	Boxelder	10			Fair		
1381	*Prunus serotina*	Black Cherry	24			Fair		
1382	*Ulmus americana*	American Elm	6			Good		
1383	*Acer negundo*	Boxelder	32			Fair		
1384	*Acer negundo*	Boxelder	8	7.4		Fair		
1385	*Acer negundo*	Boxelder	6			Fair		
1386	*Acer negundo*	Boxelder	7			Fair		
1387	*Robinia pseudoacacia*	Black Locust	15			Fair		
1388	*Robinia pseudoacacia*	Black Locust	8			Fair		
1389	*Acer negundo*	Boxelder	9			Fair		
1390	*Acer negundo*	Boxelder	7			Fair		
1391	*Acer negundo*	Boxelder	9	7.5		Fair		X
1392	*Acer negundo*	Boxelder	7			Fair		X
1393	*Acer negundo*	Boxelder	7			Fair		X
1394	*Acer negundo*	Boxelder	7			Fair		X
1395	*Robinia pseudoacacia*	Black Locust	10			Fair		X
1396	*Robinia pseudoacacia*	Black Locust	8	7.5		Fair		X
1397	*Acer negundo*	Boxelder	7	6.8		Poor		X
1398	*Acer negundo*	Boxelder	10	8.0		Fair		X
1399	*Robinia pseudoacacia*	Black Locust	18			Fair		
1400	*Acer negundo*	Boxelder	9			Fair		
1401	*Acer negundo*	Boxelder	9			Fair		
1402	*Acer negundo*	Boxelder	12			Fair		
1403	*Ulmus americana*	American Elm	7			Poor		
1404	*Acer negundo*	Boxelder	29			Fair		
1405	*Acer negundo*	Boxelder	11			Fair		
1406	*Acer negundo*	Boxelder	11	10.1		Fair		
1407	*Acer negundo*	Boxelder	30			Fair		
1408	*Acer negundo*	Boxelder	8			Fair		
1409	*Quercus ellipsoidalis*	Northern Pin Oak	14			Poor		X
1410	*Quercus ellipsoidalis*	Northern Pin Oak	8			Fair		X
1411	*Acer negundo*	Boxelder	9			Fair		X
1412	*Acer negundo*	Boxelder	8			Fair		X
1413	*Acer negundo*	Boxelder	8			Fair		X
1414	*Acer negundo*	Boxelder	11			Fair		X
1415	*Acer negundo*	Boxelder	6			Fair		X
1416	*Acer negundo*	Boxelder	7			Poor		X
1417	*Malus pumila*	Apple	7			Good		X
1418	*Prunus serotina*	Black Cherry	26			Good		X
1419	*Quercus ellipsoidalis*	Northern Pin Oak	7			Fair		X
1420	*Quercus velutina*	Black Oak	13			Good		X
1421	*Prunus serotina*	Black Cherry	9			Good		X
1422	*Juniperus virginiana*	Red Cedar	8			Fair		X
1423	*Malus pumila*	Apple	8			Fair		X
1424	*Quercus ellipsoidalis*	Northern Pin Oak	11			Good		X
1425	*Prunus serotina*	Black Cherry	14			Good		X
1426	*Prunus serotina*	Black Cherry	12			Fair		
1427	*Juniperus virginiana*	Red Cedar	7			Fair		
1428	*Juniperus virginiana*	Red Cedar	14			Good		
1429	*Quercus ellipsoidalis*	Northern Pin Oak	10			Fair		
1430	*Quercus ellipsoidalis*	Northern Pin Oak	18			Fair		
1431	*Prunus serotina*	Black Cherry	10			Fair		
1432	*Quercus ellipsoidalis*	Northern Pin Oak	8			Good		
1433	*Prunus serotina*	Black Cherry	13			Fair		
1434	*Quercus ellipsoidalis*	Northern Pin Oak	19			Good		
1435	*Quercus ellipsoidalis*	Northern Pin Oak	18			Good		
1436	*Quercus ellipsoidalis*	Northern Pin Oak	10			Fair		
1437	*Prunus serotina*	Black Cherry	12			Poor		
1438	*Quercus ellipsoidalis*	Northern Pin Oak	20			Fair		
1439	*Quercus ellipsoidalis*	Northern Pin Oak	36			Fair		
1440	*Prunus serotina*	Black Cherry	16			Fair		
1441	*Prunus serotina*	Black Cherry	7			Fair		
1442	*Prunus serotina*	Black Cherry	25			Fair		
1443	*Carya glabra*	Pignut Hickory	9			Good		
1444	*Carya glabra*	Pignut Hickory	12			Good		
1445	*Prunus serotina*	Black Cherry	21			Fair		
1446	*Prunus serotina*	Black Cherry	11			Good		X
1447	*Juniperus virginiana*	Red Cedar	10			Good		X
1448	*Acer negundo*	Boxelder	9			Fair		X
1449	*Robinia pseudoacacia*	Black Locust	7			Fair		X
1450	*Carya glabra*	Pignut Hickory	35			Good		X
1451	*Acer negundo*	Boxelder	11			Fair		X
1452	*Acer negundo*	Boxelder	8			Fair		X
1453	*Acer negundo*	Boxelder	7			Fair		X
1454	*Quercus ellipsoidalis*	Northern Pin Oak	11			Fair		X
1455	*Acer negundo*	Boxelder	10			Fair		X
1456	*Morus alba*	White Mulberry	9			Fair		X
1457	*Acer negundo*	Boxelder	7			Fair		X
1458	*Acer negundo*	Boxelder	7			Fair		X
1459	*Acer negundo*	Boxelder	10			Fair		X
1460	*Acer negundo*	Boxelder	10			Fair		X
1461	*Acer negundo*	Boxelder	9			Fair		X
1462	*Prunus serotina*	Black Cherry	11			Good		X
1463	*Malus pumila*	Apple	8			Good		X
1464	*Malus pumila*	Apple	20	12.5		Good		X
1465	*Prunus serotina*	Black Cherry	18			Good		X
1466	*Juniperus virginiana*	Red Cedar	13			Good		X
1467	*Prunus serotina*	Black Cherry	14	13.0		Good		X
1468	*Malus pumila*	Apple	11			Good		X
1469	*Juniperus virginiana*	Red Cedar	12			Good		X
1470	*Juniperus virginiana*	Red Cedar	13			Good		X
1471	*Quercus ellipsoidalis*	Northern Pin Oak	13			Good		X
1472	*Malus pumila*	Apple	11			Good		X
1473	*Juniperus virginiana*	Red Cedar	9			Good		X
1474	*Juniperus virginiana*	Red Cedar	14			Good		X
1475	*Juniperus virginiana*	Red Cedar	10			Fair		X
1476	*Quercus ellipsoidalis*	Northern Pin Oak	12			Fair		X
1477	*Prunus serotina*	Black Cherry	18			Good		X
1478	*Malus pumila*	Apple	11			Good		X
1479	*Prunus serotina*	Black Cherry	9			Good		X
1480	*Prunus serotina*	Black Cherry	16			Good		X
1481	*Juniperus virginiana*	Red Cedar	14			Good		X
1482	*Quercus ellipsoidalis*	Northern Pin Oak	24			Good		
1483	*Malus pumila*	Apple	6			Fair		X
1484	*Quercus ellipsoidalis*	Northern Pin Oak	21			Good		X
1485	*Prunus serotina*	Black Cherry	16			Good		X
1486	*Salix alba*	White Willow	15			Good		
1487	*Prunus serotina*	Black Cherry	17			Good		
1488	*Malus pumila*	Apple	11			Fair		
1489	*Salix alba*	White Willow	13			Good		
1490	*Juniperus virginiana*	Red Cedar	11			Good		
1491	*Prunus serotina*	Black Cherry	12			Good		X
1492	*Prunus serotina*	Black Cherry	10			Good		X
1493	*Juniperus virginiana*	Red Cedar	14			Good		X
1494	*Carya glabra*	Pignut Hickory	10			Good		X
1495	*Juniperus virginiana*	Red Cedar	11			Good		
1496	*Quercus ellipsoidalis*	Northern Pin Oak	19			Good		
1497	*Quercus ellipsoidalis*	Northern Pin Oak	10			Good		
1498	*Quercus ellipsoidalis*	Northern Pin Oak	16			Good		
1499	*Juniperus virginiana*	Red Cedar	13			Good		
1500	*Salix alba*	White Willow	11			Good		
1501	*Amelanchier arborea*	Juneberry	10	9.0		Good		
1502	*Juniperus virginiana*	Red Cedar	8			Good		
1503	*Quercus ellipsoidalis*	Northern Pin Oak	8			Good		
1504	*Prunus serotina*	Black Cherry	23			Good		
1505	*Prunus serotina*	Black Cherry	15			Fair		
1506	*Carya glabra*	Pignut Hickory	9			Good		
1507	*Prunus serotina*	Black Cherry	6			Fair		
1508	*Salix alba*	White Willow	10			Good		
1509	*Salix discolor*	Pussy Willow	7			Fair		
1510	*Malus pumila*	Apple	11			Good		X
1511	*Malus pumila*	Apple	10	7.6		Good		X
1512	*Prunus serotina*	Black Cherry	21			Fair		X
1513	*Quercus ellipsoidalis*	Northern Pin Oak	13			Fair		X
1514	*Juniperus virginiana*	Red Cedar	8			Good		X
1515	*Malus pumila*	Apple	11			Good		X
1516	*Prunus serotina*	Black Cherry	14			Good		X
1517	*Juniperus virginiana*	Red Cedar	9			Good		X
1518	*Malus pumila*	Apple	8			Good		X
1519	*Prunus serotina*	Black Cherry	8			Good		X
1520	*Juniperus virginiana*	Red Cedar	13			Good		X
1521	*Prunus serotina*	Black Cherry	10			Good		X
1522	*Malus pumila*	Apple	12			Good		X
1523	*Juniperus virginiana*	Red Cedar	6			Fair		X
1524	*Juniperus virginiana*	Red Cedar	8			Fair		X
1525	*Prunus serotina*	Black Cherry	17			Fair		X
1526	*Malus pumila*	Apple	8			Fair		X
1527	*Prunus serotina*	Black Cherry	18			Fair		X
1528	*Malus pumila*	Apple	8			Good		X
1529	*Prunus serotina*	Black Cherry	15			Good		X
1530	*Prunus serotina*	Black Cherry	7			Good		X
1531	*Quercus ellipsoidalis*	Northern Pin Oak	16			Good		X
1532	*Juniperus virginiana*	Red Cedar	9			Fair		X
1533	*Juniperus virginiana*	Red Cedar	10			Good		X
1534	*Prunus serotina*	Black Cherry	11			Fair		X
1535	*Acer rubrum*	Red Maple	29			Fair		X
1536	*Quercus ellipsoidalis*	Northern Pin Oak	22			Good		X
1537	*Quercus ellipsoidalis*	Northern Pin Oak	16			Fair		X
1538	*Quercus ellipsoidalis*	Northern Pin Oak	14			Fair		X
1539	*Juniperus virginiana*	Red Cedar	8			Fair		X
1540	*Juniperus virginiana*	Red Cedar	10			Fair		X
1541	*Quercus ellipsoidalis*	Northern Pin Oak	11			Poor		
1542	*Quercus ellipsoidalis*	Northern Pin Oak	25			Fair		
1543	*Quercus ellipsoidalis*	Northern Pin Oak	18			Fair		
1544	*Prunus serotina*	Black Cherry	9			Fair		
1545	*Quercus ellipsoidalis*	Northern Pin Oak	15			Fair		
1546	*Quercus ellipsoidalis*	Northern Pin Oak	16			Fair		
1547	*Quercus ellipsoidalis*	Northern Pin Oak	25			Fair		
1548	*Juniperus virginiana*	Red Cedar	15			Good		
1549	*Quercus ellipsoidalis*	Northern Pin Oak	16			Fair		
1550	*Prunus serotina*	Black Cherry	14			Good		
1551	*Juniperus virginiana*	Red Cedar	8			Good		
1552	*Prunus serotina*	Black Cherry	10			Good		X
1553	*Juniperus virginiana*	Red Cedar	9			Good		X
1554	*Juniperus virginiana*	Red Cedar	9			Good		X
1555	*Juniperus virginiana*	Red Cedar	6			Good		X
1556	*Juniperus virginiana*	Red Cedar	7			Good		X
1557	*Prunus serotina*	Black Cherry	8			Good		
1558	*Prunus serotina*	Black Cherry	11			Good		
1559	*Acer rubrum*	Red Maple	28			Good		
1560	*Prunus serotina*	Black Cherry	10			Good		
1561	*Prunus serotina*	Black Cherry	8			Fair		
1562	*Quercus ellipsoidalis*	Northern Pin Oak	22			Good		X
1563	*Quercus ellipsoidalis*	Northern Pin Oak	7			Good		
1564	*Prunus serotina*	Black Cherry	7			Poor		
1565	*Prunus serotina*	Black Cherry	10			Good		
1566	*Prunus serotina*	Black Cherry	7			Good		
1567	*Juniperus virginiana*	Red Cedar	15			Fair		X
1568	*Ulmus americana*	American Elm	9			Fair		X
1569	*Juniperus virginiana*	Red Cedar	10			Fair		X
1570	*Ulmus americana*	American Elm	6			Fair		X
1571	*Prunus serotina*	Black Cherry	14			Fair		X
1572	*Juniperus virginiana*	Red Cedar	13			Fair		X
1573	*Prunus serotina*	Black Cherry	24			Good		X
1574	*Pinus sylvestris*	Scotch Pine	18			Fair		X
1575	*Prunus serotina*	Black Cherry	16			Fair		X
1576	*Prunus serotina*	Black Cherry	19			Good		X
1577	*Prunus serotina*	Black Cherry	15			Good		X
1578	*Quercus ellipsoidalis*	Northern Pin Oak	10			Fair		X
1578	*Juniperus virginiana*	Red Cedar	13			Fair		X
1579	*Quercus ellipsoidalis*	Northern Pin Oak	9			Fair		X
1580	*Quercus ellipsoidalis*	Northern Pin Oak	16			Fair		X
1581	*Malus pumila*	Apple	7			Poor		X
1582	*Prunus serotina*	Black Cherry	7			Fair		X
1583	*Carya glabra*	Pignut Hickory	8			Good		X
1584	*Prunus serotina*	Black Cherry	10			Good		X
1585	*Juniperus virginiana*	Red Cedar	11			Good		X
1586	*Juniperus virginiana*	Red Cedar	12			Good		X
1587	*Carya glabra*	Pignut Hickory	12			Fair		X
1588	*Carya glabra*	Pignut Hickory	14			Fair		X
1589	*Quercus ellipsoidalis*	Northern Pin Oak	11			Fair		X
1590	*Malus pumila*	Apple	13			Fair		X
1591	*Carya glabra*	Pignut Hickory	16			Good		X
1592	*Carya glabra*	Pignut Hickory	7			Fair		X
1593	*Prunus serotina*	Black Cherry	7			Good		X
1594	*Quercus rubra*	Red Oak	13			Fair		X
1595	*Prunus serotina*	Black Cherry	7			Good		X
1596	*Prunus serotina*	Black Cherry	12			Fair		
1597	*Quercus rubra*	Red Oak	9			Poor		
1598	*Quercus ellipsoidalis*	Northern Pin Oak	18			Fair		
1599	*Quercus ellipsoidalis*	Northern Pin Oak	18			Fair		
1600	*Quercus ellipsoidalis*	Northern Pin Oak	14			Fair		
1601	*Quercus rubra*	Red Oak	11			Fair		X
1602	*Quercus rubra*	Red Oak	9			Poor		X
1603	*Quercus rubra*	Red Oak	8			Fair		X
1604	*Quercus rubra*	Red Oak	6			Poor		X
1605	*Quercus rubra*	Red Oak	9			Fair		X
1606	*Quercus rubra*	Red Oak	6			Poor		X
1607	*Quercus rubra*	Red Oak	9			Fair		X
1608	*Quercus rubra*	Red Oak	8			Poor		X
1609	*Carya ovata*	Shagbark Hickory	23			Good		X
1610	*Quercus rubra*	Red Oak	7			Poor		X
1611	*Quercus rubra*	Red Oak	11			Fair		X
1612	*Quercus rubra*	Red Oak	8			Poor		X
1613	*Quercus rubra*	Red Oak	7			Poor		X
1614	*Quercus rubra*	Red Oak	8			Poor		X
1615	*Quercus rubra*	Red Oak	8			Very Poor		X
1616	*Quercus rubra*	Red Oak	12			Poor		X
1617	*Quercus rubra*	Red Oak	11			Poor		X
1618	*Quercus rubra*	Red Oak	8			Poor		X
1619	*Quercus rubra*	Red Oak	7			Poor		X
1620	*Quercus rubra*	Red Oak	12			Poor		X
1621	*Quercus rubra*	Red Oak	12			Poor		X
1622	*Quercus rubra*	Red Oak	6			Poor		X
1623	*Quercus spp.*	Oak	7			Poor		X
1624	*Quercus rubra*	Red Oak	8			Very Poor		X
1625	*Quercus rubra*	Red Oak	6			Poor		X
1626	*Quercus rubra*	Red Oak	7			Poor		X
1627	*Quercus rubra*	Red Oak	7			Poor		X
1628	*Quercus rubra*	Red Oak	8			Poor		X
1629	*Quercus rubra*	Red Oak	9			Good		X
1630	*Quercus rubra*	Red Oak	8			Fair		X
1631	*Quercus rubra*	Red Oak	9			Fair		X
1632	*Prunus serotina*	Black Cherry	7			Good		X
1633	*Quercus alba*	White Oak	25			Very Poor		X
1634	*Carya spp.*	Hickory	19			Very Poor		X
1635	*Quercus spp.*	Oak	6			Very Poor		X
1636	*Quercus rubra*	Red Oak	8			Fair		X
1637	*Quercus rubra*	Red Oak	8			Fair		X
1638	*Quercus spp.*	Oak	17			Fair		X
1639	*Quercus rubra*	Red Oak	8			Fair		X
1640	*Quercus velutina*	Black Oak	7			Fair		X
1641	*Quercus spp.*	Oak	10			Poor		X
1642	*Quercus spp.*	Oak	11			Poor		X
1643	*Quercus spp.*	Oak	8			Poor		X
1644	*Quercus rubra*	Red Oak	9			Poor		X
1645	*Quercus rubra*	Red Oak	8			Poor		X
1646	*Quercus rubra*	Red Oak	7			Fair		X
1647	*Quercus rubra*	Red Oak	8			Fair		X
1648	*Quercus spp.*	Oak	9			Fair		X
1649	*Quercus rubra*	Red Oak	7			Fair		X
1650	*Quercus rubra*	Red Oak	6			Fair		X
1651	*Quercus rubra*	Red Oak	9			Poor		X
1652	*Quercus rubra*	Red Oak	9			Poor		X
1653	*Quercus rubra*	Red Oak	11			Fair		X
1654	*Quercus rubra*	Red Oak	11			Fair		X
1655	*Quercus spp.*	Oak	11			Fair		X
1656	*Quercus rubra*	Red Oak	7			Fair		X
1657	*Quercus rubra*	Red Oak	8			Fair		X
1658	*Quercus rubra*	Red Oak	6			Poor		X
1659	*Quercus rubra*	Red Oak	6			Poor		X
1660	*Quercus rubra*	Red Oak	11			Fair		X
1661	*Quercus alba*	White Oak	27			Fair		
1662	*Quercus alba*	White Oak	29			Fair		
1663	*Robinia pseudoacacia*	Black Locust	7			Very Poor		
1664	*Robinia pseudoacacia*	Black Locust	10			Poor		
1665	*Robinia pseudoacacia*	Black Locust	8			Poor		X
1666	*Robinia pseudoacacia*	Black Locust	9	8.4		Fair		X
1666	*Robinia pseudoacacia*	Black Locust	7			Poor		X
1667	*Robinia pseudoacacia*	Black Locust	12			Poor		X
1669	*Robinia pseudoacacia*	Black Locust	8			Fair		X
1670	*Robinia pseudoacacia*	Black Locust	10			Poor		X
1671	*Robinia pseudoacacia*	Black Locust	11			Very Poor		
1672	*Robinia pseudoacacia*	Black Locust	8			Poor		
1673	*Robinia pseudoacacia*	Black Locust	10			Very Poor		X
1674	*Robinia pseudoacacia*	Black Locust	8	6.7		Very Poor		
1675	*Robinia pseudoacacia*	Black Locust	8			Very Poor		
1676	*Robinia pseudoacacia*	Black Locust	7			Very Poor		
1677	*Robinia pseudoacacia*	Black Locust	10			Very Poor		X
1678	*Robinia pseudoacacia*	Black Locust	11			Poor		X
1679	*Robinia pseudoacacia*	Black Locust	8			Poor		X
1680	*Robinia pseudoacacia*	Black Locust	8			Very Poor		X
1681	*Robinia pseudoacacia*	Black Locust	9			Poor		X
1682	*Robinia pseudoacacia*	Black Locust	7			Very Poor		
1683	*Robinia pseudoacacia*	Black Locust	8			Poor		
1684	*Robinia pseudoacacia*	Black Locust	8	8.2		Fair		
1685	*Robinia pseudoacacia*	Black Locust	8			Poor		X
1686	*Robinia pseudoacacia*	Black Locust	8			Poor		
1687	*Robinia pseudoacacia*	Black Locust	8			Very Poor		
1688	*Robinia pseudoacacia*	Black Locust	6			Very Poor		
1689	*Robinia pseudoacacia*	Black Locust	9			Very Poor		
1690	*Robinia pseudoacacia*	Black Locust	7			Very Poor		
1691	*Robinia pseudoacacia*	Black Locust	10			Poor		
1692	*Robinia pseudoacacia*	Black Locust	6			Poor		
1693	*Robinia pseudoacacia*	Black Locust	9			Poor		X
1694	*Robinia pseudoacacia*	Black Locust	11			Poor		X
1695	*Robinia pseudoacacia*	Black Locust	11			Poor		
1696	*Robinia pseudoacacia*	Black Locust	7			Poor		
1697	*Robinia pseudoacacia*	Black Locust	7			Very Poor		
1698	*Robinia pseudoacacia*	Black Locust	10			Very Poor		
1699	*Robinia pseudoacacia*	Black Locust	7			Very Poor		
1700	*Robinia pseudoacacia*	Black Locust	7			Very Poor		
1701	*Robinia pseudoacacia*	Black Locust	11			Fair		
1702	*Robinia pseudoacacia*	Black Locust	7			Fair		
1703	*Robinia pseudoacacia*	Black Locust	8			Poor		
1705	*Robinia pseudoacacia*	Black Locust	6			Poor		X
1706	*Robinia pseudoacacia*	Black Locust	7			Poor		
1707	*Robinia pseudoacacia*	Black Locust	9			Poor		
1708	*Robinia pseudoacacia*	Black Locust	8			Poor		
1709	*Robinia pseudoacacia*	Black Locust	7			Fair		
1710	*Robinia pseudoacacia*	Black Locust	7			Very Poor		
1711	*Robinia pseudoacacia*	Black Locust	9			Very Poor		
1712	*Acer negundo*	Boxelder	8			Fair		
1713	*Robinia pseudoacacia*	Black Locust	7			Very Poor		
1714	*Robinia pseudoacacia*	Black Locust	6			Poor		
1715	*Robinia pseudoacacia*	Black Locust	7			Poor		
1716	*Robinia pseudoacacia*	Black Locust	11			Poor		
1717	*Robinia pseudoacacia*	Black Locust	13			Poor		
1718	*Robinia pseudoacacia*	Black Locust	10			Good		
1719	*Robinia pseudoacacia*	Black Locust	14			Poor		
1720	*Robinia pseudoacacia*	Black Locust	7			Fair		
1721	*Robinia pseudoacacia*	Black Locust	12			Poor		
1722	*Robinia pseudoacacia*	Black Locust	11			Fair		
1724	*Robinia pseudoacacia*	Black Locust	7			Very Poor		
1726	*Robinia pseudoacacia*	Black Locust	11			Fair		
1727	*Robinia pseudoacacia*	Black Locust	11			Fair		
1728	*Robinia pseudoacacia*	Black Locust	7			Fair		
1729	*Robinia pseudoacacia*	Black Locust	6			Fair		
1730	*Robinia pseudoacacia*	Black Locust	8			Fair		
1731	*Robinia pseudoacacia*	Black Locust	11			Fair		
1732	*Robinia pseudoacacia*	Black Locust	9			Fair		
1733	*Robinia pseudoacacia*	Black Locust	12			Poor		
1734	*Robinia pseudoacacia*	Black Locust	7			Poor		X
1735	*Robinia pseudoacacia*	Black Locust	11			Poor		X
1736	*Robinia pseudoacacia*	Black Locust	7			Poor		X
1737	*Robinia pseudoacacia*	Black Locust	19			Fair		
1739	*Robinia pseudoacacia*	Black Locust	6			Poor		X
1740	*Robinia pseudoacacia*	Black Locust	7			Poor		X
1741	*Robinia pseudoacacia*	Black Locust	7			Very Poor		X
1742	*Robinia pseudoacacia*	Black Locust	6			Very Poor		X
1743	*Prunus spp.*	Cherry	8			Good		
1744	*Robinia pseudoacacia*	Black Locust	9			Very Poor		
1745	*Robinia pseudoacacia*	Black Locust	6			Very Poor		
1746	*Robinia pseudoacacia*	Black Locust	12			Fair		
1747	*Carya ovata*	Shagbark Hickory	15			Fair		X
1748	*Carya ovata*	Shagbark Hickory	17			Fair		X
1749	*Robinia pseudoacacia*	Black Locust	12			Fair		X
1750	*Carya ovata*	Shagbark Hickory	9			Fair		X
1751	*Malus pumila*	Apple	19			Fair		X
1752	*Juniperus virginiana*	Red Cedar	7			Fair		X
1753	*Carya ovata*	Shagbark Hickory	10			Fair		X
1754	*Malus pumila*	Apple	11			Fair		X
1755	*Prunus serotina*	Black Cherry	14			Fair		X
1756	*Prunus serotina*	Black Cherry	28			Fair		X
1757	*Carya ovata*	Shagbark Hickory	19			Good		X
1758	*Malus pumila*	Apple	11			Fair		X
1759	*Prunus serotina*	Black Cherry	10			Fair		X
1760	*Prunus serotina*	Black Cherry	27			Poor		X
1761	*Quercus rubra*	Red Oak	7			Fair		X
1762	*Prunus serotina*	Black Cherry	21			Fair		X
1763	*Prunus serotina*	Black Cherry	27			Fair		X
1764	*Prunus serotina*	Black Cherry	10			Fair		X
1765	*Prunus serotina*	Black Cherry	7			Fair		X
1766	*Malus pumila*	Apple	13			Fair		X
1767	*Malus pumila*	Apple	11			Fair		X
1768	*Prunus serotina*	Black Cherry	14	6.2		Fair		X
1769	*Quercus ellipsoidalis*	Northern Pin Oak	7			Fair		X
1770	*Prunus serotina*	Black Cherry	10			Fair		X
1771	*Prunus serotina*	Black Cherry	13			Fair		X
1772	*Quercus ellipsoidalis*	Northern Pin Oak	7			Fair		X
1773	*Malus pumila*	Apple	19			Fair		X
1774	*Quercus ellipsoidalis*	Northern Pin Oak	14			Fair		X
1775	*Malus pumila*	Apple	7			Dead		X
1776	*Malus pumila*	Apple	8			Fair		X
1777	*Prunus serotina*	Black Cherry	10			Fair		X
1778	*Prunus serotina*	Black Cherry	7			Poor		X
1779	*Prunus serotina*	Black Cherry	13			Fair		X
1780	*Malus pumila*	Apple	8			Fair		X
1781	*Juniperus virginiana*	Red Cedar	7			Fair		X
1782	*Prunus serotina*	Black Cherry	7			Fair		X
1783	*Malus pumila*	Apple	14			Fair		X
1784	*Malus pumila*	Apple	12			Fair		X
1785	*Juniperus virginiana*	Red Cedar	12			Fair		X
1786	*Quercus ellipsoidalis*	Northern Pin Oak	6			Fair		X
1787	*Prunus serotina*	Black Cherry	14			Fair		X
1788	*Prunus serotina*	Black Cherry	16			Fair		X
1789	*Prunus serotina*	Black Cherry	12			Fair		X
1790	*Prunus serotina*	Black Cherry	11			Fair		X
1791	*Juniperus virginiana*	Red Cedar	8			Fair		X
1792	*Juniperus virginiana*	Red Cedar	7			Fair		X

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Surveying • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE
OPEN SPACE PUD DEVELOPMENT
TREE LIST 2

15

DATE: 8/29/18
SHEET 15 OF 19
CADD:
ENG: JCA, TPH
PM: RCW
TECH:
18037EX2.dwg

REVISIONS:
PER TOWNSHIP COMMENTS 11/19/18
PER TOWNSHIP COMMENTS 12/10/18

JOB No. 18037

M:\Civil3d_Proj\18037\Preliminary Site Plan\18037EX2.dwg, 12/7/2018 4:37 PM, Ted P. Hirsch, TREE LIST2, MCLLC PDF.pc3

1793	*Juniperus virginiana*	Red Cedar	9			Fair		X
1794	*Juniperus virginiana*	Red Cedar	9			Fair		X
1795	*Prunus serotina*	Black Cherry	10			Fair		X
1796	*Juniperus virginiana*	Red Cedar	10			Fair		X
1797	*Juniperus virginiana*	Red Cedar	12			Fair		X
1798	*Juniperus virginiana*	Red Cedar	8			Fair		X
1799	*Juniperus virginiana*	Red Cedar	11			Fair		X
1800	*Quercus ellipsoidalis*	Northern Pin Oak	17			Fair		X
1801	*Juniperus virginiana*	Red Cedar	12			Fair		X
1802	*Malus pumila*	Apple	21			Fair		X
1803	*Juniperus virginiana*	Red Cedar	7			Fair		X
1805	*Juniperus virginiana*	Red Cedar	13			Fair		X
1806	*Juniperus virginiana*	Red Cedar	11			Fair		X
1807	*Prunus serotina*	Black Cherry	9			Fair		X
1808	*Prunus serotina*	Black Cherry	9			Fair		X
1809	*Juniperus virginiana*	Red Cedar	16			Fair		X
1810	*Malus pumila*	Apple	11			Fair		X
1811	*Malus pumila*	Apple	12			Fair		X
1812	*Malus pumila*	Apple	12			Fair		X
1813	*Robinia pseudoacacia*	Black Locust	13			Fair		X
1814	*Malus pumila*	Apple	16			Dead		X
1815	*Malus pumila*	Apple	12			Fair		X
1816	*Malus pumila*	Apple	9	6.6		Fair		X
1817	*Malus pumila*	Apple	7			Fair		X
1818	*Prunus serotina*	Black Cherry	14			Fair		X
1819	*Prunus serotina*	Black Cherry	8			Fair		X
1820	*Prunus serotina*	Black Cherry	7			Fair		X
1821	*Juniperus virginiana*	Red Cedar	12			Fair		X
1822	*Quercus ellipsoidalis*	Northern Pin Oak	9			Fair		X
1823	*Juniperus virginiana*	Red Cedar	9			Fair		X
1824	*Quercus ellipsoidalis*	Northern Pin Oak	10			Fair		X
1825	*Malus pumila*	Apple	16			Fair		X
1826	*Juniperus virginiana*	Red Cedar	8			Fair		X
1827	*Prunus serotina*	Black Cherry	26			Fair		X
1828	*Quercus ellipsoidalis*	Northern Pin Oak	23			Fair		X
1829	*Acer negundo*	Boxelder	17	9.9		Fair		X
1830	*Malus pumila*	Apple	14			Fair		X
1831	*Malus pumila*	Apple	12			Fair		X
1832	*Malus pumila*	Apple	13			Fair		X
1833	*Prunus serotina*	Black Cherry	9			Fair		X
1834	*Juniperus virginiana*	Red Cedar	9			Fair		X
1835	*Malus pumila*	Apple	11			Fair		X
1836	*Juniperus virginiana*	Red Cedar	7			Fair		X
1838	*Malus pumila*	Apple	13			Good		X
1839	*Malus pumila*	Apple	11			Good		X
1840	*Malus pumila*	Apple	24			Good		X
1841	*Malus pumila*	Apple	6			Poor		X
1842	*Malus pumila*	Apple	6			Good		X
1843	*Prunus serotina*	Black Cherry	11			Good		X
1844	*Prunus serotina*	Black Cherry	7			Good		X
1845	*Prunus serotina*	Black Cherry	13			Good		X
1846	*Prunus serotina*	Black Cherry	7			Good		X
1847	*Prunus serotina*	Black Cherry	8			Good		X
1848	*Prunus serotina*	Black Cherry	8			Good		X
1849	*Malus pumila*	Apple	7			Fair		X
1850	*Prunus serotina*	Black Cherry	7			Fair		X
1851	*Juniperus virginiana*	Red Cedar	8			Fair		X
1852	*Prunus serotina*	Black Cherry	16			Fair		X
1853	*Juniperus virginiana*	Red Cedar	6			Fair		X
1854	*Juniperus virginiana*	Red Cedar	13			Good		X
1855	*Malus pumila*	Apple	13			Good		X
1856	*Juniperus virginiana*	Red Cedar	6			Poor		X
1857	*Malus pumila*	Apple	19	13.3		Fair		X
1858	*Prunus serotina*	Black Cherry	14			Fair		X
1859	*Prunus serotina*	Black Cherry	47			Poor		
1860	*Robinia pseudoacacia*	Black Locust	9			Fair		
1861	*Robinia pseudoacacia*	Black Locust	8			Fair		
1862	*Robinia pseudoacacia*	Black Locust	6			Fair		
1863	*Robinia pseudoacacia*	Black Locust	7			Fair		
1864	*Robinia pseudoacacia*	Black Locust	15			Good		
1865	*Robinia pseudoacacia*	Black Locust	15			Fair		
1866	*Robinia pseudoacacia*	Black Locust	6			Fair		
1867	*Robinia pseudoacacia*	Black Locust	17			Fair		
1868	*Robinia pseudoacacia*	Black Locust	22			Good		
1869	*Populus deltoides*	Cottonwood	17			Fair		
1870	*Robinia pseudoacacia*	Black Locust	9			Fair		
1871	*Robinia pseudoacacia*	Black Locust	12			Fair		
1872	*Prunus serotina*	Black Cherry	15			Good		
1873	*Carya glabra*	Pignut Hickory	13			Good		
1874	*Robinia pseudoacacia*	Black Locust	8			Fair		
1875	*Robinia pseudoacacia*	Black Locust	14			Fair		
1876	*Robinia pseudoacacia*	Black Locust	13			Fair		
1877	*Robinia pseudoacacia*	Black Locust	12			Fair		
1878	*Robinia pseudoacacia*	Black Locust	14			Poor		
1879	*Robinia pseudoacacia*	Black Locust	13			Fair		
1880	*Quercus velutina*	Black Oak	16			Poor		
1881	*Robinia pseudoacacia*	Black Locust	9			Fair		X
1882	*Robinia pseudoacacia*	Black Locust	7			Fair		X
1883	*Robinia pseudoacacia*	Black Locust	7			Fair		X
1884	*Robinia pseudoacacia*	Black Locust	7			Fair		X
1885	*Prunus serotina*	Black Cherry	16			Fair		X
1886	*Carya glabra*	Pignut Hickory	9			Good		X
1888	*Robinia pseudoacacia*	Black Locust	8			Fair		X
1888	*Prunus serotina*	Black Cherry	15			Good		
1889	*Prunus serotina*	Black Cherry	20			Fair		
1890	*Quercus rubra*	Red Oak	23			Fair		
1891	*Quercus velutina*	Black Oak	14			Poor		
1892	*Quercus velutina*	Black Oak	12			Fair		
1893	*Quercus velutina*	Black Oak	14			Fair		
1894	*Prunus serotina*	Black Cherry	11			Fair		X
1895	*Acer negundo*	Boxelder	9			Fair		X
1896	*Acer negundo*	Boxelder	13			Fair		X
1897	*Prunus serotina*	Black Cherry	17			Fair		X
1898	*Quercus ellipsoidalis*	Northern Pin Oak	11			Fair		X
1899	*Carya ovata*	Shagbark Hickory	10			Fair		X
1900	*Prunus serotina*	Black Cherry	20			Fair		X
1901	*Carya ovata*	Shagbark Hickory	6			Fair		X
1902	*Carya ovata*	Shagbark Hickory	6			Fair		X
1903	*Quercus ellipsoidalis*	Northern Pin Oak	7			Fair		X
1904	*Malus pumila*	Apple	11			Fair		X
1905	*Carya ovata*	Shagbark Hickory	9			Fair		X
1906	*Carya ovata*	Shagbark Hickory	9			Fair		X
1907	*Carya ovata*	Shagbark Hickory	8			Fair		X
1908	*Carya ovata*	Shagbark Hickory	14			Fair		X
1909	*Prunus serotina*	Black Cherry	10			Fair		X
1910	*Prunus serotina*	Black Cherry	12			Fair		X
1910	*Juniperus virginiana*	Red Cedar	15			Fair		X
1911	*Carya ovata*	Shagbark Hickory	6			Fair		X
1912	*Carya ovata*	Shagbark Hickory	9			Fair		X
1913	*Carya ovata*	Shagbark Hickory	8			Fair		X
1914	*Quercus ellipsoidalis*	Northern Pin Oak	10			Fair		X
1915	*Carya ovata*	Shagbark Hickory	8			Fair		X
1916	*Carya ovata*	Shagbark Hickory	8			Fair		X
1917	*Carya ovata*	Shagbark Hickory	6			Fair		X
1918	*Carya ovata*	Shagbark Hickory	10			Fair		X
1919	*Carya ovata*	Shagbark Hickory	9			Fair		X
1920	*Carya ovata*	Shagbark Hickory	7			Fair		X
1921	*Prunus serotina*	Black Cherry	7			Fair		X
1922	*Prunus serotina*	Black Cherry	11			Fair		X
1923	*Carya ovata*	Shagbark Hickory	32			Good		X
1924	*Morus alba*	White Mulberry	7			Fair		X
1925	*Carya ovata*	Shagbark Hickory	7			Fair		X
1926	*Carya ovata*	Shagbark Hickory	9			Fair		X
1927	*Carya ovata*	Shagbark Hickory	11			Fair		X
1928	*Carya ovata*	Shagbark Hickory	8			Fair		X
1929	*Carya ovata*	Shagbark Hickory	7			Fair		X
1930	*Carya ovata*	Shagbark Hickory	6			Fair		X
1931	*Malus pumila*	Apple	12			Fair		X
1932	*Malus pumila*	Apple	12			Fair		X
1933	*Juniperus virginiana*	Red Cedar	7			Fair		X
1934	*Carya ovata*	Shagbark Hickory	8			Fair		X
1935	*Carya ovata*	Shagbark Hickory	9			Fair		X
1936	*Carya ovata*	Shagbark Hickory	10	9.1		Fair		X
1937	*Carya ovata*	Shagbark Hickory	11			Fair		X
1938	*Prunus serotina*	Black Cherry	11			Fair		X
1939	*Carya ovata*	Shagbark Hickory	10			Fair		X
1940	*Carya ovata*	Shagbark Hickory	8			Fair		X
1941	*Carya ovata*	Shagbark Hickory	10			Fair		X
1942	*Carya ovata*	Shagbark Hickory	8			Fair		X
1943	*Malus pumila*	Apple	9			Fair		X
1944	*Prunus serotina*	Black Cherry	19			Fair		X
1945	*Juniperus virginiana*	Red Cedar	12			Fair		X
1946	*Juniperus virginiana*	Red Cedar	7			Fair		X
1947	*Juniperus virginiana*	Red Cedar	8			Fair		X
1948	*Malus pumila*	Apple	12			Fair		X
1949	*Prunus serotina*	Black Cherry	25			Fair		X
1950	*Prunus serotina*	Black Cherry	14			Fair		X
1951	*Malus pumila*	Apple	12	11.0		Fair		X
1952	*Prunus serotina*	Black Cherry	14			Fair		X
1953	*Juniperus virginiana*	Red Cedar	8			Fair		X
1954	*Juniperus virginiana*	Red Cedar	12			Fair		X
1955	*Prunus serotina*	Black Cherry	20	17.9		Fair		X
1956	*Malus pumila*	Apple	10			Fair		X
1957	*Juniperus virginiana*	Red Cedar	6			Fair		X
1958	*Prunus serotina*	Black Cherry	19			Fair		X
1959	*Malus pumila*	Apple	7			Fair		X
1960	*Malus pumila*	Apple	14			Fair		X
1961	*Prunus serotina*	Black Cherry	24			Fair		X
1962	*Prunus serotina*	Black Cherry	14			Fair		X
1963	*Prunus serotina*	Black Cherry	21			Fair		X
1965	*Juniperus virginiana*	Red Cedar	16			Fair		X
1966	*Malus pumila*	Apple	6			Fair		X
1967	*Juniperus virginiana*	Red Cedar	8			Fair		X
1968	*Juniperus virginiana*	Red Cedar	7			Fair		X
1969	*Juniperus virginiana*	Red Cedar	7			Fair		X
1970	*Juniperus virginiana*	Red Cedar	15			Fair		X
1971	*Malus pumila*	Apple	15			Fair		X
1972	*Juniperus virginiana*	Red Cedar	12			Fair		X
1973	*Juniperus virginiana*	Red Cedar	14			Fair		X
1974	*Juniperus virginiana*	Red Cedar	7			Fair		X
1975	*Prunus serotina*	Black Cherry	7			Fair		X
1976	*Prunus serotina*	Black Cherry	6			Fair		X
1977	*Prunus serotina*	Black Cherry	13			Fair		X
1978	*Malus pumila*	Apple	9			Fair		X
1979	*Malus pumila*	Apple	14			Fair		X
1980	*Malus pumila*	Apple	7			Fair		X
1980	*Prunus serotina*	Black Cherry	11			Fair		X
1982	*Prunus serotina*	Black Cherry	10			Fair		X
1983	*Prunus serotina*	Black Cherry	12			Fair		X
1984	*Juniperus virginiana*	Red Cedar	6			Fair		X
1985	*Prunus serotina*	Black Cherry	17			Fair		X
1986	*Prunus serotina*	Black Cherry	8			Fair		X
1987	*Ulmus pumila*	Siberian Elm	15			Good		X
1988	*Malus pumila*	Apple	7			Good		X
1989	*Malus pumila*	Apple	11			Fair		X
1990	*Malus pumila*	Apple	12			Fair		X
1991	*Malus pumila*	Apple	9			Fair		X
1992	*Juniperus virginiana*	Red Cedar	6			Fair		X
1993	*Malus pumila*	Apple	14			Fair		X
1994	*Prunus serotina*	Black Cherry	6			Fair		X
1995	*Quercus ellipsoidalis*	Northern Pin Oak	8			Fair		X
1996	*Prunus serotina*	Black Cherry	13			Fair		X
1997	*Malus pumila*	Apple	17			Fair		X
1998	*Malus pumila*	Apple	12			Fair		X
1999	*Malus pumila*	Apple	12			Fair		X
2000	*Malus pumila*	Apple	11			Fair		X
2177	*Juniperus virginiana*	Red Cedar	13			Fair		X
2701	*Quercus rubra*	Red Oak	15			Fair		X
2702	*Quercus rubra*	Red Oak	18			Fair		X
2703	*Quercus rubra*	Red Oak	9			Good		X
2704	*Prunus serotina*	Black Cherry	11			Good		X
2705	*Prunus serotina*	Black Cherry	16			Good		X
2706	*Quercus alba*	White Oak	10			Poor		X
2707	*Quercus rubra*	Red Oak	9			Good		X
2708	*Prunus serotina*	Black Cherry	9			Fair		X
2709	*Quercus velutina*	Black Oak	10			Fair		X
2710	*Carya glabra*	Pignut Hickory	6			Good		X
2711	*Quercus rubra*	Red Oak	7			Good		X
2712	*Populus tremuloides*	Quaking Aspen	9			Good		X
2713	*Populus tremuloides*	Quaking Aspen	11			Good		X
2714	*Quercus alba*	White Oak	13			Fair		X
2715	*Carya glabra*	Pignut Hickory	6			Good		X
2716	*Quercus velutina*	Black Oak	6			Good		X
2717	*Populus tremuloides*	Quaking Aspen	6			Good		X
2718	*Juniperus virginiana*	Red Cedar	10			Good		X
2719	*Quercus ellipsoidalis*	Northern Pin Oak	10			Fair		X
2720	*Quercus ellipsoidalis*	Northern Pin Oak	13			Fair		X
2721	*Quercus rubra*	Red Oak	19			Fair		X
2722	*Carya glabra*	Pignut Hickory	7			Good		X
2723	*Quercus ellipsoidalis*	Northern Pin Oak	8			Poor		X
2724	*Carya glabra*	Pignut Hickory	8			Fair		X
2725	*Quercus alba*	White Oak	20	8.6		Fair		X
2726	*Prunus serotina*	Black Cherry	9			Fair		X
2727	*Prunus serotina*	Black Cherry	10			Fair		X
2728	*Quercus rubra*	Red Oak	17			Fair		X
2729	*Quercus alba*	White Oak	8			Fair		X
2730	*Quercus alba*	White Oak	6			Fair		X
2731	*Quercus rubra*	Red Oak	12			Fair		X
2732	*Quercus rubra*	Red Oak	10			Fair		X
2733	*Quercus alba*	White Oak	7			Fair		X
2734	*Quercus alba*	White Oak	15			Fair		X
2735	*Prunus serotina*	Black Cherry	19			Good		X
2736	*Juniperus virginiana*	Red Cedar	8			Good		X
2737	*Malus pumila*	Apple	15			Good		X
2738	*Quercus rubra*	Red Oak	15			Fair		X
2738	*Quercus rubra*	Red Oak	15			Good		X
2739	*Quercus rubra*	Red Oak	14			Fair		X
2740	*Quercus rubra*	Red Oak	9			Fair		X
2741	*Quercus rubra*	Red Oak	14			Fair		X
2742	*Quercus rubra*	Red Oak	13			Fair		X
2743	*Quercus rubra*	Red Oak	11			Fair		X
2744	*Quercus rubra*	Red Oak	14			Fair		X
2745	*Quercus rubra*	Red Oak	8			Fair		X
2746	*Prunus serotina*	Black Cherry	7			Fair		X
2747	*Prunus serotina*	Black Cherry	8			Fair		X
2748	*Quercus rubra*	Red Oak	9			Fair		X
2749	*Quercus rubra*	Red Oak	9			Fair		X
2749	*Quercus rubra*	Red Oak	9			Fair		X
2750	*Carya glabra*	Pignut Hickory	6			Good		X
2751	*Quercus rubra*	Red Oak	8			Fair		X
2752	*Prunus serotina*	Black Cherry	7			Fair		X
2753	*Quercus rubra*	Red Oak	8			Fair		X
2754	*Quercus rubra*	Red Oak	12			Poor		X
2755	*Quercus rubra*	Red Oak	18			Good		X
2756	*Quercus rubra*	Red Oak	14			Good		X
2757	*Quercus rubra*	Red Oak	6			Good		X
2758	*Quercus rubra*	Red Oak	9			Good		X
2759	*Quercus rubra*	Red Oak	8			Good		
2760	*Quercus rubra*	Red Oak	9			Good		
2761	*Quercus rubra*	Red Oak	7			Fair		X
2762	*Quercus rubra*	Red Oak	12			Fair		X
2763	*Quercus rubra*	Red Oak	12			Fair		X
2764	*Quercus rubra*	Red Oak	11			Fair		X
2765	*Quercus rubra*	Red Oak	10			Fair		X
2766	*Quercus alba*	White Oak	13			Fair		X
2767	*Quercus rubra*	Red Oak	16			Good		X
2768	*Prunus serotina*	Black Cherry	9			Good		X
2769	*Juglans nigra*	Black Walnut	7			Good		X
2770	*Prunus serotina*	Black Cherry	10			Good		X
2771	*Quercus rubra*	Red Oak	8			Poor		X
2772	*Juniperus virginiana*	Red Cedar	8			Good		X
2773	*Prunus serotina*	Black Cherry	10			Fair		X
2774	*Amelanchier arborea*	Juneberry	17			Good		X
2775	*Prunus serotina*	Black Cherry	27			Fair		X
2776	*Ulmus americana*	American Elm	8			Fair		X
2778	*Prunus serotina*	Black Cherry	7			Fair		X
2779	*Prunus serotina*	Black Cherry	12			Fair		X
2780	*Prunus serotina*	Black Cherry	17			Good		X
2781	*Juniperus virginiana*	Red Cedar	10			Fair		X
2782	*Juniperus virginiana*	Red Cedar	7			Fair		X
2783	*Prunus serotina*	Black Cherry	10			Very Poor		X
2784	*Prunus serotina*	Black Cherry	18			Good		X
2785	*Malus pumila*	Apple	10			Fair		X
2786	*Juniperus virginiana*	Red Cedar	9			Good		X
2787	*Prunus serotina*	Black Cherry	20			Good		X
2788	*Prunus serotina*	Black Cherry	16			Good		X
2789	*Prunus serotina*	Black Cherry	15			Good		X
2790	*Juniperus virginiana*	Red Cedar	8			Good		X
2791	*Juniperus virginiana*	Red Cedar	8			Good		X
2792	*Juniperus virginiana*	Red Cedar	8			Good		X
2793	*Prunus serotina*	Black Cherry	20			Fair		X
2794	*Juniperus virginiana*	Red Cedar	8			Good		X
2795	*Prunus serotina*	Black Cherry	8			Fair		X
2796	*Juniperus virginiana*	Red Cedar	8			Good		X
2797	*Juniperus virginiana*	Red Cedar	14			Good		X
2798	*Juniperus virginiana*	Red Cedar	11			Good		X
2799	*Prunus serotina*	Black Cherry	7			Fair		X
2800	*Prunus serotina*	Black Cherry	8			Good		X
2801	*Quercus ellipsoidalis*	Northern Pin Oak	18			Poor		
2802	*Quercus ellipsoidalis*	Northern Pin Oak	18			Poor		
2803	*Quercus rubra*	Red Oak	12			Fair		
2804	*Quercus rubra*	Red Oak	10			Good		
2805	*Quercus rubra*	Red Oak	8			Fair		
2806	*Quercus rubra*	Red Oak	8			Fair		
2807	*Quercus rubra*	Red Oak	11			Fair		
2808	*Carya glabra*	Pignut Hickory	7			Fair		
2809	*Quercus rubra*	Red Oak	13			Fair		
2810	*Quercus rubra*	Red Oak	10			Fair		
2811	*Quercus ellipsoidalis*	Northern Pin Oak	16	9.5		Fair		
2812	*Quercus ellipsoidalis*	Northern Pin Oak	11			Poor		X
2813	*Quercus rubra*	Red Oak	9			Fair		X
2814	*Quercus rubra*	Red Oak	18			Fair		X
2815	*Carya glabra*	Pignut Hickory	9			Poor		X
2816	*Carya glabra*	Pignut Hickory	8			Fair		X
2817	*Quercus rubra*	Red Oak	16			Fair		X
2818	*Carya glabra*	Pignut Hickory	9			Fair		
2819	*Carya glabra*	Pignut Hickory	41			Fair		X
2820	*Carya glabra*	Pignut Hickory	11			Fair		X
2821	*Quercus rubra*	Red Oak	11			Good		X
2822	*Carya glabra*	Pignut Hickory	11			Fair		X
2823	*Carya glabra*	Pignut Hickory	9			Poor		X
2824	*Carya glabra*	Pignut Hickory	10			Fair		X
2825	*Carya glabra*	Pignut Hickory	8	7.3		Fair		X
2826	*Quercus rubra*	Red Oak	18			Fair		X
2827	*Quercus rubra*	Red Oak	21			Good		X
2828	*Quercus rubra*	Red Oak	21			Fair		X
2829	*Quercus rubra*	Red Oak	18			Fair		X
2830	*Quercus rubra*	Red Oak	22			Fair		X
2831	*Juniperus virginiana*	Red Cedar	11			Good		
2832	*Juniperus virginiana*	Red Cedar	10			Good		
2833	*Juniperus virginiana*	Red Cedar	8			Fair		
2834	*Quercus rubra*	Red Oak	13			Poor		
2835	*Quercus ellipsoidalis*	Northern Pin Oak	23			Poor		
2836	*Quercus ellipsoidalis*	Northern Pin Oak	13			Good		
2837	*Quercus rubra*	Red Oak	11			Fair		
2838	*Quercus ellipsoidalis*	Northern Pin Oak	14			Fair		
2839	*Carya glabra*	Pignut Hickory	8			Poor		
2840	*Prunus serotina*	Black Cherry	13			Good		
2841	*Quercus rubra*	Red Oak	19			Good		
2842	*Quercus rubra*	Red Oak	11			Good		
2843	*Quercus rubra*	Red Oak	16			Fair		
2844	*Ulmus americana*	American Elm	13			Fair		
2845	*Carya glabra*	Pignut Hickory	7			Fair		
2846	*Acer rubrum*	Red Maple	10			Fair		
2847	*Carya glabra*	Pignut Hickory	6			Poor		
2848	*Prunus serotina*	Black Cherry	7			Fair		
2849	*Prunus serotina*	Black Cherry	7			Fair		
2850	*Quercus rubra*	Red Oak	18			Fair		
2851	*Juniperus virginiana*	Red Cedar	13			Good		
2852	*Prunus serotina*	Black Cherry	17			Poor		
2853	*Quercus rubra*	Red Oak	8			Fair		
2854	*Carya glabra*	Pignut Hickory	7			Poor		
2855	*Quercus rubra*	Red Oak	10			Fair		X
2856	*Quercus rubra*	Red Oak	7			Fair		X
2857	*Quercus rubra*	Red Oak	13	9.4		Good		X
2858	*Quercus rubra*	Red Oak	17			Fair		X
2859	*Quercus rubra*	Red Oak	13			Fair		X
2860	*Quercus rubra*	Red Oak	16			Poor		X
2861	*Quercus rubra*	Red Oak	8			Fair		X
2862	*Quercus rubra*	Red Oak	9			Fair		X
2863	*Carya glabra*	Pignut Hickory	7			Fair		X
2864	*Quercus rubra*	Red Oak	7			Poor		X
2865	*Quercus rubra*	Red Oak	8			Poor		X
2866	*Quercus rubra*	Red Oak	16			Poor		X
2867	*Quercus rubra*	Red Oak	14			Fair		X
2868	*Juniperus virginiana*	Red Cedar	11			Fair		X
2869	*Quercus rubra*	Red Oak	17			Fair		X
2870	*Quercus rubra*	Red Oak	13			Poor		X
2871	*Quercus rubra*	Red Oak	9			Fair		X
2872	*Quercus rubra*	Red Oak	10			Fair		X
2873	*Quercus rubra*	Red Oak	18			Fair		X
2874	*Quercus rubra*	Red Oak	10			Fair		X
2875	*Prunus serotina*	Black Cherry	13			Fair		X
2876	*Quercus rubra*	Red Oak	8			Poor		X
2877	*Quercus rubra*	Red Oak	12			Fair		X
2878	*Quercus rubra*	Red Oak	7			Fair		X
2879	*Quercus rubra*	Red Oak	18			Poor		X
2880	*Quercus rubra*	Red Oak	7			Fair		X
2881	*Quercus rubra*	Red Oak	13			Fair		X
2882	*Carya glabra*	Pignut Hickory	14			Fair		X
2883	*Carya glabra*	Pignut Hickory	15			Fair		X
2884	*Quercus rubra*	Red Oak	14			Fair		X
2885	*Quercus rubra*	Red Oak	13			Fair		X
2886	*Quercus rubra*	Red Oak	12			Fair		X
2887	*Prunus serotina*	Black Cherry	12			Fair		X
2888	*Quercus rubra*	Red Oak	13			Good		X
2889	*Juniperus virginiana*	Red Cedar	14			Good		X
2890	*Juniperus virginiana*	Red Cedar	11			Good		X
2891	*Prunus serotina*	Black Cherry	8			Fair		X
2892	*Malus pumila*	Apple	11			Fair		X
2893	*Juniperus virginiana*	Red Cedar	11			Good		X
2894	*Quercus rubra*	Red Oak	22			Good		X
2895	*Prunus serotina*	Black Cherry	9			Good		X
2896	*Quercus rubra*	Red Oak	10			Fair		X
2896	*Quercus rubra*	Red Oak	24			Good		X
2897	*Carya glabra*	Pignut Hickory	8			Good		X
2898	*Quercus rubra*	Red Oak	14			Good		X
2900	*Quercus rubra*	Red Oak	9			Fair		X
2901	*Crataegus spp.*	Hawthorn	7			Good		X
2903	*Malus pumila*	Apple	8	7.6	7.2	Fair		X
2904	*Malus pumila*	Apple	12			Fair		X
2905	*Juniperus virginiana*	Red Cedar	8			Good		X
2906	*Juniperus virginiana*	Red Cedar	8			Fair		X
2907	*Juniperus virginiana*	Red Cedar	6			Fair		X
2908	*Juniperus virginiana*	Red Cedar	10			Fair		X
2909	*Malus pumila*	Apple	11			Fair		X
2911	*Prunus serotina*	Black Cherry	11			Fair		X
2912	*Malus pumila*	Apple	13			Fair		X
2914	*Prunus serotina*	Black Cherry	7			Fair		X
2915	*Acer negundo*	Boxelder	7			Fair		X
2916	*Prunus serotina*	Black Cherry	12			Fair		X
2917	*Prunus serotina*	Black Cherry	11			Fair		X
2918	*Quercus ellipsoidalis*	Northern Pin Oak	10			Fair		X
2919	*Malus pumila*	Apple	8			Fair		X
2920	*Malus pumila*	Apple	9			Good		X
2921	*Acer negundo*	Boxelder	23			Fair		X
2922	*Malus pumila*	Apple	13			Good		X
2923	*Juniperus virginiana*	Red Cedar	7			Good		X
2924	*Prunus serotina*	Black Cherry	22			Good		X
2925	*Juniperus virginiana*	Red Cedar	6			Good		X
2926	*Prunus serotina*	Black Cherry	14			Good		X
2927	*Juniperus virginiana*	Red Cedar	16			Good		X
2928	*Malus pumila*	Apple	12			Fair		X
2929	*Malus pumila*	Apple	6			Fair		X
2930	*Malus pumila*	Apple	16			Good		X
2931	*Quercus ellipsoidalis*	Northern Pin Oak	8			Fair		X
2932	*Juniperus virginiana*	Red Cedar	7			Fair		X
2933	*Malus pumila*	Apple	11			Good		X
2934	*Prunus serotina*	Black Cherry	14			Fair		X
2935	*Prunus serotina*	Black Cherry	8			Fair		X
2936	*Prunus serotina*	Black Cherry	9			Fair		X
2937	*Prunus serotina*	Black Cherry	9			Fair		X
2938	*Prunus serotina*	Black Cherry	18			Fair		X
2939	*Juniperus virginiana*	Red Cedar	8			Fair		X
2940	*Malus pumila*	Apple	11			Fair		X
2941	*Malus pumila*	Apple	6			Fair		X
2942	*Juniperus virginiana*	Red Cedar	8			Fair		X
2943	*Juniperus virginiana*	Red Cedar	8			Fair		X
2944	*Malus pumila*	Apple	16			Fair		X
2945	*Juniperus virginiana*	Red Cedar	7			Fair		X
2946	*Juniperus virginiana*	Red Cedar	9			Fair		X
2947	*Malus pumila*	Apple	9			Fair		X
2948	*Juniperus virginiana*	Red Cedar	7			Fair		X
2949	*Prunus serotina*	Black Cherry	13			Fair		X
2950	*Prunus serotina*	Black Cherry	13			Fair		X
2951	*Prunus serotina*	Black Cherry	8			Fair		X
2952	*Malus pumila*	Apple	11			Fair		X
2953	*Malus pumila*	Apple	8			Fair		X
2954	*Juniperus virginiana*	Red Cedar	6			Fair		X
2955	*Prunus serotina*	Black Cherry	8			Fair		X
2956	*Prunus serotina*	Black Cherry	7			Fair		X
2957	*Acer negundo*	Boxelder	7			Fair		X
2958	*Malus pumila*	Apple	7			Fair		X
2959	*Malus pumila*	Apple	8			Good		X
2960	*Juniperus virginiana*	Red Cedar	13			Good		X
2961	*Juniperus virginiana*	Red Cedar	8			Fair		X
2962	*Malus pumila*	Apple	6			Fair		X
2964	*Quercus velutina*	Black Oak	17			Fair		
2965	*Quercus alba*	White Oak	9			Poor		
2966	*Carya glabra*	Pignut Hickory	8			Fair		
2967	*Carya glabra*	Pignut Hickory	9			Fair		
2968	*Carya glabra*	Pignut Hickory	11	7.8		Fair		
2969	*Prunus serotina*	Black Cherry	18			Good		
2970	*Quercus alba*	White Oak	26			Fair		
2971	*Quercus alba*	White Oak	25			Fair		
2972	*Carya glabra*	Pignut Hickory	9			Fair		
2973	*Quercus rubra*	Red Oak	6			Fair		
2974	*Quercus rubra*	Red Oak	31			Fair		
2976	*Carya glabra*	Pignut Hickory	13			Poor		
2977	*Quercus rubra*	Red Oak	34			Good		
2978	*Carya glabra*	Pignut Hickory	12			Good		
2979	*Carya glabra*	Pignut Hickory	22			Good		
2980	*Quercus rubra*	Red Oak	29			Fair		
2981	*Quercus rubra*	Red Oak	45			Fair		X
2982	*Carya glabra*	Pignut Hickory	19			Fair		X
2983	*Quercus alba*	White Oak	31			Fair		X
2984	*Prunus serotina*	Black Cherry	9			Poor		X
2985	*Carya glabra*	Pignut Hickory	6			Good		X
2986	*Quercus ellipsoidalis*	Northern Pin Oak	12			Good		X
2987	*Quercus alba*	White Oak	7			Very Poor		X
2988	*Quercus rubra*	Red Oak	19			Fair		X
2989	*Quercus alba*	White Oak	26			Fair		X
2990	*Quercus alba*	White Oak	25			Fair		X
2991	*Quercus alba*	White Oak	30			Fair		X
2992	*Quercus rubra*	Red Oak	15			Fair		X
2993	*Quercus rubra*	Red Oak	16			Poor		X
2994	*Quercus rubra*	Red Oak	6			Fair		X
2995	*Quercus rubra*	Red Oak	6			Good		
2996	*Quercus rubra*	Red Oak	10			Fair		
2997	*Quercus rubra*	Red Oak	10			Good		
2998	*Quercus rubra*	Red Oak	15			Good		X
2999	*Quercus rubra*	Red Oak	12			Good		X
3000	*Quercus rubra*	Red Oak	21			Good		X
4289	*Malus pumila*	Apple	8			Fair		X
4293	*Juniperus virginiana*	Red Cedar	12			Fair		X
4301	*Malus pumila*	Apple	9	6.7		Good		X
4302	*Prunus serotina*	Black Cherry	10			Good		X
4303	*Malus pumila*	Apple	7			Fair		X
4304	*Juniperus virginiana*	Red Cedar	10			Good		X
4305	*Malus pumila*	Apple	22			Fair		X
4306	*Malus pumila*	Apple	11			Fair		X
4308	*Juniperus virginiana*	Red Cedar	9			Good		X
4309	*Prunus serotina*	Black Cherry	8			Good		X
4310	*Prunus serotina*	Black Cherry	18			Good		X
4311	*Prunus serotina*	Black Cherry	21			Fair		X
4312	*Pyrus communis*	Common Pear	10			Fair		X
4313	*Malus pumila*	Apple	17			Fair		X
4314	*Malus pumila*	Apple	7			Fair		X
4315	*Prunus serotina*	Black Cherry	7			Fair		X
4316	*Juniperus virginiana*	Red Cedar	9			Good		X
4317	*Prunus serotina*	Black Cherry	10			Good		X
4318	*Juniperus virginiana*	Red Cedar	8			Good		X
4319	*Prunus serotina*	Black Cherry	12			Good		X
4320	*Juniperus virginiana*	Red Cedar	18			Good		X
4321	*Prunus serotina*	Black Cherry	17			Good		X
4322	*Malus pumila*	Apple	10			Good		X
4323	*Juniperus virginiana*	Red Cedar	14			Good		X
4324	*Juniperus virginiana*	Red Cedar	7			Good		X
4325	*Juniperus virginiana*	Red Cedar	9			Fair		X
4326	*Prunus serotina*	Black Cherry	18			Fair		X
4327	*Juniperus virginiana*	Red Cedar	6			Fair		X

M I D W E S T E R N
C O N S U L T I N G

3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Surveys • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE
OPEN SPACE PUD DEVELOPMENT
TREE LIST 3

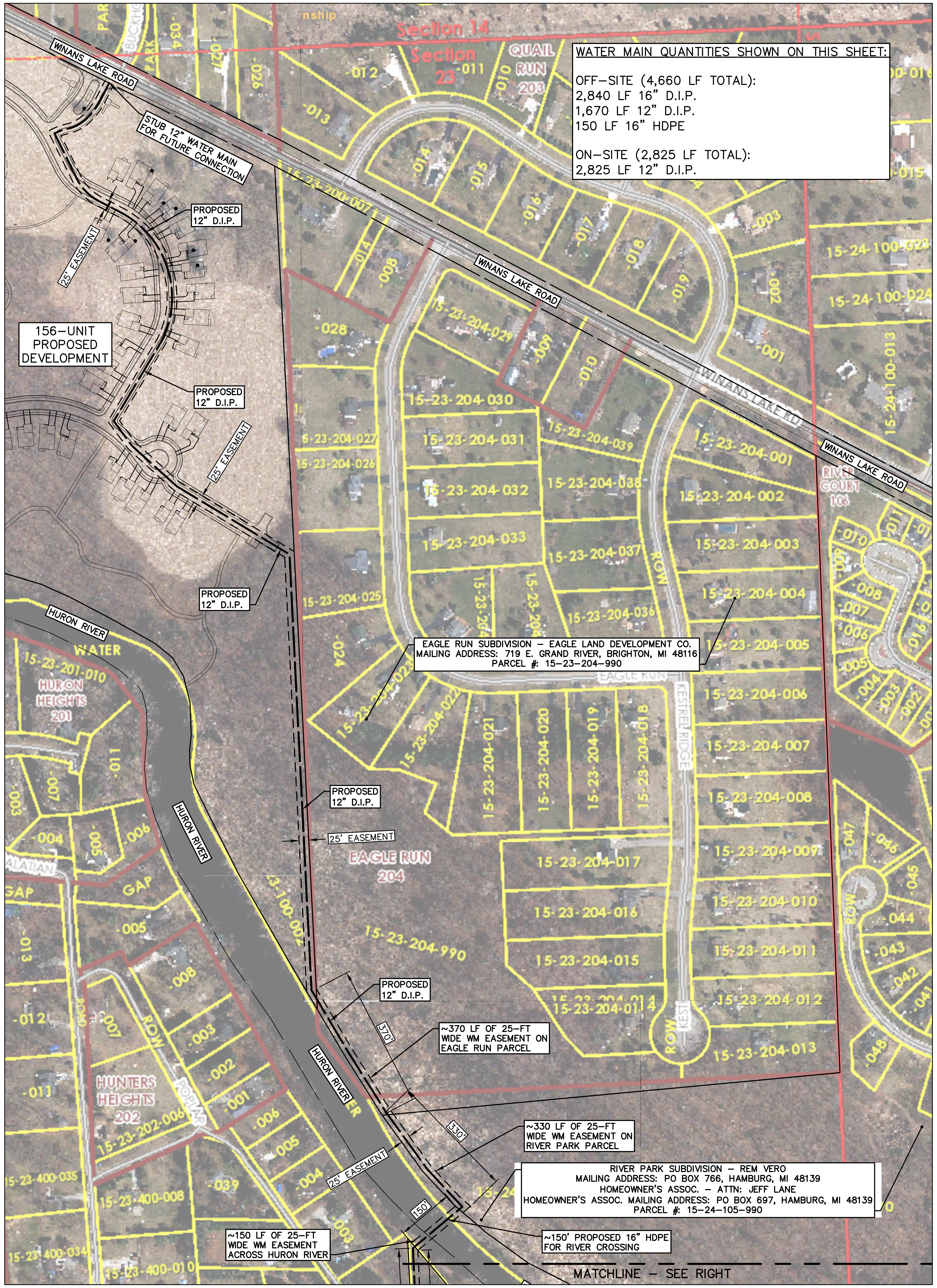
16

JOB No. 18037
DATE: 8/29/18
SHEET 16 OF 19

REVISIONS:	REV. DATE
PER TOWNSHIP COMMENTS	11/19/18
PER TOWNSHIP COMMENTS	12/10/18

CADD:
ENG: JCA, TPH
PM: RCW
TECH:
18037EX2.dwg

M:\Civil3d_Proj\18037\Preliminary Site Plan\18037EX2.dwg, 12/7/2018 4:37 PM, Ted P. Hirsch, TREE LIST3, MCLLC PDF.pc3



MIDWESTERN CONSULTING

3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE
OPEN SPACE PUD DEVELOPMENT
PUBLIC WATER MAIN EXTENSION

17

JOB No.	18037
DATE	11/19/18
SHEET	17 OF 19
CAD:	
DES:	JCA TPH
PM:	RCW
TECH:	18037WM_EXT1

REVISIONS:	REV. DATE
PER TOWNSHIP COMMENTS	12/10/18

M:\Civil3d_Proj\18037\Preliminary Site Plan\18037WM_EXT1.dwg, 12/7/2018 4:37 PM, Ted P. Hirsch, None

MIDWESTERN CONSULTING
3815 Plaza Drive
Ann Arbor, Michigan 48108
734.995.0200

Land Development • Land Surveying • Municipal • Wireless Communications • Institutional • Transportation • Landfill Services

December 10, 2018

To: Township of Hamburg
Township
PO Box 157
10405 Merrill Road
Hamburg, MI 48139

Attn: Amy Steffens, AICP, Planning and Zoning Administrator
Scott Pacheco, AICP, Planning Department

Re: Waters Edge Village Open Space Community PUD
Response to McKenna's Review #4
Midwestern File No.: 18037

Dear Ms. Steffens:

Midwestern Consulting has previously submitted preliminary site plans for review for Waters Edge, and has received Planning comments from McKenna. We have revised the plans to incorporate the requested changes, and offer the following as a response to the comments and description of changes. We believe the changes made make this an unconventional, outside of the box, exceptional project.

McKenna – John R. Jackson, AICP, President – November 21, 2018

1 Summary – Parallel Plan – Preliminary Site Plan Item

Done. The Parallel Plan on Sheet 3 has been revised to show 150 feet wide lots in the Natural River District, NR. Please note that the number of lots on the Parallel Plan have been reduced from 79 to 77. It should be noted that if Waters Edge was developed as the Parallel Plan that the open space along the Huron River and Gill Lake would be eliminated and that swimming pools and swing sets could be installed very close to the neighboring subdivisions.

2A Eligibility Review – Recognizable Benefit – Preliminary Site Plan Item

Done. Picket Fence sections (3 feet tall by 6 feet long) have been added to the rear of the river lots in order to delineate the private space from the public space. In addition, Note 12 has been added to the Preliminary Site Plan Sheet 4 stating that the lots will be restored with sod and that the Association will be responsible for cutting the lots. Five well marked entrances will lead to an eight feet wide crushed stone pathway along the river. Two areas have been provided to launch kayaks, canoes and paddleboats along its river bank. Some kayaks, canoes and paddleboats will be provided by Waters Edge.

Three public park areas with four benches with pathways leading to them have been provided along Gill Lake. In these areas, landscaping, tall grasses and fencing will be added in order to delineate the public and private space. Public Lake Viewing Area Signs have been provided designating the Gill Lake Parks as open to the public.

In the southerly most viewing area, a seasonal dock will be provided for viewing and for launching non-motorized boats such as kayaks, canoes and paddleboats. Parking areas in five of the eight Huron River/Gill Lake Park areas have been provided in order for the entire Hamburg Township to enjoy these amenities.

2B Eligibility Review - Open Space – Preliminary Site Plan Item

Done. The lot boundaries have been added to the Tree Survey Plan Sheets in order to show the limits of disturbance. The Tree Survey shows trees 6-inches and greater in caliper and the quality of the woodlands that exist. These sheets and the Site Analysis Plan Sheet 5 show an exceptional number of trees being preserved. The number of trees surveyed and trees removed will be provided at the Planning Commission Meeting or before. Final details will be provided on the Final Site Plan.

One hundred percent of the wetlands and one hundred percent of the water bodies including Gill Lake and the Huron River will be preserved.

2C Eligibility Review – Guarantee of Open Space – Final Site Plan Item

Documents including the Master Deed and by-laws will be provided at the Final Site Plan stage regarding maintenance of open spaces. The approved PUD Site Plan as well as the Master Deed and By-laws will dictate the preservation of the natural features and open space.

2D Eligibility Review – Cohesive Neighborhood - Preliminary Site Plan Item

Done. The site plan has been revised to show over four miles of pathways accessible to every unit and every open space, including connections to Gill Lake and the Huron River. A 5 feet wide path has been added behind units 98 and 99 (formerly 89-97). The units formerly labeled 126-138 have been eliminated along the north end of Fountain Park. Units 137 to 144 (formerly 148-154) have a sidewalk along the private road. The picnic tables have been eliminated and pathways have been provided to the benches and gazebo. The note regarding extensive paths has been moved north of the 3.76 acre preserved woodland. This note was meant to denote extensive paths are proposed throughout the development. We believe these changes represent that best practices for a cohesive neighborhood have been met.

Signs have been added to the two Gill Lake Public Viewing Areas and an Environmental Interpretive Sign has been added along the Huron River.

2F Eligibility Review – Density Impact– Final Site Plan Item

Done. Although not required until the Final Site Plan stage, a Natural Features Impact Statement was provided with the previous submittal made on November 19. The Preliminary Traffic Impact Study is being updated and will be provided at the Planning Commission Meeting or before, if available.

The Open Space Development Plan Sheet 3 demonstrates that the proposed density has been reduced from 1.66 to 1.56 units per acre. It should be noted that the extension of public water main to the site will preserve the aquifer when compared to another development's proposal to install 77 individual wells or a community well.

Waters Edge will consist of a majority of 2 bed units which attract empty nesters (mainly semi retirees and fully retired empty nesters). Ten Universal 1200 square foot units have been added to the plan.

2G Eligibility Review – Township Master Plan- Preliminary Site Plan Item

The Site Plan has been revised to reduce the number of lots from 154 to 144, reducing the requested density bonus from 95 percent to 87 percent. Furthermore, the units along the Huron River have been set back 100 feet from the top of the bluff. Please reference the Site Analysis Plan Sheet 5 for the extensive Natural Features Preservation in the Natural Rivers District. Sensitive Site Design Best Practices have been implemented along the river.

McKenna previously noted 34 residential units along the River. This number has been reduced to 27. We believe the revisions made to the Preliminary Site Plan/Planned Open Space Community justifies Waters Edge as an "exemplary" project.

3.14.14.2: Project Design Standards – Permitted Uses - Preliminary Site Plan Item

McKenna previously noted 34 residential units along the River. This number has been reduced to 27, or less than one-fifth of the proposed units.

Waters Edge provides natural study areas, hiking areas, pedestrian paths, and viewing platforms along the river frontage. A 10'x18' platform with an environmental interpretive sign is proposed. We believe this proposal meets the intent to protect and enhance natural features that allow for recreational values and uses of the river and that enhance fish, wildlife and their habitats. Signage is proposed along the tree line promoting and requiring conservation of natural features.

3.14.14.3: Project Design Standards – Dwelling Density- Preliminary Site Plan Item

Done. The Parallel Plan on Sheet 3 has been revised to show 150 feet wide lots in the Natural River District, NR. Please note that the number of lots on the Parallel Plan have been reduced from 79 to 77. It should be noted that if Waters Edge was developed as the Parallel Plan that the open space along the Huron River and Gill Lake would be eliminated and that swimming pools and swing sets could be installed very close to the neighboring subdivisions.

3.14.14.5: Project Design Standards – Water and Sewer Service

Winans Lake Development, LLC, proposes to extend nearly a mile of off-site 16-inch water main to the site. Please reference the Public Water Main Extension Sheet 17 showing the extension along M-36 from the Hamburg Professional Center and along the west end of Parcel No. 15-23-400-001. This water main will not only benefit Waters Edge but will benefit several other Hamburg Township properties. In addition to this extension $792,000 water and sewer tap fees are proposed. A sanitary sewer lift station is proposed in order to avoid the Township Utility Department's maintenance of individual grinder pumps. Fire hydrants will be provided which will reduce the insurance rates for the residents.

3.14.14.7: Project Design Standards – Regulatory Flexibility- Preliminary Site Plan Item

Done. Please reference the Exemplary Project Items listed on the right hand side of the Open Space Development Plan Sheet No. 3. The Regulatory Flexibility Data Chart has been updated on the above mentioned Sheet 3.

3.14.14.8: Project Design Standards – Open Space Requirements - Preliminary Site Plan Item

Done. The Site Plan has been revised to reduce density and to increase the open space from 56 percent to an exemplary percentage of 62 percent. The Open Space Calculation can be found at the bottom right hand corner of the Open Space Development Plan Sheet 3. While only 25 percent of the open space is required to be upland of wetlands, an exemplary percentage of 90 percent has been met at Waters Edge. A color drawing of the open space calculation has been provided to the right of the calculation.

3.14.14.9: Project Design Standards – Compatibility with Adjacent Uses - Preliminary Site Plan Item

Done. We have deleted the pickle ball courts in order to be sensitive to the resident's concerns about noise. The Large Gazebo has been moved to the center of the Garden Green. The Waters Edge architecture is similar to that of the neighbors and a 150 feet perimeter setback is proposed along the residential areas where housing exists. Extensive landscaping has been provided on the Landscape Plan Sheet 6 to screen the area from the adjacent residences.

3.14.14.10: Project Design Standards – Transition Area - Final Site Plan Item

Done. Extensive, high quality landscaping has been provided within the 150 feet perimeter setback on the Landscape Plan Sheet 6. The species and landscape details will be indicated on the final site plan. In addition, the recreation amenities have been removed from the southeast corner of the site.

3.14.14.11: Project Design Standards – Architectural and Site Element Design - Final Site Plan Item

Done. Note No. 5 on the Preliminary Site Plan Sheet 4 states "at least 40% of the homes proposed along private roads are to be side entry or have recessed garages." Elevations are provided on the Architectural Details Sheet 8 and in the Architectural Guidebook dated November 14, 2018, submitted on November 19. Walkout Elevations and dimensions will be provided on the Final Site Plan. Typical Lot Configurations are provided on Sheet 4.

3.14.14.12: Project Design Standards – Access - Final Site Plan Item

The updated Traffic Study will be provided at the Planning Commission Meeting or before, if available. This study will address the following:

1. ***Allowing Waters Edge Traffic through Huron Rapids to Lake Crest and M-36 will negatively affect traffic at that intersection.***
2. ***The above mentioned traffic study, the Fire Marshal's suggestion of an emergency gate only and Huron Highland's opposition to the connection has led to the proposal of the emergency access connection as shown on the site plan.***
3. ***The updated traffic study will address the fact that the proposed units will be occupied by retirees who mostly travel outside of the peak hour times.***
4. ***The updated traffic study will indicate minimal impact at the entrance to Winans Lake Road since a left turn center lane, deceleration and acceleration lane is proposed.***
5. ***The traffic study will address traffic impact with and without access to Huron Rapids Drive.***
6. ***Sight Distance Approval at the entrance was provided with the most recent submittal on November 19.***

Most of the proposed homes are two bedrooms, which will generally be purchased by people who will not impact the rush hour traffic.

3.14.14.13: Project Design Standards – Internal Roads - Final Site Plan Item

The private roads will comply with the Hamburg Township Private Road Ordinance. A cross access easement will be provided on the Final Site Plan.

3.14.14.14: Project Design Standards – Pedestrian Circulation- Preliminary Site Plan Item

Done. Pedestrian access is provided from all residential units to all open space areas and amenities. All open space areas are connected by pathways. The location for the school bus stop has been identified at the entrance and by Note No. 6 on the Preliminary Site Plan Sheet 4.

The trail along the Huron River has been improved to be an 8 feet wide 21AA crushed aggregate stone pathway.

3.14.14.15: Project Design Standards – Natural Features - Final Site Plan Item

Done. The Tree Survey and Tree List sheets clearly denote existing trees to be preserved and removed. The number of trees will be provided at the Planning Commission Meeting or before, if available. Please note that the Site Analysis Plan Sheet 5 indicates an extensive amount of woodlands will be preserved. Further information on the floating dock design will be provided on the Final Site Plan. It is intended to be used for fishing, kayaking, canoeing, and for paddle boats.

4: Provisions for Exemplary Projects - Preliminary Site Plan Item

Done. By following McKenna's suggestions for an exemplary project, the site plan has been revised to be a model exemplary project that will provide Hamburg Township with a long term and sustainable residential development. Modifications have been made to transition from roads to "lanes" that will allow the units to front on the Water Green. The Water Green Community has been revised to have recognizable front yards fronting public open space. Extensive pedestrian paths and sidewalks have been provided to every unit. Ten Universal Village 1200 sf units have been provided.

Access to the Huron River and Gill Lake have been emphasized through frequent and large access points strategically located to be highly visible. Five access points have been provided to the Huron River with a pathway and platform. Three access points have been provided to Gill Lake. These access points provide access to appropriate viewing platforms and take advantage of the bluffs and also to provide the most appropriate access to the water given the natural topography. Public Lake Viewing Area Park Signs have been added to two Gill Lake Access points.

5.1: Site Plan Requirements-Natural Features Impact Statement

Done. Although required at the Final Site Plan Stage by the Ordinance, a Natural Features Impact Statement was submitted with the last submittal on November 19.

5.2: Site Plan Requirements-Zoning Setbacks and Requirements

Done. The parallel plan has been updated as stated above. Please notice that if the site was developed with the parallel plan that lots will back up to the Huron River and to Gill Lake, leaving no open space for the entire Township to enjoy. It should be noted that each lot would have access to docks and water vehicles if developed by right. The 150 feet perimeter setback would not be provided if developed under the current zoning. The landscaping and exterior of the homes will be maintained by the Homeowners Association and will not be allowed to deteriorate like a by right development.

5.3: Site Plan Requirements-Design Elements

a. ***Architectural Styles. Please reference the Architectural Details Sheet 5 and the Architectural Guidebook for the different types of architectural products that will be available. Typical Lot Configurations are shown on Sheet 5. A mix of housing is proposed on the site plan. Dimensions, setbacks and porches are indicated on the above mentioned Typical Lot Configuration.***

   The elevations will be compatible with neighboring subdivisions and with Hamburg Township. As noted above, at least 40% of homes along private roads will have recessed garages or be side loading.

b. Materials. The architect will provide information on building and siding materials on the Final Site Plan. The buildings will be high quality materials and will be maintenance free.

c. Garages. Garages will not dominate the facades of the units in order to achieve an attractive and cohesive community design that supports walkability and connectivity. The recessed garages will be dimensioned on the Final Site Plan.

d. Mailboxes. The designs of mailboxes and structures will be provided on the final site plan. Photographs will be provided at that time indicating the mailbox area concept.

5.4: Site Plan Requirements-Site Circulation

Done. At least six parking areas have been provided throughout the site. Winans Lake Development with work with Hamburg Township and McKenna to provide additional ample parking, if requested The curbs have been revised to be barrier curb on the private roads on the Site Details Sheet 7. The emergency access gate has been moved north of the property line. It should be noted that this gate would be required even if the site was developed with 77 units.

5.5: Site Plan Requirements-Pedestrian Circulation

Done. The pedestrian paths/walk circulation/connectivity has been improved as stated above.

5.6: Site Plan Requirements-Site Frontage

Species and landscape details will be provided on the Final Site Plan. We understand the quality of the landscaping will be evaluated during the final site plan review and that the transition/buffer areas will be effective. Extensive landscaping, above ordinance requirements, has been provided along Winans Lake Road.

5.7: Site Plan Requirements-Emergency Access

Done. In a Memorandum dated November 28, 2018, Fire Marshal Jordan Zernick approved the Site Plan. Per discussions with Mr. Zernick and with Hamburg Township's Amy Steffens, we understand the Police Department leans on the Fire Marshal for emergency access.

5.8: Site Plan Requirements-Storm Water Management

Done. Detention areas have been included on the parallel plan. Additional details regarding storm water management will be included on the Final Site Plan. Best management practices will be utilized to ensure that the storm water management plan is an environmental and sustainable asset to the site.

5.9: Site Plan Requirements-Landscaping

During the Final Site Plan stage, a complete Landscape Plan for the entire site and a Typical Lot Landscape Plan for each unit will be provided.

5.10: Site Plan Requirements-Lighting

Done. Note No. 3 has been added to the Preliminary Site Plan Sheet 4 regarding lighting. Minimal light pollution is proposed with all internal lighting being provided on the garages on photocells. Ample entrance and mailbox lighting is also proposed. Details will be provided on the Final Site Plan.

5.11: Site Plan Requirements-Master Deed and Bylaws

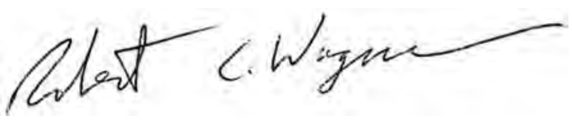
The Master Deed and Bylaws will be provided at the Final Site Plan stage.

5.12: Site Plan Requirements-Agency Approvals

Agency approvals will be provided at the Final Site Plan stage.

Should you have any further concerns or have further questions, please feel free to contact Robert C. Wagner by phone at (734)995-0200 (Ext. 274), or email at rcw@midwesternconsulting.com. We look forward to your feedback.

Sincerely,
MIDWESTERN CONSULTING, LLC



Robert C. Wagner, P.E.
Project Manager

Exhibit D: Revised Traffic Impact Study, December 10, 2018

Traffic Impact Study

Waters Edge Residential Development

Hamburg Township, Michigan

December 10, 2018
(Version 01)

Prepared For:

Winans Lake Development LLC
3596 W. Maple Road, Suite 230
Bloomfield Hills, MI 48301

Prepared By:

Midwestern Consulting
3815 Plaza Drive
Ann Arbor, Michigan 48108

MIDWESTERN™
CONSULTING

Table of Contents

Appendix Contents

- **ITE Trip Generation Sheets – Single Family Homes, Senior Housing**
- **Turning Movement Count Data**
- **SEMCOG Data**
- **24-Hr Volume Count Data**
- **HCM Output Pages**
- **SimTraffic Output Pages**
- **Signal Timing Plans**

This traffic impact study has been prepared by:

Michael R. Cool

Michael R. Cool, P.E.
Midwestern Consulting
Project Manager
License No: 6201050420

1.0 Executive Summary

The proposed Waters Edge development, located on the south side of Winans Lake Road near Buckhorn Lane in Hamburg Township, is a 144-unit development marketed to and designed for empty nesters and retirees. Most of the homes will have two bedrooms with the option to expand to a third bedroom if desired. A traffic count at a similar site in Oceola Township, with similar sized dwelling units and a similar demographic, has identified that this type of community generates traffic at lower rates similar to the land use category Senior Adult Housing.

Under current zoning, this site could be developed with 77 typical single family homes. Based upon the proposed demographic and design, it is likely that the proposed Waters Edge development will generate traffic volumes that are slightly less than or equivalent to a more traditional 77-unit single family home development, even with the additional 67 units.

Despite evidence that supports utilizing the lower trip generation rates for this type of development and demographic, this study assumes that the Waters Edge development would generate traffic as a normal single family home, and so this traffic study should be considered conservative and a worse-case scenario.

This study uses an annual background traffic growth rate of 1.4% growth per year, based upon existing historical traffic count data in the area. Background growth, extrapolated to 2028, is expected to drive the need for some future improvements at the study intersections, which would be needed even without the traffic generated by the Waters Edge development.

The site generated traffic has been distributed to the study intersections according to existing traffic flow patterns. These study intersections include:

1. Winans Lake Road and Chilson Road
2. Winans Lake Road and Buckhorn Lane / Site Driveway
3. Winans Lake Road and Hamburg Road (T-Intersection)
4. Winans Lake road and Hamburg Road (Roundabout)
5. M-36 and Chilson Road
6. M-36 and Lake Crest Drive (a potential secondary access point for the site)
7. M-36 and Merrill Road
8. M-36 and Hamburg Road

Summary List of Mitigation

The following is a list of recommended mitigation that may be needed to accommodate the projected background traffic growth:

- #9001 – Winans Lake Road and Chilson Road
    - Install a separate left-turn and right-turn lane on the westbound approach to the intersection.
- #9002 – Winans Lake Road and Buckhorn Lane / Site Driveway
    - Install a center left-turn lane and right-turn deceleration lane at the site driveway as currently proposed.

- #1001 – M-36 and Chilson Road
  - Install a separate westbound right-turn only lane to reduce westbound approach delays, and increase the gaps available for eastbound left-turns.
- #1002 – M-36 and Merrill Road
  - Signal timing optimization will likely be needed to address longer westbound queues predicted for background conditions during the afternoon peak hour.
- #1003 – M-36 and Hamburg Road
  - Left-turn only phasing on M-36 may be needed to address potentially long eastbound left-turn queues as the availability of gaps decreases as traffic on M-36 increases due to background growth.
- #9005 – M-36 and Lake Crest Drive
  - While internal subdivision connections are generally good design principles, background traffic growth is expected to make it more difficult for Lake Crest Drive traffic to turn onto M-36. If the emergency connection to the south of the site is upgraded to a full access drive, the delays for southbound Lake Crest Drive are expected to increase significantly as some site traffic can be expected to flow south to M-36. We do not recommend a full access connection at this time.

With these improvements completed at some point in the future to address background traffic growth, the additional site generated traffic is easily accommodated on the street system, with no further significant impact to delays.

Given that the site traffic applied to the study intersections is estimated at the conservative single family home rate, the actual impact of the Waters Edge empty nester community will be less than what is shown in this report (about 50% less impactful).

2.0 Introduction

A 144-unit single family home development is planned for a site located south of Winans Lake Road between Chilson and Hamburg Roads in Hamburg Township, Michigan. The site's driveway connection to Winans Lake Road will be located across from Buckhorn Lane a private road that serves 10 single family homes.

An emergency-only access connection to Huron Rapids Drive, an existing residential neighborhood to the south of the site, is planned and would provide emergency vehicles with an alternative way to reach the development from M-36 via Lake Crest Drive to Huron Rapids Drive. This study will also analyze a forecast traffic scenario if that emergency access were to be completely open to all traffic.

The scope of this traffic study includes the following intersections:

- 9001 – Winans Lake Road and Chilson Road
- 9002 – Winans Lake Road and Buckhorn Lane / Site Driveway
- 9003 – Winans Lake Road Hamburg Road (T-Intersection)
- 9004 – Winans Lake Road and Hamburg Road (Roundabout)
- 1001 – M-36 and Chilson Road
- 9005 – M-36 and Lake Crest Drive
- 1002 – M-36 and Merrill Road
- 1003 – M-36 and Hamburg Road

This study will identify the existing, background, and forecast level of service at the study intersections in order to determine the impact this development will have on area traffic.

3.0 Area Description & Site Plan

3.1 Proposed Site Location and Surroundings

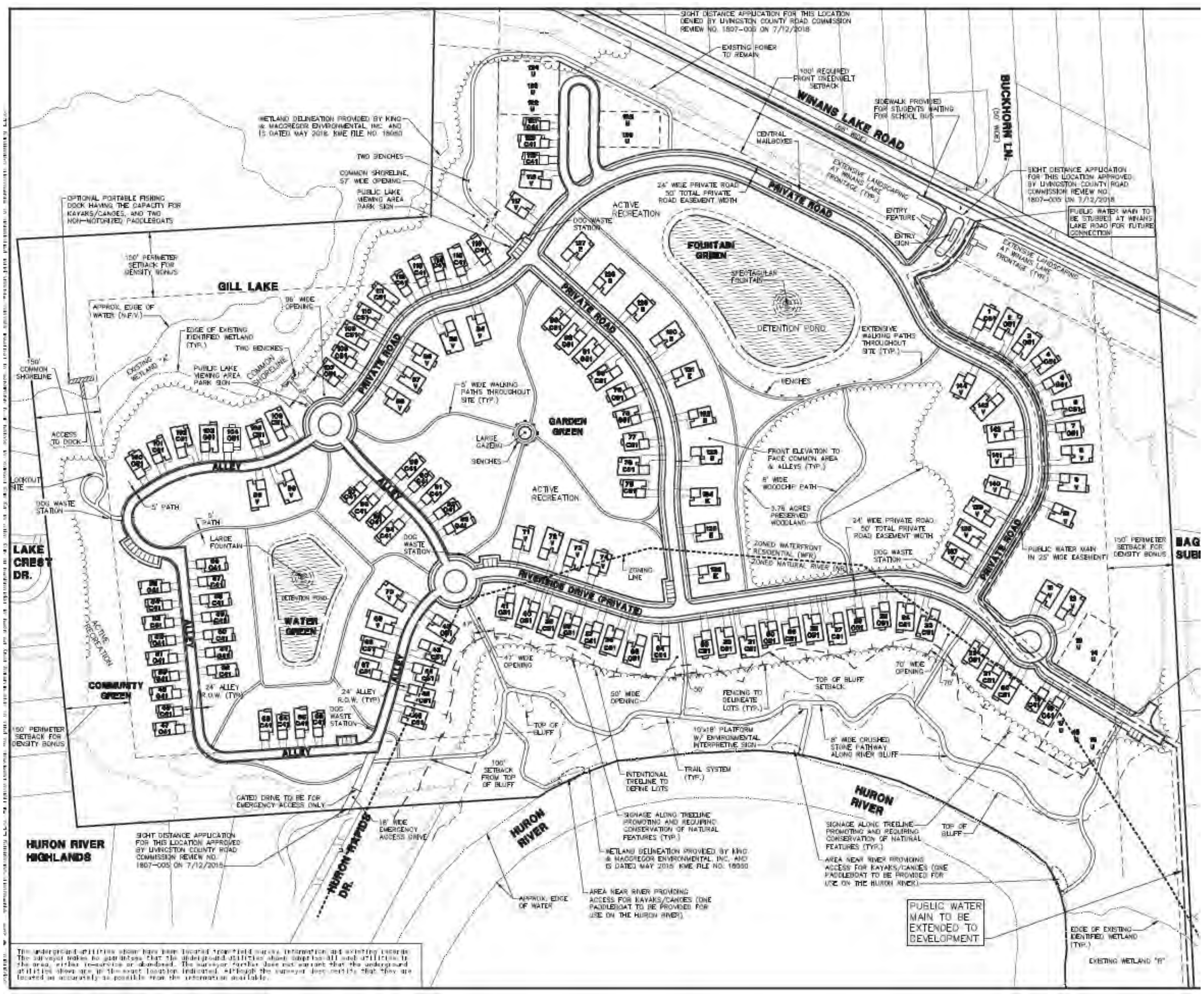
The site is located south of Winans Lake Road between Chilson Road and Hamburg Road. The site's driveway will be located across from Buckhorn Lane, a private road that provides access for 10 homes.

3.2 Existing and Proposed Zoning

The site is currently zoned WFR (Waterfront Residential) and NR (Natural River), and will be rezoned to Open Space Community PUD.

3.3 Site Plan

The proposed site layout is shown below:



3.4 Project Scope and Study Intersections

The intersections that are considered within the traffic influence area of this development and that are analyzed in this traffic study are as follows:

- 9001 – Winans Lake Road and Chilson Road
- 9002 – Winans Lake Road and Buckhorn Lane / Site Driveway
- 9003 – Winans Lake Road Hamburg Road (T-Intersection)
- 9004 – Winans Lake Road and Hamburg Road (Roundabout)
- 1001 – M-36 and Chilson Road
- 9005 – M-36 and Lake Crest Drive
- 1002 – M-36 and Merrill Road
- 1003 – M-36 and Hamburg Road

9001 - Winans Lake Road and Chilson Road

Winans Lake Road and Chilson Road are both under the jurisdiction of the Livingston County Road Commission. The speed limit near the intersection is 35 MPH on both Chilson Road and Winans Lake Road. The T-intersection is stop-controlled for the Winans Lake Road approach, while Chilson Road is free flowing. Each approach consists of a single approach and departure lane and is shown in the picture below.

Chilson Road and Winans Lake Road Intersection (Looking North)

9002 – Winans Lake Road and Buckhorn Lane
Winans Lake Road is two-lanes wide and is under the jurisdiction of the Livingston County Road Commission, and Buckhorn Lane is a private driveway. The Right-Of-Way on Winans Lake Road is 66' wide and the speed limit on this segment is 45 MPH. The intersection is stop-controlled for Buckhorn Lane and the future driveway connection, while Winans Lake Road is free flowing.

The intersection is planned to be widened to include a center-left turn lane and a right-turn deceleration lane for the proposed site driveway. The proposed driveway will be designed with a boulevard style entrance.

A west facing view of the intersection is shown in the picture below.

Winans Lake Road and Buckhorn Lane / Proposed Driveway Intersection (Looking West)

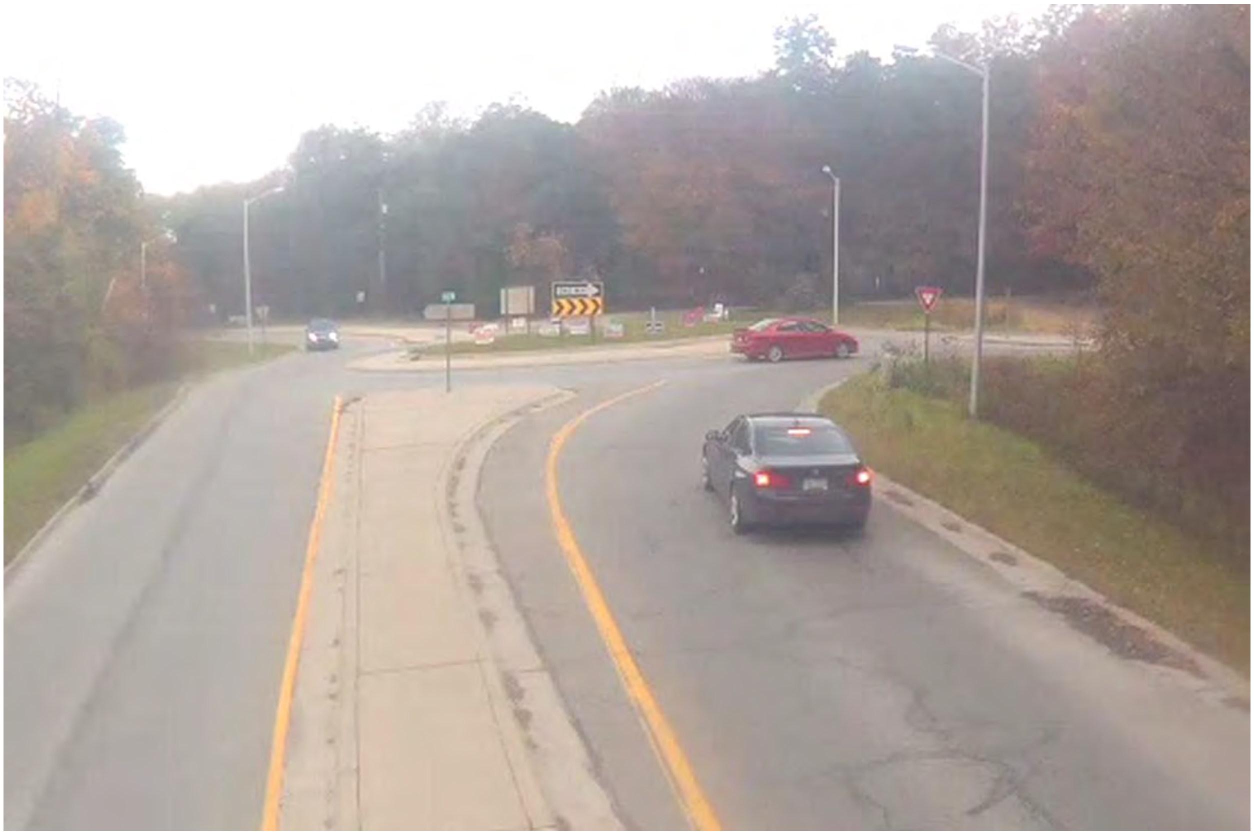
9003 – Winans Lake Road and Hamburg Road (T-Intersection)
Both Winans Lake Road and Hamburg Road are two-lanes wide and under the jurisdiction of the Livingston County Road Commission. The speed limit near the intersection is 45 MPH on Winans Lake Road and 35 MPH on Hamburg Road. Hamburg Road is stop-controlled, while Winans Lake Road is free-flowing. There is a short deceleration taper for the westbound approach to the intersection.

A west facing view of the intersection is shown in the picture below.

Winans Lake Road and Hamburg Road T-Intersection (Looking West)

9004 – Winans Lake Road and Hamburg Road (Roundabout)
Both Winans Lake Road and Hamburg Road are two-lanes wide and under the jurisdiction of the Livingston County Road Commission. The speed limit is 45 MPH on both roadways departing the intersection. All approaches to the single-lane roundabout are yield-controlled, with a circulatory speed of 20 MPH.

A north facing view of the roundabout is shown in the picture below.



Winans Lake Road and Hamburg Road Roundabout (Looking North)

1001 – M-36 and Chilson Road
Chilson Road is under the jurisdiction of the Livingston County Road Commission, while M-36 is under the jurisdiction of the Michigan Department of Transportation (MDOT). This intersection is controlled with a semi-actuated signal (loops sensors on Chilson and the retail driveway) with a 70 second AM cycle length and 80 second PM cycle length. All approaches include a pedestrian crosswalk.

The speed limit on Chilson Road is 35 MPH, and the speed limit on M-36 is 45 MPH.

A south facing view of the roundabout is shown in the picture below.

M-36 and Chilson Road Intersection (Looking South)

9005 – M-36 and Lake Crest Drive
M-36 is under the jurisdiction of MDOT and Lake Crest Drive is under the jurisdiction of the Livingston County Road Commission. M-36 is 45 MPH near the intersection, with a 30 MPH advisory speed limit to the west around the curve near Hull Road. Lake Crest Drive is 25 MPH which connects to Huron Rapids Drive which in turn connects to the proposed site through the proposed emergency access (or full access).

There is a driveway to a club located across from Lake Crest Drive, which had very little traffic during the morning peak hours, but did have some traffic during the afternoon peak hours.

M-36 has a short deceleration lane for Lake Crest Drive, and there is no left-turn passing or center-left-turn lane along M-36 at this intersection. M-36 is free flowing, while the club driveway and Lake Crest Drive is stop-controlled.

An east facing view shows the intersection of M-36 and Lake Crest Drive.

M-36 and Lake Crest Drive (Looking East)

1002 – M-36 and Merrill Road
Merrill Road is under the jurisdiction of the Livingston County Road Commission, while M-36 is under the jurisdiction of the Michigan Department of Transportation (MDOT). The speed limit on M-36 is 45 MPH. This intersection is controlled with a semi-actuated signal (loops sensors on the Merrill Road approach) that runs free with the same Max timing all day long. There is an overlap phase for eastbound M-36 right-turns that allow that traffic to proceed while Merrill Road traffic is receiving a green indication.

The eastbound M-36 approach consists of a through-only lane and a right-turn only lane. The westbound M-36 approach consists of a through only lane and a short left-turn only lane. The northbound Merrill Road approach consists of a separate left-turn and right-turn only lane.

A west facing view of the intersection is shown in the picture below.

M-36 and Merrill Road (Looking West)

1002 – M-36 and Hamburg Road
Hamburg Road is under the jurisdiction of the Livingston County Road Commission, while M-36 is under the jurisdiction of the Michigan Department of Transportation (MDOT). The speed limit on M-36 is 45 MPH, and 40 MPH further to the south. The speed limit on Hamburg Road is 45 Miles per hour. The northbound approach to this intersection is a retail development driveway.

This intersection is controlled with a semi-actuated signal (loops sensors on the Hamburg Road and the retail driveway approaches) that runs free with the same Max timing until the late evening when the intersection is set to flash (yellow flash on M-36, red flash on Hamburg / Retail Driveway) at 11 PM until 4 AM.

The southbound Hamburg Road approach consists of a left-turn only lane and shared through/right-turn lane. The northbound retail driveway approach consists of a left-turn only lane and a shared through right-turn lane. The eastbound and westbound M-36 approaches consist of separate left-turn, through-only, and right-turn lanes.

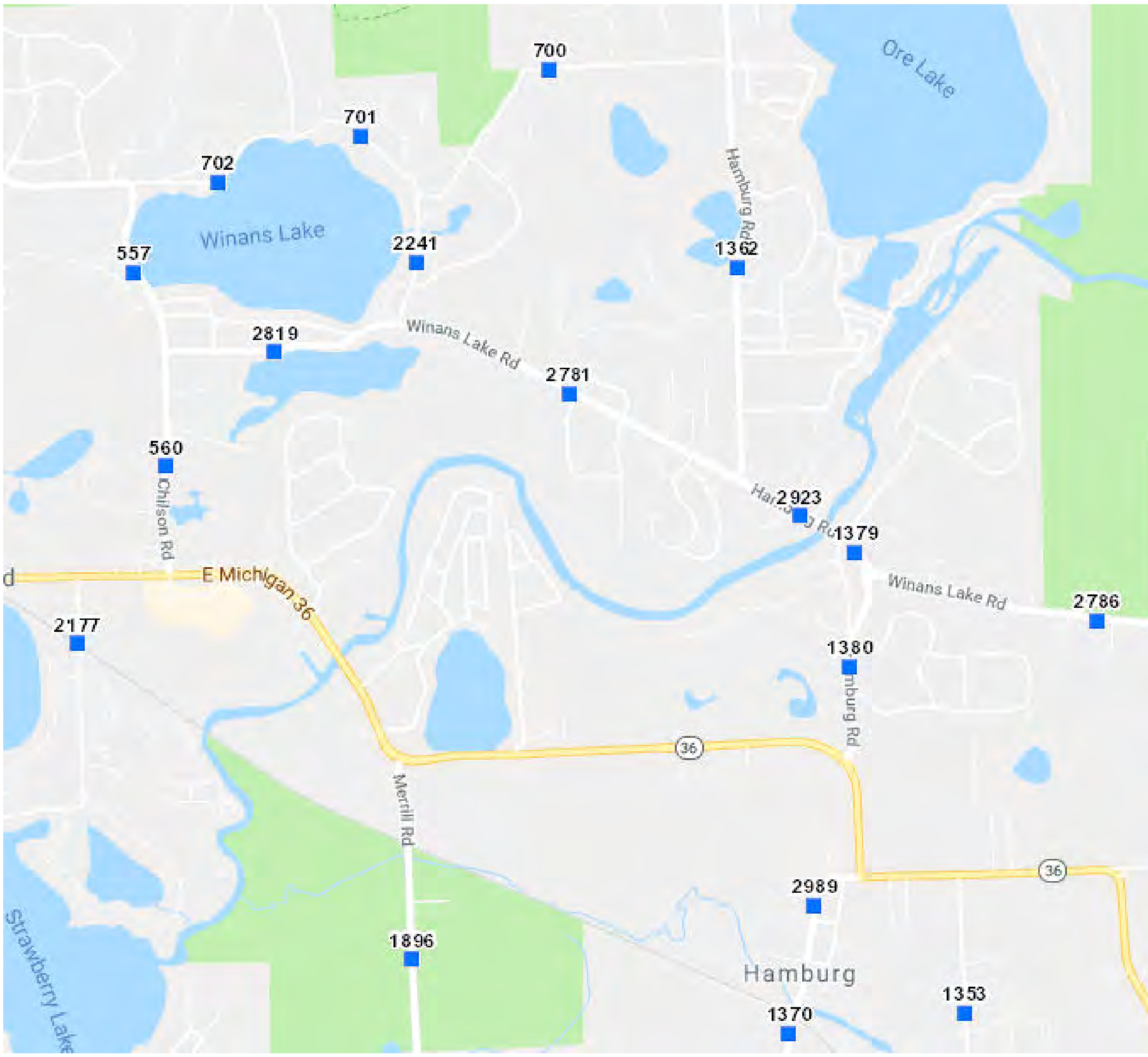
A south facing view of the intersection is shown below.

M-36 and Hamburg Road (Looking South)

4.0 Data Collection & Existing Traffic Volumes

4.1 Twenty-Four Hour Traffic Volumes

Existing and historical 24-hr volume data for this traffic study have been acquired from the Southeast Michigan Council of Government's (SEMCOG) traffic count database. Each location's volume summary printout is included in the appendix, and each of the calculated average annual daily traffic volumes (AADT) from these locations are summarized in Table 4.1.



Map of SEMCOG TCDS Count Locations
(the numbers are local Ids, not traffic volumes volumes)

Table 4.1 – Area 24-Hr Volumes

Local ID	557	560	1362	1379	1380	1896	2781	2786	2819	2923	MDOT-12
Year	AADT										
2018			3,610		11,130		4,380	10,700	4,230	6,170	
2017											
2016	6,630	7,100		6,930		7,400	4,330		4,120		
2015			3,860		9,470			9,930		5,300	9,182
2014	5,650	6,260		5,570		5,720	4,820		3,580		
2013			3,680		8,840	5,630		9,230		4,960	
2012	5,500	5,920		5,480		5,900	4,210		3,920		10,702
2011											
2010	5,810		3,550		7,780	5,640	4,590	8,860		5,300	
2009		5,720		5,350					3,820		8,244
2008	5,380		3,440		7,890					5,650	
Forecasted 2028 Volume											
2028	7,666	9,106	4,003	8,861	14,062	9,883	4,256	12,999	4,561	6,148	11,877
Raw Growth	1.156	1.283	1.109	1.279	1.263	1.336	0.972	1.215	1.078	0.996	1.294
# of Years											
Years	12	12	10	12	10	12	10	10	10	10	13
Growth Rate	1.012	1.021	1.010	1.021	1.024	1.024	0.997	1.020	1.008	1.000	1.020
Average Growth Rate											
1.014											

The 2028 forecast volumes are calculated using the existing AADT data points and the FORECAST function in Excel. If the historical growth trends continue from the past 10 years into the future, the overall growth rate for the area is about 1.4% per year.

4.2 Turning Movement Counts

Turning movement counts have been taken between the hours of 7:00-9:00 AM and 4:00-6:00 PM have been taken at the following intersections for use in this traffic study:

- 9001 – Winans Lake Road and Chilson Road
- 9003 – Winans Lake Road and Hamburg Road (T-Intersection)
- 9004 – Winans Lake Road and Hamburg Road (Roundabout)
- 1001 – M-36 and Chilson Road
- 9005 – M-36 and Lake Crest Drive
- 1002 – M-36 and Merrill Road
- 1003 – M-36 and Hamburg Road

These morning and afternoon peak hour counts include all personal vehicles, commercial truck traffic, pedestrians, and bicycle traffic. A summary of these turning movement counts is included in the Appendix.

Figures 4.1 and 4.2 show the existing morning and afternoon peak hour traffic volumes.

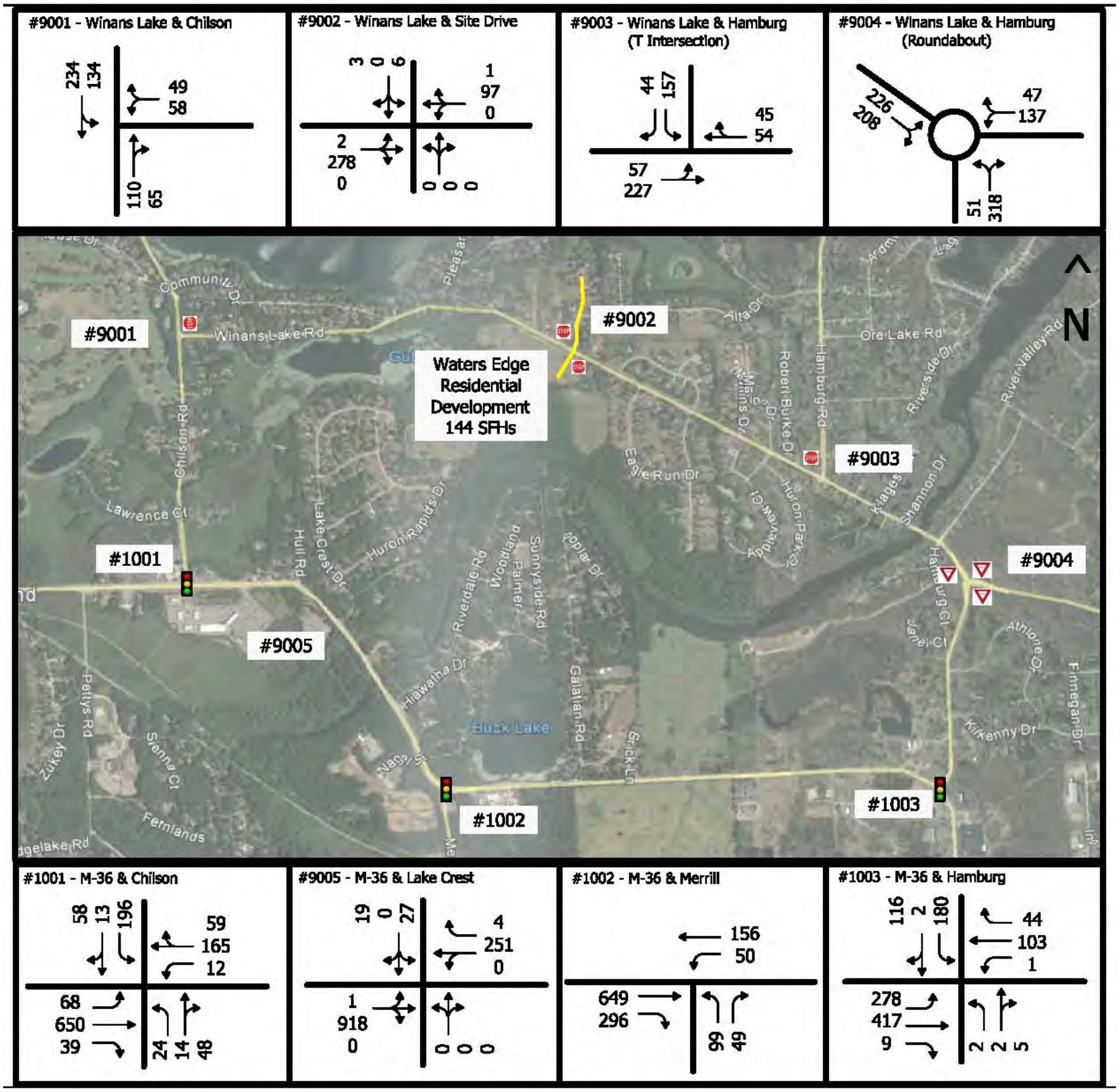


Figure 4.1 – Existing Morning Peak Hour Volumes

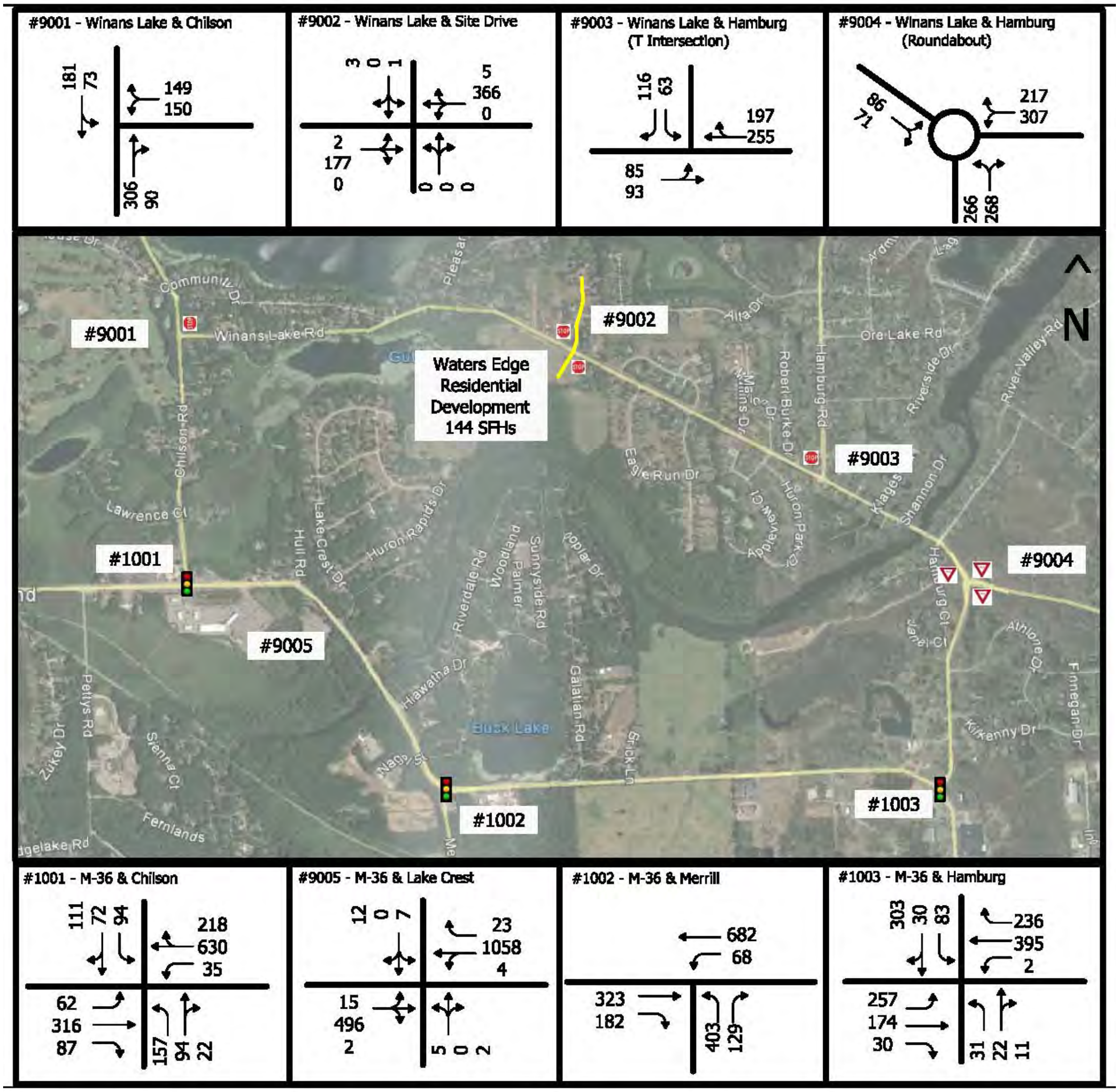


Figure 4.2 – Existing Afternoon Peak Hour Volumes

4.3 Observations on Existing Traffic Conditions

The following general observations were made during the counting process:

- 9001 – Winans Lake Road and Chilson Road
  - AM westbound queues for stopped traffic were typically in the 1-5 vehicle range.
  - PM westbound queues for stopped traffic were occasionally longer than 10 vehicles, but cleared out regularly.
- 9003 – Winans Lake Road and Hamburg Road (T-Intersection)
  - AM southbound queues for stopped traffic were typically in the 1-5 vehicle range.
  - PM southbound queues for stopped traffic were typically in the 1-5 vehicle range.
- 9004 – Winans Lake Road and Hamburg Road (Roundabout)
  - AM traffic moves very well through the roundabout, occasional short lived queues of 1-5 vehicles northbound and westbound.
  - PM traffic also moves well through the roundabout, with occasionally longer westbound queues in the 1-10 vehicle range, and northbound queues in the 1-7 vehicle range.
- 1001 – M-36 and Chilson Road
  - AM southbound left-turns occasionally wait for more than one signal cycle to complete their turn.
  - PM traffic seems to move fairly well through the signal with limited queuing and less waiting through multiple signal cycles.
- 9005 – M-36 and Lake Crest Drive
  - Relatively little traffic on each driveway, so there is very little queuing.
- 1002 – M-36 and Merrill Road
  - Traffic appears to move through this intersection fairly well during both peak hours.
- 1003 – M-36 and Hamburg Road
  - Traffic moves well during the AM peak hour, southbound left-turn queues are in the 1-5 range.
  - Occasionally the eastbound left-turns from M-36 to Hamburg Road wait for multiple signal cycles, during the PM peak hour.

5.0 Background Growth and Other Developments

Typically traffic volumes may grow over time due to development in the surrounding area. The existing traffic volumes are increased by a background growth rate to estimate the background traffic conditions that will be present when the proposed site has reached its build-out.

SEMCOG’s Hamburg township community profile projects a population and job growth rates approximately 0.3% per year for the next 28 years. However the historical traffic volumes from the past 10 years is closer to 1.4% per year. To be conservative this study will use a 1.4% per year growth rate for a period of 10 years to 2028, the buildout year for this development.

No other developments in the area were considered into this study at this time.

Figures 5.1 and 5.2 show the background volumes for the morning and afternoon peak hours.

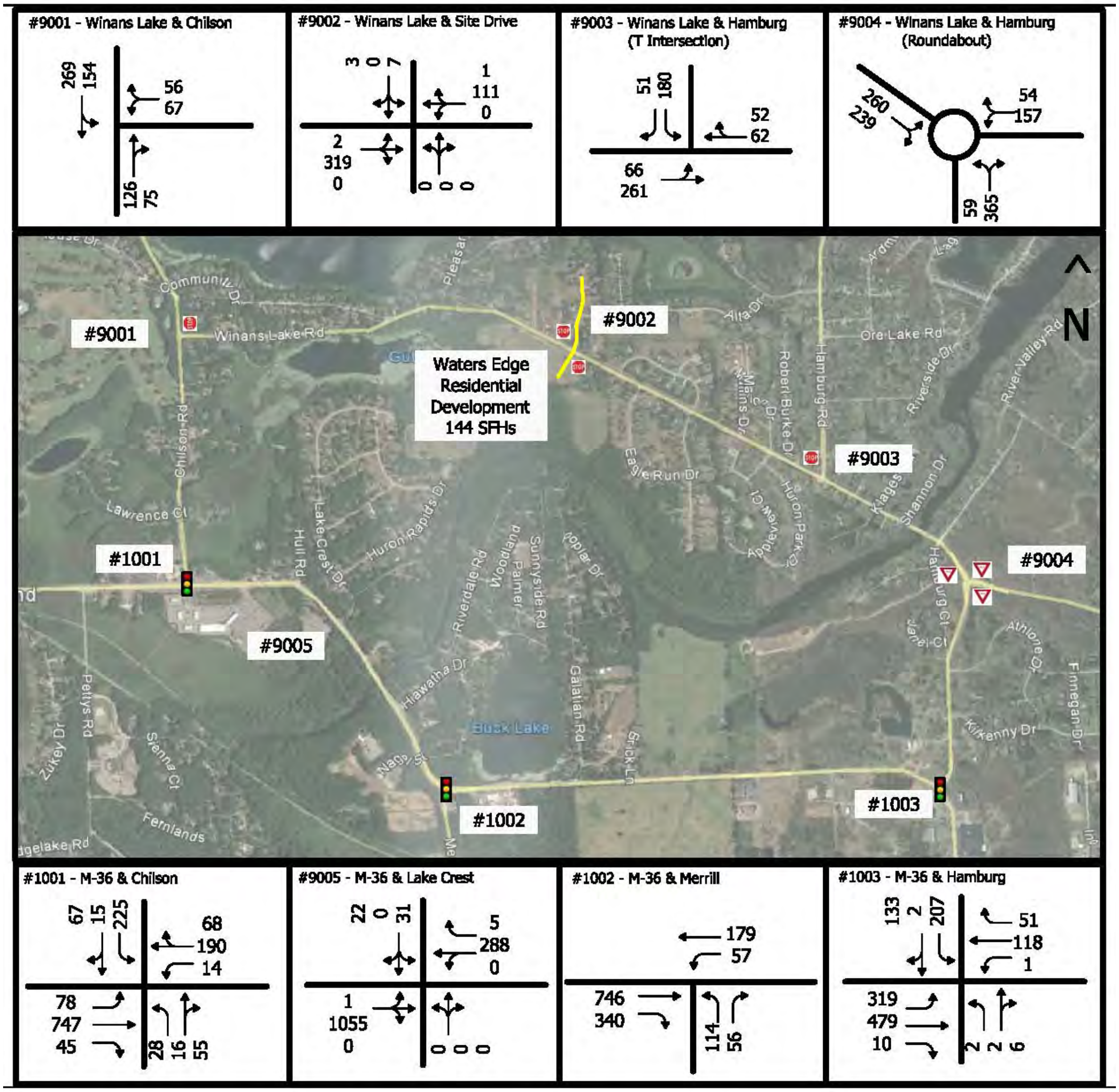


Figure 5.1 – Background 2028 Morning Peak Hour Volumes

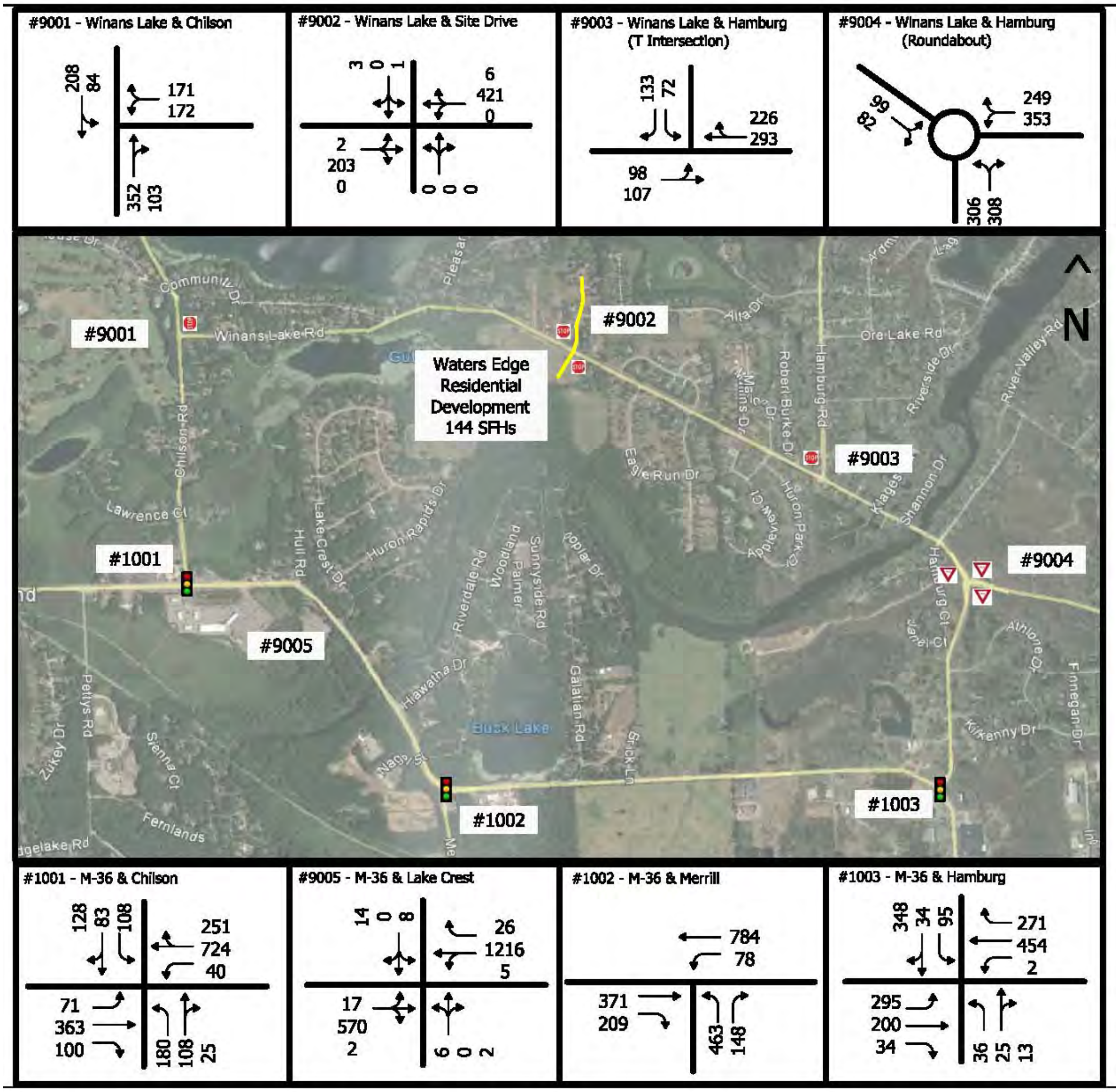


Figure 5.2 – Background 2028 Afternoon Peak Hour Volumes

6.0 Trip Generation

6. 1 Methodology

Trip generation for this traffic study is based upon the rates and equations contained in the Institute of Transportation Engineer's (ITE) **Trip Generation Manual**, 10th Edition. The **Trip Generation Manual** is a publication that contains a wealth of traffic data on a wide variety of land uses that fall within the categories of residential, lodging, recreational, institutional, industrial, medical, office, retail, and services. The **Trip Generation Manual** is typically used if no local data for a specific land use is readily available.

Base Vehicular Trips

The methodology in estimating the base vehicular trip generation for the site and any background developments is contained in the ITE **Trip Generation Handbook**, 3rd Edition and is summarized as follows:

- Identify the most appropriate land use category. If more is known about the exact type of land use for a development and there is data on it within the **Trip Generation Manual**, then it is better to select the specific land use. Otherwise there are more general land uses such as General Office or Shopping Center that can be used.
    - This development is designed and will be marketed towards empty nesters, seniors, and retirees who drive at rates significantly less than what a typical single family home development occupied with working families and school age children may generate.
    - To be conservative, however, this traffic study will forecast site traffic based upon the ITE category Single Family Housing, ITE Code 210.

- Next, select the independent variable used in the analysis. For residential land uses this is typically the number of units, or number of bedrooms/population. For retail and office space the independent various is often the size of the building, or the number of employees.
    - The independent variable is housing units. (144)

- Determine if the trip generation equations or rates are more appropriate to use in the analysis. The coefficient of determination (R^2) is defined as a number that indicates how well data fit a statistical model – sometimes simply a line or curve. In this case it relates to the line through the data points contained in the **Trip Generation Manual** for proposed development. If the coefficient of determination is less than 0.75, or no equation is provided within the **Trip Generation Manual**, then the trip generation rate is used. If the R^2 value is greater than 0.75, then the equations provided are typically used. Other factors to consider include the number of available studies for each land use, and how the size of the development relates to the average size of the available data set.
    - Equations are used, all coefficients of determination are above 0.75.

- Calculate the base number of vehicular trips for the typical weekday, the morning peak hour, and the afternoon peak hour. The inbound and outbound trips are calculated by the directional distribution provided on the data sheet for a specific category.

- Multi-modal Trip Generation
    - If a development is positioned near convenient public transportation options, or if there are significant destinations within walking or biking distance, the number of vehicle trips may be reduced. In this case, most all trips to and from this development are likely to occur by vehicle, and so there will be no reductions due to alternative modes of transportation.

6.2 Trip Generation Summary – Proposed Development

The trip generation for the proposed development is summarized in Table 6.1. The number of trips that exist on Buckhorn Lane, which is across from the proposed site driveway is also estimated by the Single Family Housing category. The ITE data sheets are included in the Appendix.

- 24-Hour Volumes – This is an estimate of the total weekday daily traffic entering and existing the site (with half entering and half exiting).
- The AM and PM peak hours (of adjacent street traffic) is an estimation of the traffic that enters and exits the site during the peak hours of the day, which is typically period of 1 hour from 7:00-9:00 AM and 4:00-6:00 PM.

Table 6.1 Trip Generation – Proposed Development

		Size	24-Hour	AM Peak Hour			PM Peak Hour		
Land Use	ITE Code	(Units)	Volume	Enter	Exit	Total	Enter	Exit	Total
Proposed Development	210	144	1454	27	80	107	91	53	144
Buckhorn Lane (estimated)	210	10	125	3	9	12	7	4	11

As previously stated, the proposed Waters Edge community will be marketed towards empty nesters and retirees with different driving habits than if the site were a more typical blend of working families with children. Each house is expected to contain only 2-3 bedrooms and so overall population of the site is expected to be less, and would likely result into fewer vehicle trips than estimated for this study.

To support this assumption, we have taken 24-Hour machine counts at a similar residential development (similar bedroom count and demographic, Figure 6.2.1) in Oceola Township located off of Latson Road, north of Golf Club Road. These machine counts recorded traffic at both site driveways for a period of roughly 48 hours to get traffic data for two morning peak hours and two afternoon peak hours. This subdivision has a total of 226 units comprised of 134 units of single family homes, with 92 units of attached duplexes (46 x 2).

If the site were analyzed as a single family and multi-family subdivision, the site would have an expected trip generation of total 144 AM trips and 190 total PM trips. Our counts recorded 55 AM trip and 85 PM trips during the morning and afternoon peak hours and so this site is generating roughly 1/3rd to 1/2 of the traffic of a typical single family development.

If one were to consider this Oceola Township site as a Senior Housing development, another category contained in ITE's Trip Generation Manual, then the expected trips for that site drop to 76 AM and 91 PM, which align far more closely to the traffic that was recorded.

While this report analyzes the Water's Edge site's traffic impact at the higher Single Family Housing trip generation rates as worst case scenario, the site's actual impact will likely be more similar to that of a Senior Housing development which generates only a 1/2 to 1/3rd of the traffic that a typical Single Family Housing development. The likely trip generation for the proposed Waters Edge development would be 54 AM trips (instead of 107 AM trips) and 64 PM trips (instead of 144 PM trips).

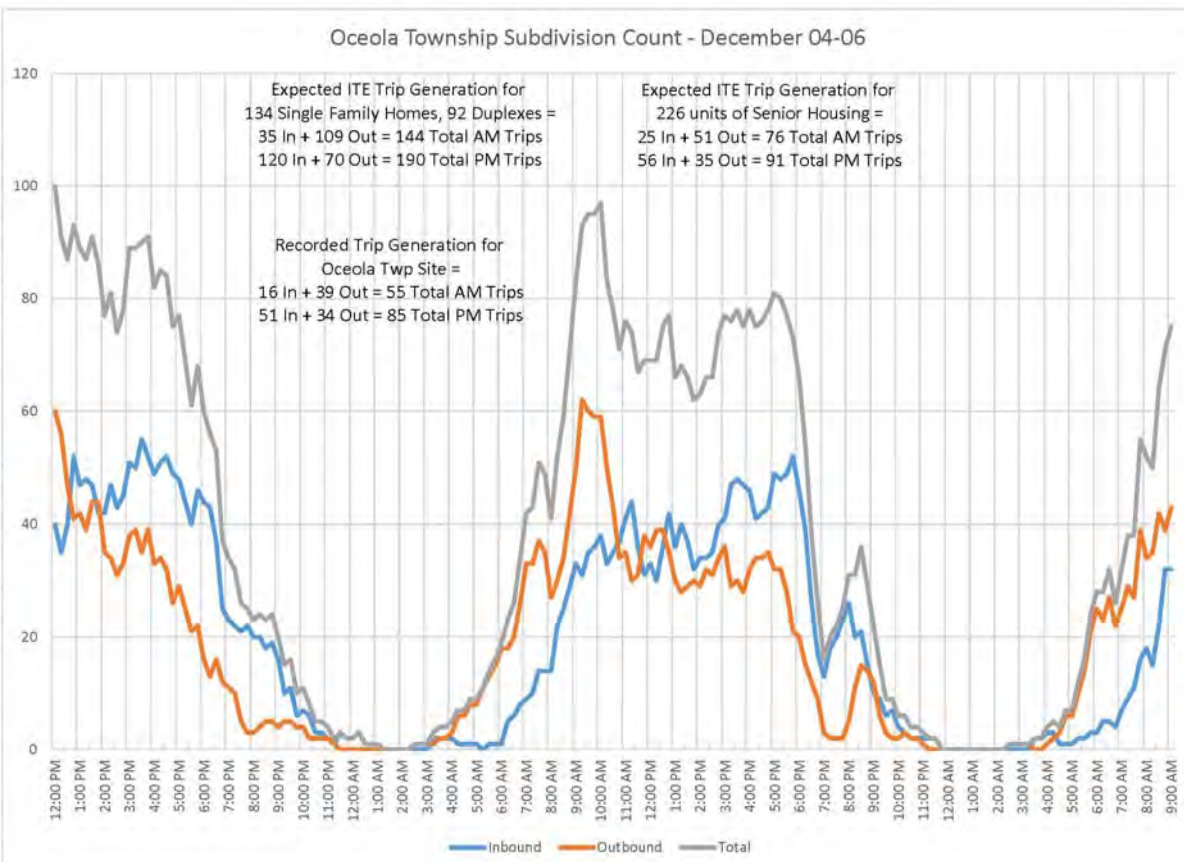


Figure 6.2.1 – Traffic Count and Trip Generation at a Similar Site in Oceola Township

6.3 Trip Generation Comparison – Parallel Plan – 77 Single Family Homes

We understand that 77 typical single family units may be constructed on site, according to the Township ordinances. The ITE trip generation for this would be:

		Size	24-Hour	AM Peak Hour			PM Peak Hour		
Land Use	ITE Code	(Units)	Volume	Enter	Exit	Total	Enter	Exit	Total
Typical Single Family Homes	210	77	818	15	44	59	50	29	79
Waters Edge Development	251	144	775	18	36	54	39	25	64

The proposed Waters Edge development, also analyzed as single family homes for the purposes of this traffic study, is more likely to generate traffic at rates similar to the ITE category Senior Housing. Therefore, the 77 typical single family homes currently permitted on site would likely generate traffic that is slightly more, but roughly equivalent to the traffic that the Waters Edge development is likely to generate even with 67 more units.

7.0 Trip Distribution

Trip Distribution for both the proposed development and the other background developments are based upon the existing traffic patterns in the area.

A summary of the existing traffic volumes that enter and exit the area is shown in Table 7.1. In general traffic is flowing eastbound during the morning and returning westbound during the PM peak hour. The assumed percentages are just rounded estimates for simpler calculations.

Table 7.1 – Trip Distribution Table

AM Outbound	Vol	%	Assumed %	AM Inbound	Vol	%	Assumed %
North on Chilson	159	8.0%	10%	North on Chilson	368	20.4%	20%
West on M-36	247	12.4%	15%	West on M-36	757	41.9%	40%
South on Merrill	346	17.3%	10%	South on Merrill	148	8.2%	10%
East on M-36	602	30.1%	30%	East on M-36	148	8.2%	10%
East on Winans Lake Road	544	27.2%	30%	East on Winans Lake Road	184	10.2%	10%
North on Hamburg Road	102	5.1%	5%	North on Hamburg Road	201	11.1%	10%
Total	2000	100.0%	100%	Total	1806	100.0%	100%
PM Outbound	Vol	%	Assumed %	PM Inbound	Vol	%	Assumed %
North on Chilson	455	18.1%	20%	North on Chilson	254	9.8%	10%
West on M-36	898	35.8%	35%	West on M-36	465	18.0%	20%
South on Merrill	250	10.0%	10%	South on Merrill	532	20.6%	20%
East on M-36	268	10.7%	10%	East on M-36	633	24.5%	25%
East on Winans Lake Road	354	14.1%	15%	East on Winans Lake Road	524	20.3%	20%
North on Hamburg Road	282	11.2%	10%	North on Hamburg Road	179	6.9%	5%
Total	2507	100.0%	100%	Total	2587	100.0%	100%

Figures 7.1 and 7.2 illustrate the generated traffic volumes for the morning and afternoon peak hours assuming that all site traffic enters and exit the site through its proposed driveway access across from Buckhorn Lane.

Figures 7.3 and 7.4 illustrate the generated traffic volumes assuming that the emergency access to the residential neighborhood to the south is open to all traffic. An estimated 30% of the site traffic is assumed to divert to and from the south through Huron Rapids Drive to Lake Crest Drive and M-36. Traffic that goes to and comes from the southern connection is assumed to only head to and from east and west M-36 as well as Merrill since those are the most logical destinations.

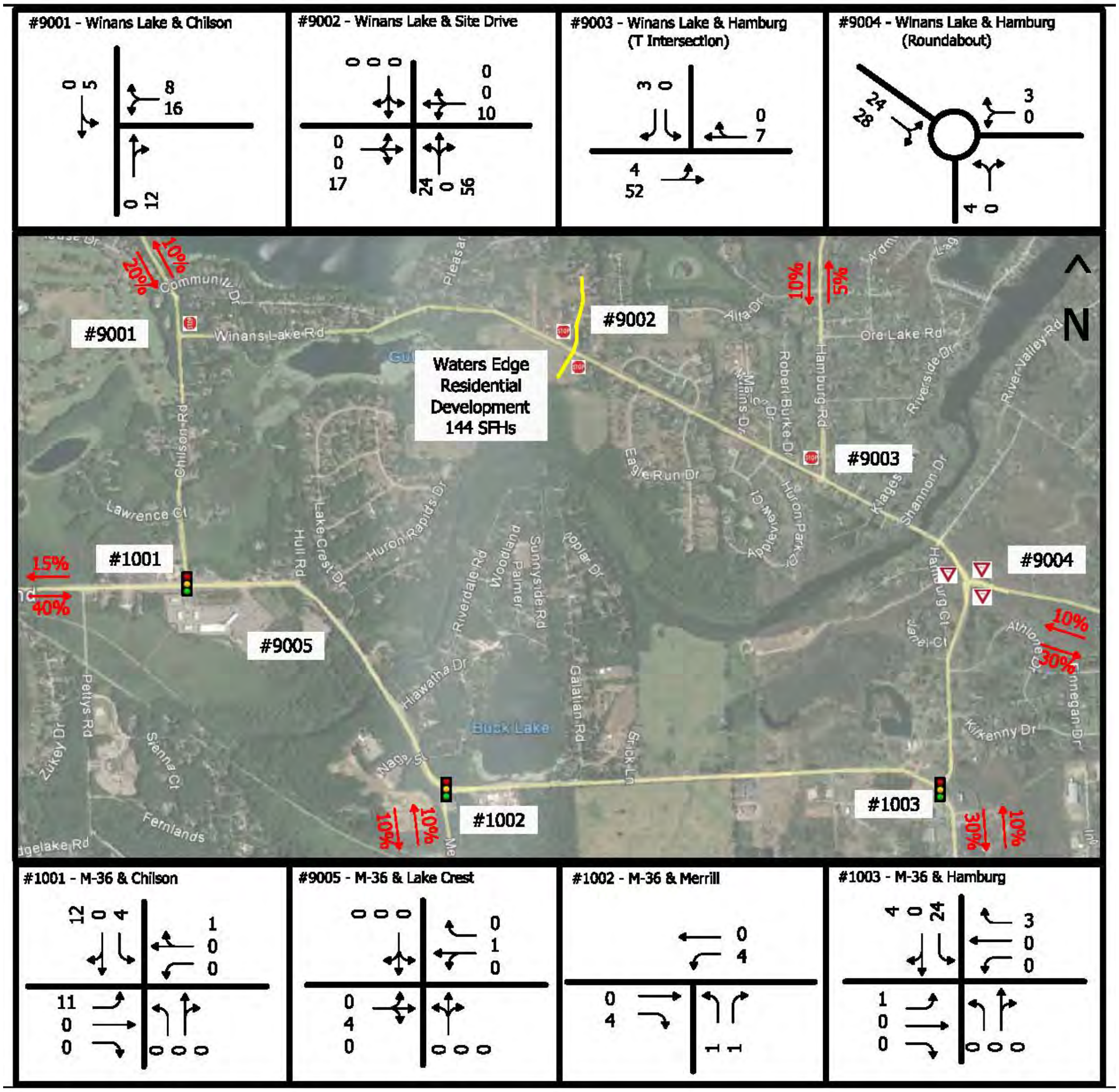


Figure 7.1 – Generated Morning Peak Hour Volumes

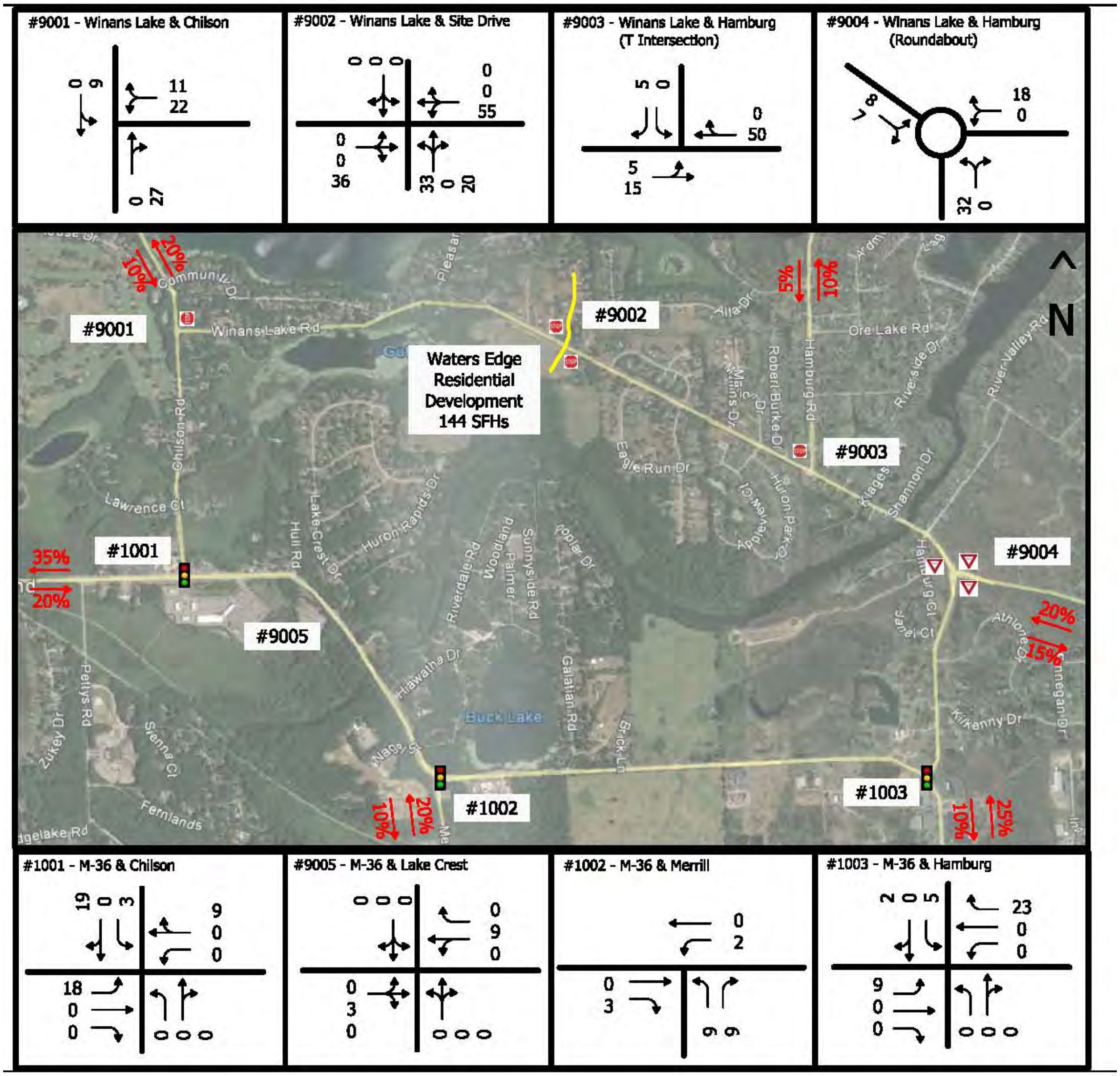


Figure 7.2 – Generated Afternoon Peak Hour Volumes

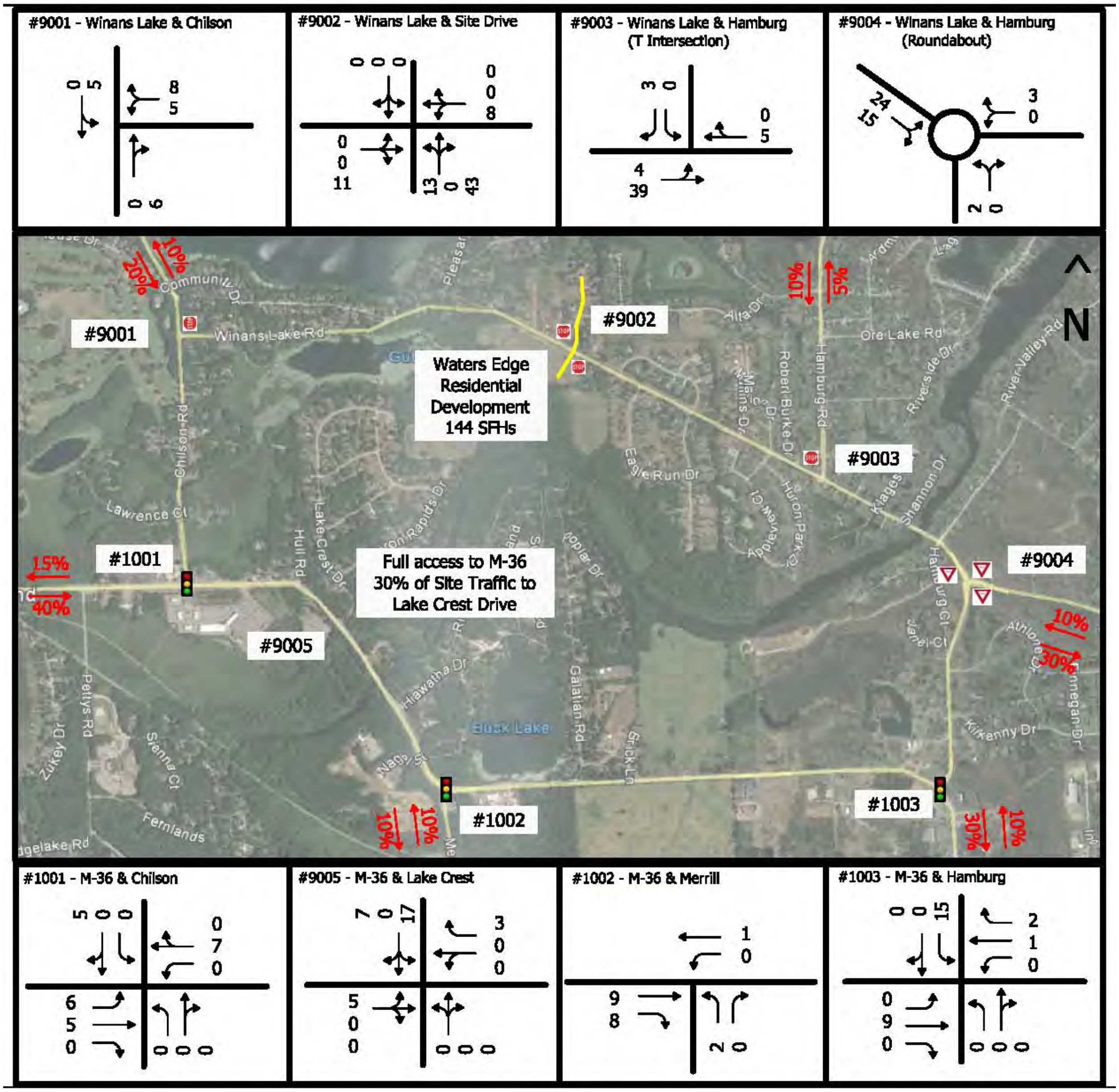


Figure 7.3 – Generated Morning Peak Hour Volumes
(Full Access to Lake Crest Drive)

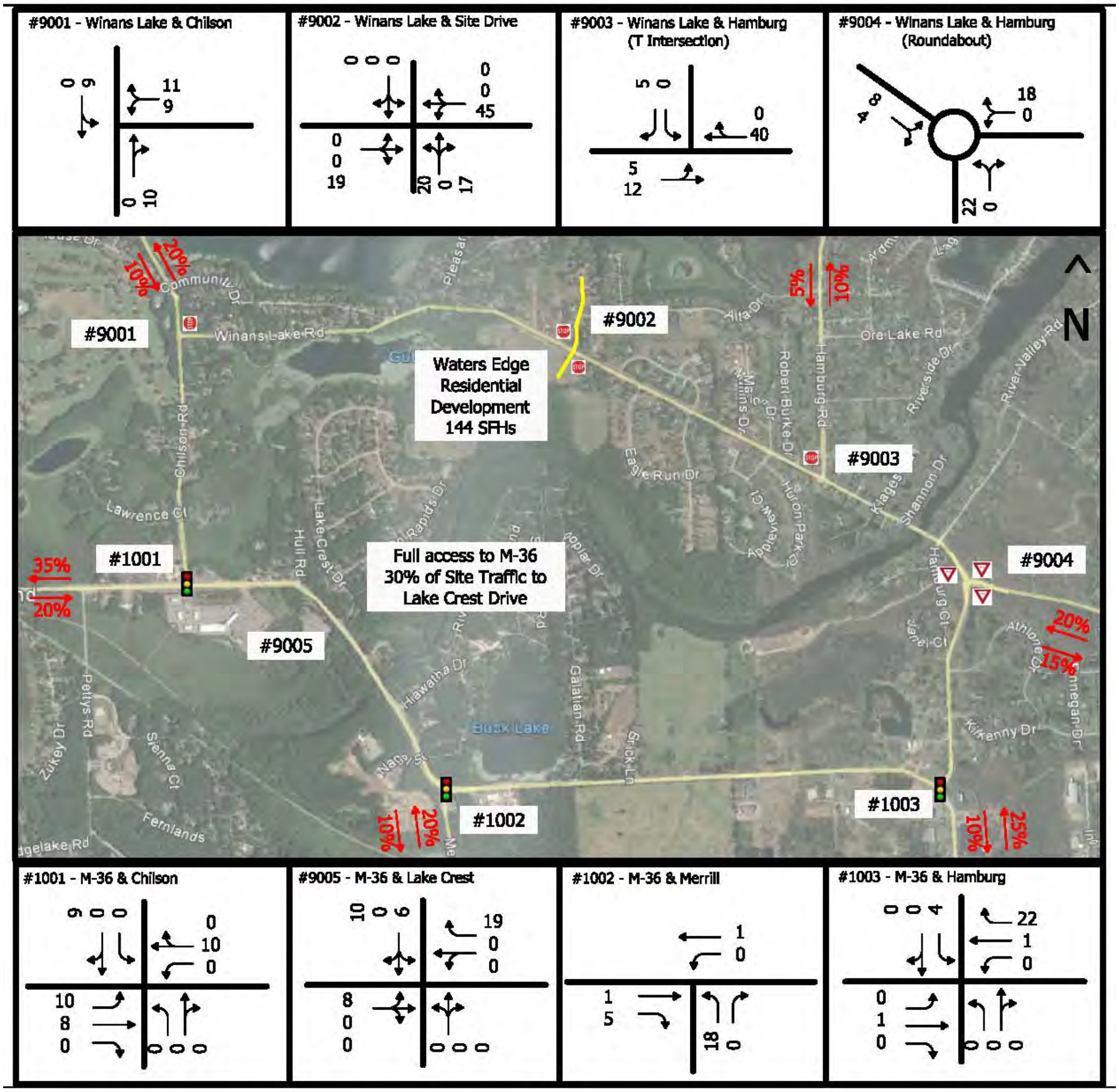


Figure 7.4 – Generated Afternoon Peak Hour Volumes
(Full access to Lake Crest Drive)

Figures 7.5 and 7.6 illustrate the forecast morning and afternoon peak hour traffic volumes, (background traffic plus generated traffic). This forecast scenario assumes all generated traffic enters and exits the site at the driveway connection to Winans Lake Road at Buckhorn Lane.

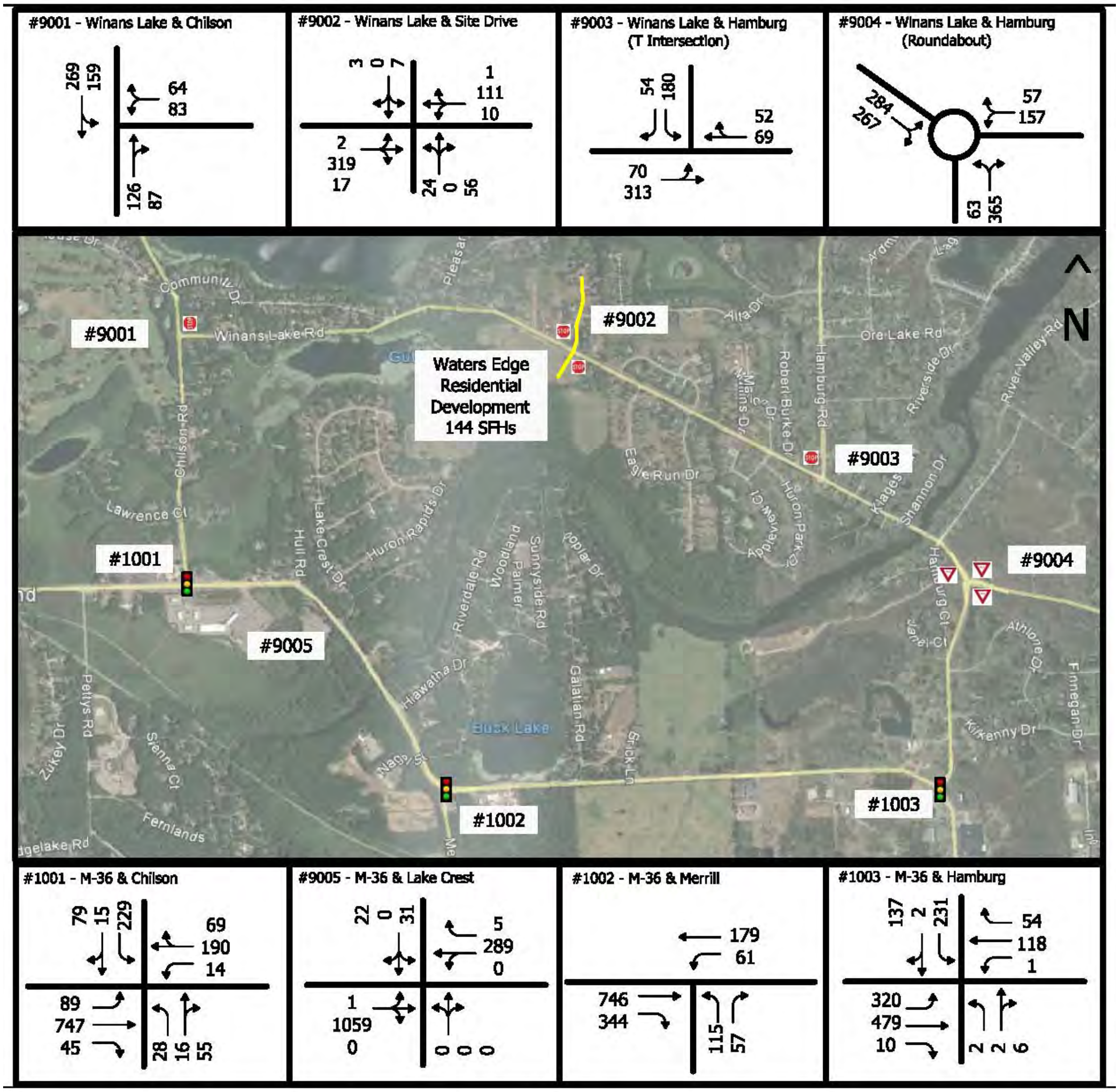


Figure 7.5 – Forecast 2028 Morning Peak Hour Volumes

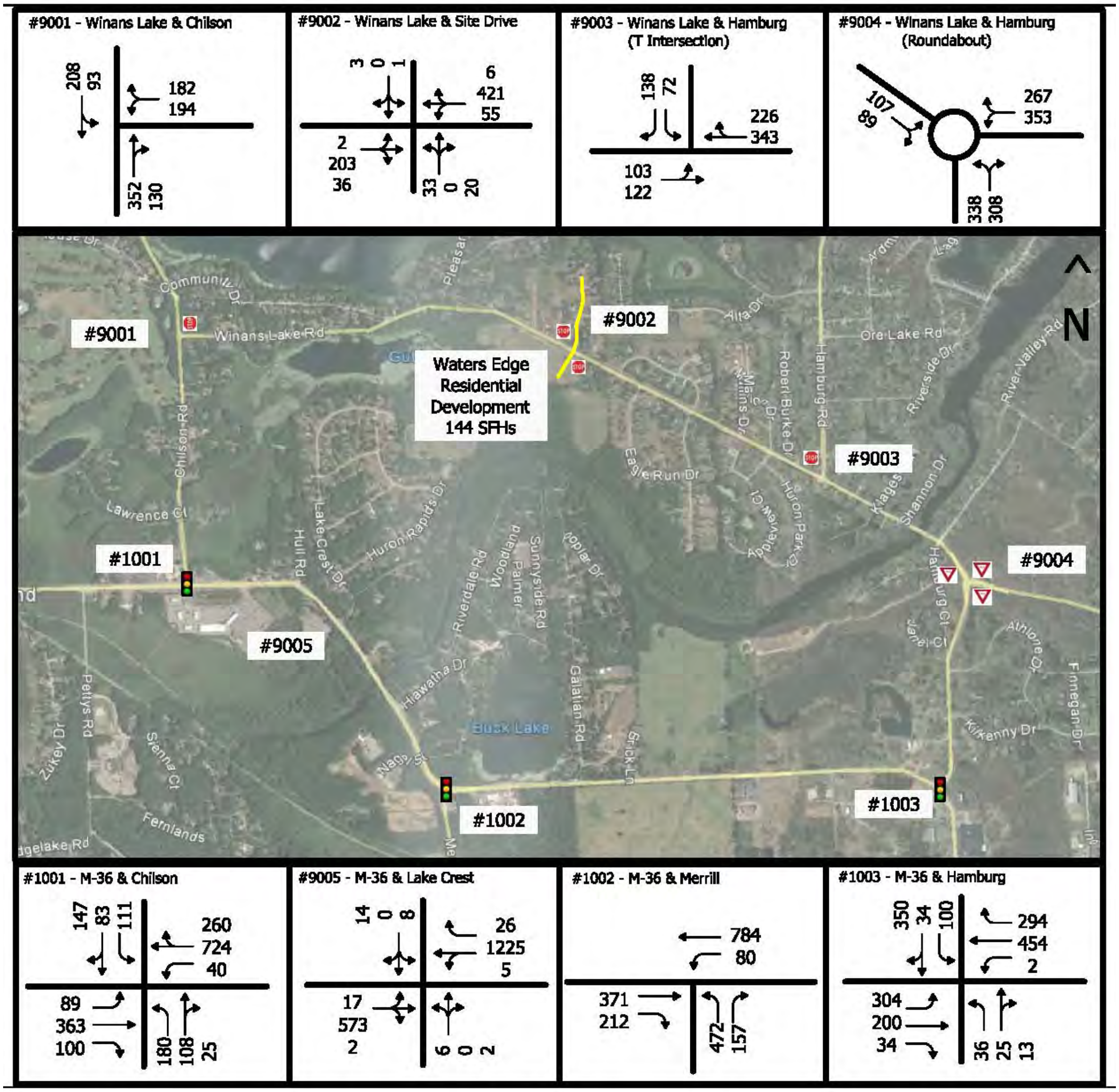


Figure 7.6 – Forecast 2028 Afternoon Peak Hour Volumes

Figures 7.7 and 7.8 illustrate the alternative forecast morning and peak hour traffic scenarios assuming that 30% of all site-generated traffic enters and exits the site through an open connection to Lake Crest Drive via Huron Rapids Drive.

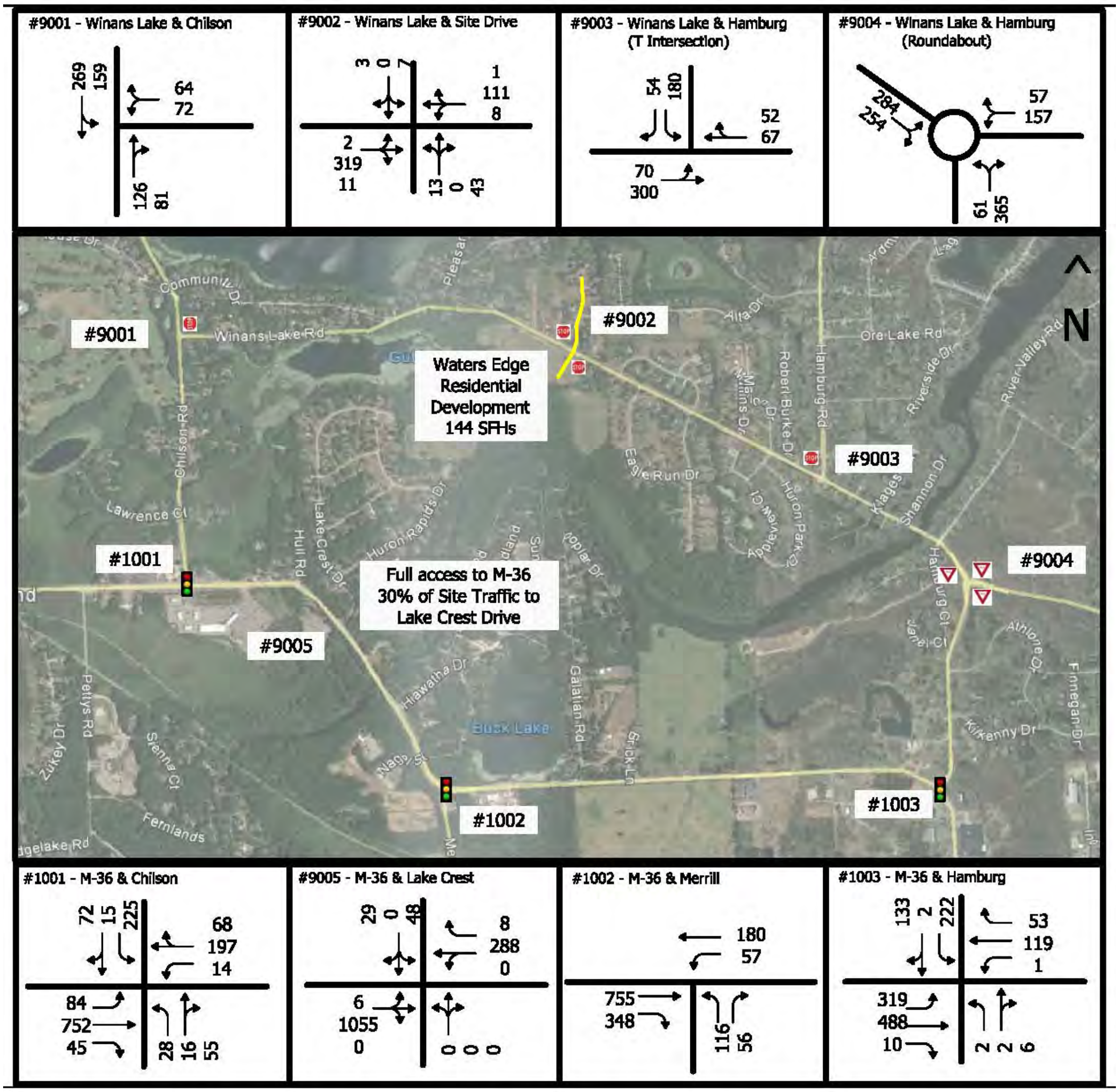


Figure 7.7 – Alternative Forecast Morning Peak Hour Volumes
(Full Access to Lake Crest Drive)

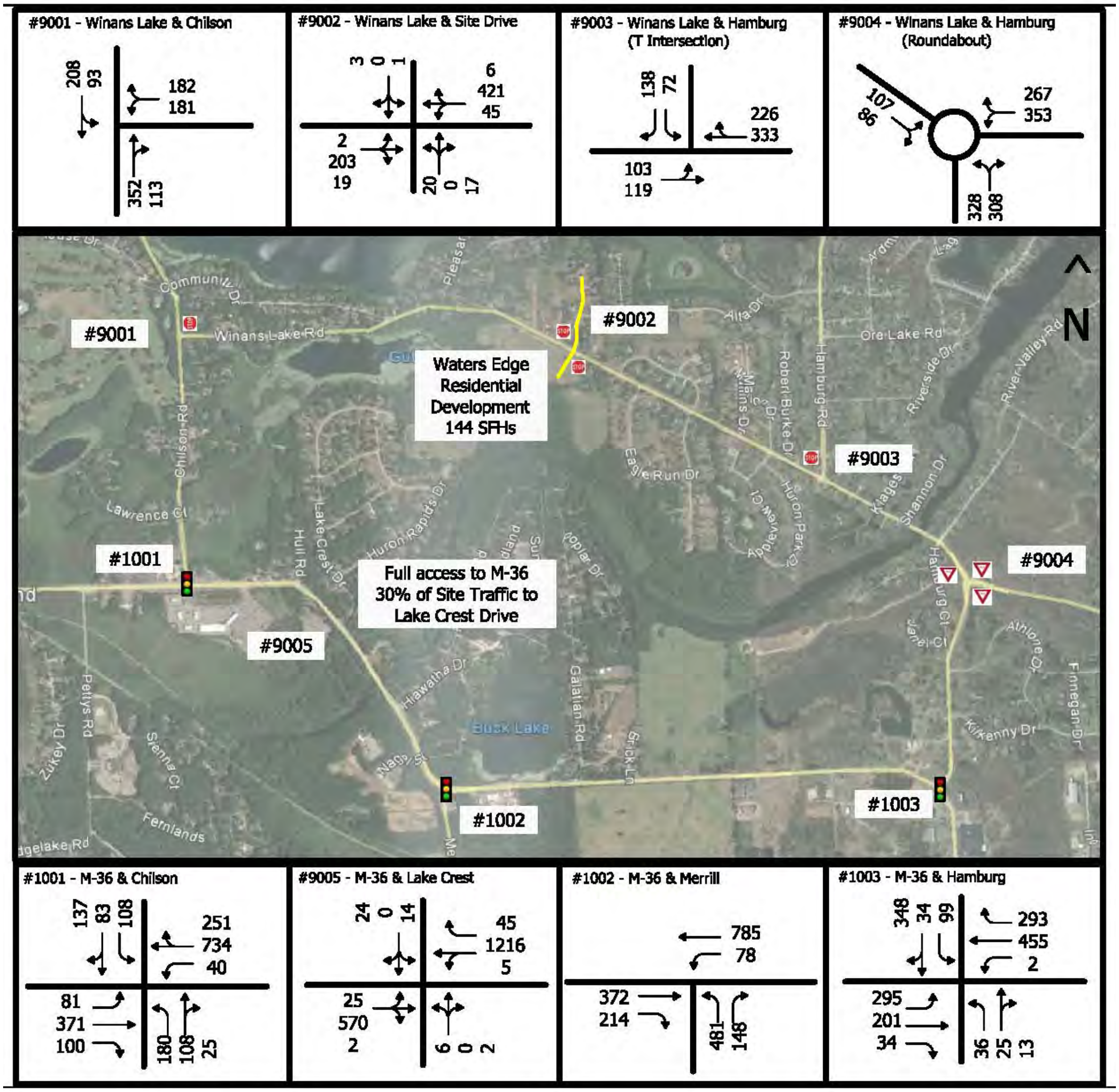


Figure 7.8 – Alternative Forecast Afternoon Peak Hour Volumes
(Full Access to Lake Crest Drive)

8.0 Capacity Analysis

8.1 Methodology and Analysis Tools

Capacity analysis for this traffic study utilizes the Synchro/SimTraffic (Version 10) program to create a traffic model of the existing, background growth (if needed), and forecast traffic scenarios. Synchro provides the **Highway Capacity Manual**'s (HCM) level of service for each study intersection, while the SimTraffic model provides an alternative and sometimes more realistic analysis of traffic conditions and impacts where queuing at intersections may impact other driveways, or delays for other turning movements at the same or other nearby intersections.

Neither analysis method is perfect as the equations within the **Highway Capacity Manual** may result in unrealistically long delays at busy unsignalized intersections. Sometimes the vehicle behavior within the SimTraffic model does not always match reality, such as where human drivers would more easily change lanes to avoid a blockage, or instances where more drivers in reality "sneak" through an intersection at the end of a signal phase to turn left.

SimTraffic

The SimTraffic traffic model includes all of the intersections within the scope of this study, detailed with the laneage at each intersection, the links between each intersection, and the traffic control used or proposed for each intersection. Spreadsheets are developed with the existing, background, and forecasted peak hour traffic volumes. The traffic volume data from those spreadsheets (.csv files) is then input into the various traffic models scenarios. Each scenario that is analyzed is run 20 times within SimTraffic to generate average delays at each of the study intersections. The reported average delay per vehicle results in SimTraffic are not calculated utilizing the same methodology as the Highway Capacity Manual. Both AM and PM models were found to be within MDOTs volume thresholds for calibration, and seemed to match field conditions as well.

Synchro - HCM Level-of-service (LOS)

The Highway Capacity Manual assigns the following level-of-service grades to the ranges of control delay in seconds for unsignalized and signalized intersections. Generally LOS D is considered the limit of acceptable delay, although there are many situations where providing road improvements needed to improve a failing intersection LOS grade may be realistically unattainable for a sole developer or even undesirable to a community:

Table 8.1 – Highway Capacity Manual
Level of Service Delay Ranges and Grades

Unsignalized Level-of-service Grades						
Delay (sec.)	0-10	10-15	15-25	25-35	35-50	50+
LOS	A	B	C	D	E	F

Signalized Level-of-service Grades						
Delay (sec.)	0-10	10-20	20-35	35-55	55-80	80+
LOS	A	B	C	D	E	F

The HCM Level of Service grades for each scenario and study intersection is the basis upon which improvements are recommended in this traffic impact study. Any turning movement with a HCM level of service E or F is highlighted and improvements are recommended to mitigate those poor level of service grades. The delays and queues from the SimTraffic Model are included as a check to insure that excessive queuing at an intersection does not significantly impact other locations.

Capacity Analysis: Intersection #9001 – Winans Lake Road and Chilson Road
Tables 8.1.1-4 summarize the capacity analysis results for the intersection of Winans Lake Road and Chilson Road during the morning peak hour. Tables 8.1.5-8 summarize the findings for the afternoon peak hour. The four traffic scenarios include existing conditions, background 2028 conditions, forecast 2028 conditions, and forecast 2028 conditions assuming a full access connection that allows site traffic to directly reach M-36 via Lake Crest Drive.

Table 8.1.1 – #9001 - Winans Lake Road and Chilson Road – Existing Morning Peak Hour

Scenario	Westbound Winans Lake		Northbound Chilson		Southbound Chilson		Int.
Existing AM Peak	Left	Right	Thru	Right	Left	Thru	Tot.
Volume	58	49	110	65	134	234	650
HCM Delay	15.5		0.0		2.9		4.0
HCM LOS	C		A		A		n/a
Delay (Model)	10.7	5.6	1.5	0.7	3.2	1.9	3.0
95% Queue (Model)	78’		2’		65’		n/a

Table 8.1.2 – #9001 - Winans Lake Road and Chilson Road – Background Morning Peak Hour

Scenario	Westbound Winans Lake		Northbound Chilson		Southbound Chilson		Int.
Background AM Peak	Left	Right	Thru	Right	Left	Thru	Tot.
Volume	67	56	126	75	154	269	747
HCM Delay	18.8		0.0		3.0		4.5
HCM LOS	C		A		A		n/a
Delay (Model)	12.3	6.4	1.7	0.8	3.6	2.3	3.5
95% Queue (Model)	79’		6’		74’		n/a

Table 8.1.3 – #9001 - Winans Lake Road and Chilson Road – Forecast Morning Peak Hour (No Access to Lake Crest Drive)

Scenario	Westbound Winans Lake		Northbound Chilson		Southbound Chilson		Int.
Forecast AM Peak	Left	Right	Thru	Right	Left	Thru	Tot.
Volume	83	64	126	87	159	269	788
HCM Delay	21.6		0.0		3.1		5.4
HCM LOS	C		A		A		n/a
Delay (Model)	13.1	7.1	1.9	1.0	3.8	2.4	4.0
95% Queue (Model)	89’		7’		78’		n/a

Table 8.1.4 – #9001 - Winans Lake Road and Chilson Road – Forecast Morning Peak Hour (with Access to Lake Crest Drive)

Scenario	Westbound Winans Lake		Northbound Chilson		Southbound Chilson		Int.
Forecast AM w Access	Left	Right	Thru	Right	Left	Thru	Tot.
Volume	72	64	126	81	159	269	771
HCM Delay	19.8		0.0		3.1		4.9
HCM LOS	C		A		A		n/a
Delay (Model)	14.2	7.1	1.8	0.9	3.6	2.5	3.9
95% Queue (Model)	91’		6’		81’		n/a

Table 8.1.5 – #9001 - Winans Lake Road and Chilson Road – Existing Afternoon Peak Hour

Scenario	Westbound Winans Lake		Northbound Chilson		Southbound Chilson		Int.
Existing PM Peak	Left	Right	Thru	Right	Left	Thru	Tot.
Volume	150	149	306	90	73	181	949
HCM Delay	33.2		0.0		2.4		10.8
HCM LOS	D		A		A		n/a
Delay (Model)	18.7	14.4	2.6	1.4	4.3	1.7	6.5
95% Queue (Model)	161’		3’		65’		n/a

Table 8.1.6 – #9001 - Winans Lake Road and Chilson Road – Background Afternoon Peak Hour

Scenario	Westbound Winans Lake		Northbound Chilson		Southbound Chilson		Int.
Background PM Peak	Left	Right	Thru	Right	Left	Thru	Tot.
Volume	172	171	352	103	84	208	1090
HCM Delay	77.3		0.0		2.5		24.2
HCM LOS	F		A		A		n/a
Delay (Model)	26.2	20.7	3.0	1.6	4.4	1.8	8.7
95% Queue (Model)	219’		8’		70’		n/a

Table 8.1.7 – #9001 - Winans Lake Road and Chilson Road – Forecast Afternoon Peak Hour (No Access to Lake Crest Drive)

Scenario	Westbound Winans Lake		Northbound Chilson		Southbound Chilson		Int.
Forecast PM Peak	Left	Right	Thru	Right	Left	Thru	Tot.
Volume	194	182	352	130	93	208	1159
HCM Delay	131.8		0.0		2.7		42.1
HCM LOS	F		A		A		n/a
Delay (Model)	32.0	26.5	3.1	1.7	5.2	2.2	10.9
95% Queue (Model)	266’		10’		79’		n/a

Table 8.1.8 – #9001 - Winans Lake Road and Chilson Road – Forecast Afternoon Peak Hour (with Access to Lake Crest Drive)

Scenario	Westbound Winans Lake		Northbound Chilson		Southbound Chilson		Int.
Forecast PM w Access	Left	Right	Thru	Right	Left	Thru	Tot.
Volume	181	182	352	113	93	208	1129
HCM Delay	105.8		0.0		2.7		33.6
HCM LOS	F		A		A		n/a
Delay (Model)	27.6	21.6	2.9	1.6	4.9	2.1	9.4
95% Queue (Model)	238’		7’		77’		n/a

Capacity Analysis Discussion – #9001 – Winans Lake Road and Chilson Road
During the morning peak hour, the impact of background growth and forecast traffic is fairly minor. The westbound level of service at the intersection is currently considered a C, and is expected to remain a C.

During the afternoon peak hour, the background traffic growth will significantly impact the westbound level of service which is expected to drop from a D to a level of service F. Additional traffic generated by the proposed development will exacerbate the delays on the westbound approach if the intersection is not improved in some way.

Mitigation – 9001 – Winans Lake Road and Chilson Road
This study has examined four improvement scenarios to assess their effectiveness in reducing delays at this intersection during the background and forecast afternoon peak hour.

- A separate left-turn and right-turn lane on the westbound approach:
  - Background 2028 Delay and LOS: from 77.3 E to 28.2 D (WB delay only)
  - Forecast 2028 Delay and LOS: from 138.1 F to 39.3 E (WB delay only)
- 3-Way Stop Control, with existing laneage:
  - Background 2028 Delay and LOS: from 24.2 to 20.9 C
  - Forecast 2028 Delay and LOS: from 42.1 to 26.9 C
- A traffic control signal with a separate left-turn and right-turn lane on the westbound approach:
  - Background 2028 Delay and LOS: from 24.2 to 9.6 A
  - Forecast 2028 Delay and LOS: from 42.1 to 10.0 B
- A single lane roundabout:
  - Background 2028 Delay and LOS: from 24.2 to 7.4 A
  - Forecast 2028 Delay and LOS: from 42.1 to 7.9 A

We recommend that the Livingston County Road Commission consider widening westbound Winans Lake Road to include a separate left-turn and right-turn lane to help reduce WB delays that are expected to occur in the future due to background growth.

The proposed site may add approximately 6% to the total traffic volumes that pass through this intersection during the afternoon peak hour.

Capacity Analysis: Intersection #9002 – Winans Lake Road and Site Driveway

Tables 8.2.1-4 summarize the capacity analysis results for the intersection of Winans Lake Road and the site driveway during the morning peak hour. Tables 8.2.5-8 summarize the findings for the afternoon peak hour. The four traffic scenarios include existing conditions, background 2028 conditions, forecast 2028 conditions, and forecast 2028 conditions assuming a full access connection that allows site traffic to directly reach M-36 via Lake Crest Drive.

Table 8.2.1 – #9002 - Winans Lake Road and Site Driveway – Existing Morning Peak Hour

Scenario	EB Winans Lake			WB Winans Lake			NB Site Driveway			SB Buckhorn Ln			Int.
Existing AM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	2	278	0	0	97	1	0	0	0	6	0	3	387
HCM Delay	0.1			0.0			0.0			10.9			0.3
HCM LOS	A			A			A			B			n/a
Delay (Model)	1.9	1.7	0.0	0.0	0.7	0.3	0.0	0.0	0.0	5.3	0.0	2.9	1.5
95% Queue (Model)	3’			0’			0’			30’			n/a

Table 8.2.2 – #9002 - Winans Lake Road and Site Driveway – Background Morning Peak Hour

Scenario	EB Winans Lake			WB Winans Lake			NB Site Driveway			SB Buckhorn Ln			Int.
Background AM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	2	319	0	0	111	1	0	0	0	7	0	3	443
HCM Delay	0.0			0.0			0.0			11.6			0.2
HCM LOS	A			A			A			B			n/a
Delay (Model)	5.6	1.9	0.0	0.0	0.8	0.3	0.0	0.0	0.0	6.3	0.0	3.2	1.7
95% Queue (Model)	4’			0’			0’			32’			n/a

Table 8.2.3 – #9002 - Winans Lake Road and Site Driveway – Forecast Morning Peak Hour
(No Access to Lake Crest Drive)

Scenario	EB Winans Lake			WB Winans Lake			NB Site Driveway			SB Buckhorn Ln			Int.
Forecast AM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	2	319	17	10	111	1	24	0	56	7	0	3	550
HCM Delay	0.0			0.7			12.2			12.8			2.1
HCM LOS	A			A			B			B			n/a
Delay (Model)	5.5	2.3	1.9	2.2	0.9	0.2	7.0	0.0	4.3	6.8	0.0	2.9	2.5
95% Queue (Model)	2’	0’	1’	13’	0’	0’	53’			32’			n/a

Table 8.2.4 – #9002 - Winans Lake Road and Site Driveway – Forecast Morning Peak Hour
(with Access to Lake Crest Drive)

Scenario	EB Winans Lake			WB Winans Lake			NB Site Driveway			SB Buckhorn Ln			Int.
Forecast AM /w Access	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	2	319	11	8	111	1	13	0	43	7	0	3	518
HCM Delay	0.0			0.5			11.6			12.5			1.5
HCM LOS	A			A			B			B			n/a
Delay (Model)	4.7	2.1	1.7	1.7	0.9	0.4	6.8	0.0	4.0	6.6	0.0	3.0	2.2
95% Queue (Model)	5’	0’	0’	10’	0’	0’	46’			31’			n/a

Table 8.2.5 – #9002 - Winans Lake Road and Site Driveway – Existing Afternoon Peak Hour

Scenario	EB Winans Lake			WB Winans Lake			NB Site Driveway			SB Buckhorn Ln			Int.
Existing PM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	2	177	0	0	366	5	0	0	0	1	0	3	554
HCM Delay	0.1			0.0			0.0			11.4			0.1
HCM LOS	A			A			A			B			n/a
Delay (Model)	35	1.7	0.0	0.0	1.7	1.2	0.0	0.0	0.0	0.0	0.0	4.3	1.7
95% Queue (Model)	8’			0’			0’			21’			n/a

Table 8.2.6 – #9002 - Winans Lake Road and Site Driveway – Background Afternoon Peak Hour

Scenario	EB Winans Lake			WB Winans Lake			NB Site Driveway			SB Buckhorn Ln			Int.
Background PM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	2	203	0	0	421	6	0	0	0	1	0	3	636
HCM Delay	0.1			0.0			0.0			12.0			0.1
HCM LOS	A			A			A			B			n/a
Delay (Model)	5.7	1.7	0.0	0.0	1.9	0.9	0.0	0.0	0.0	5.7	0.0	3.2	1.8
95% Queue (Model)	10’			0’			0’			21’			n/a

Table 8.2.7 – #9002 - Winans Lake Road and Site Driveway – Forecast Afternoon Peak Hour
(No Access to Lake Crest Drive)

Scenario	EB Winans Lake			WB Winans Lake			NB Site Driveway			SB Buckhorn Ln			Int.
Forecast PM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	2	203	36	55	421	6	33	0	20	1	0	3	780
HCM Delay	0.1			0.9			16.5			12.9			1.7
HCM LOS	A			A			C			B			n/a
Delay (Model)	5.2	2.3	1.8	3.2	3.0	1.2	9.2	0.0	3.5	8.5	0.0	4.0	3.1
95% Queue (Model)	8’			44’			50’			22’			n/a

Table 8.2.8 – #9002 - Winans Lake Road and Site Driveway – Forecast Afternoon Peak Hour
(with Access to Lake Crest Drive)

Scenario	EB Winans Lake			WB Winans Lake			NB Site Driveway			SB Buckhorn Ln			Int.
Forecast PM /w Access	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	2	203	19	45	421	6	20	0	17	1	0	3	737
HCM Delay	0.1			0.8			14.8			12.7			1.3
HCM LOS	A			A			B			B			n/a
Delay (Model)	4.4	2.0	1.6	2.9	2.7	1.1	8.4	0.0	3.5	2.9	0.0	3.9	2.7
95% Queue (Model)	9’			37’			44’			21’			n/a

Capacity Analysis Discussion - #9002 – Winans Lake Road and Site Driveway
Background traffic and site generated traffic is not expected to significantly impact the existing delays at Buckhorn Lane during either peak hour. All site generated traffic is expected to be able to enter and exit the site driveway onto Winans Lake Road with an acceptable level of service.

The proposed center left-turn and right-turn deceleration lane will help to reduce the site’s impact on Winans Lake Road traffic. No other improvements are necessary for this intersection.

Capacity Analysis: Intersection #9003 – Winans Lake Road and Hamburg Road (T-Intersection)

Tables 8.3.1-4 summarize the capacity analysis results for the intersection of Winans Lake Road and Hamburg Road (T-Intersection) during the morning peak hour. Tables 8.3.5-8 summarize the findings for the afternoon peak hour. The four traffic scenarios include existing conditions, background 2028 conditions, forecast 2028 conditions, and forecast 2028 conditions assuming a full access connection that allows site traffic to directly reach M-36 via Lake Crest Drive.

Table 8.3.1 - #9003 – Winans Lake Road and Hamburg Road (T-Intersection) – Existing Morning Peak Hour

Scenario	EB Winans Lake		WB Winans Lake		SB Hamburg Road		Int.
Existing AM Peak	Left	Thru	Thru	Right	Left	Right	Tot.
Volume	57	227	54	45	157	44	584
HCM Delay	1.5		0.0		13.9		5.3
HCM LOS	A		A		B		n/a
Delay (Model)	2.8	3.0	0.9	0.2	8.3	3.5	4.0
95% Queue (Model)	32’		2’		67’	49’	n/a

Table 8.3.2 - #9003 – Winans Lake Road and Hamburg Road (T-Intersection) – Background Morning Peak Hour

Scenario	EB Winans Lake		WB Winans Lake		SB Hamburg Road		Int.
Background AM Peak	Left	Thru	Thru	Right	Left	Right	Tot.
Volume	66	261	62	52	180	51	672
HCM Delay	1.5		0.0		16.2		6.1
HCM LOS	A		A		C		n/a
Delay (Model)	3.0	3.3	1.1	0.2	9.5	3.8	4.5
95% Queue (Model)	38’		0’		77’	54’	n/a

Table 8.3.3 - #9003 – Winans Lake Road and Hamburg Road (T-Intersection) – Forecast Morning Peak Hour (No Access to Lake Crest Drive)

Scenario	EB Winans Lake		WB Winans Lake		SB Hamburg Road		Int.
Forecast AM Peak	Left	Thru	Thru	Right	Left	Right	Tot.
Volume	70	313	69	52	180	54	738
HCM Delay	1.4		0.0		18.3		6.3
HCM LOS	A		A		C		n/a
Delay (Model)	3.1	3.3	1.1	0.2	10.8	4.0	4.7
95% Queue (Model)	42’		4’		83’	56’	n/a

Table 8.3.4 - #9003 – Winans Lake Road and Hamburg Road (T-Intersection) – Forecast Morning Peak Hour (with Access to Lake Crest Drive)

Scenario	EB Winans Lake		WB Winans Lake		SB Hamburg Road		Int.
Forecast AM /w Access	Left	Thru	Thru	Right	Left	Right	Tot.
Volume	70	300	67	52	180	54	723
HCM Delay	1.4		0.0		17.7		6.2
HCM LOS	A		A		C		n/a
Delay (Model)	3.3	3.3	1.1	0.3	10.6	4.3	4.7
95% Queue (Model)	43’		0’		85’	57’	n/a

Table 8.3.5 - #9003 – Winans Lake Road and Hamburg Road (T-Intersection) – Existing Afternoon Peak Hour

Scenario	EB Winans Lake		WB Winans Lake		SB Hamburg Road		Int.
Existing PM Peak	Left	Thru	Thru	Right	Left	Right	Tot.
Volume	85	93	255	197	63	116	809
HCM Delay	4.2		0.0		13.8		4.1
HCM LOS	A		A		B		n/a
Delay (Model)	7.1	4.6	3.6	1.4	12.7	4.8	4.4
95% Queue (Model)	85’		13’		54’	64’	n/a

Table 8.3.6 - #9003 – Winans Lake Road and Hamburg Road (T-Intersection) – Background Afternoon Peak Hour

Scenario	EB Winans Lake		WB Winans Lake		SB Hamburg Road		Int.
Background PM Peak	Left	Thru	Thru	Right	Left	Right	Tot.
Volume	98	107	293	226	72	133	929
HCM Delay	4.3		0.0		15.8		4.5
HCM LOS	A		A		C		n/a
Delay (Model)	8.0	5.0	3.9	1.6	14.5	5.6	5.0
95% Queue (Model)	94’		18’		65’	69’	n/a

Table 8.3.7 - #9003 – Winans Lake Road and Hamburg Road (T-Intersection) – Forecast Afternoon Peak Hour (No Access to Lake Crest Drive)

Scenario	EB Winans Lake		WB Winans Lake		SB Hamburg Road		Int.
Forecast PM Peak	Left	Thru	Thru	Right	Left	Right	Tot.
Volume	103	122	343	226	72	138	1004
HCM Delay	4.3		0.0		17.5		4.7
HCM LOS	A		A		C		n/a
Delay (Model)	9.4	6.0	4.1	1.7	20.1	6.4	5.8
95% Queue (Model)	104		19		77	70	n/a

Table 8.3.8 - #9003 – Winans Lake Road and Hamburg Road (T-Intersection) – Forecast Afternoon Peak Hour (with Access to Lake Crest Drive)

Scenario	EB Winans Lake		WB Winans Lake		SB Hamburg Road		Int.
Forecast PM /w Access	Left	Thru	Thru	Right	Left	Right	Tot.
Volume	103	119	333	226	72	138	991
HCM Delay	4.3		0.0		17.2		4.7
HCM LOS	A		A		C		n/a
Delay (Model)	9.1	5.8	4.1	1.7	17.9	6.0	5.5
95% Queue (Model)	107’		19’		74’	70’	n/a

Capacity Analysis Discussion - #9003 – Winans Lake Road and Hamburg Road (T-Intersection)
Background traffic and site generated traffic is not expected to significantly impact the existing delays at Winans Lake Road and Hamburg Road during either peak hour. All approaches to the intersection currently operate and will continue to operate within acceptable levels of service. The proposed development is projected to increase the total volume at this intersection by approximately 8%, background to forecast, during the PM peak hour.

No improvements are needed at the intersection of Winans Lake Road and Hamburg Road at this time.

Capacity Analysis: Intersection #9004 – Winans Lake Road and Hamburg Road (Roundabout)

Tables 8.4.1-4 summarize the capacity analysis results for the intersection of Winans Lake Road and Hamburg Road (Roundabout) during the morning peak hour. Tables 8.4.5-8 summarize the findings for the afternoon peak hour. The four traffic scenarios include existing conditions, background 2028 conditions, forecast 2028 conditions, and forecast 2028 conditions assuming a full access connection that allows site traffic to directly reach M-36 via Lake Crest Drive.

Table 8.4.1 - #9004 – Winans Lake Road and Hamburg Road (Roundabout) – Existing Morning Peak Hour

Scenario	WB Winans Lake		NB Hamburg Road		SB Hamburg Road		Int.
Existing AM Peak	Left	Right	Thru	Right	Left	Thru	Tot.
Volume	137	47	51	318	226	208	987
HCM Delay	4.5		8.7		7.7		7.4
HCM LOS	A		A		A		A
Delay (Model)	2.8	2.6	6.8	4.5	4.9	7.3	5.0
95% Queue (Model)	34’		83’		75’		n/a

Table 8.4.2 - #9004 – Winans Lake Road and Hamburg Road (Roundabout) – Background Morning Peak Hour

Scenario	WB Winans Lake		NB Hamburg Road		SB Hamburg Road		Int.
Background AM Peak	Left	Right	Thru	Right	Left	Thru	Tot.
Volume	157	54	59	365	260	239	1134
HCM Delay	4.9		10.7		9.1		8.9
HCM LOS	A		B		A		A
Delay (Model)	3.1	2.8	7.9	5.7	5.7	8.1	5.8
95% Queue (Model)	42’		114’		93’		n/a

Table 8.4.3 - #9004 – Winans Lake Road and Hamburg Road (Roundabout) – Forecast Morning Peak Hour (No Access to Lake Crest Drive)

Scenario	WB Winans Lake		NB Hamburg Road		SB Hamburg Road		Int.
Forecast AM Peak	Left	Right	Thru	Right	Left	Thru	Tot.
Volume	157	57	63	365	284	267	1193
HCM Delay	5.0		11.4		10.1		9.6
HCM LOS	A		B		B		A
Delay (Model)	3.0	2.7	7.9	5.5	6.4	8.8	6.1
95% Queue (Model)	40’		111’		112’		n/a

Table 8.4.4 - #9004 – Winans Lake Road and Hamburg Road (Roundabout) – Forecast Morning Peak Hour (with Access to Lake Crest Drive)

Scenario	WB Winans Lake		NB Hamburg Road		SB Hamburg Road		Int.
Forecast AM /w Access	Left	Right	Thru	Right	Left	Thru	Tot.
Volume	157	57	61	365	284	254	1178
HCM Delay	4.9		11.3		9.8		9.4
HCM LOS	A		B		A		A
Delay (Model)	3.1	2.9	8.0	5.8	6.0	8.4	6.0
95% Queue (Model)	40		115’		104’		n/a

Table 8.4.5 - #9004 – Winans Lake Road and Hamburg Road (Roundabout) – Existing Afternoon Peak Hour

Scenario	WB Winans Lake		NB Hamburg Road		SB Hamburg Road		Int.
Existing PM Peak	Left	Right	Thru	Right	Left	Thru	Tot.
Volume	307	217	266	268	86	71	1215
HCM Delay	11.8		7.7		5.7		9.3
HCM LOS	B		A		A		A
Delay (Model)	6.5	6.2	6.6	4.2	3.4	5.7	5.7
95% Queue (Model)	114'		80'		66'		n/a

Table 8.4.6 - #9004 – Winans Lake Road and Hamburg Road (Roundabout) – Background Afternoon Peak Hour

Scenario	WB Winans Lake		NB Hamburg Road		SB Hamburg Road		Int.
Background PM Peak	Left	Right	Thru	Right	Left	Thru	Tot.
Volume	353	249	306	308	99	82	1397
HCM Delay	16.4		9.0		6.4		12.0
HCM LOS	C		A		A		B
Delay (Model)	10.9	11.0	6.9	4.6	3.6	5.7	7.9
95% Queue (Model)	209'		80'		54'		n/a

Table 8.4.7 - #9004 – Winans Lake Road and Hamburg Road (Roundabout) – Forecast Afternoon Peak Hour (No Access to Lake Crest Drive)

Scenario	WB Winans Lake		NB Hamburg Road		SB Hamburg Road		Int.
Forecast PM Peak	Left	Right	Thru	Right	Left	Thru	Tot.
Volume	353	267	338	308	107	89	1462
HCM Delay	19.3		9.7		6.7		13.6
HCM LOS	C		A		A		B
Delay (Model)	13.6	13.4	7.3	4.9	3.5	5.8	9.2
95% Queue (Model)	252'		95'		54'		n/a

Table 8.4.8 - #9004 – Winans Lake Road and Hamburg Road (Roundabout) – Forecast Afternoon Peak Hour (with Access to Lake Crest Drive)

Scenario	WB Winans Lake		NB Hamburg Road		SB Hamburg Road		Int.
Forecast PM /w Access	Left	Right	Thru	Right	Left	Thru	Tot.
Volume	353	267	328	308	107	86	1449
HCM Delay	18.7		9.6		6.6		13.2
HCM LOS	C		A		A		B
Delay (Model)	12.5	12.3	7.3	5.0	3.7	5.9	8.7
95% Queue (Model)	233'		95'		53'		n/a

Capacity Analysis Discussion - #9004 – Winans Lake Road and Hamburg Road (Roundabout)
Background traffic and site generated traffic is not expected to significantly impact the existing delays at Winans Lake Road and Hamburg Road during either peak hour. All approaches to the intersection currently operate and will continue to operate within acceptable levels of service.

No improvements are needed at the intersection of Winans Lake Road and Hamburg Road (Roundabout) at this time. The proposed development is projected to increase traffic at this intersection, background to forecast, by approximately 5% during the afternoon peak hour.

Capacity Analysis: Intersection #1001 – M-36 and Chilson Road
Tables 8.5.1-4 summarize the capacity analysis results for the intersection of M-36 and Chilson Road during the morning peak hour. Tables 8.5.5-8 summarize the findings for the afternoon peak hour. The four traffic scenarios include existing conditions, background 2028 conditions, forecast 2028 conditions, and forecast 2028 conditions assuming a full access connection that allows site traffic to directly reach M-36 via Lake Crest Drive.

Table 8.5.1 - #1001 – M-36 and Chilson Road – Existing Morning Peak Hour

Scenario	EB M-36			WB M-36			NB Retail Dr.			Chilson Road			Int.
Existing AM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	68	650	39	12	165	59	24	14	48	196	13	58	1346
HCM Delay	9.4	12.9	6.5	16.4	7.9		23.9	22.5		29.7	22.4		15.4
HCM LOS	A	B	A	B	A		C	C		C	C		B
Delay (Model)	11.8	11.8	4.1	21.1	7.1	3.6	24.5	21.8	10.5	31.0	8.2	5.9	13.2
95% Queue (Model)	61'	221'	38'	32'	97'		43'	57'		160'	85'		n/a

Table 8.5.2 - #1001 – M-36 and Chilson Road – Background Morning Peak Hour

Scenario	EB M-36			WB M-36			NB Retail Dr.			Chilson Road			Int.
Background AM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	78	747	45	14	190	68	28	16	55	225	15	67	1548
HCM Delay	11.6	18.3	7.5	22.8	9.3		22.7	21.0		30.1	20.9		18.2
HCM LOS	B	B	A	C	A		C	C		C	C		B
Delay (Model)	14.4	16.7	6.2	24.9	8.1	4.7	22.6	23.7	12.6	33.3	7.6	6.2	16.3
95% Queue (Model)	69'	319'	88'	35'	115'		44'	71'		183'	108'		n/a

Table 8.5.3 - #1001 – M-36 and Chilson Road – Forecast Morning Peak Hour
(No Access to Lake Crest)

Scenario	EB M-36			WB M-36			NB Retail Dr.			Chilson Road			Int.
Forecast AM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	89	747	45	14	190	69	28	16	55	229	15	79	1576
HCM Delay	11.9	18.6	7.6	23.1	9.5		22.9	20.9		30.1	21.0		18.4
HCM LOS	B	B	A	C	A		C	C		C	C		B
Delay (Model)	14.1	16.6	6.2	30.3	8.0	4.3	24.2	19.8	12.0	33.7	7.7	6.8	16.2
95% Queue (Model)	74'	305'	99'	34'	115'		44'	63'		191'	130'		n/a

Table 8.5.4 - #1001 – M-36 and Chilson Road – Forecast Morning Peak Hour
(/w Access to Lake Crest)

Scenario	EB M-36			WB M-36			NB Retail Dr.			Chilson Road			Int.
Forecast AM /w Access	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	84	752	45	14	197	68	28	16	55	225	15	72	1571
HCM Delay	11.8	18.5	7.5	23.1	9.4		22.8	21.0		30.1	21.0		18.3
HCM LOS	B	B	A	C	A		C	C		C	C		B
Delay (Model)	14.3	15.6	5.9	30.1	7.8	4.1	23.7	21.5	12.5	33.4	8.1	6.7	15.7
95% Queue (Model)	73'	281'	82'	36'	113'		46'	68'		181'	110'		n/a

Table 8.5.5 - #1001 – M-36 and Chilson Road – Existing Afternoon Peak Hour

Scenario	EB M-36			WB M-36			NB Retail Dr.			Chilson Road			Int.
Existing PM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	62	316	87	35	630	218	157	94	22	94	72	111	1898
HCM Delay	41.5	9.4	7.4	11.4	26.0		37.8	25.2		29.7	26.2		23.9
HCM LOS	D	A	A	B	C		D	C		C	C		C
Delay (Model)	135.8	8.9	2.9	27.2	24.2	24.2	56.1	25.0	11.8	34.5	15.9	18.6	26.2
95% Queue (Model)	203’	128’	42’	150’	564’		179’	103’		110’	145’		n/a

Table 8.5.6 - #1001 – M-36 and Chilson Road – Background Afternoon Peak Hour

Scenario	EB M-36			WB M-36			NB Retail Dr.			Chilson Road			Int.
Background PM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	71	363	100	40	724	251	180	108	25	108	83	128	2181
HCM Delay	110.3	9.9	7.5	12.4	51.9		50.6	25.6		31.2	27.0		39.5
HCM LOS	F	A	A	B	D		D	C		C	C		D
Delay (Model)	541.2	30.3	22.4	69.5	65.1	70.3	88.2	31.6	19.6	38.2	17.1	21.7	66.5
95% Queue (Model)	527’	954’	54’	217’	1142’		206’	136’		120’	165’		n/a

Table 8.5.7 - #1001 – M-36 and Chilson Road – Forecast Afternoon Peak Hour
(No Access to Lake Crest)

Scenario	EB M-36			WB M-36			NB Retail Dr.			Chilson Road			Int.
Forecast PM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	89	363	100	40	724	260	180	108	25	111	83	147	2230
HCM Delay	171.7	9.9	7.5	12.4	55.1		59.9	25.6		31.4	27.8		44.9
HCM LOS	F	A	A	B	E		E	C		C	C		D
Delay (Model)	821.8	117.6	117.7	68.1	67.6	74.3	99.5	33.9	19.8	38.7	16.9	22.2	97.3
95% Queue (Model)	665’	2010’	44’	219’	1471’		210’	132’		131’	176’		n/a

Table 8.5.8 - #1001 – M-36 and Chilson Road – Forecast Afternoon Peak Hour
(/w Access to Lake Crest)

Scenario	EB M-36			WB M-36			NB Retail Dr.			Chilson Road			Int.
Forecast PM /w Access	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	81	371	100	40	734	251	180	108	25	108	83	137	2218
HCM Delay	141.0	10.0	7.5	12.6	55.1		54.5	25.6		31.2	27.3		42.7
HCM LOS	F	B	A	B	E		D	C		C	C		D
Delay (Model)	629.4	49.4	37.3	76.6	69.2	74.8	89.6	31.5	18.1	37.3	16.8	22.0	76.3
95% Queue (Model)	592’	1272’	55’	212’	1506’		209’	129’		117’	169’		n/a

Capacity Analysis Discussion - #1001 – M-36 and Chilson Road

The background growth and the forecast traffic from the site does not significantly impact the delays and levels of service at the intersection of M-36 and Chilson Road during the morning peak hour.

While the average intersection delays during the afternoon peak hour are still expected to be within acceptable levels for all scenarios, the background traffic growth is expected to cause a significant increase to the average delay at the intersection (from 23.9 to 39.5 seconds). The increase in westbound through traffic will result in longer delays on that approach and in turn make it more difficult for eastbound left-turning traffic to find gaps in traffic. The site traffic will exacerbate this situation by a small degree.

Mitigation #1001 – M-36 and Chilson Road
In order to address the significant increase in delays that may occur due to background traffic growth, we have analyzed two potential improvement options for consideration to help reduce the impact of future traffic growth:

- Signal Optimization (increase Cycle Length from 80 to 90 seconds)
  - Background PM Peak: from 39.5 C to 34.7 C
  - Forecast PM Peak: from 44.9 D to 40.7 D
- Installing a right-turn only lane for westbound traffic (much more effective in reducing EB left-turn delays and queues on the SimTraffic model).
  - Background PM Peak: from 39.5 C to 20.0 B
  - Forecast PM Peak: from 44.9 D to 21.1 C

We recommend that MDOT consider widening the westbound M-36 approach to include a right-turn only lane.

The proposed development is projected to increase traffic at this intersection, background to forecast, by approximately 2% during the afternoon peak hour.

Capacity Analysis: Intersection #1002 – M-36 and Merrill Road

Tables 8.6.1-4 summarize the capacity analysis results for the intersection of M-36 and Merrill Road during the morning peak hour. Tables 8.6.5-8 summarize the findings for the afternoon peak hour. The four traffic scenarios include existing conditions, background 2028 conditions, forecast 2028 conditions, and forecast 2028 conditions assuming a full access connection that allows site traffic to directly reach M-36 via Lake Crest Drive.

Table 8.6.1 – #1002 – M-36 and Merrill Road - Existing Morning Peak Hour

Scenario	EB M-36		WB M-36		NB Merrill Road		Int.
Existing AM Peak	Thru	Right	Left	Thru	Left	Right	Tot.
Volume	649	296	50	156	99	49	1299
HCM Delay	8.4	2.6	12.1	4.5	22.1	19.5	8.3
HCM LOS	A	A	B	A	C	B	A
Delay (Model)	13.5	6.2	28.7	5.3	16.8	6.8	11.4
95% Queue (Model)	209’	71’	73’	78’	83’	44’	n/a

Table 8.6.2 – #1002 – M-36 and Merrill Road - Background Morning Peak Hour

Scenario	EB M-36		WB M-36		NB Merrill Road		Int.
Background AM Peak	Thru	Right	Left	Thru	Left	Right	Tot.
Volume	746	340	57	179	114	56	1492
HCM Delay	10.5	2.8	16.3	4.7	22.8	19.7	9.6
HCM LOS	B	A	B	A	C	B	A
Delay (Model)	18.7	8.9	45.1	6.3	17.4	9.1	15.5
95% Queue (Model)	311’	139’	91’	93’	96’	47’	n/a

Table 8.6.3 – #1002 – M-36 and Merrill Road - Forecast Morning Peak Hour (No Access to Lake Crest)

Scenario	EB M-36		WB M-36		NB Merrill Road		Int.
Forecast AM Peak	Thru	Right	Left	Thru	Left	Right	Tot.
Volume	746	344	61	179	115	57	1502
HCM Delay	10.5	2.8	16.8	4.7	22.9	19.7	9.7
HCM LOS	B	A	B	A	C	B	A
Delay (Model)	19.5	9.4	49.8	6.2	16.7	8.8	16.1
95% Queue (Model)	337’	170’	103’	96’	91’	51’	n/a

Table 8.6.4 – #1002 – M-36 and Merrill Road - Forecast Morning Peak Hour (/w Access to Lake Crest)

Scenario	EB M-36		WB M-36		NB Merrill Road		Int.
Forecast AM w/ Access	Thru	Right	Left	Thru	Left	Right	Tot.
Volume	755	348	57	180	116	56	1512
HCM Delay	10.7	2.8	16.8	4.7	23.0	19.7	9.8
HCM LOS	B	A	B	A	C	B	A
Delay (Model)	18.2	8.5	45.3	6.4	17.1	9.4	15.1
95% Queue (Model)	290’	148’	90’	100’	91’	54’	n/a

Table 8.6.5 – #1002 – M-36 and Merrill Road - Existing Afternoon Peak Hour

Scenario	EB M-36		WB M-36		NB Merrill Road		Int.
Existing PM Peak	Thru	Right	Left	Thru	Left	Right	Tot.
Volume	323	182	68	682	403	129	1787
HCM Delay	11.4	1.7	14.5	20.4	26.2	15.8	17.8
HCM LOS	B	A	B	C	C	B	B
Delay (Model)	13.6	3.9	25.8	22.6	20.5	6.6	17.5
95% Queue (Model)	160’	52’	157’	384’	211’	112’	n/a

Table 8.6.6 – #1002 – M-36 and Merrill Road – Background Afternoon Peak Hour

Scenario	EB M-36		WB M-36		NB Merrill Road		Int.
Background PM Peak	Thru	Right	Left	Thru	Left	Right	Tot.
Volume	371	209	78	784	463	148	2053
HCM Delay	14.1	1.7	18.9	40.0	30.2	15.2	26.7
HCM LOS	B	A	B	D	C	B	C
Delay (Model)	17.9	5.6	56.8	55.8	22.7	8.9	33.2
95% Queue (Model)	206’	81’	305’	889’	240’	224’	n/a

Table 8.6.7 – #1002 – M-36 and Merrill Road – Forecast Afternoon Peak Hour
(No Access to Lake Crest)

Scenario	EB M-36		WB M-36		NB Merrill Road		Int.
Forecast PM Peak	Thru	Right	Left	Thru	Left	Right	Tot.
Volume	371	212	80	784	472	157	2076
HCM Delay	14.4	1.7	19.5	42.1	30.8	15.2	27.6
HCM LOS	B	A	B	D	C	B	C
Delay (Model)	17.4	5.3	56.2	54.4	22.0	8.4	32.6
95% Queue (Model)	196’	67’	305’	864’	239’	210’	n/a

Table 8.6.8 – #1002 – M-36 and Merrill Road – Forecast Afternoon Peak Hour
(/w Access to Lake Crest)

Scenario	EB M-36		WB M-36		NB Merrill Road		Int.
Forecast PM /w Access	Thru	Right	Left	Thru	Left	Right	Tot.
Volume	372	214	78	785	481	148	2078
HCM Delay	14.7	1.7	19.8	44.3	31.6	15.0	28.8
HCM LOS	B	A	B	D	C	B	C
Delay (Model)	18.9	6.4	65.2	65.3	22.9	9.1	37.6
95% Queue (Model)	239’	99’	320’	995’	246’	234’	n/a

Capacity Analysis Discussion - #1002 – M-36 and Merrill Road
The background growth and site traffic is expected to have no significant impact on the levels of service and delays during the morning peak hour.

During the afternoon peak hour, the background traffic volumes is expected to cause a fairly significant increase in existing average delays at the intersection (from 17.8 seconds to 26.7 seconds). Westbound queues are expected to significantly increase even though the average delays are still within acceptable levels. The site traffic, which is only approximately 1% of the intersection’s future volumes, only exacerbate the delays by a small degree.

Mitigation - #1002 – M-36 and Merrill Road
Given that the westbound delays are expected to significantly increase due to background growth during the afternoon peak hour, we have re-evaluated the intersection with the following signal timing adjustments:

- Signal Optimization (Cycle Length set to 90 seconds)
    - Background PM Peak: from 26.7 C to 24.5 C
    - Forecast PM Peak: from 27.6 C to 25.2 C

We recommend that MDOT consider signal timing optimization at some point in the future at this intersection to help address increased through traffic on M-36 due to background growth.

The proposed development is projected to increase traffic at this intersection, background to forecast, by approximately 1% during the afternoon peak hour.

Capacity Analysis: Intersection #1003 – M-36 and Hamburg Road

Tables 8.7.1-4 summarize the capacity analysis results for the intersection of M-36 and Hamburg Road during the morning peak hour. Tables 8.7.5-8 summarize the findings for the afternoon peak hour. The four traffic scenarios include existing conditions, background 2028 conditions, forecast 2028 conditions, and forecast 2028 conditions assuming a full access connection that allows site traffic to directly reach M-36 via Lake Crest Drive.

Table 8.7.1 – #1003 – M-36 and Hamburg Road – Existing Morning Peak Hour

Scenario	EB M-36			WB M-36			NB Retail Dr.			Hamburg Road			Int.
Existing AM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	278	417	9	1	103	44	2	2	5	180	2	116	1159
HCM Delay	9.7	8.0	5.2	9.0	5.9	5.4	21.1	18.7		23.5	20.3		11.7
HCM LOS	A	A	A	A	A	A	C	B		C	C		B
Delay (Model)	11.6	7.1	1.6	0.0	6.2	1.3	20.7	16.6	3.9	24.0	1.6	3.9	9.8
95% Queue (Model)	140’	141’	14’	5’	54’	30’	8’	18’		121’	77’		n/a

Table 8.7.2 – #1003 – M-36 and Hamburg Road – Background Morning Peak Hour

Scenario	EB M-36			WB M-36			NB Retail Dr.			Hamburg Road			Int.
Background AM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	319	479	10	1	118	51	2	2	6	207	2	133	1330
HCM Delay	12.5	9.7	5.8	11.2	6.7	6.1	21.0	18.1		23.6	19.9		13.1
HCM LOS	B	A	A	B	A	A	C	B		C	B		B
Delay (Model)	13.8	8.0	1.6	12.5	7.0	1.5	17.7	20.6	4.9	24.7	1.3	4.4	10.9
95% Queue (Model)	161’	165’	15’	6’	65’	33’	11’	18’		139’	95’		n/a

Table 8.7.3 – #1003 – M-36 and Hamburg Road – Forecast Morning Peak Hour
(no Access to Lake Crest)

Scenario	EB M-36			WB M-36			NB Retail Dr.			Hamburg Road			Int.
Forecast AM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	320	479	10	1	118	54	2	2	6	231	2	137	1362
HCM Delay	13.7	10.6	6.3	12.2	7.3	6.7	20.6	17.7		23.7	19.5		13.9
HCM LOS	B	B	A	B	A	A	C	B		C	B		B
Delay (Model)	14.1	8.4	2.2	7.2	7.0	1.6	21.3	17.9	5.5	24.8	1.3	4.4	11.3
95% Queue (Model)	161’	173’	17’	7’	62’	34’	11’	19’		147’	109’		n/a

Table 8.7.4 – #1003 – M-36 and Hamburg Road – Forecast Morning Peak Hour
(/w Access to Lake Crest)

Scenario	EB M-36			WB M-36			NB Retail Dr.			Hamburg Road			Int.
Forecast AM /w Access	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	319	488	10	1	119	53	2	2	6	222	2	133	1357
HCM Delay	13.3	10.3	6.1	11.9	7.1	6.4	20.7	17.9		23.6	19.6		13.6
HCM LOS	B	B	A	B	A	A	C	B		C	B		B
Delay (Model)	13.8	8.2	1.9	7.8	6.9	1.6	17.0	11.3	5.0	24.9	1.2	4.3	11.1
95% Queue (Model)	162’	162’	18’	6’	63’	34’	9’	17’		144’	99’		n/a

Table 8.7.5 – #1003 – M-36 and Hamburg Road – Existing Afternoon Peak Hour

Scenario	EB M-36			WB M-36			NB Retail Dr.			Hamburg Road			Int.
Existing PM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	257	174	30	2	395	236	31	22	11	83	30	303	1574
HCM Delay	20.9	6.4	5.5	6.7	8.4	6.6	27.1	18.8		20.6	24.9		14.2
HCM LOS	C	A	A	A	A	A	C	B		C	C		B
Delay (Model)	81.3	11.2	4.6	16.7	11.1	3.7	27.2	17.0	4.4	22.9	20.5	9.9	22.3
95% Queue (Model)	377’	329’	45’	8’	155’	65’	50’	39’		85’	139’		n/a

Table 8.7.6 – #1003 – M-36 and Hamburg Road – Background Afternoon Peak Hour

Scenario	EB M-36			WB M-36			NB Retail Dr.			Hamburg Road			Int.
Background PM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	295	200	34	2	454	271	36	25	13	95	34	348	1807
HCM Delay	43.8	7.7	6.5	8.2	10.7	8.1	28.3	18.0		20.1	24.8		19.4
HCM LOS	D	A	A	A	B	A	C	B		C	C		B
Delay (Model)	233.1	34.9	23.2	17.9	13.4	4.3	30.8	16.9	4.0	23.3	22.8	12.5	49.2
95% Queue (Model)	532’	701’	65’	8’	187’	67’	58’	41’		93’	169’		n/a

Table 8.7.7 – #1003 – M-36 and Hamburg Road – Forecast Afternoon Peak Hour
(no Access to Lake Crest)

Scenario	EB M-36			WB M-36			NB Retail Dr.			Hamburg Road			Int.
Forecast PM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	304	200	34	2	454	294	36	25	13	100	34	350	1846
HCM Delay	50.9	7.7	6.6	8.2	10.8	8.4	28.4	17.9		20.2	24.8		20.7
HCM LOS	D	A	A	A	B	A	C	B		C	C		C
Delay (Model)	241.7	36.6	24.8	11.8	13.1	4.6	29.5	16.4	4.8	22.6	23.9	12.7	49.6
95% Queue (Model)	519’	691’	60’	9’	186’	88’	55’	41’		99’	171’		n/a

Table 8.7.8 – #1003 – M-36 and Hamburg Road – Forecast Afternoon Peak Hour
(/w Access to Lake Crest)

Scenario	EB M-36			WB M-36			NB Retail Dr.			Hamburg Road			Int.
Forecast PM /w Access	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	295	201	34	2	455	293	36	25	13	99	34	348	1835
HCM Delay	46.3	7.7	6.5	8.2	10.7	8.3	28.3	18.0		20.2	24.8		19.7
HCM LOS	D	A	A	A	B	A	C	B		C	C		B
Delay (Model)	241.7	36.7	22.9	13.7	13.4	4.5	32.2	16.4	4.8	24.3	22.9	12.5	49.1
95% Queue (Model)	541’	703’	66’	10’	191’	77’	60’	43’		101’	168’		n/a

Capacity Analysis Discussion - #1003 – M-36 and Hamburg Road

The background and forecast traffic has no significant impact on the delays and level of service at the intersection of M-36 and Hamburg Road during the morning peak hour.

With the addition of background growth during the afternoon peak hour, the traffic model predicts that the eastbound left turn movement will likely experience a significant increase in average delay as westbound through traffic increases, thus reducing the availability of gaps in which to turn.

Mitigation - #1003 M-36 and Hamburg Road
The queuing that occurs within the background SimTraffic model exceeds the available storage in the eastbound M-36 left-turn lane. This situation is the primary cause of the significant jump in average delays in the SimTraffic model. While the extensive background queues predicted by the SimTraffic model may not grow quite so long in the future, we have analyzed the intersection with left-turn phasing in case the left-turns become a significant issue at some point. Adding the M-36 left-turn phasing would result in an increase in average intersection delays, but would ensure that the left turn queues are minimized and traffic flow on the SimTraffic model is greatly improved.

- Add left-turn phasing for M-36 traffic. (90 second cycle length)
    - Background PM Peak
        - HCM: from 19.4 B to 24.9 C
        - SimTraffic: from 49.2 to 18.7
    - Forecast PM Peak
        - HCM: from 20.7 C to 25.9 C
        - SimTraffic: from 49.6 to 20.4

We recommend that MDOT consider implementing left turn phasing at this intersection to help mitigate potentially long eastbound left-turn delays that may occur due to background traffic growth.

The proposed development is projected to increase traffic at this intersection, background to forecast, by approximately 2% during the afternoon peak hour.

Capacity Analysis: Intersection #9005 – M-36 and Lake Crest Drive

Tables 8.8.1-4 summarize the capacity analysis results for the intersection of M-36 and Lake Crest Drive during the morning peak hour. Tables 8.8.5-8 summarize the findings for the afternoon peak hour. The four traffic scenarios include existing conditions, background 2028 conditions, forecast 2028 conditions, and forecast 2028 conditions assuming a full access connection that allows site traffic to directly reach M-36 via Lake Crest Drive.

Table 8.8.1 – #9005 – M-36 and Lake Crest Drive – Existing Morning Peak Hour

Scenario	EB M-36			WB M-36			NB Club Drive			Lake Crest Drive			Int.
Existing AM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	1	918	0	0	251	4	0	0	0	27	0	19	1220
HCM Delay	0.0			0.0			0.0			36.7			1.9
HCM LOS	A			A			A			E			n/a
Delay (Model)	1.2	1.3	0.0	0.0	2.7	1.8	0.0	0.0	0.0	14.7	0.0	6.0	1.9
95% Queue (Model)	2’			0’			0’			54’			n/a

Table 8.8.2 – #9005 – M-36 and Lake Crest Drive – Background Morning Peak Hour

Scenario	EB M-36			WB M-36			NB Club Drive			Lake Crest Drive			Int.
Background AM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	1	1055	0	0	288	5	0	0	0	31	0	22	1402
HCM Delay	0.0			0.0			0.0			66.8			3.5
HCM LOS	A			A			A			F			n/a
Delay (Model)	0.0	1.5	0.0	0.0	2.9	2.4	0.0	0.0	0.0	23.8	0	10.8	2.4
95% Queue (Model)	6’			0’			0’			68’			n/a

Table 8.8.3 – #9005 – M-36 and Lake Crest Drive – Forecast Morning Peak Hour
(no Access to Lake Crest Drive)

Scenario	EB M-36			WB M-36			NB Club Drive			Lake Crest Drive			Int.
Forecast AM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	1	1059	0	0	289	5	0	0	0	31	0	22	1407
HCM Delay	0.0			0.0			0.0			67.8			3.6
HCM LOS	A			A			A			F			n/a
Delay (Model)	0.0	1.5	0.0	0.0	2.8	2.4	0.0	0.0	0.0	22.9	0.0	9.0	2.3
95% Queue (Model)	3’			0’			0’			64’			n/a

Table 8.8.4 – #9005 – M-36 and Lake Crest Drive – Forecast Morning Peak Hour
(with Access to Lake Crest Drive)

Scenario	EB M-36			WB M-36			NB Club Drive			Lake Crest Drive			Int.
Forecast AM /w Access	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	6	1055	0	0	288	8	0	0	0	48	0	29	1434
HCM Delay	0.0			0.0			0.0			143.5			10.8
HCM LOS	A			A			A			F			n/a
Delay (Model)	2.4	1.7	0.0	0.0	2.9	2.2	0.0	0.0	0.0	25.6	0.0	11.6	3.0
95% Queue (Model)	20’			0’			0’			85’			n/a

Table 8.8.5 – #9005 – M-36 and Lake Crest Drive – Existing Afternoon Peak Hour

Scenario	EB M-36			WB M-36			NB Club Drive			Lake Crest Drive			Int.
Existing PM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	15	496	2	4	1058	23	5	0	2	7	0	12	1624
HCM Delay	0.3			0.0			55.3			40.2			1.0
HCM LOS	A			A			F			E			n/a
Delay (Model)	8.4	1.6	0.5	7.0	6.2	5.2	22.4	0.0	5.2	26.5	0.0	12.2	5.0
95% Queue (Model)	72'			18'			25'			39'			n/a

Table 8.8.6 – #9005 – M-36 and Lake Crest Drive – Background Peak Hour

Scenario	EB M-36			WB M-36			NB Club Drive			Lake Crest Drive			Int.
Background PM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	17	570	2	5	1216	26	6	0	2	8	0	14	1866
HCM Delay	0.3			0.0			98.9			63.8			1.6
HCM LOS	A			A			F			F			n/a
Delay (Model)	25.9	7.3	1.8	18.3	15.0	10.9	168.5	0.0	73.9	116.2	0.0	92.9	14.3
95% Queue (Model)	291'			460'			56'			90'			n/a

Table 8.8.7 – #9005 – M-36 and Lake Crest Drive – Forecast Afternoon Peak Hour
(no Access to Lake Crest Drive)

Scenario	EB M-36			WB M-36			NB Club Drive			Lake Crest Drive			Int.
Forecast PM Peak	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	17	573	2	5	1225	26	6	0	2	8	0	14	1878
HCM Delay	0.3			0.0			104.0			65.7			1.7
HCM LOS	A			A			F			F			n/a
Delay (Model)	23.2	6.7	1.8	17.2	13.1	11.0	72.7	0.0	13.5	58.0	00	45.1	12.0
95% Queue (Model)	268'			323'			32'			51'			n/a

Table 8.8.8 – #9005 – M-36 and Lake Crest Drive – Forecast Afternoon Peak Hour
(with Access to Lake Crest Drive)

Scenario	EB M-36			WB M-36			NB Club Drive			Lake Crest Drive			Int.
Forecast PM /w Access	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume	25	570	2	5	1216	45	6	0	2	14	0	24	1909
HCM Delay	0.5			0.0			119.1			96.1			3.2
HCM LOS	A			A			F			F			n/a
Delay (Model)	40.3	17.2	22.8	22.5	14.7	11.8	117.2	0.0	80.8	164.5	0.0	138.7	18.8
95% Queue (Model)	472'			536'			42'			157'			n/a

Capacity Analysis Discussion - #9005 – M-36 and Lake Crest Drive

The background traffic volume increases are expected to make it more difficult for traffic to enter and exit Lake Crest Drive at M-36. The level of service for southbound Lake Crest Drive goes from LOS E (existing) to LOS F (background) during both peak hours. The forecast traffic is not expected to have a significant impact on this intersection unless a full access connection to the site is opened. If full access is provided via Lake Crest Drive, there would be a significant jump in delays for traffic waiting to turn out onto M-36.

No mitigation is proposed at this intersection as the existing, background, and forecast southbound queues currently are not that long even though the average delay increases. The proposed site is expected to add approximately 2% to the PM peak hour volumes if a full connection is provided, but less than 1% if that connection is emergency access only.

Site Access & Circulation

The proposed Waters Edge development will have a single access drive to Winans Lake Road that is aligned across from Buckhorn Lane, a private road serving 10 single family homes. The driveway will be a boulevard style entrance with a center left-turn lane and right-turn deceleration lane provided along Winans Lake Road.

The Livingston County Road Commission has already approved the site driveway with respect to adequate sight distance.

A secondary emergency-only access will connect to Huron Rapids Drive and would allow emergency vehicles to reach the Waters Edge site from the south via the M-36 and Lake Crest Drive intersection.

A full access connection to the south was considered, but the potential increase in delays at the Lake Crest Drive and M-36 intersection were significant enough that this connection is not recommended.

Summary

The proposed Waters Edge development, located on the south side of Winans Lake Road near Buckhorn Lane in Hamburg Township, is a 144-unit development marketed to and designed for empty nesters and retirees. Most of the homes will have two bedrooms with the option to expand to a third bedroom if desired. A traffic count at a similar site in Oceola Township, with similar sized dwelling units and a similar demographic, has identified that this type of community generates traffic at lower rates similar to the land use category Senior Adult Housing.

Under current zoning, this site could be developed with 77 typical single family homes. Based upon the proposed demographic and design, it is likely that the proposed Waters Edge development will generate traffic volumes that are slightly less than or equivalent to a more traditional 77-unit single family home development, even with the additional 67 units.

Despite evidence that supports utilizing the lower trip generation rates for this type of development and demographic, this study assumes that the Waters Edge development would generate traffic as a normal single family home, and so this traffic study should be considered conservative and a worse-case scenario.

This study uses an annual background traffic growth rate of 1.4% growth per year, based upon existing historical traffic count data in the area. Background growth, extrapolated to 2028, is expected to drive the need for some future improvements at the study intersections, which would be needed even without the traffic generated by the Waters Edge development.

The site generated traffic has been distributed to the study intersections according to existing traffic flow patterns. These study intersections include:

9. Winans Lake Road and Chilson Road
10. Winans Lake Road and Buckhorn Lane / Site Driveway
11. Winans Lake Road and Hamburg Road (T-Intersection)
12. Winans Lake road and Hamburg Road (Roundabout)
13. M-36 and Chilson Road
14. M-36 and Lake Crest Drive (a potential secondary access point for the site)
15. M-36 and Merrill Road
16. M-36 and Hamburg Road

Summary List of Mitigation

The following is a list of recommended mitigation that may be needed to accommodate the projected background traffic growth:

- #9001 – Winans Lake Road and Chilson Road
    - Install a separate left-turn and right-turn lane on the westbound approach to the intersection.
- #9002 – Winans Lake Road and Buckhorn Lane / Site Driveway
    - Install a center left-turn lane and right-turn deceleration lane at the site driveway as currently proposed.

- #1001 – M-36 and Chilson Road
  - Install a separate westbound right-turn only lane to reduce westbound approach delays, and increase the gaps available for eastbound left-turns.
- #1002 – M-36 and Merrill Road
  - Signal Timing Optimization will likely be needed to address longer westbound queues predicted for background conditions during the afternoon peak hour.
- #1003 – M-36 and Hamburg Road
  - Left-turn only phasing on M-36 may be needed to address potentially long eastbound left-turn queues as the availability of gaps decreases as traffic on M-36 increases due to background growth.
- #9005 – M-36 and Lake Crest Drive
  - While internal subdivision connections are generally good design principles, background traffic growth is expected to make it more difficult for Lake Crest Drive traffic to turn onto M-36. If the emergency connection to the south of the site is upgraded to a full access drive, the delays for southbound Lake Crest Drive are expected to increase significantly as some site traffic can be expected to flow south to M-36. We do not recommend a full access connection at this time.

With these improvements completed at some point in the future to address background traffic growth, the additional site generated traffic is easily accommodated on the street system, with no further significant impact to delays.

Given that the site traffic applied to the study intersections is estimated at the conservative single family home rate, the actual impact of the Waters Edge empty nester community will be less than what is shown in this report (about 50% less impactful).

Waters Edge Traffic Impact Study

Appendix

(Version 01)

- **ITE Trip Generation Data Sheets**
- **Turning Movement Counts**
- **SEMCOG Information**
- **24-Hour Volume Count Data**
- **HCM Output**
- **SimTraffic Output**
- **Signal Timing Plans**

Single-Family Detached Housing
(210)

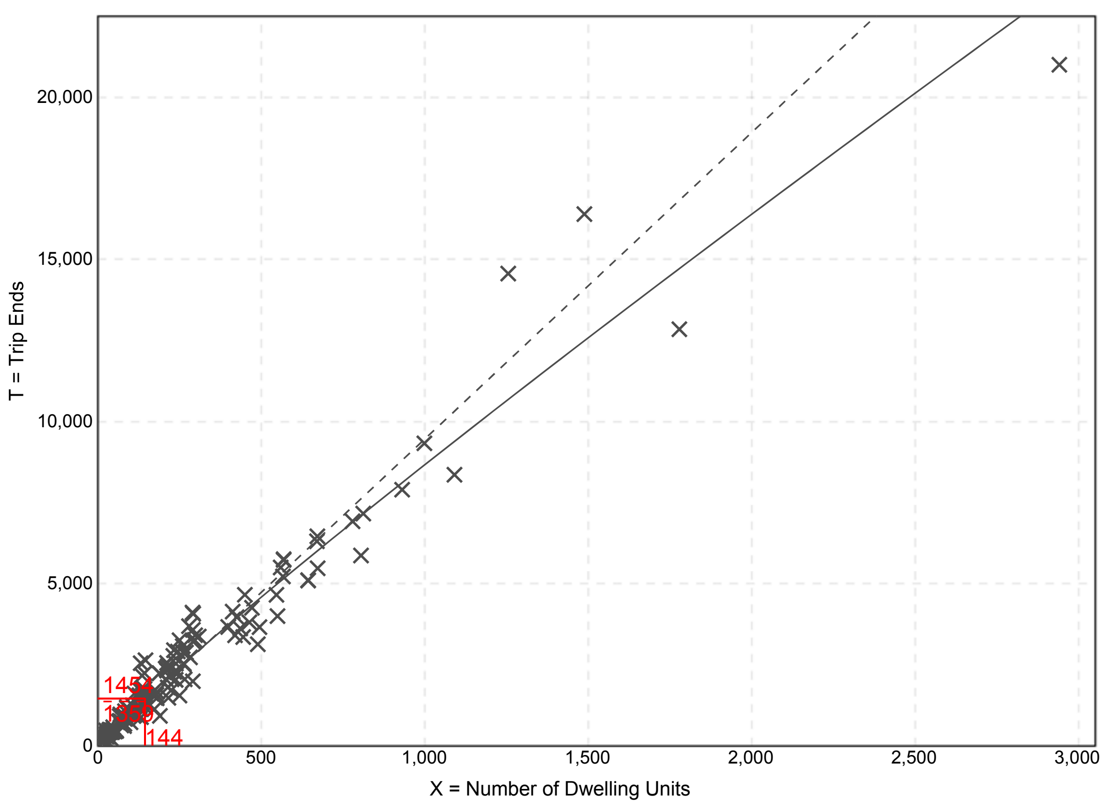
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 159
Avg. Num. of Dwelling Units: 264
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.44	4.81 - 19.39	2.10

Data Plot and Equation



× **Study Site** — **Fitted Curve** - - - - **Average Rate**

Fitted Curve Equation: Ln(T) = 0.92 Ln(X) + 2.71 **R^2= 0.95**

Trip Generation Manual, 10th Edition • Institute of Transportation Engineers

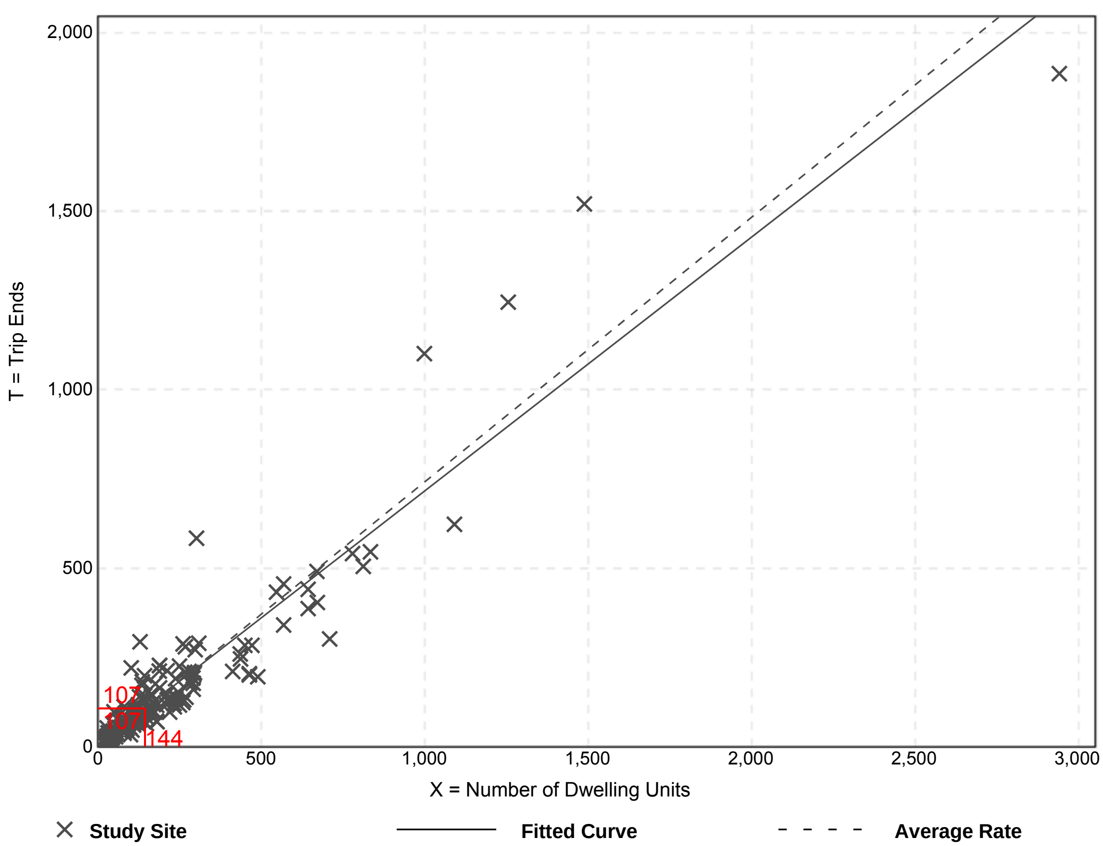
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	173
Avg. Num. of Dwelling Units:	219
Directional Distribution:	25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.74	0.33 - 2.27	0.27

Data Plot and Equation



Fitted Curve Equation: T = 0.71(X) + 4.80 **R^2= 0.89**

Trip Generation Manual, 10th Edition • Institute of Transportation Engineers

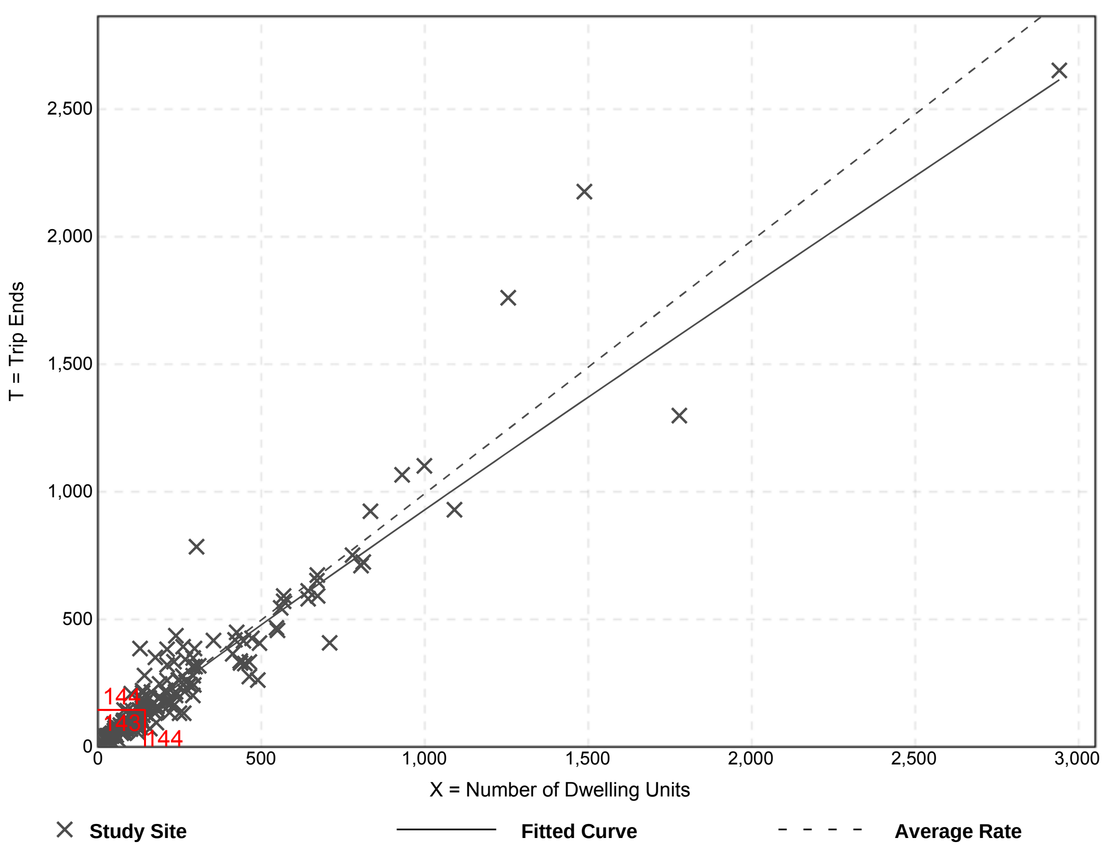
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	190
Avg. Num. of Dwelling Units:	242
Directional Distribution:	63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.96 Ln(X) + 0.20 **R^2= 0.92**

Trip Generation Manual, 10th Edition • Institute of Transportation Engineers

Senior Adult Housing - Detached
(251)

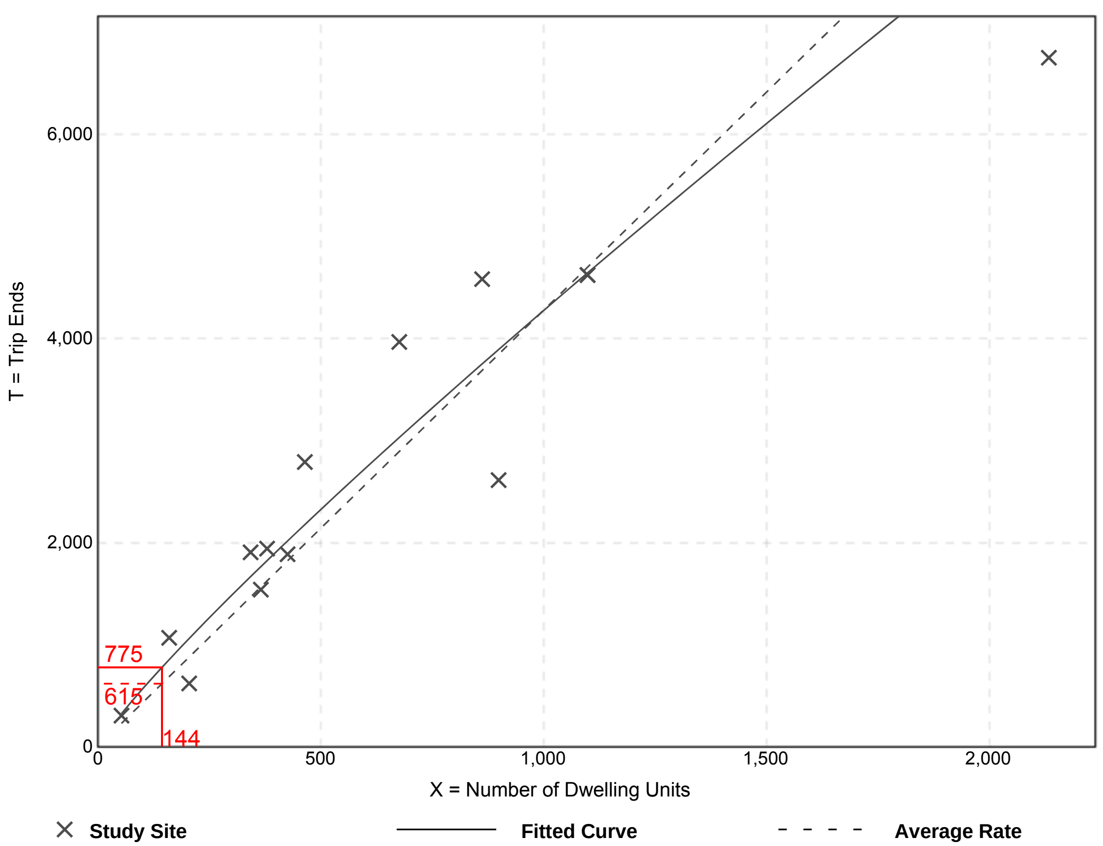
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 14
Avg. Num. of Dwelling Units: 655
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
4.27	2.90 - 6.66	1.11

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.88 Ln(X) + 2.28

R^2= 0.92

Trip Generation Manual, 10th Edition ● Institute of Transportation Engineers

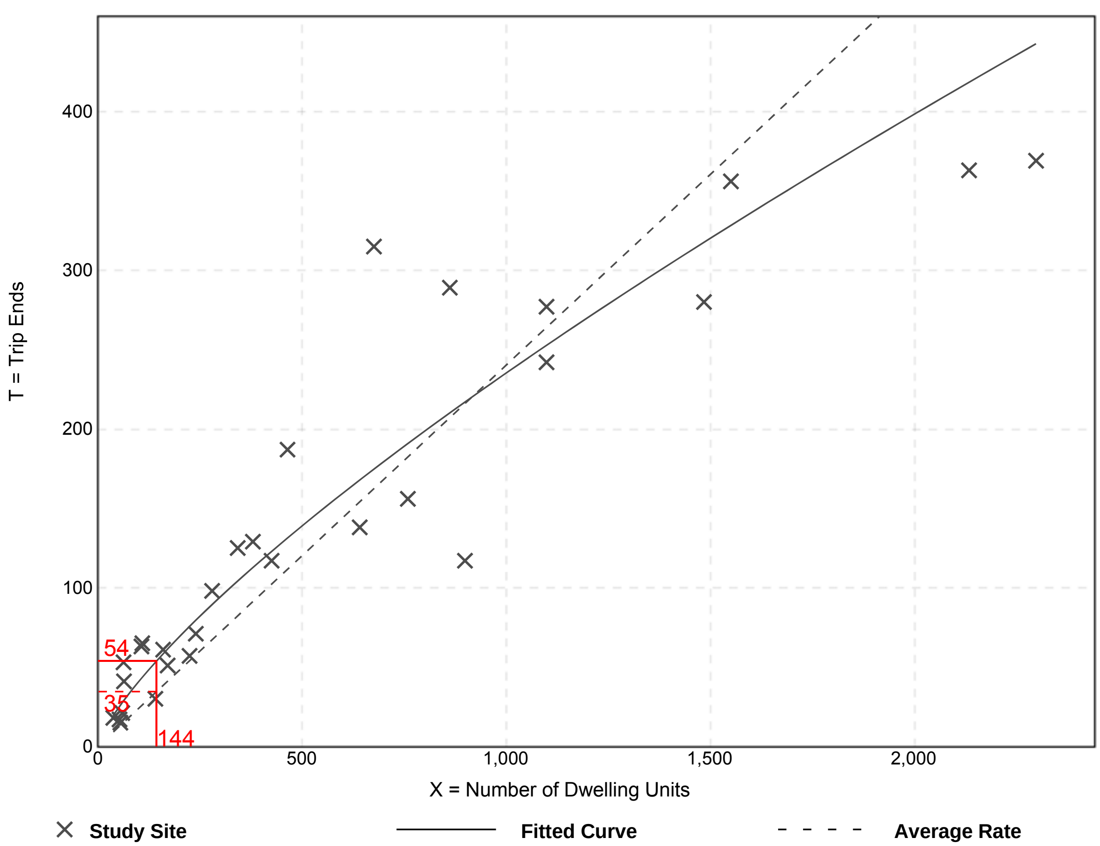
Senior Adult Housing - Detached
(251)

Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 29
Avg. Num. of Dwelling Units: 583
Directional Distribution: 33% entering, 67% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.24	0.13 - 0.84	0.10

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.76 Ln(X) + 0.21 **R^2= 0.89**

Trip Generation Manual, 10th Edition • Institute of Transportation Engineers

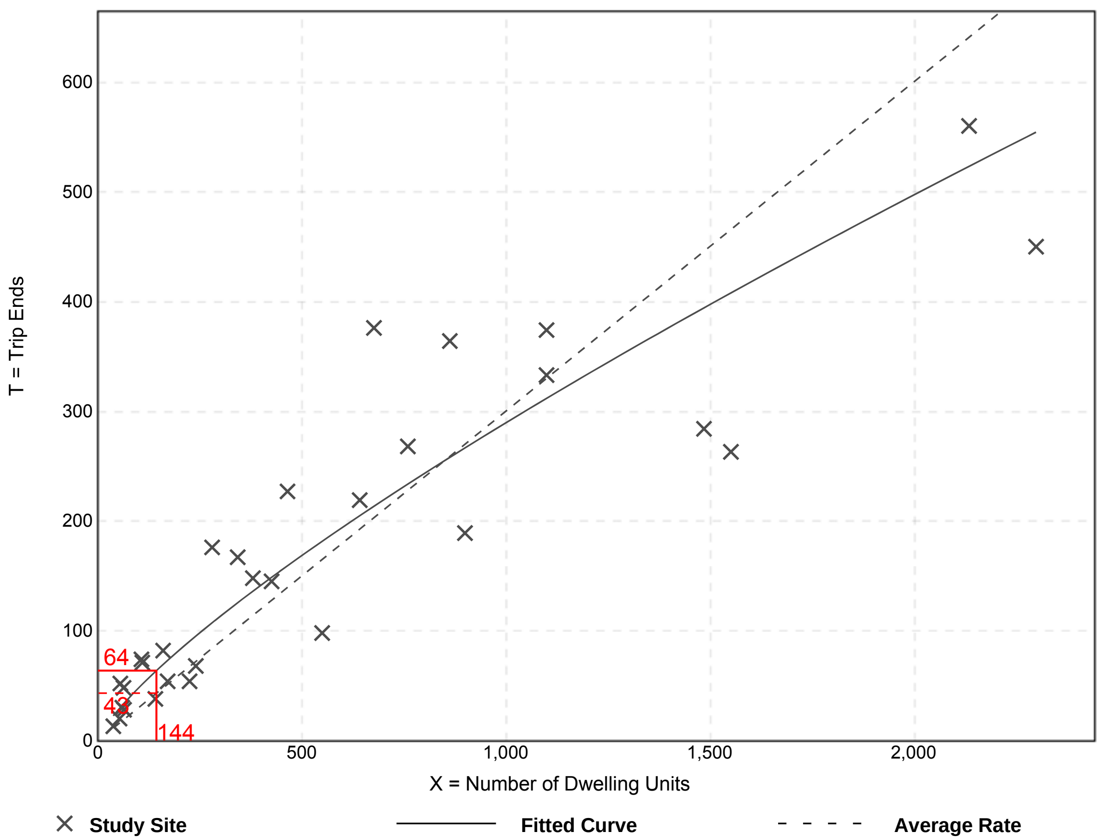
Senior Adult Housing - Detached
(251)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	30
Avg. Num. of Dwelling Units:	582
Directional Distribution:	61% entering, 39% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.30	0.17 - 0.95	0.13

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.78 Ln(X) + 0.28 **R^2= 0.87**

Trip Generation Manual, 10th Edition • Institute of Transportation Engineers

Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: Winans Lake Road
N/S: Chilson Road
Weather:

File Name : TMC_18037A_Winans Lake and Chilson_Oct-30-2018
Site Code : 9001
Start Date : 10/30/2018
Page No : 1

Groups Printed- Cars - H.V.

	None Eastbound				Winans Lake Road Westbound				Chilson Road Northbound				Chilson Road Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	0	0	0	0	25	0	12	0	0	25	9	0	40	58	0	0	169
07:15 AM	0	0	0	0	14	0	10	0	0	13	22	0	24	54	0	0	137
07:30 AM	0	0	0	0	12	0	12	0	0	35	22	0	33	59	0	0	173
07:45 AM	0	0	0	0	9	0	20	0	0	22	11	0	30	65	0	0	157
Total	0	0	0	0	60	0	54	0	0	95	64	0	127	236	0	0	636
08:00 AM	0	0	0	0	15	0	11	0	0	27	14	0	42	62	0	0	171
08:15 AM	0	0	0	0	22	0	6	0	0	26	18	0	29	48	0	0	149
08:30 AM	0	0	0	0	17	0	7	0	0	29	18	0	22	50	0	0	143
08:45 AM	0	0	0	0	15	0	8	0	0	20	24	0	18	50	0	0	135
Total	0	0	0	0	69	0	32	0	0	102	74	0	111	210	0	0	598
*** BREAK ***																	
04:00 PM	0	0	0	0	20	0	29	0	0	57	29	0	24	34	0	0	193
04:15 PM	0	0	0	0	31	0	32	0	0	69	27	0	26	42	0	0	227
04:30 PM	0	0	0	0	30	0	29	0	0	79	25	0	7	45	0	0	215
04:45 PM	0	0	0	0	35	0	30	0	0	62	21	0	19	36	0	0	203
Total	0	0	0	0	116	0	120	0	0	267	102	0	76	157	0	0	838
05:00 PM	0	0	0	0	30	0	40	0	0	82	23	0	16	46	0	0	237
05:15 PM	0	0	0	0	42	0	39	0	0	83	17	0	27	51	0	0	259
05:30 PM	0	0	0	0	39	0	28	0	0	79	29	0	18	46	0	0	239
05:45 PM	0	0	0	0	39	0	42	0	0	62	21	0	12	38	0	0	214
Total	0	0	0	0	150	0	149	0	0	306	90	0	73	181	0	0	949
Grand Total	0	0	0	0	395	0	355	0	0	770	330	0	387	784	0	0	3021
Apprch %	0	0	0	0	52.7	0	47.3	0	0	70	30	0	33	67	0	0	
Total %	0	0	0	0	13.1	0	11.8	0	0	25.5	10.9	0	12.8	26	0	0	
Cars	0	0	0	0	391	0	349	0	0	752	322	0	384	755	0	0	2953
% Cars	0	0	0	0	99	0	98.3	0	0	97.7	97.6	0	99.2	96.3	0	0	97.7
H.V.	0	0	0	0	4	0	6	0	0	18	8	0	3	29	0	0	68
% H.V.	0	0	0	0	1	0	1.7	0	0	2.3	2.4	0	0.8	3.7	0	0	2.3

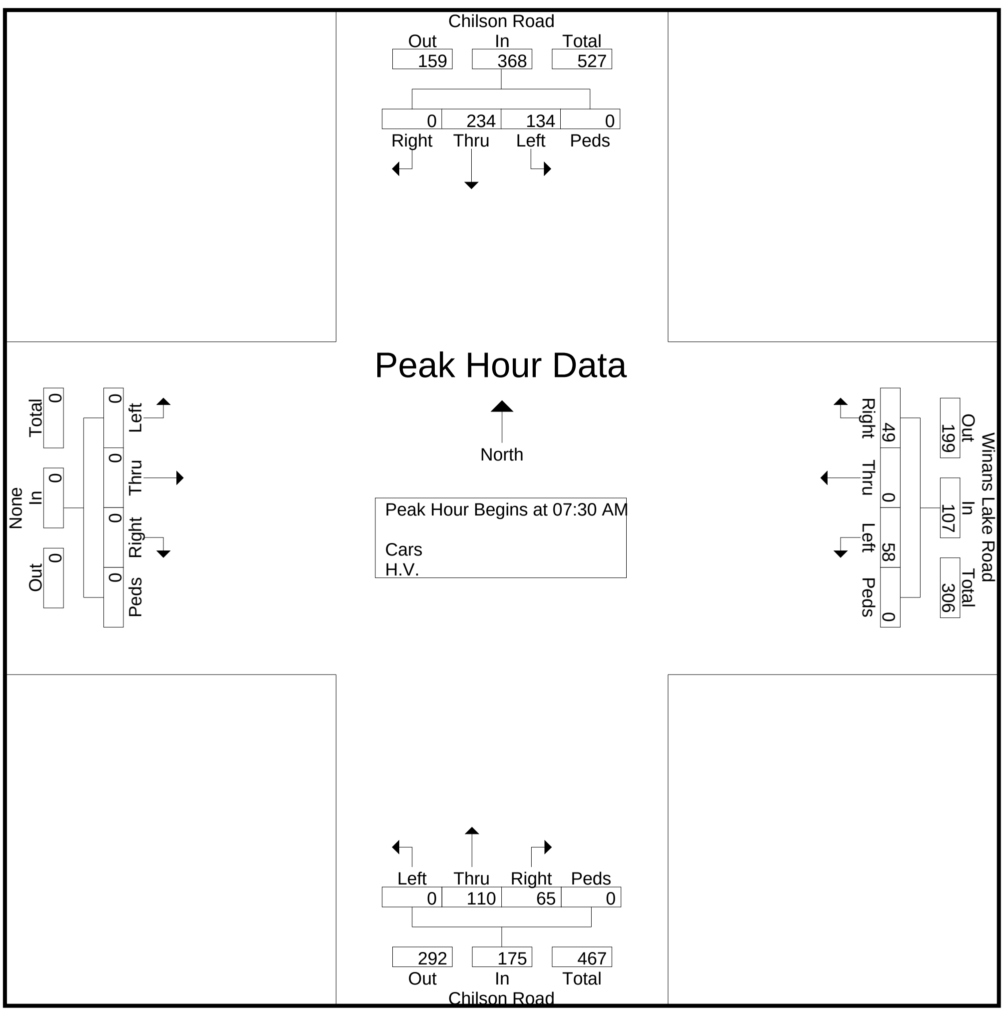
Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: Winans Lake Road
N/S: Chilson Road
Weather:

File Name : TMC_18037A_Winans Lake and Chilson_Oct-30-2018
Site Code : 9001
Start Date : 10/30/2018

	None Eastbound					Winans Lake Road Westbound					Chilson Road Northbound					Chilson Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	0	0	0	0	12	0	12	0	24	0	35	22	0	57	33	59	0	0	92	173
07:45 AM	0	0	0	0	0	9	0	20	0	29	0	22	11	0	33	30	65	0	0	95	157
08:00 AM	0	0	0	0	0	15	0	11	0	26	0	27	14	0	41	42	62	0	0	104	171
08:15 AM	0	0	0	0	0	22	0	6	0	28	0	26	18	0	44	29	48	0	0	77	149
Total Volume	0	0	0	0	0	58	0	49	0	107	0	110	65	0	175	134	234	0	0	368	650
% App. Total	0	0	0	0		54.2	0	45.8	0		0	62.9	37.1	0		36.4	63.6	0	0		
PHF	.000	.000	.000	.000	.000	.659	.000	.613	.000	.922	.000	.786	.739	.000	.768	.798	.900	.000	.000	.885	.939



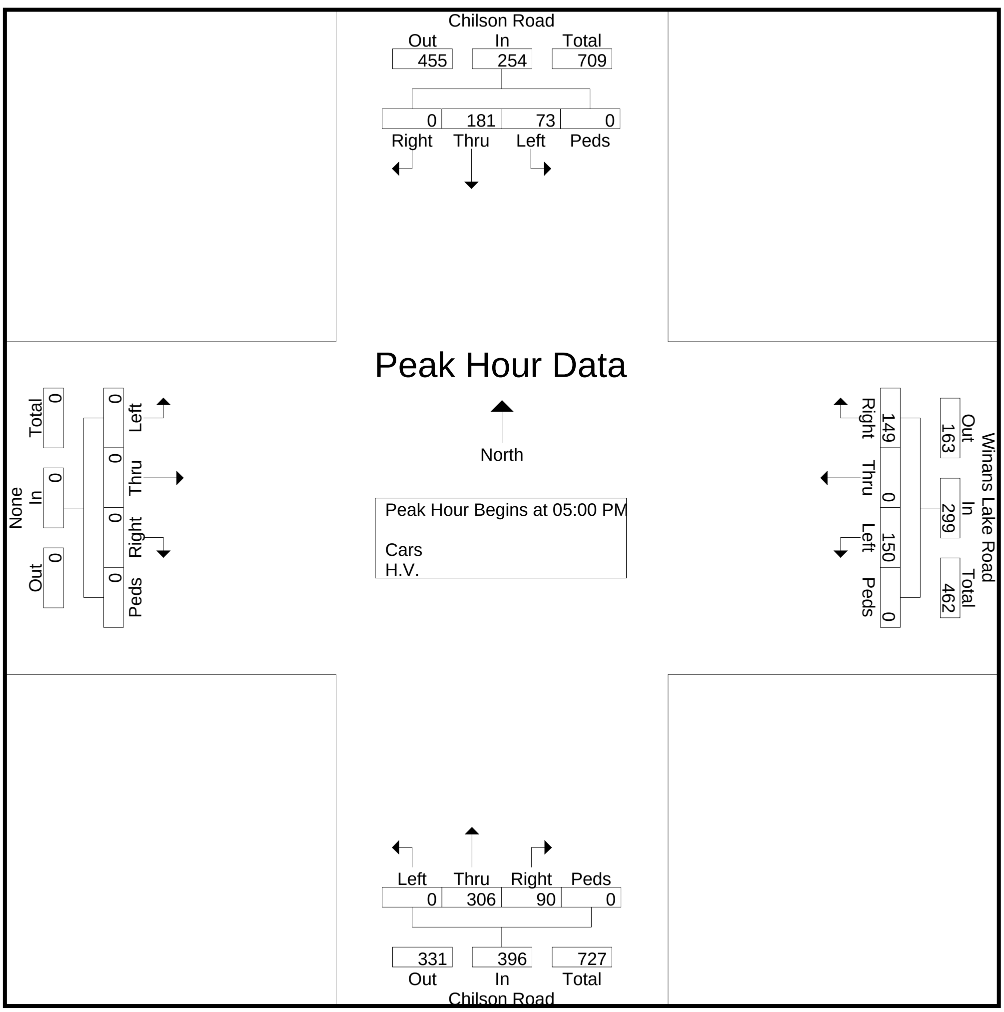
Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: Winans Lake Road
N/S: Chilson Road
Weather:

File Name : TMC_18037A_Winans Lake and Chilson_Oct-30-2018
Site Code : 9001
Start Date : 10/30/2018
Page No : 3

	None Eastbound					Winans Lake Road Westbound					Chilson Road Northbound					Chilson Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	0	0	0	0	30	0	40	0	70	0	82	23	0	105	16	46	0	0	62	237
05:15 PM	0	0	0	0	0	42	0	39	0	81	0	83	17	0	100	27	51	0	0	78	259
05:30 PM	0	0	0	0	0	39	0	28	0	67	0	79	29	0	108	18	46	0	0	64	239
05:45 PM	0	0	0	0	0	39	0	42	0	81	0	62	21	0	83	12	38	0	0	50	214
Total Volume	0	0	0	0	0	150	0	149	0	299	0	306	90	0	396	73	181	0	0	254	949
% App. Total	0	0	0	0		50.2	0	49.8	0		0	77.3	22.7	0		28.7	71.3	0	0		
PHF	.000	.000	.000	.000	.000	.893	.000	.887	.000	.923	.000	.922	.776	.000	.917	.676	.887	.000	.000	.814	.916



Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: Winans Lake Road
N/S: Site Driveway / Buckhorn Lane
Weather:

File Name : TMC_18037A_Winans Lake and Buckhorn Estimated_9002_Oct-30-2018
Site Code : 9002
Start Date : 10/30/2018
Page No : 1

Groups Printed- Cars - H.V.

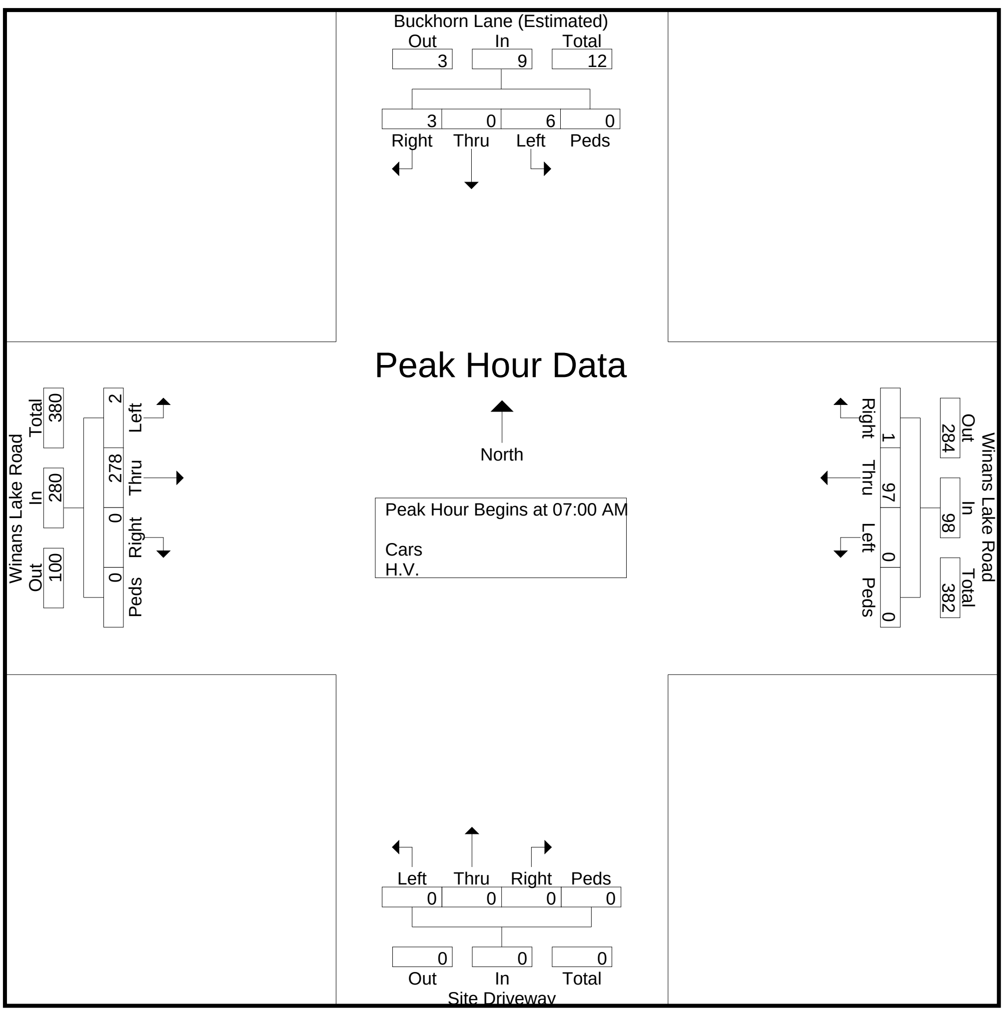
	Winans Lake Road Eastbound				Winans Lake Road Westbound				Site Driveway Northbound				Buckhorn Lane (Estimated) Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	0	64	0	0	0	27	1	0	0	0	0	0	1	0	1	0	94
07:15 AM	1	70	0	0	0	23	0	0	0	0	0	0	2	0	1	0	97
07:30 AM	1	63	0	0	0	20	0	0	0	0	0	0	2	0	1	0	87
07:45 AM	0	81	0	0	0	27	0	0	0	0	0	0	1	0	0	0	109
Total	2	278	0	0	0	97	1	0	0	0	0	0	6	0	3	0	387
08:00 AM	0	65	0	0	0	20	1	0	0	0	0	0	1	0	1	0	88
08:15 AM	1	68	0	0	0	25	0	0	0	0	0	0	2	0	1	0	97
08:30 AM	1	61	0	0	0	17	0	0	0	0	0	0	2	0	1	0	82
08:45 AM	0	49	0	0	0	23	0	0	0	0	0	0	1	0	0	0	73
Total	2	243	0	0	0	85	1	0	0	0	0	0	6	0	3	0	340
*** BREAK ***																	
04:00 PM	1	45	0	0	0	66	2	0	0	0	0	0	1	0	0	0	115
04:15 PM	0	50	0	0	0	78	1	0	0	0	0	0	0	0	1	0	130
04:30 PM	1	43	0	0	0	82	1	0	0	0	0	0	0	0	1	0	128
04:45 PM	0	39	0	0	0	68	1	0	0	0	0	0	0	0	1	0	109
Total	2	177	0	0	0	294	5	0	0	0	0	0	1	0	3	0	482
05:00 PM	1	39	0	0	0	88	2	0	0	0	0	0	1	0	0	0	131
05:15 PM	0	38	0	0	0	95	1	0	0	0	0	0	0	0	1	0	135
05:30 PM	1	55	0	0	0	90	1	0	0	0	0	0	0	0	1	0	148
05:45 PM	0	45	0	0	0	93	1	0	0	0	0	0	0	0	1	0	140
Total	2	177	0	0	0	366	5	0	0	0	0	0	1	0	3	0	554
Grand Total	8	875	0	0	0	842	12	0	0	0	0	0	14	0	12	0	1763
Apprch %	0.9	99.1	0	0	0	98.6	1.4	0	0	0	0	0	53.8	0	46.2	0	
Total %	0.5	49.6	0	0	0	47.8	0.7	0	0	0	0	0	0.8	0	0.7	0	
Cars	8	863	0	0	0	831	12	0	0	0	0	0	14	0	12	0	1740
% Cars	100	98.6	0	0	0	98.7	100	0	0	0	0	0	100	0	100	0	98.7
H.V.	0	12	0	0	0	11	0	0	0	0	0	0	0	0	0	0	23
% H.V.	0	1.4	0	0	0	1.3	0	0	0	0	0	0	0	0	0	0	1.3

Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection | File Name : TMC_18037A_Winans Lake and Buckhorn Estimated_9002_Oct-30-2018
E/W: Winans Lake Road | Site Code : 9002
N/S: Site Driveway / Buckhorn Lane | Start Date : 10/30/2018
Weather: |

	Winans Lake Road Eastbound					Winans Lake Road Westbound					Site Driveway Northbound					Buckhorn Lane (Estimated) Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	64	0	0	64	0	27	1	0	28	0	0	0	0	0	1	0	1	0	2	94
07:15 AM	1	70	0	0	71	0	23	0	0	23	0	0	0	0	0	2	0	1	0	3	97
07:30 AM	1	63	0	0	64	0	20	0	0	20	0	0	0	0	0	2	0	1	0	3	87
07:45 AM	0	81	0	0	81	0	27	0	0	27	0	0	0	0	0	1	0	0	0	1	109
Total Volume	2	278	0	0	280	0	97	1	0	98	0	0	0	0	0	6	0	3	0	9	387
% App. Total	0.7	99.3	0	0		0	99	1	0		0	0	0	0		66.7	0	33.3	0		
PHF	.500	.858	.000	.000	.864	.000	.898	.250	.000	.875	.000	.000	.000	.000	.000	.750	.000	.750	.000	.750	.888



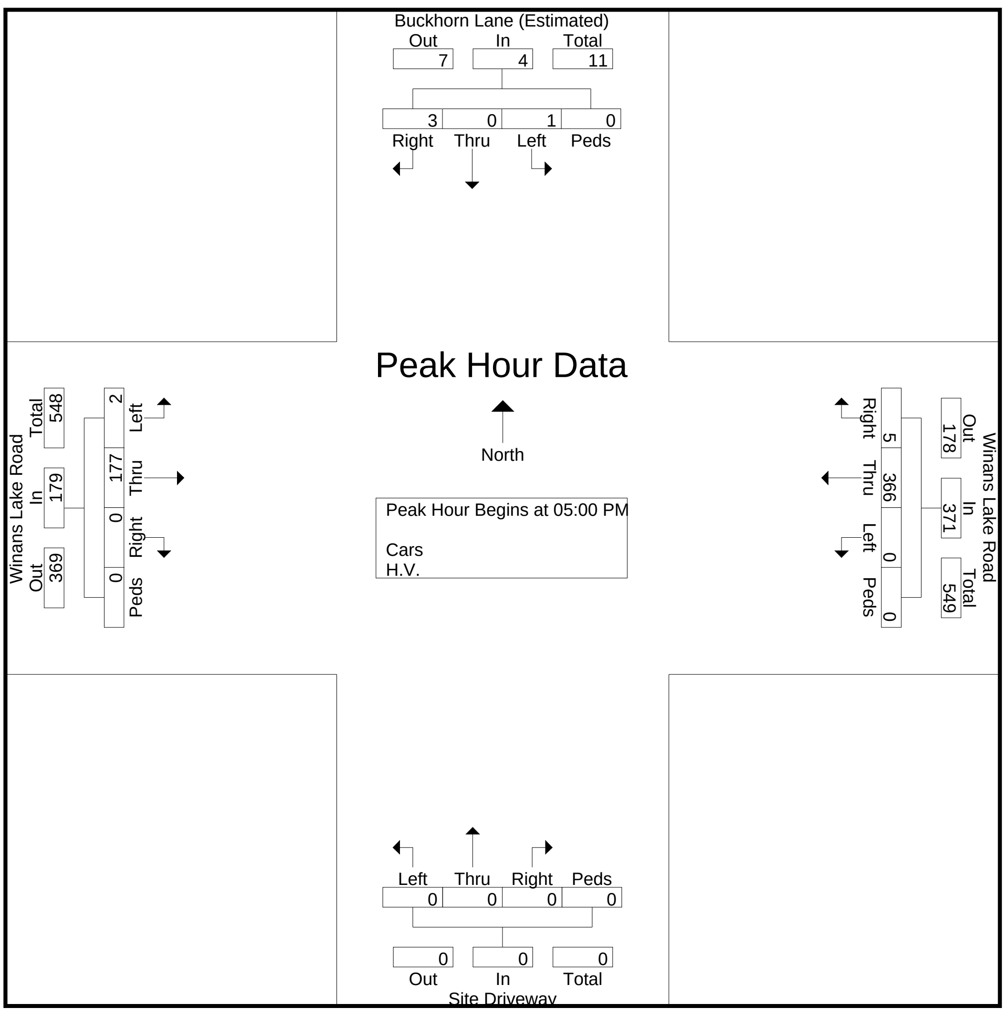
Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: Winans Lake Road
N/S: Site Driveway / Buckhorn Lane
Weather:

File Name : TMC_18037A_Winans Lake and Buckhorn Estimated_9002_Oct-30-2018
Site Code : 9002
Start Date : 10/30/2018
Page No : 3

	Winans Lake Road Eastbound					Winans Lake Road Westbound					Site Driveway Northbound					Buckhorn Lane (Estimated) Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	1	39	0	0	40	0	88	2	0	90	0	0	0	0	0	1	0	0	0	1	131
05:15 PM	0	38	0	0	38	0	95	1	0	96	0	0	0	0	0	0	0	1	0	1	135
05:30 PM	1	55	0	0	56	0	90	1	0	91	0	0	0	0	0	0	0	1	0	1	148
05:45 PM	0	45	0	0	45	0	93	1	0	94	0	0	0	0	0	0	0	1	0	1	140
Total Volume	2	177	0	0	179	0	366	5	0	371	0	0	0	0	0	1	0	3	0	4	554
% App. Total	1.1	98.9	0	0		0	98.7	1.3	0		0	0	0	0		25	0	75	0		
PHF	.500	.805	.000	.000	.799	.000	.963	.625	.000	.966	.000	.000	.000	.000	.000	.250	.000	.750	.000	1.00	.936



Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: Winans Lake Road
N/S: Hamburg Road
Weather:

File Name : TMC_18037A_Winans Lake and Hamburg_T-Int_Oct-30-2018
Site Code : 9003
Start Date : 10/30/2018
Page No : 1

Groups Printed- Cars - H.V.

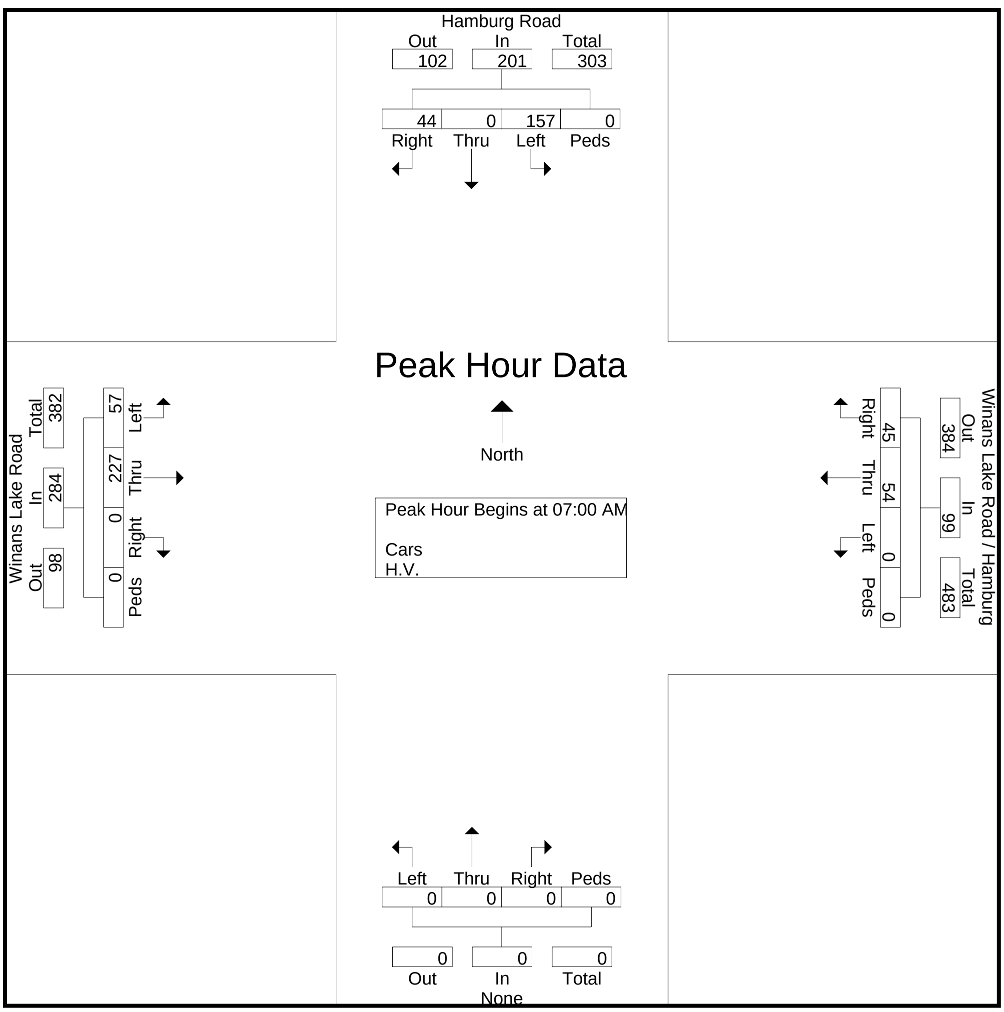
	Winans Lake Road Eastbound				Winans Lake Road / Hamburg Westbound				None Northbound				Hamburg Road Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	12	53	0	0	0	13	14	0	0	0	0	0	38	0	15	0	145
07:15 AM	12	60	0	0	0	12	11	0	0	0	0	0	34	0	11	0	140
07:30 AM	13	52	0	0	0	11	10	0	0	0	0	0	40	0	9	0	135
07:45 AM	20	62	0	0	0	18	10	0	0	0	0	0	45	0	9	0	164
Total	57	227	0	0	0	54	45	0	0	0	0	0	157	0	44	0	584
08:00 AM	13	53	0	0	0	12	16	0	0	0	0	0	29	0	9	0	132
08:15 AM	23	47	0	0	0	17	12	0	0	0	0	0	24	0	8	0	131
08:30 AM	21	42	0	0	0	11	12	0	0	0	0	0	33	0	6	0	125
08:45 AM	16	34	0	0	0	13	8	0	0	0	0	0	22	0	10	0	103
Total	73	176	0	0	0	53	48	0	0	0	0	0	108	0	33	0	491
*** BREAK ***																	
04:00 PM	21	25	0	0	0	51	43	0	0	0	0	0	22	0	17	0	179
04:15 PM	25	25	0	0	0	60	24	0	0	0	0	0	15	0	19	0	168
04:30 PM	22	21	0	0	0	59	31	0	0	0	0	0	26	0	24	0	183
04:45 PM	20	19	0	0	0	50	39	0	0	0	0	0	13	0	19	0	160
Total	88	90	0	0	0	220	137	0	0	0	0	0	76	0	79	0	690
05:00 PM	21	19	0	0	0	66	48	0	0	0	0	0	17	0	24	0	195
05:15 PM	21	17	0	0	0	68	56	0	0	0	0	0	15	0	28	0	205
05:30 PM	29	26	0	0	0	63	49	0	0	0	0	0	16	0	28	0	211
05:45 PM	14	31	0	0	0	58	44	0	0	0	0	0	15	0	36	0	198
Total	85	93	0	0	0	255	197	0	0	0	0	0	63	0	116	0	809
Grand Total	303	586	0	0	0	582	427	0	0	0	0	0	404	0	272	0	2574
Apprch %	34.1	65.9	0	0	0	57.7	42.3	0	0	0	0	0	59.8	0	40.2	0	
Total %	11.8	22.8	0	0	0	22.6	16.6	0	0	0	0	0	15.7	0	10.6	0	
Cars	299	578	0	0	0	575	425	0	0	0	0	0	399	0	268	0	2544
% Cars	98.7	98.6	0	0	0	98.8	99.5	0	0	0	0	0	98.8	0	98.5	0	98.8
H.V.	4	8	0	0	0	7	2	0	0	0	0	0	5	0	4	0	30
% H.V.	1.3	1.4	0	0	0	1.2	0.5	0	0	0	0	0	1.2	0	1.5	0	1.2

Midwestern Consulting
3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: Winans Lake Road
N/S: Hamburg Road
Weather:

File Name : TMC_18037A_Winans Lake and Hamburg_T-Int_Oct-30-2018
Site Code : 9003
Start Date : 10/30/2018
Page No : 2

	Winans Lake Road Eastbound					Winans Lake Road / Hamburg Westbound					None Northbound					Hamburg Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	12	53	0	0	65	0	13	14	0	27	0	0	0	0	0	38	0	15	0	53	145
07:15 AM	12	60	0	0	72	0	12	11	0	23	0	0	0	0	0	34	0	11	0	45	140
07:30 AM	13	52	0	0	65	0	11	10	0	21	0	0	0	0	0	40	0	9	0	49	135
07:45 AM	20	62	0	0	82	0	18	10	0	28	0	0	0	0	0	45	0	9	0	54	164
Total Volume	57	227	0	0	284	0	54	45	0	99	0	0	0	0	0	157	0	44	0	201	584
% App. Total	20.1	79.9	0	0		0	54.5	45.5	0		0	0	0	0		78.1	0	21.9	0		
PHF	.713	.915	.000	.000	.866	.000	.750	.804	.000	.884	.000	.000	.000	.000	.000	.872	.000	.733	.000	.931	.890



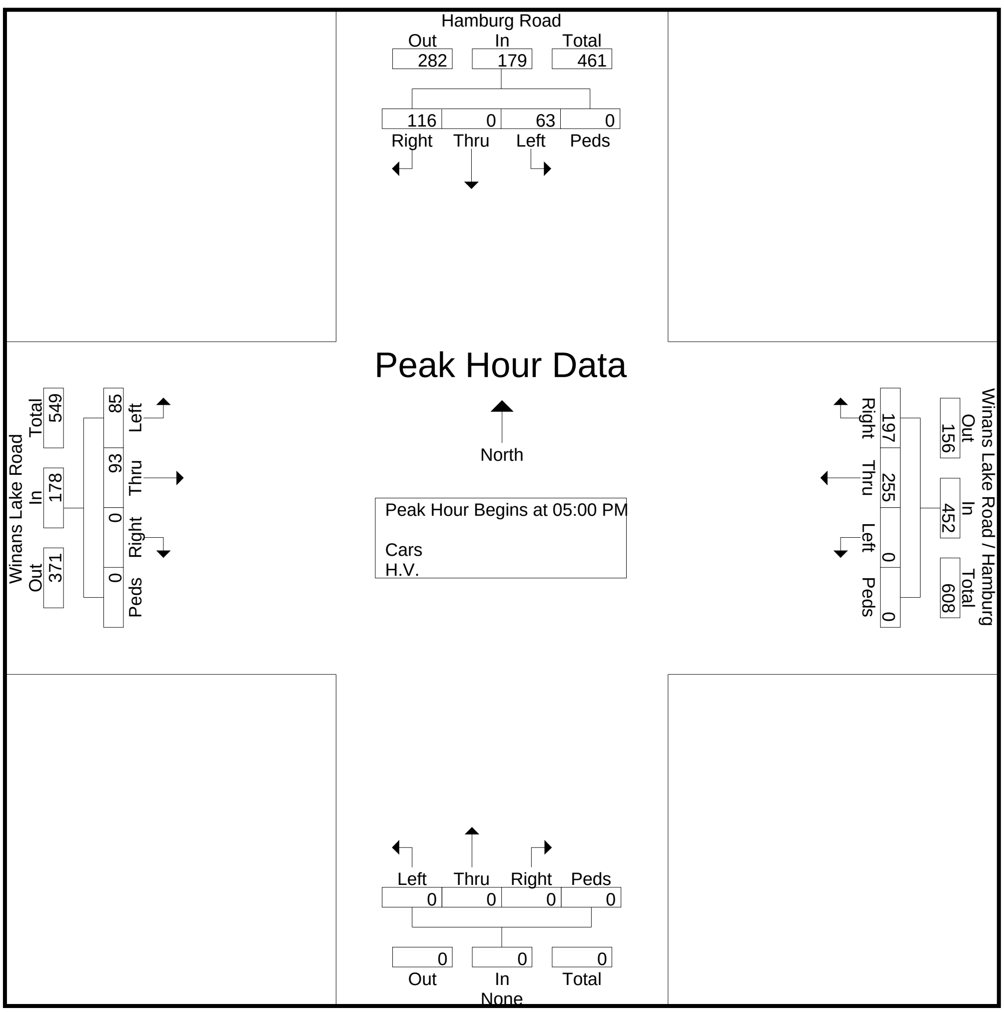
Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: Winans Lake Road
N/S: Hamburg Road
Weather:

File Name : TMC_18037A_Winans Lake and Hamburg_T-Int_Oct-30-2018
Site Code : 9003
Start Date : 10/30/2018
Page No : 3

	Winans Lake Road Eastbound					Winans Lake Road / Hamburg Westbound					None Northbound					Hamburg Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	21	19	0	0	40	0	66	48	0	114	0	0	0	0	0	17	0	24	0	41	195
05:15 PM	21	17	0	0	38	0	68	56	0	124	0	0	0	0	0	15	0	28	0	43	205
05:30 PM	29	26	0	0	55	0	63	49	0	112	0	0	0	0	0	16	0	28	0	44	211
05:45 PM	14	31	0	0	45	0	58	44	0	102	0	0	0	0	0	15	0	36	0	51	198
Total Volume	85	93	0	0	178	0	255	197	0	452	0	0	0	0	0	63	0	116	0	179	809
% App. Total	47.8	52.2	0	0		0	56.4	43.6	0		0	0	0	0		35.2	0	64.8	0		
PHF	.733	.750	.000	.000	.809	.000	.938	.879	.000	.911	.000	.000	.000	.000	.000	.926	.000	.806	.000	.877	.959



Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: Winans Lake Road
N/S: Hamburg Road
Weather:

File Name : TMC_18037A_Winans Lake and Hamburg_Roundabout_Oct-30-2018
Site Code : 9004
Start Date : 10/30/2018

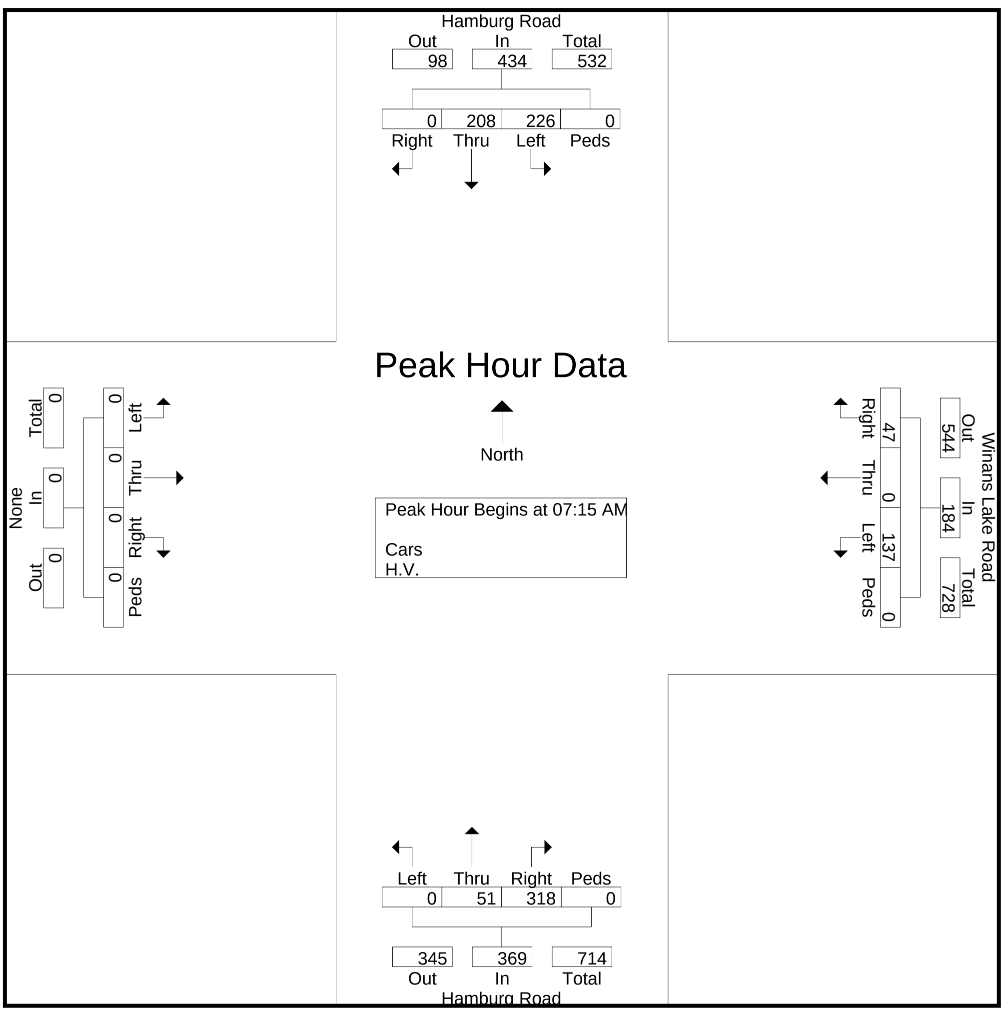
Groups Printed- Cars - H.V.

	None Eastbound				Winans Lake Road Westbound				Hamburg Road Northbound				Hamburg Road Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	0	0	0	0	23	0	5	0	0	12	69	0	65	47	0	0	221
07:15 AM	0	0	0	0	24	0	13	0	0	11	105	0	59	53	0	0	265
07:30 AM	0	0	0	0	31	0	9	0	0	11	89	0	55	44	0	0	239
07:45 AM	0	0	0	0	46	0	16	0	0	14	56	0	58	60	0	0	250
Total	0	0	0	0	124	0	43	0	0	48	319	0	237	204	0	0	975
08:00 AM	0	0	0	0	36	0	9	0	0	15	68	0	54	51	0	0	233
08:15 AM	0	0	0	0	26	0	12	0	0	12	63	0	58	26	0	0	197
08:30 AM	0	0	0	0	29	0	16	0	0	7	68	0	48	31	0	0	199
08:45 AM	0	0	0	0	34	0	12	0	0	8	61	0	35	23	0	0	173
Total	0	0	0	0	125	0	49	0	0	42	260	0	195	131	0	0	802
*** BREAK ***																	
04:00 PM	0	0	0	0	103	0	60	0	0	50	58	0	31	23	0	0	325
04:15 PM	0	0	0	0	99	0	56	0	0	38	59	0	21	21	0	0	294
04:30 PM	0	0	0	0	79	0	52	0	0	37	62	0	23	21	0	0	274
04:45 PM	0	0	0	0	71	0	44	0	0	52	75	0	19	12	0	0	273
Total	0	0	0	0	352	0	212	0	0	177	254	0	94	77	0	0	1166
05:00 PM	0	0	0	0	69	0	60	0	0	68	70	0	27	17	0	0	311
05:15 PM	0	0	0	0	91	0	62	0	0	75	64	0	16	24	0	0	332
05:30 PM	0	0	0	0	76	0	51	0	0	71	59	0	24	18	0	0	299
05:45 PM	0	0	0	0	84	0	49	0	0	52	54	0	21	9	0	0	269
Total	0	0	0	0	320	0	222	0	0	266	247	0	88	68	0	0	1211
Grand Total	0	0	0	0	921	0	526	0	0	533	1080	0	614	480	0	0	4154
Apprch %	0	0	0	0	63.6	0	36.4	0	0	33	67	0	56.1	43.9	0	0	
Total %	0	0	0	0	22.2	0	12.7	0	0	12.8	26	0	14.8	11.6	0	0	
Cars	0	0	0	0	898	0	515	0	0	530	1064	0	606	473	0	0	4086
% Cars	0	0	0	0	97.5	0	97.9	0	0	99.4	98.5	0	98.7	98.5	0	0	98.4
H.V.	0	0	0	0	23	0	11	0	0	3	16	0	8	7	0	0	68
% H.V.	0	0	0	0	2.5	0	2.1	0	0	0.6	1.5	0	1.3	1.5	0	0	1.6

Midwestern Consulting
3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection	File Name	:	TMC_18037A_Winans Lake and Hamburg_Roundabout_Oct-30-2018
E/W: Winans Lake Road	Site Code	:	9004
N/S: Hamburg Road	Start Date	:	10/30/2018
Weather:	Page No	:	2

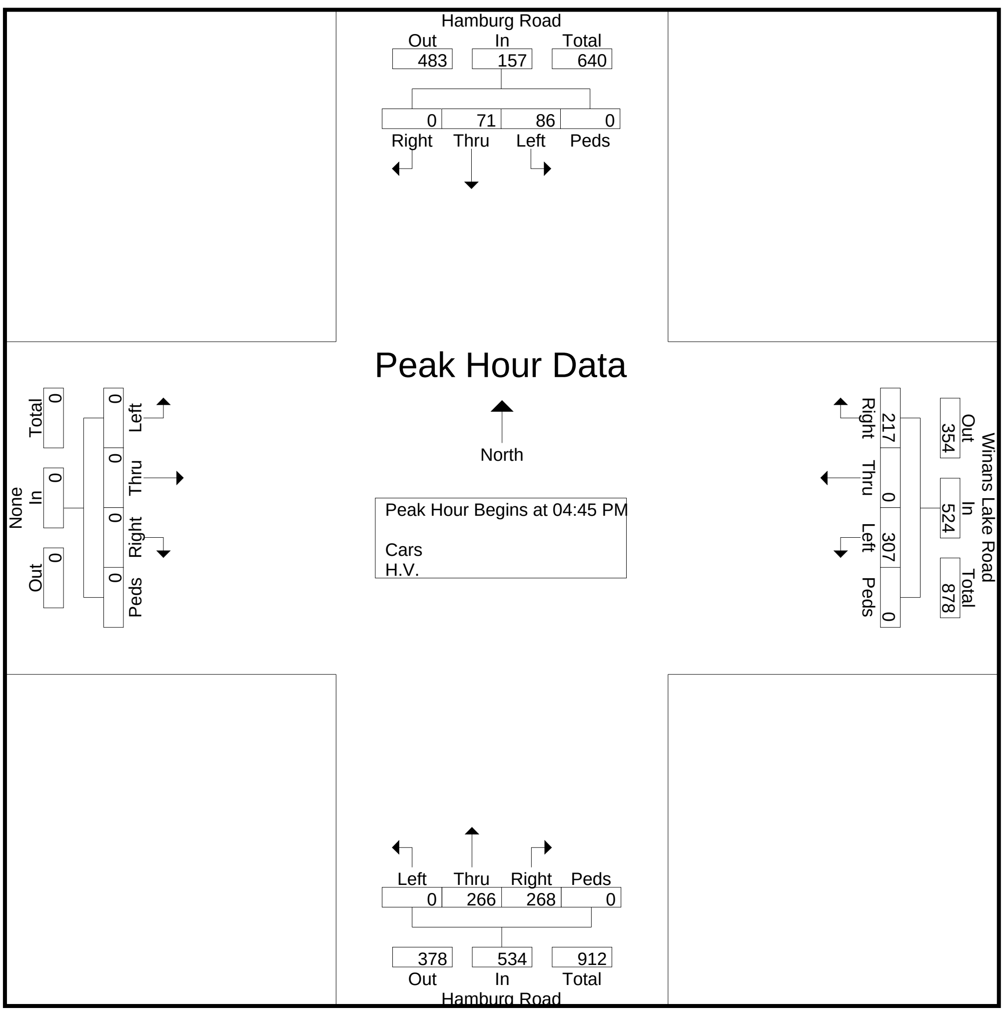
	None Eastbound					Winans Lake Road Westbound					Hamburg Road Northbound					Hamburg Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	0	0	0	0	24	0	13	0	37	0	11	105	0	116	59	53	0	0	112	265
07:30 AM	0	0	0	0	0	31	0	9	0	40	0	11	89	0	100	55	44	0	0	99	239
07:45 AM	0	0	0	0	0	46	0	16	0	62	0	14	56	0	70	58	60	0	0	118	250
08:00 AM	0	0	0	0	0	36	0	9	0	45	0	15	68	0	83	54	51	0	0	105	233
Total Volume	0	0	0	0	0	137	0	47	0	184	0	51	318	0	369	226	208	0	0	434	987
% App. Total	0	0	0	0		74.5	0	25.5	0		0	13.8	86.2	0		52.1	47.9	0	0		
PHF	.000	.000	.000	.000	.000	.745	.000	.734	.000	.742	.000	.850	.757	.000	.795	.958	.867	.000	.000	.919	.931



Midwestern Consulting
3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection	File Name	: TMC_18037A_Winans Lake and Hamburg_Roundabout_Oct-30-2018
E/W: Winans Lake Road	Site Code	: 9004
N/S: Hamburg Road	Start Date	: 10/30/2018
Weather:	Page No	: 3

	None Eastbound					Winans Lake Road Westbound					Hamburg Road Northbound					Hamburg Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	0	0	0	0	71	0	44	0	115	0	52	75	0	127	19	12	0	0	31	273
05:00 PM	0	0	0	0	0	69	0	60	0	129	0	68	70	0	138	27	17	0	0	44	311
05:15 PM	0	0	0	0	0	91	0	62	0	153	0	75	64	0	139	16	24	0	0	40	332
05:30 PM	0	0	0	0	0	76	0	51	0	127	0	71	59	0	130	24	18	0	0	42	299
Total Volume	0	0	0	0	0	307	0	217	0	524	0	266	268	0	534	86	71	0	0	157	1215
% App. Total	0	0	0	0		58.6	0	41.4	0		0	49.8	50.2	0		54.8	45.2	0	0		
PHF	.000	.000	.000	.000	.000	.843	.000	.875	.000	.856	.000	.887	.893	.000	.960	.796	.740	.000	.000	.892	.915



Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: M-36
N/S: Chilson
Weather:

File Name : tmc_18037a_m36 & chilson_1001_nov 01 2018
Site Code : 1001
Start Date : 11/1/2018
Page No : 1

Groups Printed- Cars - H.V.

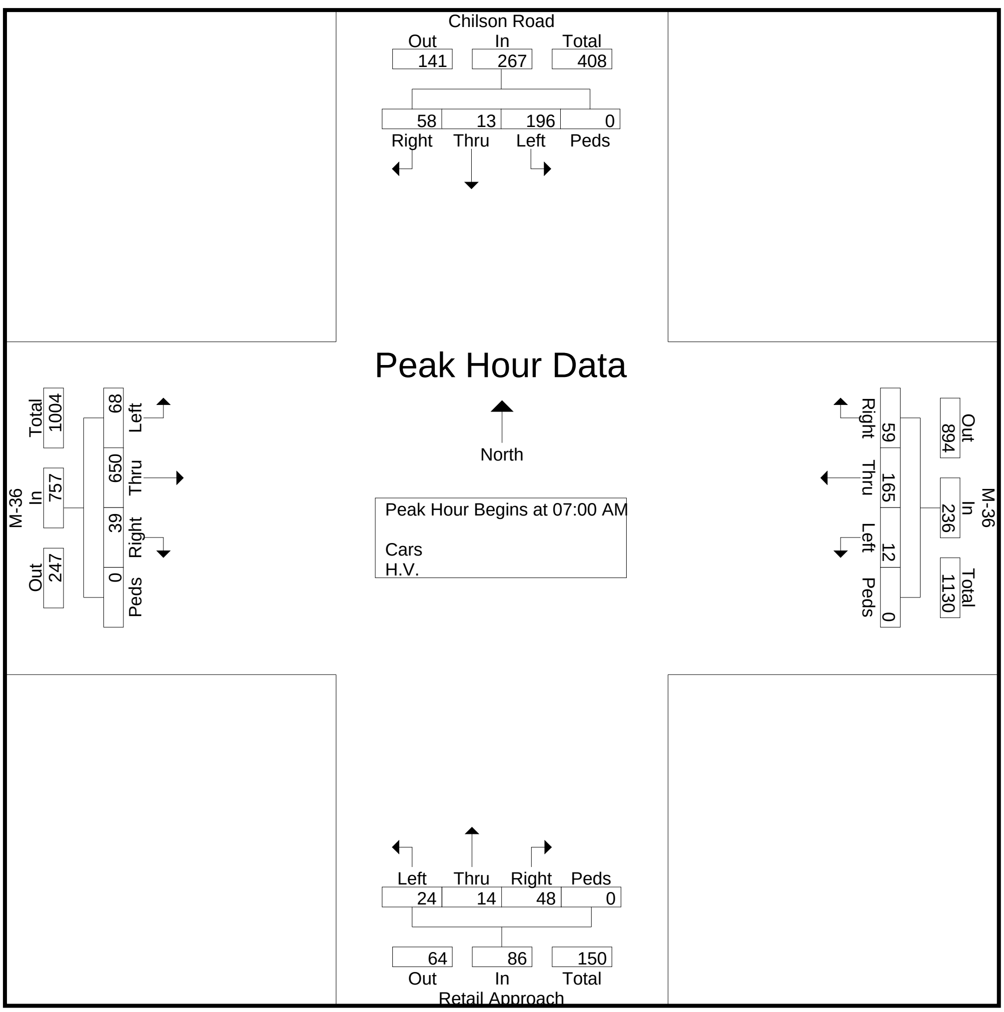
	M-36 Eastbound				M-36 Westbound				Retail Approach Northbound				Chilson Road Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	9	169	11	0	4	44	17	0	11	3	21	0	46	4	20	0	359
07:15 AM	19	172	10	0	4	31	11	0	4	0	11	0	49	2	12	0	325
07:30 AM	19	163	6	0	3	37	12	0	5	5	6	0	55	2	8	0	321
07:45 AM	21	146	12	0	1	53	19	0	4	6	10	0	46	5	18	0	341
Total	68	650	39	0	12	165	59	0	24	14	48	0	196	13	58	0	1346
08:00 AM	12	117	7	0	5	59	15	0	12	4	10	0	48	3	24	0	316
08:15 AM	18	131	29	0	4	48	18	0	10	7	13	0	44	12	16	0	350
08:30 AM	12	120	22	0	1	48	12	0	11	3	16	0	25	9	18	0	297
08:45 AM	15	127	17	0	7	57	10	0	16	5	9	0	26	16	11	0	316
Total	57	495	75	0	17	212	55	0	49	19	48	0	143	40	69	0	1279
*** BREAK ***																	
04:00 PM	14	102	25	0	6	146	37	0	29	27	10	0	22	16	19	0	453
04:15 PM	18	89	18	0	8	131	44	0	34	23	10	0	24	16	27	0	442
04:30 PM	17	65	21	0	10	134	44	0	32	11	8	0	20	9	21	0	392
04:45 PM	15	62	22	0	9	145	56	0	32	16	4	0	25	20	31	0	437
Total	64	318	86	0	33	556	181	0	127	77	32	0	91	61	98	0	1724
05:00 PM	14	87	26	0	9	172	67	0	42	33	4	0	18	16	21	0	509
05:15 PM	16	94	22	0	6	160	45	0	45	23	6	0	22	18	28	0	485
05:30 PM	17	73	17	0	11	153	50	0	38	22	8	0	29	18	31	0	467
05:45 PM	13	64	18	0	10	149	49	0	35	28	5	0	18	15	29	0	433
Total	60	318	83	0	36	634	211	0	160	106	23	0	87	67	109	0	1894
Grand Total	249	1781	283	0	98	1567	506	0	360	216	151	0	517	181	334	0	6243
Apprch %	10.8	77	12.2	0	4.5	72.2	23.3	0	49.5	29.7	20.8	0	50.1	17.5	32.4	0	
Total %	4	28.5	4.5	0	1.6	25.1	8.1	0	5.8	3.5	2.4	0	8.3	2.9	5.3	0	
Cars	242	1753	280	0	96	1523	495	0	355	215	150	0	494	181	324	0	6108
% Cars	97.2	98.4	98.9	0	98	97.2	97.8	0	98.6	99.5	99.3	0	95.6	100	97	0	97.8
H.V.	7	28	3	0	2	44	11	0	5	1	1	0	23	0	10	0	135
% H.V.	2.8	1.6	1.1	0	2	2.8	2.2	0	1.4	0.5	0.7	0	4.4	0	3	0	2.2

Midwestern Consulting
3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: M-36
N/S: Chilson
Weather:

File Name : tmc_18037a_m36 & chilson_1001_nov 01 2018
Site Code : 1001
Start Date : 11/1/2018
Page No : 2

	M-36 Eastbound					M-36 Westbound					Retail Approach Northbound					Chilson Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	9	169	11	0	189	4	44	17	0	65	11	3	21	0	35	46	4	20	0	70	359
07:15 AM	19	172	10	0	201	4	31	11	0	46	4	0	11	0	15	49	2	12	0	63	325
07:30 AM	19	163	6	0	188	3	37	12	0	52	5	5	6	0	16	55	2	8	0	65	321
07:45 AM	21	146	12	0	179	1	53	19	0	73	4	6	10	0	20	46	5	18	0	69	341
Total Volume	68	650	39	0	757	12	165	59	0	236	24	14	48	0	86	196	13	58	0	267	1346
% App. Total	9	85.9	5.2	0		5.1	69.9	25	0		27.9	16.3	55.8	0		73.4	4.9	21.7	0		
PHF	.810	.945	.813	.000	.942	.750	.778	.776	.000	.808	.545	.583	.571	.000	.614	.891	.650	.725	.000	.954	.937

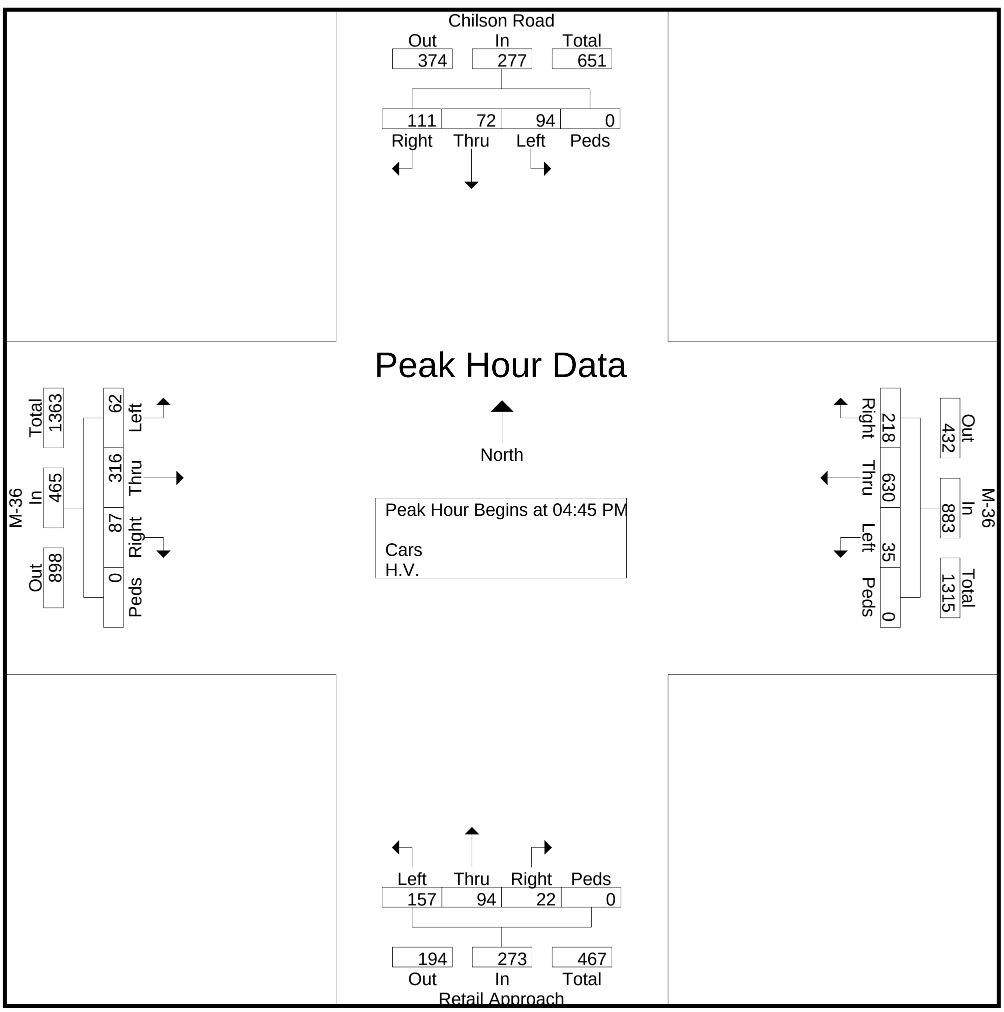


Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection	File Name : tmc_18037a_m36 & chilson_1001_nov 01 2018
E/W: M-36	Site Code : 1001
N/S: Chilson	Start Date : 11/1/2018
Weather:	Page No : 3

	M-36 Eastbound					M-36 Westbound					Retail Approach Northbound					Chilson Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	15	62	22	0	99	9	145	56	0	210	32	16	4	0	52	25	20	31	0	76	437
05:00 PM	14	87	26	0	127	9	172	67	0	248	42	33	4	0	79	18	16	21	0	55	509
05:15 PM	16	94	22	0	132	6	160	45	0	211	45	23	6	0	74	22	18	28	0	68	485
05:30 PM	17	73	17	0	107	11	153	50	0	214	38	22	8	0	68	29	18	31	0	78	467
Total Volume	62	316	87	0	465	35	630	218	0	883	157	94	22	0	273	94	72	111	0	277	1898
% App. Total	13.3	68	18.7	0		4	71.3	24.7	0		57.5	34.4	8.1	0		33.9	26	40.1	0		
PHF	.912	.840	.837	.000	.881	.795	.916	.813	.000	.890	.872	.712	.688	.000	.864	.810	.900	.895	.000	.888	.932



Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: M-36
N/S: Lake Crest Drive / Club Drive
Weather:

File Name : TMC_18037A_M36 & Lake Crest_9005_Nov 07-08 2018
Site Code : 9005
Start Date : 11/8/2018
Page No : 1

Groups Printed- Cars - H.V.

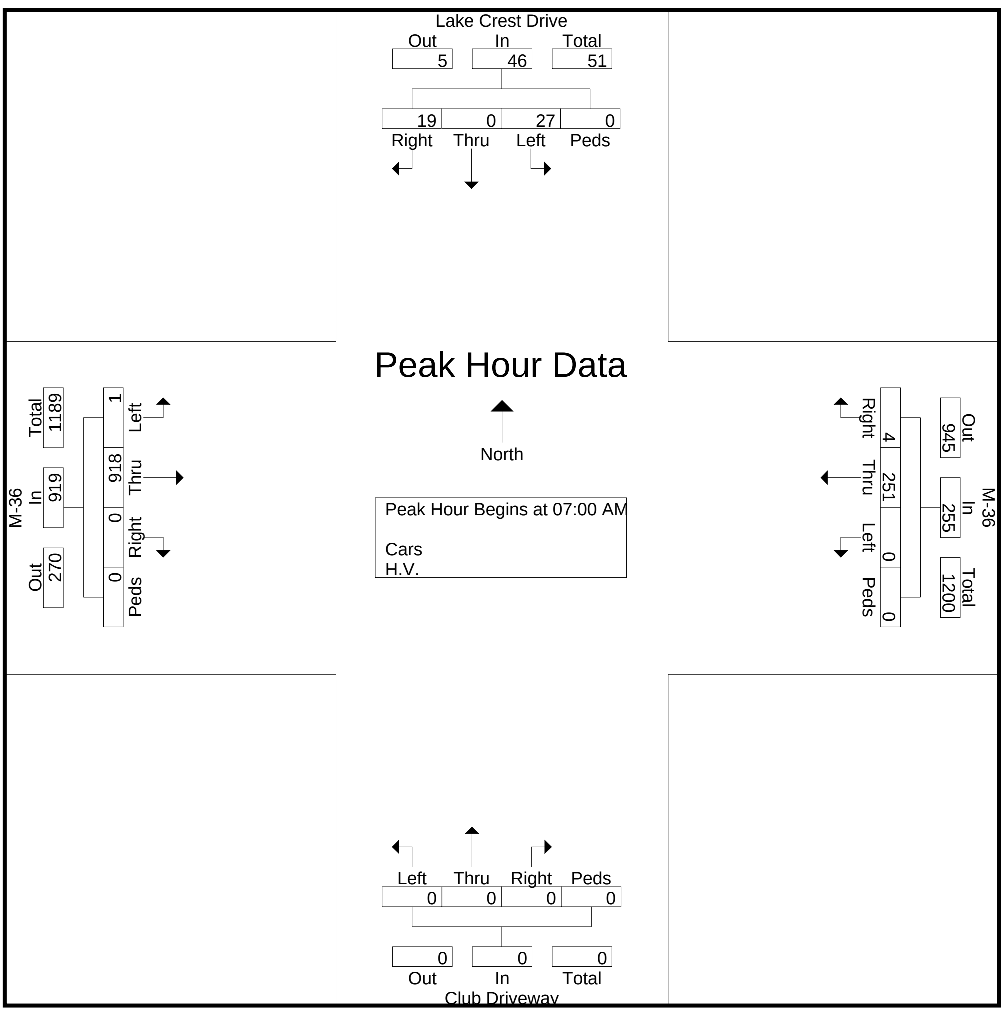
	M-36 Eastbound				M-36 Westbound				Club Driveway Northbound				Lake Crest Drive Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	0	234	0	0	0	62	2	0	0	0	0	0	10	0	9	0	317
07:15 AM	0	256	0	0	0	47	0	0	0	0	0	0	4	0	1	0	308
07:30 AM	0	227	0	0	0	56	1	0	0	0	0	0	5	0	5	0	294
07:45 AM	1	201	0	0	0	86	1	0	0	0	0	0	8	0	4	0	301
Total	1	918	0	0	0	251	4	0	0	0	0	0	27	0	19	0	1220
08:00 AM	0	174	0	0	0	80	1	0	0	0	0	0	7	0	4	0	266
08:15 AM	0	208	0	0	0	72	0	0	0	0	0	0	3	0	0	0	283
08:30 AM	1	161	0	0	0	60	2	0	0	0	0	0	7	0	5	0	236
08:45 AM	1	170	1	0	0	92	3	0	1	0	0	0	2	0	0	0	270
Total	2	713	1	0	0	304	6	0	1	0	0	0	19	0	9	0	1055
*** BREAK ***																	
04:00 PM	2	155	0	0	1	203	7	0	0	0	0	0	1	0	2	0	371
04:15 PM	2	136	3	0	4	200	5	0	0	0	3	0	2	0	2	0	357
04:30 PM	2	93	0	0	1	232	4	0	2	0	1	0	3	0	2	0	340
04:45 PM	3	103	1	0	0	283	2	0	1	0	1	0	2	0	3	0	399
Total	9	487	4	0	6	918	18	0	3	0	5	0	8	0	9	0	1467
05:00 PM	4	133	0	0	1	272	6	0	1	0	0	0	2	0	3	0	422
05:15 PM	6	137	1	0	2	244	5	0	3	0	0	0	1	0	2	0	401
05:30 PM	2	123	0	0	1	259	10	0	0	0	1	0	2	0	4	0	402
05:45 PM	2	105	2	0	0	245	5	0	0	0	0	0	2	0	2	0	363
Total	14	498	3	0	4	1020	26	0	4	0	1	0	7	0	11	0	1588
Grand Total	26	2616	8	0	10	2493	54	0	8	0	6	0	61	0	48	0	5330
Apprch %	1	98.7	0.3	0	0.4	97.5	2.1	0	57.1	0	42.9	0	56	0	44	0	
Total %	0.5	49.1	0.2	0	0.2	46.8	1	0	0.2	0	0.1	0	1.1	0	0.9	0	
Cars	26	2560	8	0	10	2440	50	0	8	0	6	0	61	0	44	0	5213
% Cars	100	97.9	100	0	100	97.9	92.6	0	100	0	100	0	100	0	91.7	0	97.8
H.V.	0	56	0	0	0	53	4	0	0	0	0	0	0	0	4	0	117
% H.V.	0	2.1	0	0	0	2.1	7.4	0	0	0	0	0	0	0	8.3	0	2.2

Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection	File Name : TMC_18037A_M36 & Lake Crest_9005_Nov 07-08 2018
E/W: M-36	Site Code : 9005
N/S: Lake Crest Drive / Club Drive	Start Date : 11/8/2018
Weather:	Page No : 2

	M-36 Eastbound					M-36 Westbound					Club Driveway Northbound					Lake Crest Drive Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	234	0	0	234	0	62	2	0	64	0	0	0	0	0	10	0	9	0	19	317
07:15 AM	0	256	0	0	256	0	47	0	0	47	0	0	0	0	0	4	0	1	0	5	308
07:30 AM	0	227	0	0	227	0	56	1	0	57	0	0	0	0	0	5	0	5	0	10	294
07:45 AM	1	201	0	0	202	0	86	1	0	87	0	0	0	0	0	8	0	4	0	12	301
Total Volume	1	918	0	0	919	0	251	4	0	255	0	0	0	0	0	27	0	19	0	46	1220
% App. Total	0.1	99.9	0	0		0	98.4	1.6	0		0	0	0	0		58.7	0	41.3	0		
PHF	.250	.896	.000	.000	.897	.000	.730	.500	.000	.733	.000	.000	.000	.000	.000	.675	.000	.528	.000	.605	.962



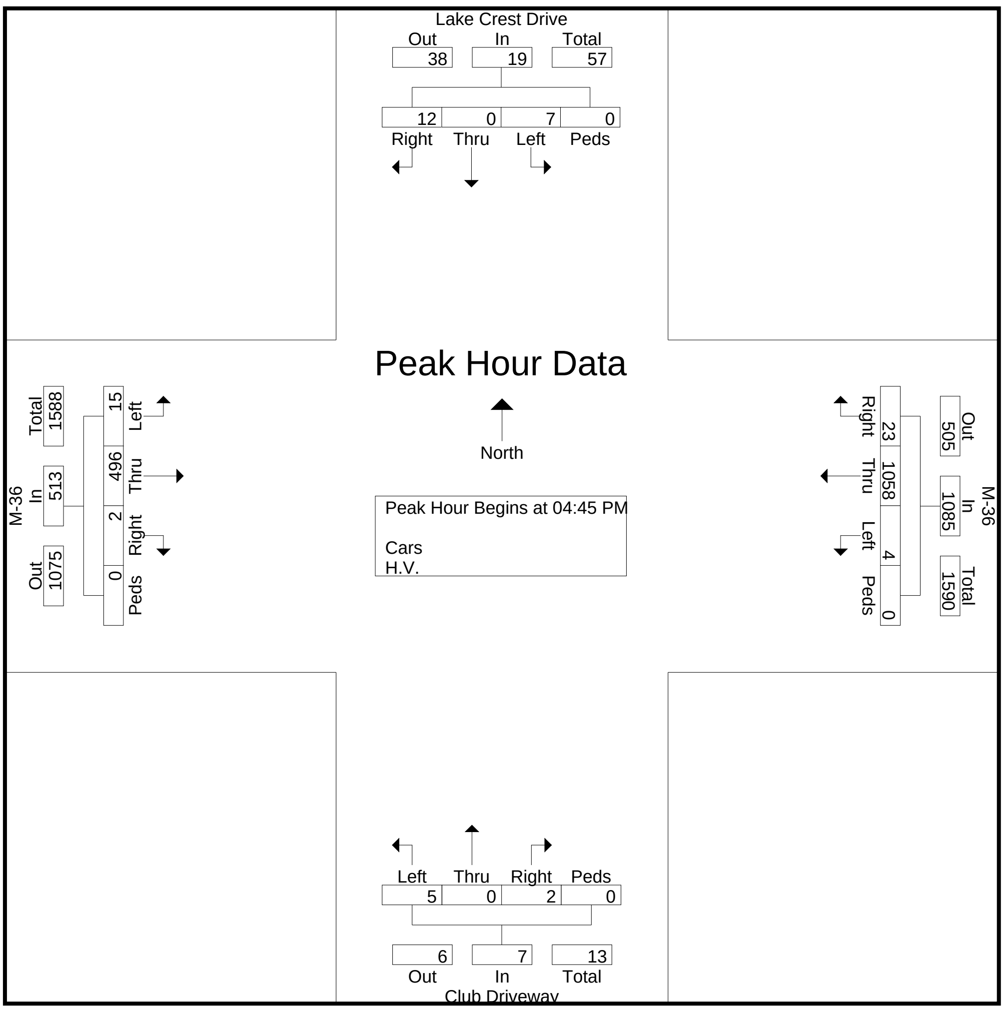
Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: M-36
N/S: Lake Crest Drive / Club Drive
Weather:

File Name : TMC_18037A_M36 & Lake Crest_9005_Nov 07-08 2018
Site Code : 9005
Start Date : 11/8/2018

	M-36 Eastbound					M-36 Westbound					Club Driveway Northbound					Lake Crest Drive Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	3	103	1	0	107	0	283	2	0	285	1	0	1	0	2	2	0	3	0	5	399
05:00 PM	4	133	0	0	137	1	272	6	0	279	1	0	0	0	1	2	0	3	0	5	422
05:15 PM	6	137	1	0	144	2	244	5	0	251	3	0	0	0	3	1	0	2	0	3	401
05:30 PM	2	123	0	0	125	1	259	10	0	270	0	0	1	0	1	2	0	4	0	6	402
Total Volume	15	496	2	0	513	4	1058	23	0	1085	5	0	2	0	7	7	0	12	0	19	1624
% App. Total																					
PHF	.625	.905	.500	.000	.891	.500	.935	.575	.000	.952	.417	.000	.500	.000	.583	.875	.000	.750	.000	.792	.962



Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: M-36
N/S: Merrill Road
Weather:

File Name : TMC_18037A_M36 & Merrill_1002_Nov 01 2018
Site Code : 1002
Start Date : 11/1/2018
Page No : 1

Groups Printed- Cars - H.V.

	M-36 Eastbound				M-36 Westbound				Merrill Road Northbound				None Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	0	169	75	0	6	37	0	0	27	0	5	0	0	0	0	0	319
07:15 AM	0	177	83	0	15	30	0	0	17	0	10	0	0	0	0	0	332
07:30 AM	0	153	79	0	13	34	0	0	23	0	17	0	0	0	0	0	319
07:45 AM	0	150	59	0	16	55	0	0	32	0	17	0	0	0	0	0	329
Total	0	649	296	0	50	156	0	0	99	0	49	0	0	0	0	0	1299
08:00 AM	0	123	58	0	10	44	0	0	37	0	16	0	0	0	0	0	288
08:15 AM	0	146	65	0	9	45	0	0	27	0	14	0	0	0	0	0	306
08:30 AM	0	118	50	0	13	38	0	0	24	0	16	0	0	0	0	0	259
08:45 AM	0	118	54	0	10	63	0	0	32	0	9	0	0	0	0	0	286
Total	0	505	227	0	42	190	0	0	120	0	55	0	0	0	0	0	1139
*** BREAK ***																	
04:00 PM	0	110	46	0	26	143	0	0	68	0	21	0	0	0	0	0	414
04:15 PM	0	103	38	0	19	140	0	0	69	0	24	0	0	0	0	0	393
04:30 PM	0	70	27	0	19	150	0	0	87	0	37	0	0	0	0	0	390
04:45 PM	0	74	32	0	20	173	0	0	112	0	32	0	0	0	0	0	443
Total	0	357	143	0	84	606	0	0	336	0	114	0	0	0	0	0	1640
05:00 PM	0	81	54	0	14	163	0	0	116	0	44	0	0	0	0	0	472
05:15 PM	0	82	56	0	21	171	0	0	80	0	24	0	0	0	0	0	434
05:30 PM	0	86	40	0	13	175	0	0	95	0	29	0	0	0	0	0	438
05:45 PM	0	69	38	0	15	147	0	0	103	0	33	0	0	0	0	0	405
Total	0	318	188	0	63	656	0	0	394	0	130	0	0	0	0	0	1749
Grand Total	0	1829	854	0	239	1608	0	0	949	0	348	0	0	0	0	0	5827
Apprch %	0	68.2	31.8	0	12.9	87.1	0	0	73.2	0	26.8	0	0	0	0	0	
Total %	0	31.4	14.7	0	4.1	27.6	0	0	16.3	0	6	0	0	0	0	0	
Cars	0	1788	839	0	237	1567	0	0	933	0	347	0	0	0	0	0	5711
% Cars	0	97.8	98.2	0	99.2	97.5	0	0	98.3	0	99.7	0	0	0	0	0	98
H.V.	0	41	15	0	2	41	0	0	16	0	1	0	0	0	0	0	116
% H.V.	0	2.2	1.8	0	0.8	2.5	0	0	1.7	0	0.3	0	0	0	0	0	2

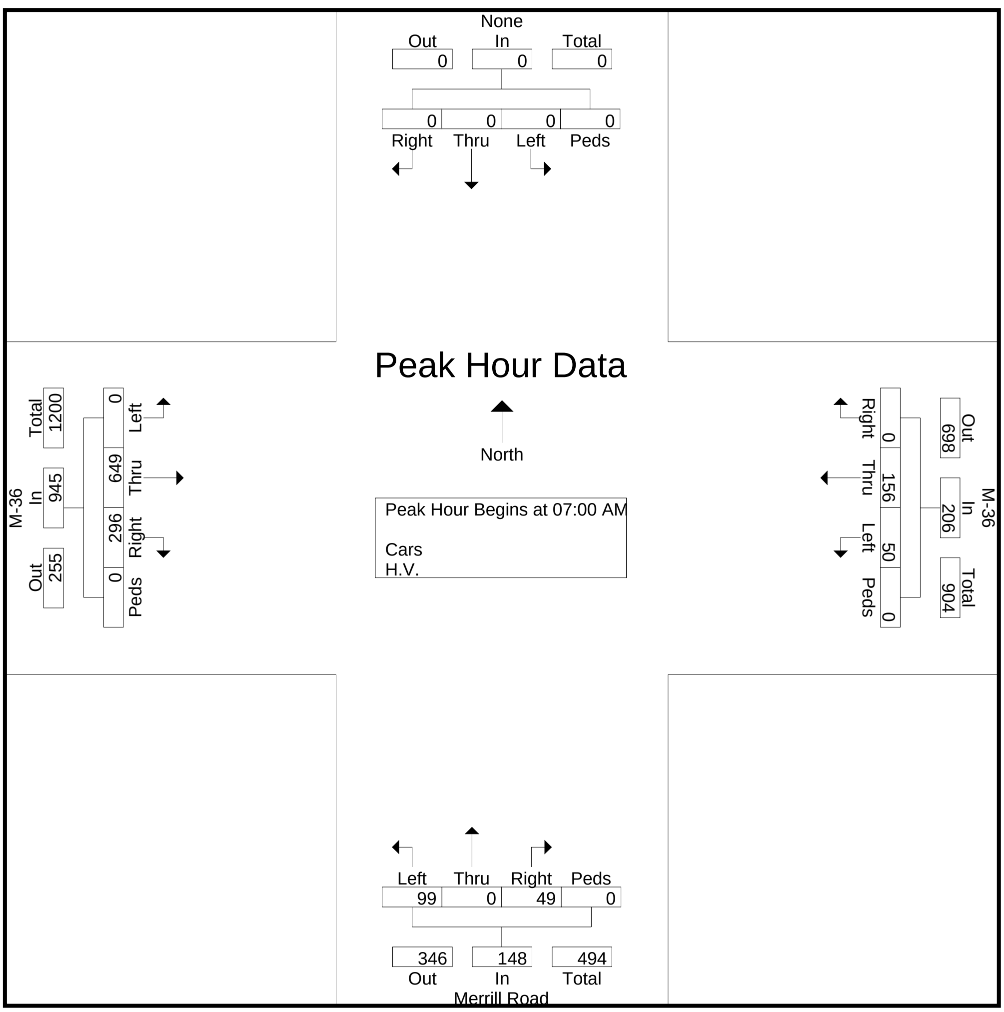
Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: M-36
N/S: Merrill Road
Weather:

File Name : TMC_18037A_M36 & Merrill_1002_Nov 01 2018
Site Code : 1002
Start Date : 11/1/2018
Page No : 2

	M-36 Eastbound					M-36 Westbound					Merrill Road Northbound					None Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	169	75	0	244	6	37	0	0	43	27	0	5	0	32	0	0	0	0	0	319
07:15 AM	0	177	83	0	260	15	30	0	0	45	17	0	10	0	27	0	0	0	0	0	332
07:30 AM	0	153	79	0	232	13	34	0	0	47	23	0	17	0	40	0	0	0	0	0	319
07:45 AM	0	150	59	0	209	16	55	0	0	71	32	0	17	0	49	0	0	0	0	0	329
Total Volume	0	649	296	0	945	50	156	0	0	206	99	0	49	0	148	0	0	0	0	0	1299
% App. Total	0	68.7	31.3	0		24.3	75.7	0	0		66.9	0	33.1	0		0	0	0	0		
PHF	.000	.917	.892	.000	.909	.781	.709	.000	.000	.725	.773	.000	.721	.000	.755	.000	.000	.000	.000	.000	.978

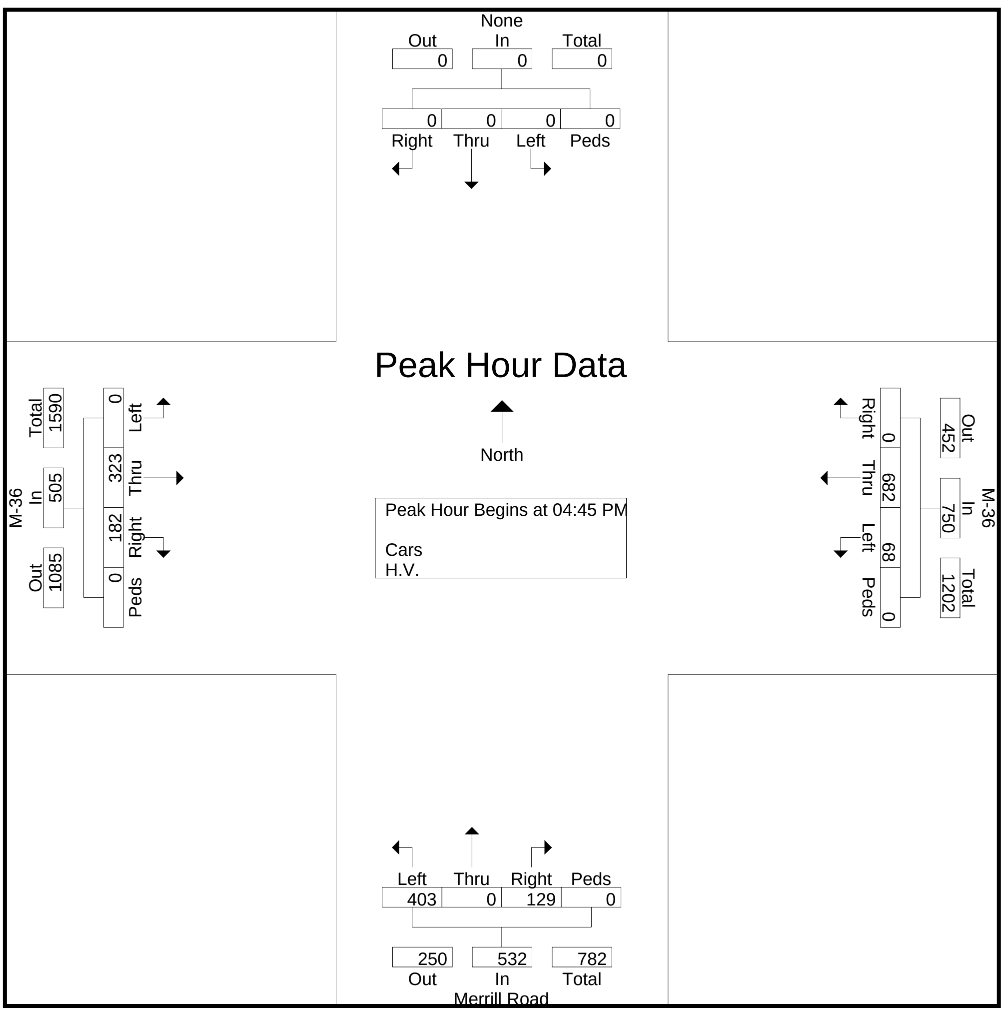


Midwestern Consulting
3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: M-36
N/S: Merrill Road
Weather:

File Name : TMC_18037A_M36 & Merrill_1002_Nov 01 2018
Site Code : 1002
Start Date : 11/1/2018

	M-36 Eastbound					M-36 Westbound					Merrill Road Northbound					None Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	74	32	0	106	20	173	0	0	193	112	0	32	0	144	0	0	0	0	0	443
05:00 PM	0	81	54	0	135	14	163	0	0	177	116	0	44	0	160	0	0	0	0	0	472
05:15 PM	0	82	56	0	138	21	171	0	0	192	80	0	24	0	104	0	0	0	0	0	434
05:30 PM	0	86	40	0	126	13	175	0	0	188	95	0	29	0	124	0	0	0	0	0	438
Total Volume	0	323	182	0	505	68	682	0	0	750	403	0	129	0	532	0	0	0	0	0	1787
% App. Total	0	64	36	0		9.1	90.9	0	0		75.8	0	24.2	0		0	0	0	0		
PHF	.000	.939	.813	.000	.915	.810	.974	.000	.000	.972	.869	.000	.733	.000	.831	.000	.000	.000	.000	.000	.947



Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: M-36
N/S: Hamburg Road
Weather:

File Name : tmc_18037a_m36 & hamburg_1003_nov 01 2018
Site Code : 1003
Start Date : 11/1/2018

Groups Printed- Cars - H.V.

	M-36 Eastbound				M-36 Westbound				Retail Driveway Northbound				Hamburg Road Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	73	95	1	0	0	25	12	0	1	1	1	0	45	1	15	0	270
07:15 AM	78	115	1	0	0	22	8	0	0	0	1	0	48	0	28	0	301
07:30 AM	64	108	4	0	1	15	10	0	1	0	1	0	41	0	28	0	273
07:45 AM	63	99	3	0	0	41	14	0	0	1	2	0	46	1	45	0	315
Total	278	417	9	0	1	103	44	0	2	2	5	0	180	2	116	0	1159
08:00 AM	63	75	1	0	0	28	13	0	1	0	0	0	37	2	30	0	250
08:15 AM	72	79	1	0	0	27	8	0	0	0	1	0	33	1	23	0	245
08:30 AM	74	66	3	0	0	23	12	0	1	3	0	0	19	3	26	0	230
08:45 AM	63	50	5	0	0	35	14	0	1	4	1	0	20	3	30	0	226
Total	272	270	10	0	0	113	47	0	3	7	2	0	109	9	109	0	951
*** BREAK ***																	
04:00 PM	51	43	11	0	4	77	49	0	2	5	0	0	12	6	83	0	343
04:15 PM	61	58	13	0	3	78	44	0	8	4	1	0	18	7	66	0	361
04:30 PM	50	46	15	0	1	106	49	0	8	8	2	0	14	4	69	0	372
04:45 PM	59	39	7	0	0	89	61	0	9	8	1	0	24	11	79	0	387
Total	221	186	46	0	8	350	203	0	27	25	4	0	68	28	297	0	1463
05:00 PM	75	45	8	0	1	104	79	0	8	7	1	0	19	5	75	0	427
05:15 PM	57	47	5	0	0	97	46	0	8	2	6	0	23	8	70	0	369
05:30 PM	66	43	10	0	1	105	50	0	6	5	3	0	17	6	79	0	391
05:45 PM	62	37	5	0	0	79	46	0	10	4	1	0	24	2	65	0	335
Total	260	172	28	0	2	385	221	0	32	18	11	0	83	21	289	0	1522
Grand Total	1031	1045	93	0	11	951	515	0	64	52	22	0	440	60	811	0	5095
Apprch %	47.5	48.2	4.3	0	0.7	64.4	34.9	0	46.4	37.7	15.9	0	33.6	4.6	61.9	0	
Total %	20.2	20.5	1.8	0	0.2	18.7	10.1	0	1.3	1	0.4	0	8.6	1.2	15.9	0	
Cars	1018	1022	91	0	10	922	509	0	63	51	21	0	436	58	794	0	4995
% Cars	98.7	97.8	97.8	0	90.9	97	98.8	0	98.4	98.1	95.5	0	99.1	96.7	97.9	0	98
H.V.	13	23	2	0	1	29	6	0	1	1	1	0	4	2	17	0	100
% H.V.	1.3	2.2	2.2	0	9.1	3	1.2	0	1.6	1.9	4.5	0	0.9	3.3	2.1	0	2

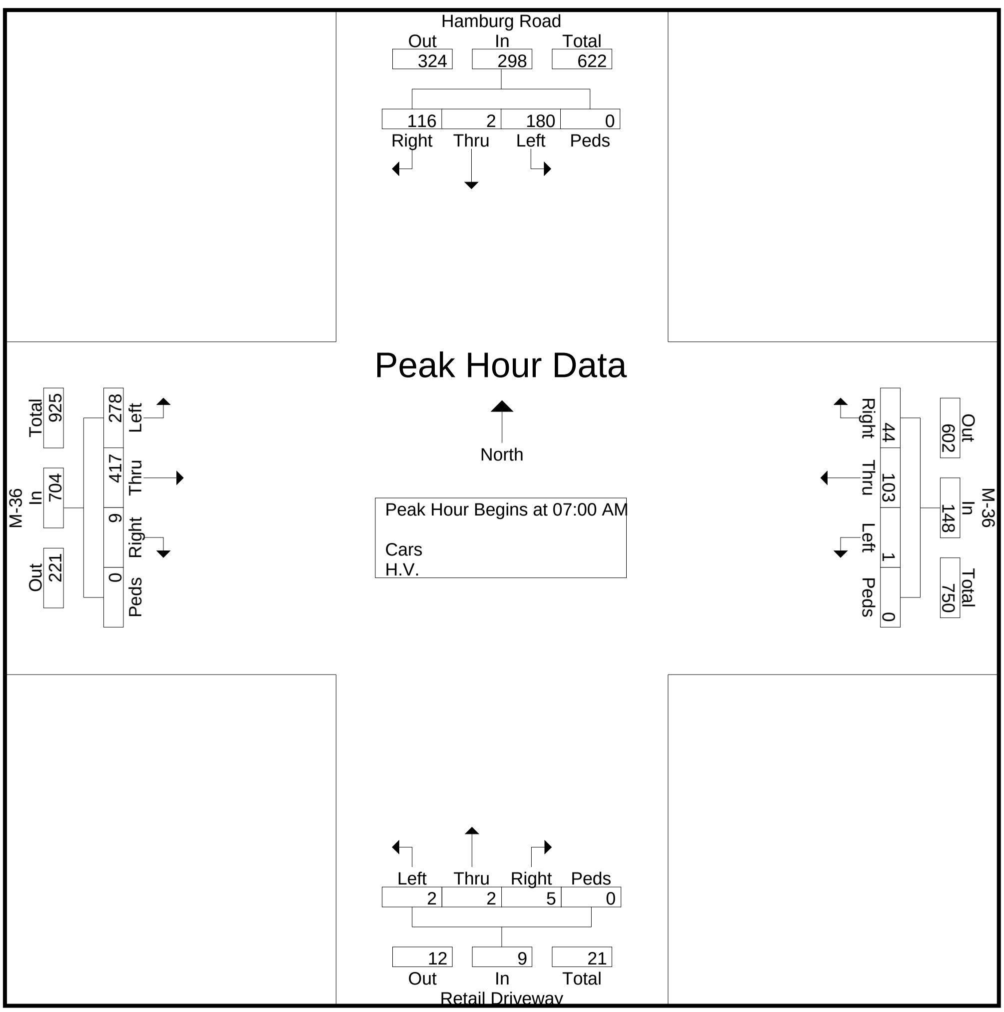
Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: M-36
N/S: Hamburg Road
Weather:

File Name : tmc_18037a_m36 & hamburg_1003_nov 01 2018
Site Code : 1003
Start Date : 11/1/2018
Page No : 2

	M-36 Eastbound					M-36 Westbound					Retail Driveway Northbound					Hamburg Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	73	95	1	0	169	0	25	12	0	37	1	1	1	0	3	45	1	15	0	61	270
07:15 AM	78	115	1	0	194	0	22	8	0	30	0	0	1	0	1	48	0	28	0	76	301
07:30 AM	64	108	4	0	176	1	15	10	0	26	1	0	1	0	2	41	0	28	0	69	273
07:45 AM	63	99	3	0	165	0	41	14	0	55	0	1	2	0	3	46	1	45	0	92	315
Total Volume	278	417	9	0	704	1	103	44	0	148	2	2	5	0	9	180	2	116	0	298	1159
% App. Total	39.5	59.2	1.3	0		0.7	69.6	29.7	0		22.2	22.2	55.6	0		60.4	0.7	38.9	0		
PHF	.891	.907	.563	.000	.907	.250	.628	.786	.000	.673	.500	.500	.625	.000	.750	.938	.500	.644	.000	.810	.920

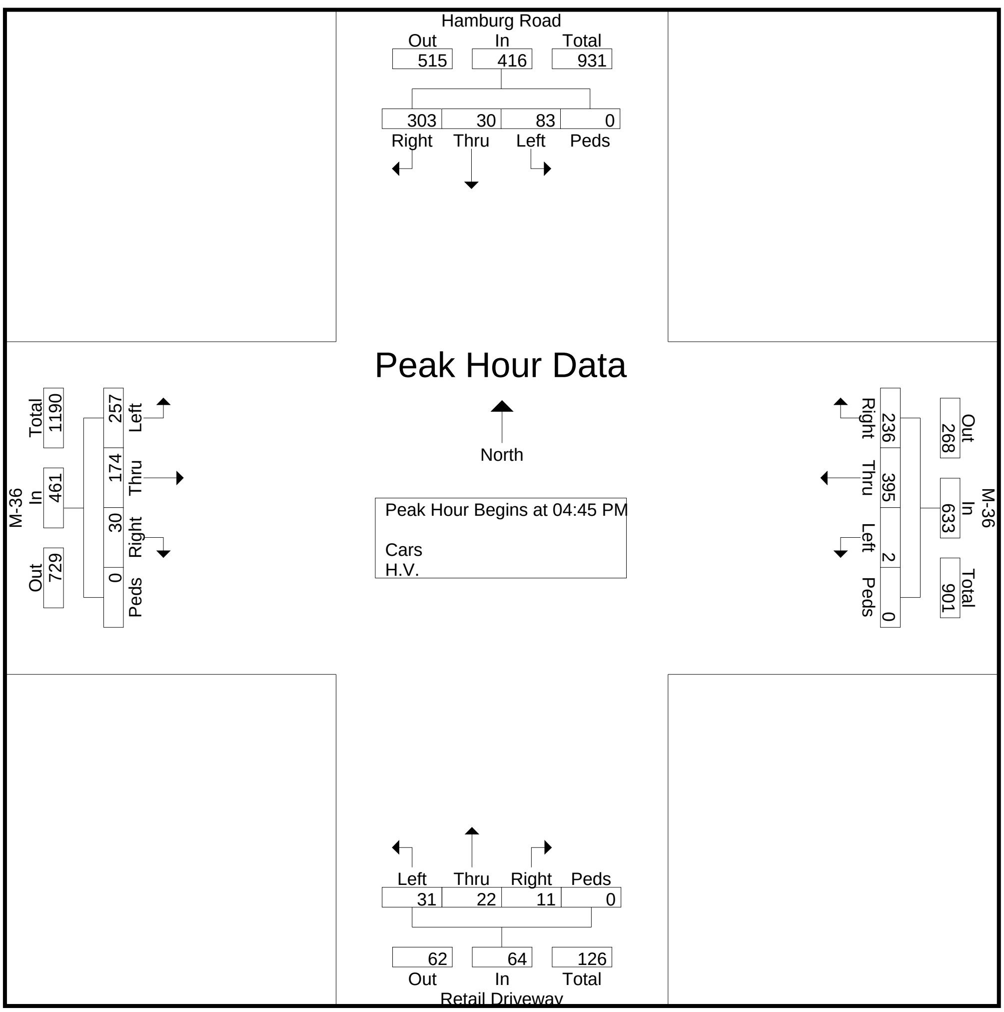


Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection	File Name : tmc_18037a_m36 & hamburg_1003_nov 01 2018
E/W: M-36	Site Code : 1003
N/S: Hamburg Road	Start Date : 11/1/2018
Weather:	Page No : 3

	M-36 Eastbound					M-36 Westbound					Retail Driveway Northbound					Hamburg Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	59	39	7	0	105	0	89	61	0	150	9	8	1	0	18	24	11	79	0	114	387
05:00 PM	75	45	8	0	128	1	104	79	0	184	8	7	1	0	16	19	5	75	0	99	427
05:15 PM	57	47	5	0	109	0	97	46	0	143	8	2	6	0	16	23	8	70	0	101	369
05:30 PM	66	43	10	0	119	1	105	50	0	156	6	5	3	0	14	17	6	79	0	102	391
Total Volume	257	174	30	0	461	2	395	236	0	633	31	22	11	0	64	83	30	303	0	416	1574
% App. Total	55.7	37.7	6.5	0		0.3	62.4	37.3	0		48.4	34.4	17.2	0		20	7.2	72.8	0		
PHF	.857	.926	.750	.000	.900	.500	.940	.747	.000	.860	.861	.688	.458	.000	.889	.865	.682	.959	.000	.912	.922



SEMCOG | Southeast Michigan Council of Governments

Community Profiles

YOU ARE VIEWING DATA FOR:

Hamburg Township

10405 Merrill Rd
Hamburg, MI 48139-0157
http://www.hamburg.mi.us/

SEMCOG MEMBER

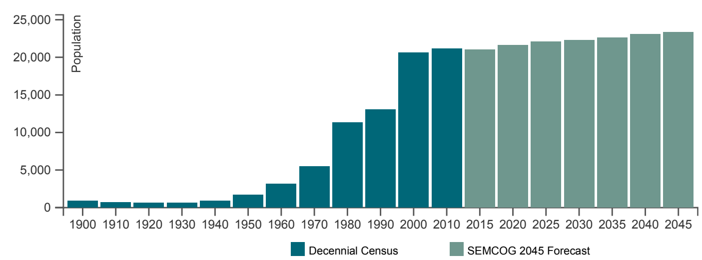
Census 2010 Population: 21,165
Area: 36 square miles

Population and Households

Link to American Community Survey (ACS) Profiles: **Select a Year** 2012-2016 **Social** | **Demographic**

Population and Household Estimates for Southeast Michigan, 2017

Population Forecast



Population and Households

Population and Households	Census 2010	Change 2000-2010	Pct Change 2000-2010	SEMCOG Jul 2017	SEMCOG 2045
Total Population	21,165	538	2.6%	21,213	23,325
Group Quarters Population	14	-233	-94.3%	14	175
Household Population	21,151	771	3.8%	21,199	23,150
Housing Units	8,668	990	12.9%	8,847	-
Households (Occupied Units)	7,860	774	10.9%	8,427	9,491
Residential Vacancy Rate	9.3%	1.6%	-	4.7%	-
Average Household Size	2.69	-0.19	-	2.52	2.44

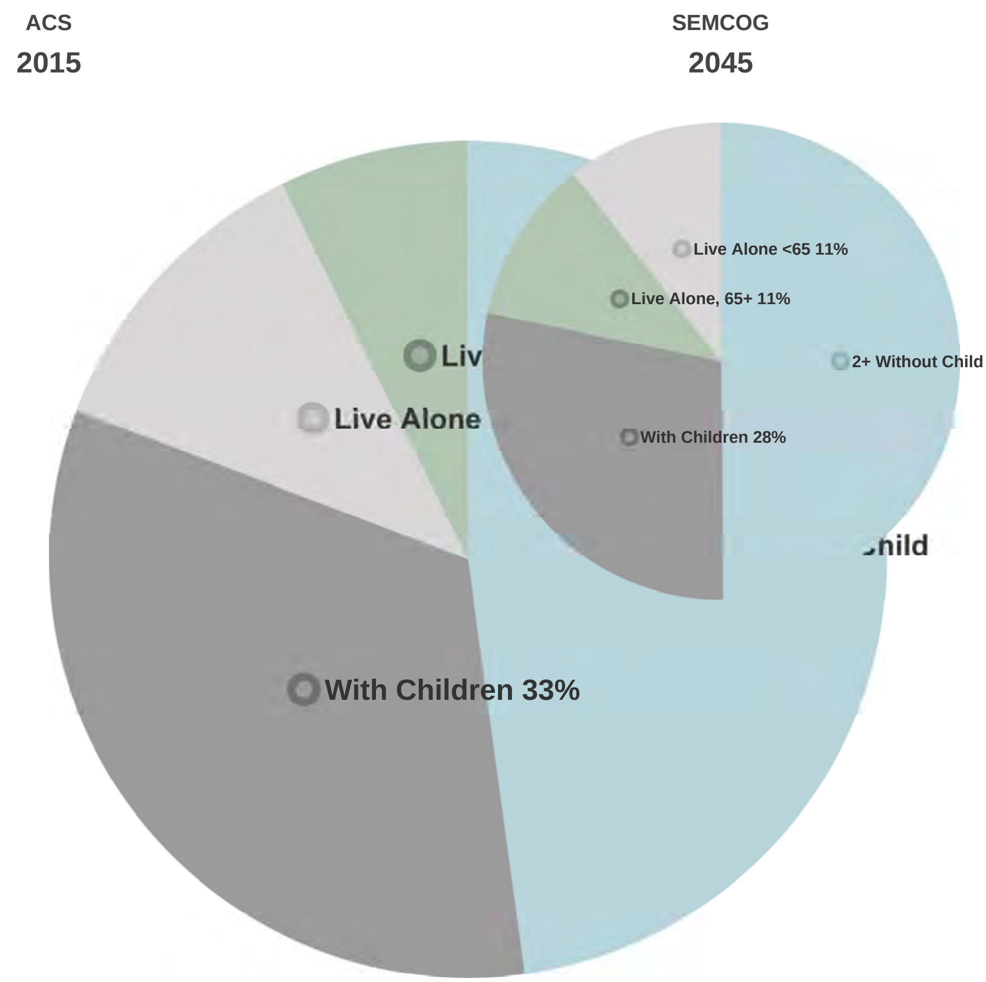
Source: **U.S. Census Bureau**, **SEMCOG Population and Household Estimates**, and **SEMCOG 2045 Regional Development Forecast**

Components of Population Change

Components of Population Change	2000-2005 Avg.	2006-2010 Avg.	2011-2015 Avg.
Natural Increase (Births - Deaths)	140	24	35
Births	241	124	161
Deaths	101	100	126
Net Migration (Movement In - Movement Out)	210	-266	-57
Population Change (Natural Increase + Net Migration)	350	-242	-22

Source: **Michigan Department of Community Health Vital Statistics**, **U.S. Census Bureau**, and SEMCOG

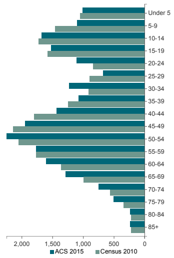
Household Types



Household Types	Census 2010	ACS 2015	Change 2010-2015	Pct Change 2010-2015	SEMCOG 2045
With Seniors 65+	1,629	2,107	478	29.3%	4,137
Without Seniors	6,231	6,077	-154	-2.5%	5,354
Live Alone, 65+	426	597	171	40.1%	1,056
Live Alone, <65	926	976	50	5.4%	1,008
2+ Persons, With children	2,833	2,697	-136	-4.8%	2,688
2+ Persons, Without children	3,675	3,914	239	6.5%	4,739
Total Households	**7,860**	**8,184**	**324**	**4.1%**	9,491

Source: **U.S. Census Bureau**, **Decennial Census**, **2015 American Community Survey 5-Year Estimates**, and **SEMCOG 2045 Regional Development Forecast**

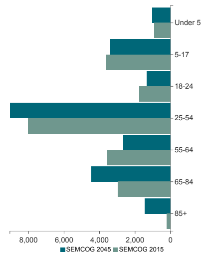
Population Change by Age, 2010-2015



Age Group	Census 2010	Change 2000-2010	ACS 2015	Change 2010-2015
Under 5	1,052	-542	1,008	-44
5-9	1,456	-331	1,097	-359
10-14	1,726	-63	1,680	-46
15-19	1,579	206	1,522	-57
20-24	838	138	1,112	274
25-29	895	-110	675	-220
30-34	914	-810	1,226	312
35-39	1,244	-949	1,076	-168
40-44	1,797	-306	1,437	-360
45-49	2,142	317	1,945	-197
50-54	2,054	547	2,247	193
55-59	1,769	706	1,767	-2
60-64	1,364	702	1,607	243
65-69	994	555	1,290	296
70-74	564	200	748	184
75-79	340	96	507	167
80-84	220	62	232	12
85+	217	120	233	16
Total	21,165	538	21,409	244
Median Age	42.6	6.8	44.7	2.1

Source: **U.S. Census Bureau**, **Decennial Census**, and **2015 American Community Survey 5-Year Estimates**

Forecasted Population Change 2015-2045



Age Group	2015	2020	2025	2030	2035	2040	2045	Change 2015 - 2045	Pct Change 2015 - 2045
Under 5	927	1,073	1,276	1,288	1,164	1,015	1,013	86	9.3%
5-17	3,608	3,008	2,744	2,957	3,361	3,483	3,388	-220	-6.1%
18-24	1,746	1,652	1,354	1,037	881	1,062	1,324	-422	-24.2%
25-54	8,035	8,119	8,243	8,484	8,788	8,972	9,054	1,019	12.7%
55-64	3,553	3,803	3,549	3,105	2,649	2,566	2,654	-899	-25.3%
65-84	2,961	3,635	4,479	4,860	4,974	4,822	4,452	1,491	50.4%
85+	223	336	453	599	828	1,152	1,440	1,217	545.7%
Total	21,053	21,626	22,098	22,330	22,645	23,072	23,325	2,272	10.8%

Source: **SEMCOG 2045 Regional Development Forecast**

Older Adults and Youth Populations

Older Adults and Youth Population	Census 2010	ACS 2015	Change 2010-2015	Pct Change 2010-2015	SEMCOG 2045
60 and over	3,699	4,617	918	24.8%	7,159
65 and over	2,335	3,010	675	28.9%	5,892
65 to 84	2,118	2,777	659	31.1%	4,452
85 and Over	217	233	16	7.4%	1,440
Under 18	5,349	4,786	-563	-10.5%	4,401
5 to 17	4,297	3,778	-519	-12.1%	3,388
Under 5	1,052	1,008	-44	-4.2%	1,013

Note: Population by age changes over time because of the aging of people into older age groups, the movement of people, and the occurrence of births and deaths.

Source: **U.S. Census Bureau**, **Decennial Census**, **2015 American Community Survey 5-Year Estimates**, and **SEMCOG 2045 Regional Development Forecast**

Race and Hispanic Origin

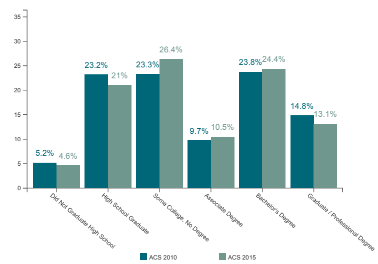
Race and Hispanic Origin	Census 2010	Percent of Population 2010	ACS 2015	Percent of Population 2015	Percentage Point Change 2010-2015
Non-Hispanic	20,886	98.7%	21,045	98.3%	-0.4%
White	20,367	96.2%	20,537	95.9%	-0.3%
Black	66	0.3%	29	0.1%	-0.2%
Asian	122	0.6%	58	0.3%	-0.3%
Multi-Racial	242	1.1%	413	1.9%	0.8%
Other	89	0.4%	8	0%	-0.4%
Hispanic	279	1.3%	364	1.7%	0.4%
Total	21,165	100%	21,409	100%	0%

Source: **U.S. Census Bureau**, **Decennial Census**, and **2015 American Community Survey 5-Year Estimates**

Highest Level of Education

Highest Level of Education*	ACS 2010	ACS 2015	Percentage Point Chg 2010-2015
Did Not Graduate High School	5.2%	4.6%	-0.5%
High School Graduate	23.2%	21%	-2.2%
Some College, No Degree	23.3%	26.4%	3.1%
Associate Degree	9.7%	10.5%	0.8%
Bachelor's Degree	23.8%	24.4%	0.6%
Graduate / Professional Degree	14.8%	13.1%	-1.7%

* Population age 25 and over

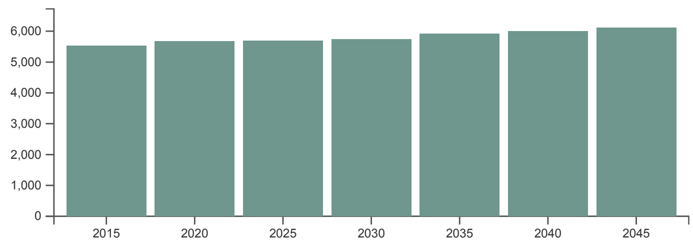


Source: **U.S. Census Bureau**, **2010 and 2015 American Community Survey 5-Year Estimates**

Economy & Jobs

Link to American Community Survey (ACS) Profiles: **Select a Year** 2012-2016 **Economic**

Forecasted Jobs



Source: **SEMCOG 2045 Regional Development Forecast**

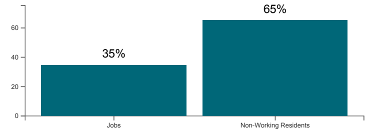
Forecasted Jobs by Industry Sector

Forecasted Jobs By Industry Sector	2015	2020	2025	2030	2035	2040	2045	Change 2015-2045	Pct Change 2015-2045
Natural Resources, Mining, & Construction	508	606	598	595	627	633	652	144	28.3%
Manufacturing	406	391	345	323	310	295	289	-117	-28.8%
Wholesale Trade	95	90	92	94	89	91	97	2	2.1%
Retail Trade	421	427	425	404	399	383	382	-39	-9.3%
Transportation, Warehousing, & Utilities	110	118	115	113	115	119	125	15	13.6%
Information & Financial Activities	1,074	1,069	1,055	1,047	1,062	1,086	1,093	19	1.8%
Professional and Technical Services & Corporate HQ	518	550	570	608	651	677	700	182	35.1%
Administrative, Support, & Waste Services	490	565	603	647	722	721	741	251	51.2%
Education Services	300	293	302	304	308	317	322	22	7.3%
Healthcare Services	245	226	236	256	268	300	327	82	33.5%
Leisure & Hospitality	681	679	684	688	690	700	708	27	4%
Other Services	481	452	447	445	444	453	448	-33	-6.9%
Public Administration	198	212	219	224	227	228	229	31	15.7%
Total Employment Numbers	5,527	5,678	5,691	5,748	5,912	6,003	6,113	586	10.6%

Source: **SEMCOG 2045 Regional Development Forecast**

Daytime Population

Daytime Population	SEMCOG and ACS 2015
Jobs	5,527
Non-Working Residents	10,398
Age 15 and under	4,041
Not in labor force	5,642
Unemployed	715
Daytime Population	15,925



Source: **SEMCOG 2045 Regional Development Forecast** and **2015 American Community Survey 5-Year Estimates**

Note: The number of residents attending school outside Southeast Michigan is not available. Likewise, the number of students commuting into Southeast Michigan to attend school is also not known.

Where Workers Commute From 2013

Rank	Where Workers Commute From *	Workers	Percent
1	**Hamburg Twp**	1,240	58.4%
2	**Green Oak Twp**	88	4.1%
3	**Pinckney or Putnum Township**	84	4%
4	**Genoa Twp**	77	3.6%
5	**Brighton**	51	2.4%
6	**Marion Twp**	43	2%
7	**Grand Blanc Charter Township, Genesee County**	41	1.9%
8	**Lake Orion or Orion Township**	32	1.5%
9	**Owosso City, Shiawassee County**	32	1.5%
10	**Dearborn**	30	1.4%
-	**Elsewhere**	405	19.1%
* Workers, age 16 and over employed in Hamburg township		**2,123**	**100%**

Source: **U.S. Census Bureau** - 2009-2013 CTTP/ACS Commuting Data and **Commuting Patterns in Southeast Michigan**

Where Residents Work 2013

Rank	Where Residents Work *	Workers	Percent
1	**Ann Arbor**	1,712	16.7%
2	**Hamburg Twp**	1,240	12.1%
3	**Brighton**	573	5.6%
4	**Pinckney**	461	4.5%
5	**Green Oak Twp**	399	3.9%
6	**Genoa Twp**	375	3.7%
7	**Pittsfield Twp**	314	3.1%
8	**Novi**	264	2.6%
9	**Livonia**	244	2.4%
10	**Brighton Twp**	242	2.4%
-	**Elsewhere**	4,401	43%
* Workers, age 16 and over residing in Hamburg township		**10,225**	**100%**

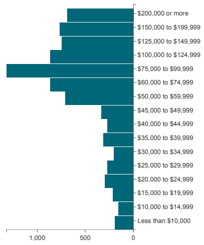
Source: **U.S. Census Bureau** - 2009-2013 CTTP/ACS Commuting Data and **Commuting Patterns in Southeast Michigan**

Household Income

Income (in 2015 dollars)	ACS 2010	ACS 2015	Change 2010-2015	Percent Change 2010-2015
Median Household Income	$92,009	$78,085	$-13,924	-15.1%
Per Capita Income	$37,963	$38,067	$104	0.3%

Source: **U.S. Census Bureau**, **2010 and 2015 American Community Survey 5-Year Estimates**

Annual Household Income



Annual Household Income	ACS 2015
$200,000 or more	689
$150,000 to $199,999	764
$125,000 to $149,999	743
$100,000 to $124,999	864
$75,000 to $99,999	1,318
$60,000 to $74,999	862
$50,000 to $59,999	706
$45,000 to $49,999	332
$40,000 to $44,999	268
$35,000 to $39,999	311
$30,000 to $34,999	202
$25,000 to $29,999	270
$20,000 to $24,999	294
$15,000 to $19,999	213
$10,000 to $14,999	155
Less than $10,000	193
Total	**8,184**

Source: **U.S. Census Bureau**, **2015 American Community Survey 5-Year Estimates**

Poverty

Poverty	ACS 2010	% of Total (2010)	ACS 2015	% of Total (2015)	% Point Chg 2010-2015
Persons in Poverty	758	3.5%	872	4.1%	0.6%
Households in Poverty	228	2.9%	335	4.1%	1.2%

Source: **U.S. Census Bureau**, **2010 and 2015 American Community Survey 5-Year Estimates**

Housing

Link to American Community Survey (ACS) Profiles: **Select a Year** 2012-2016 **Housing**

Building Permits 2000 - 2018

Year	Single Family	Two Family	Attach Condo	Multi Family	Total Units	Total Demos	Net Total
2000	214	0	0	0	214	5	209
2001	124	0	0	0	124	11	113
2002	101	0	0	0	101	4	97
2003	113	4	0	0	117	7	110
2004	187	6	0	0	193	9	184
2005	135	8	0	0	143	11	132
2006	53	10	2	0	65	5	60
2007	22	0	0	0	22	6	16
2008	12	0	0	0	12	5	7
2009	9	0	0	0	9	7	2
2010	11	0	0	0	11	3	8
2011	17	0	0	0	17	0	17
2012	23	0	0	0	23	0	23
2013	51	0	0	0	51	2	49
2014	54	0	0	0	54	3	51
2015	39	0	0	0	39	9	30
2016	50	0	0	0	50	4	46
2017	39	0	0	0	39	10	29
2018	26	0	0	0	26	1	25
2000 to 2018 totals	1,280	28	2	0	1,310	102	1,208

Source: **SEMCOG Development**

Note: Permit data for most recent years may be incomplete and is updated monthly.

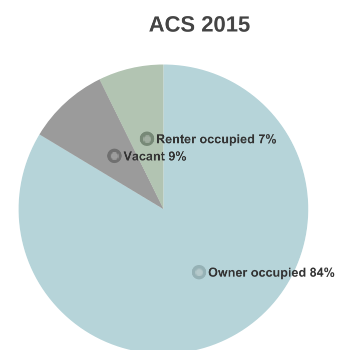
Housing Types

Housing Type	ACS 2010	ACS 2015	Change 2010-2015	New Units Permitted 2015-2018
Single Family Detached	8,083	8,274	191	154
Duplex	81	176	95	0
Townhouse / Attached Condo	67	51	-16	0
Multi-Unit Apartment	19	84	65	0
Mobile Home / Manufactured Housing	367	417	50	0
Other	0	0	0	
Total	8,617	9,002	385	154
Units Demolished				-24
Net (Total Permitted Units - Units Demolished)				130

Source: **U.S. Census Bureau**, **2010 and 2015 American Community Survey 5-Year Estimates**, **SEMCOG Development**

Housing Tenure

Housing Tenure	Census 2010	ACS 2015	Change 2010-2015
Owner occupied	7,227	7,529	302
Renter occupied	633	655	22
Vacant	808	818	10
Seasonal/migrant	474	535	61
Other vacant units	334	283	-51
Total Housing Units	8,668	9,002	334



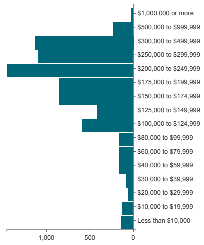
Source: **U.S. Census Bureau**, **2010 and 2015 American Community Survey 5-Year Estimates**

Housing Value and Rent

Housing Value (in 2015 dollars)	ACS 2010	ACS 2015	Change 2010-2015	Percent Change 2010-2015
Median housing value	$256,822	$206,100	$-50,722	-19.8%
Median gross rent	$1,036	$893	$-143	-13.8%

Source: **U.S. Census Bureau**, **Census 2000**, **2010 and2015 American Community Survey 5-Year Estimates**

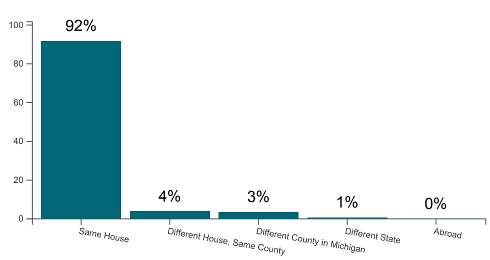
Housing Value



Housing Value	ACS 2015
$1,000,000 or more	27
$500,000 to $999,999	231
$300,000 to $499,999	1,130
$250,000 to $299,999	1,097
$200,000 to $249,999	1,456
$175,000 to $199,999	847
$150,000 to $174,999	849
$125,000 to $149,999	415
$100,000 to $124,999	586
$80,000 to $99,999	165
$60,000 to $79,999	157
$40,000 to $59,999	159
$30,000 to $39,999	78
$20,000 to $29,999	58
$10,000 to $19,999	131
Less than $10,000	143
Owner-Occupied Units	7,529

Source: **U.S. Census Bureau, 2015 American Community Survey 5-Year Estimates**

Residence One Year Ago *



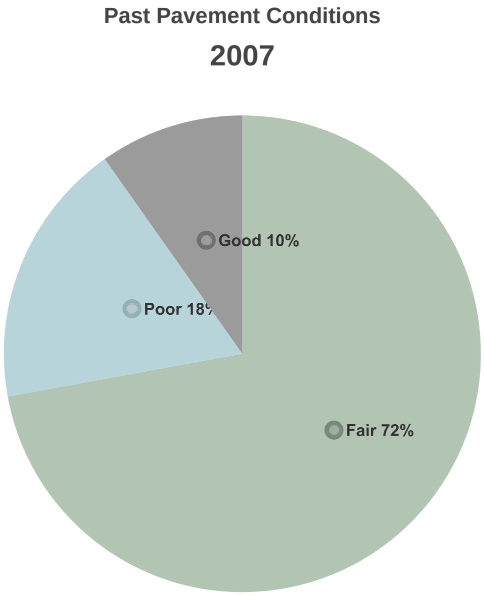
* This table represents persons, age 1 and over, living in Hamburg Township from 2011-2015. The table does not represent person who moved out of Hamburg Township from 2011-2015.

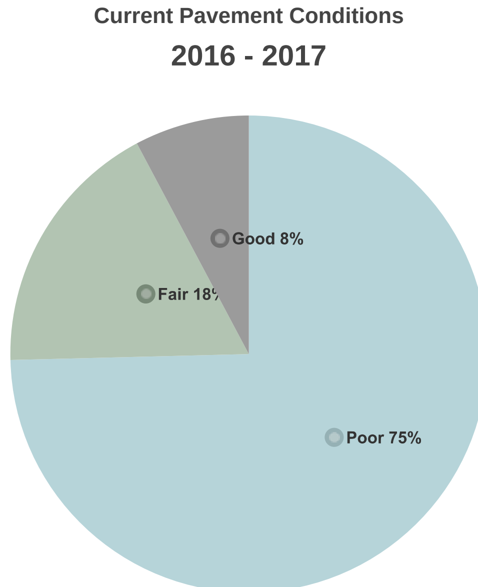
Source: **U.S. Census Bureau, 2015 American Community Survey 5-Year Estimates**

Transportation

Miles of public road (including boundary roads): 103
Source: **Michigan Geographic Framework**

Pavement Condition (in Lane Miles)



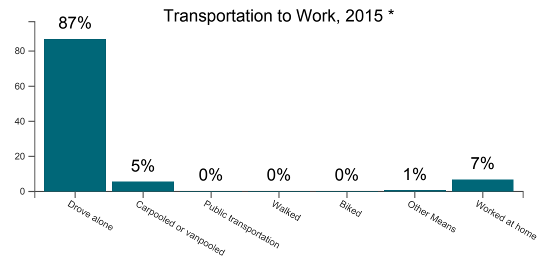


Note: Poor pavements are generally in need of rehabilitation or full reconstruction to return to good condition. Fair pavements are in need of capital preventive maintenance to avoid deteriorating to the poor classification. Good pavements generally receive only routine maintenance, such as street sweeping and snow removal, until they deteriorate to the fair condition.
Source: **SEMCOG**

Bridge Status

Bridge Status	2008	2008 (%)	2009	2009 (%)	2010	2010 (%)	Percent Point Chg 2008-2010
Open	3	100%	3	100%	8	100%	0%
Open with Restrictions	0	0%	0	0%	0	0%	0%
Closed*	0	0%	0	0%	0	0%	0%
Total Bridges	3	100.0%	3	100.0%	8	100.0%	0.0%
Deficient Bridges	1	33.3%	1	33.3%	3	37.5%	4.2%

***** Bridges may be closed because of new construction or failed condition.
Note: A bridge is considered deficient if it is structurally deficient (in poor shape and unable to carry the load for which it was designed) or functionally obsolete (in good physical condition but unable to support current or future demands, for example, being too narrow to accommodate truck traffic).
Source: Michigan Structure Inventory and Appraisal Database
Detailed Intersection & Road Data



* Resident workers age 16 and over

Transportation to Work

Transportation to Work	ACS 2010	% of Total (ACS 2010)	ACS 2015	% of Total (ACS 2015)	% Point Chg 2010-2015
Drove alone	9,300	87.5%	9,416	86.8%	-0.7%
Carpooled or vanpooled	619	5.8%	587	5.4%	-0.4%
Public transportation	5	0%	17	0.2%	0.2%
Walked	66	0.6%	28	0.3%	-0.3%
Biked	0	0%	12	0.1%	0.1%
Other Means	100	0.9%	68	0.6%	-0.3%
Worked at home	544	5.1%	723	6.7%	1.6%
Resident workers age 16 and over	10,634	100.0%	10,851	100.0%	0.0%

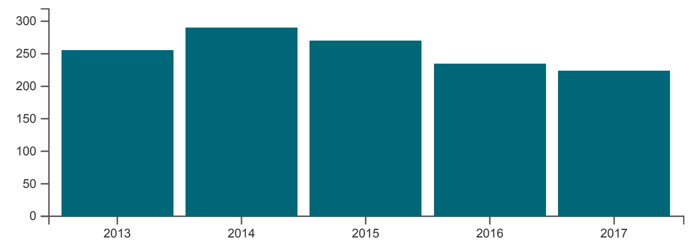
Source: **U.S. Census Bureau, 2010 and 2015 American Community Survey 5-Year Estimates**

Mean Travel Time to Work

Mean Travel Time To Work	ACS 2010	ACS 2015	Change 2010-2015
For residents age 16 and over who worked outside the home	33.4 minutes	31.3 minutes	-2.1 minutes

Source: **U.S. Census Bureau, 2010 and 2015 American Community Survey 5-Year Estimates**

Crashes, 2013-2017



Source: **Michigan Department of State Police with the Criminal Justice Information Center** and **SEMCOG**
Note: Crash data shown is for the entire city.

Crash Severity

Crash Severity	2013	2014	2015	2016	2017	Percent of Crashes 2013 - 2017
Fatal	1	2	1	0	0	0.3%
Serious Injury	1	6	5	6	7	2%
Other Injury	43	40	37	33	25	14%
Property Damage Only	210	242	227	196	192	83.8%
Total Crashes	255	290	270	235	224	100%

Crashes by Type

Crashes by Type	2013	2014	2015	2016	2017	Percent of Crashes 2013 - 2017
Head-on	6	6	3	7	2	1.9%
Angle or Head-on/Left-turn	24	42	47	33	26	13.5%
Rear-End	62	71	65	66	52	24.8%
Sideswipe	17	28	20	18	17	7.8%
Single Vehicle	139	126	127	108	118	48.5%
Backing	N/A	N/A	1	0	5	0.5%
Other or Unknown	7	17	7	3	4	3%

Crashes by Involvement

Crashes by Involvement	2013	2014	2015	2016	2017	Percent of Crashes 2013 - 2017
Red-light Running	1	1	1	2	1	0.5%
Lane Departure	95	90	89	74	63	32.3%
Alcohol	12	14	17	13	19	5.9%
Drugs	5	4	4	2	7	1.7%
Deer	52	48	48	39	53	18.8%
Train	0	0	0	0	0	0%
Commercial Truck/Bus	6	6	3	3	6	1.9%
School Bus	2	4	1	1	1	0.7%
Emergency Vehicle	4	5	4	4	0	1.3%
Motorcycle	6	9	7	5	0	2.1%
Intersection	49	84	72	77	82	28.6%
Work Zone	1	1	0	0	2	0.3%
Pedestrian	0	2	1	2	0	0.4%
Bicyclist	0	1	0	0	0	0.1%
Distracted Driver	0	0	0	1	18	1.5%
Older Driver (65 and older)	34	36	37	40	31	14%
Young Driver (16 to 24)	94	116	103	98	99	40%

High Frequency Intersection Crash Rankings

Local Rank	County Rank	Region Rank	Intersection	Annual Avg 2013-2017
1	25	1,601	Chilson Rd @ M 36 E	9.6
2	45	2,496	M 36 E @ McGregor Rd	7
3	60	3,166	Chilson Rd @ Swarthout Rd	5.8
4	84	4,239	M 36 E @ Merrill Rd	4.6
5	91	4,468	Merrill Rd @ Strawberry Lake Rd	4.4
6	95	4,709	M 36 E @ Pettysville Rd	4.2
7	99	4,951	M 36 E @ Hooker Rd	4
8	125	5,874	M 36 E @ Kress Rd	3.4
9	153	6,779	Pettysville Rd @ Swarthout Rd	3
10	153	6,779	Chilson Rd @ Winans Lake Rd	3

Note: Intersections are ranked by the number of reported crashes, which does not take into account traffic volume. Crashes reported occurred within 150 feet of the intersection.

Source: **Michigan Department of State Police with the Criminal Justice Information Center** and **SEMCOG**

High Frequency Road Segment Crash Rankings

Local Rank	County Rank	Region Rank	Segment	From Road - To Road	Annual Avg 2013-2017
1	12	720	M 36 E	Pettysville Rd - Chilson Rd	26.8
2	48	1,678	Strawberry Lake Rd	Mast Rd - Merrill Rd	16.6
3	56	1,828	M 36 E	Chilson Rd - Merrill Rd	15.6
4	72	2,217	Winans Lake Rd	Winans Lake Rd - Rickett Rd	13.8
5	91	2,858	Pettysville Rd	M 36 E - Swarthout Rd	11.4
6	104	3,197	Chilson Rd	Chilson Rd - Bishop Lake Rd	10.4
7	106	3,261	M 36 E	Farley Rd - McGregor Rd	10.2
8	145	3,836	M 36 E	McGregor Rd - Whitewood Rd	8.8
9	151	3,944	M 36 E	Merrill Rd - Hamburg Rd	8.6
10	172	4,502	Whitewood Rd	Shehan Rd - M 36 E	7.6

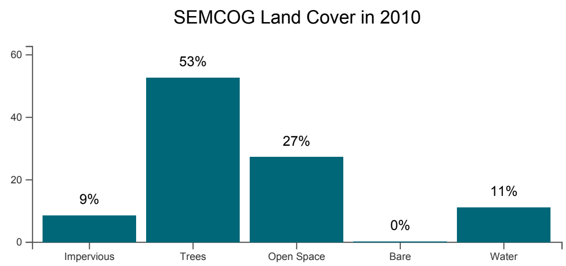
Note: Segments are ranked by the number of reported crashes, which does not take into account traffic volume.

Environment

SEMCOG 2008 Land Use

SEMCOG 2008 Land Use	Acres	Percent
Agricultural	731.4	3.2%
Single-family residential	12,534.1	54.4%
Multiple-family residential	18	0.1%
Commercial	200.9	0.9%
Industrial	158	0.7%
Governmental/Institutional	384	1.7%
Park, recreation, and open space	5,400.4	23.4%
Airport	4.6	0%
Transportation, Communication, and Utility	1,177.9	5.1%
Water	2,444.5	10.6%
Total	23,054	100%

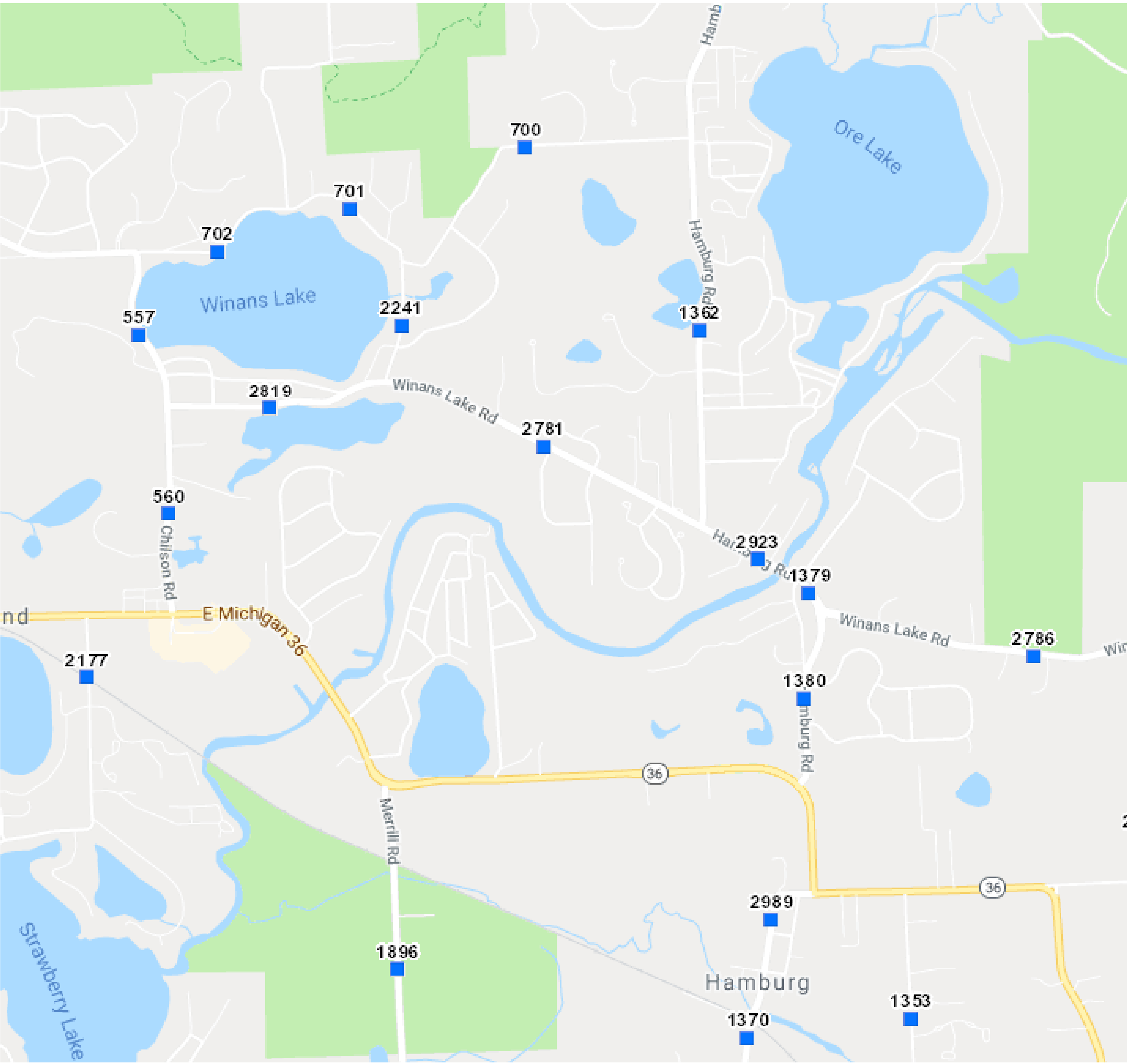
Note: Land Cover was derived from SEMCOG's 2010 Leaf off Imagery.
Source: **SEMCOG**



Source Data

SEMCOG - Detailed Data

Type	Description	Acres	Percent
Impervious	buildings, roads, driveways, parking lots	1,976.3	8.6%
Trees	woody vegetation, trees	12,148.8	52.7%
Open Space	agricultural fields, grasslands, turfgrass	6,298	27.3%
Bare	soil, aggregate piles, unplanted fields	63.3	0.3%
Water	rivers, lakes, drains, ponds	2,569.8	11.1%
Total Acres		23,056.1	



700
701
702
Winans Lake
557
2241
1362
Ore Lake
Hamburg Rd
2819
Winans Lake Rd
2781
560
Chilson Rd
2923
1379
E Michigan 36
2177
Winans Lake Rd
2786
1380
36
Merrill Rd
2989
1896
Strawberry Lake
Hamburg
1370
1353

Record |◀◀ ◀ 9 ▶ ▶▶| of 10 Goto Record go

Location ID	557	MPO ID	4918
Type	LINK	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group		Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	
Seas Clss Grp			
WIM Group			
Fnct'l Class	-	Milepost	
Located On	CHILSON		
Loc On Alias			
From Road	WINANS LAKE		
To Road	COWELL		

More Detail ▶

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2016	6,630	761	11				
	2014	5,650						
	2012	5,500						
	2010	5,810						
	2008	5,380						

|<< < > >>| 1-5 of 7

Travel Demand Model

	Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

	Date	Int	Total
	Thu 5/5/2016	60	7,516
	Mon 6/16/2014	60	6,273
	Tue 8/7/2012	60	6,109
	Tue 8/3/2010	60	6,451
	Wed 5/21/2008	60	6,108
	Mon 6/21/2004	60	6,534
	Tue 3/23/2004	60	5,260
	Mon 5/22/2000	60	5,830

VOLUME TREND

Year	Annual Growth
2016	8%
2014	1%
2012	-3%
2010	4%
2008	0%
2004	-1%

Record |◀◀ ◀ 10 ▶ ▶▶| of 10 Goto Record go

Location ID	560	MPO ID	4913
Type	LINK	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group		Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	
Seas Clss Grp			
WIM Group			
Fnct'l Class	-	Milepost	
Located On	CHILSON		
Loc On Alias			
From Road	M-36		
To Road	WINANS LAKE		

More Detail ▶

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2016	7,100	794	11				
	2014	6,260						
	2012	5,920						
	2009	5,720						
	2006	6,310						

|<< < > >>| 1-5 of 8

Travel Demand Model

	Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

	Date	Int	Total
	Thu 5/5/2016	60	8,037
	Mon 6/16/2014	60	6,941
	Tue 5/1/2012	60	6,530
	Tue 12/1/2009	60	5,962
	Mon 6/26/2006	60	6,813
	Wed 7/23/2003	60	5,938
	Mon 5/22/2000	60	6,066
	Thu 7/29/1999	60	6,291

VOLUME TREND

Year	Annual Growth
2016	6%
2014	3%
2012	1%
2009	-3%
2006	6%
2003	-4%
2000	7%

Record 1 of 10 Goto Record go

Location ID	1362	MPO ID	9829
Type	LINK	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group		Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	
Seas Clss Grp			
WIM Group			
Fnct'l Class	-	Milepost	
Located On	HAMBURG		
Loc On Alias			
From Road	WINANS LAKE W		
To Road	COWELL		

More Detail

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2018	3,610						
	2015	3,860						
	2013	3,680						
	2010	3,550						
	2008	3,440						

|<< < > >>| 1-5 of 9

Travel Demand Model

	Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

	Date	Int	Total
	Wed 7/25/2018	60	4,028
	Wed 6/10/2015	60	4,369
	Wed 5/22/2013	60	4,126
	Wed 8/4/2010	60	4,022
	Wed 5/21/2008	60	3,921
	Thu 6/17/2004	60	3,815
	Tue 3/23/2004	60	3,356
	Thu 5/18/2000	60	3,444
	Tue 7/27/1999	60	3,466
	Mon 6/29/1987	60	2,151

VOLUME TREND

Year	Annual Growth
2018	-2%
2015	2%
2013	1%
2010	2%
2008	1%
2004	2%
2000	-4%
1999	4%

Record 2 of 10 Goto Record go

Location ID	1379	MPO ID	9830
Type	LINK	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group		Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	
Seas Clss Grp			
WIM Group			
Fnct'l Class	-	Milepost	
Located On	HAMBURG		
Loc On Alias			
From Road	WINANS LAKE E		
To Road	VAN ANTWERP		

More Detail

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2016	6,930	744	11				
	2014	5,570						
	2012	5,480						
	2009	5,350						
	2007	5,880						

|<< < > >>| 1-5 of 9

Travel Demand Model

	Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

	Date	Int	Total
	Tue 8/2/2016	60	7,648
	Mon 6/16/2014	60	6,162
	Tue 5/1/2012	60	6,039
	Tue 12/1/2009	60	5,580
	Wed 5/16/2007	60	6,517
	Mon 5/3/2004	60	7,065
	Wed 7/23/2003	60	9,200
	Mon 5/22/2000	60	7,596
	Thu 7/29/1999	60	8,174

VOLUME TREND

Year	Annual Growth
2016	12%
2014	1%
2012	1%
2009	-5%
2007	-5%
2004	-15%
2003	3%
2000	4%

Record	3	of 10	Goto Record	go

Location ID	1380	MPO ID	9824
Type	LINK	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group		Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	
Seas Clss Grp			
WIM Group			
Fnct'l Class	-	Milepost	
Located On	HAMBURG		
Loc On Alias			
From Road	M-36		
To Road	WINANS LAKE E		

More Detail

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2018	11,130						
	2015	9,470						
	2013	8,840						
	2010	7,780						
	2008	7,890						

|<< < > >>| 1-5 of 8

Travel Demand Model

	Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

	Date	Int	Total
	Wed 7/25/2018	60	12,442
	Tue 6/9/2015	60	10,561
	Mon 6/3/2013	60	9,654
	Wed 8/4/2010	60	8,815
	Wed 5/21/2008	60	9,003
	Mon 6/21/2004	60	9,130
	Thu 7/24/2003	60	9,372
	Mon 5/22/2000	60	8,288

VOLUME TREND

Year	Annual Growth
2018	6%
2015	4%
2013	4%
2010	-1%
2008	-1%
2004	-1%
2003	2%

Record | 4 | of 10 | Goto Record | go

Location ID	1896	MPO ID	15180
Type	LINK	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group		Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	
Seas Clss Grp			
WIM Group			
Fnct'l Class	-	Milepost	
Located On	MERRILL		
Loc On Alias			
From Road	STRAWBERRY LAKE		
To Road	M-36		

More Detail

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2016	7,400	967	13				
	2014	5,720						
	2013	5,630						
	2012	5,900						
	2010	5,640						

|<< < > >>| 1-5 of 9

Travel Demand Model

	Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

	Date	Int	Total
	Mon 8/1/2016	60	8,113
	Mon 6/2/2014	60	6,337
	Wed 10/23/2013	60	6,278
	Tue 7/17/2012	60	6,353
	Wed 6/30/2010	60	6,146
	Wed 10/10/2007	60	5,202
	Thu 6/17/2004	60	5,523
	Tue 5/23/2000	60	5,260
	Tue 3/30/1982	60	789

VOLUME TREND

Year	Annual Growth
2016	14%
2014	2%
2013	-5%
2012	2%
2010	6%
2007	0%
2004	0%
2000	11%

Record |◀◀ ◀ 5 ▶ ▶▶| of 10 Goto Record go

Location ID	2781	MPO ID	22931
Type	LINK	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group		Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	
Seas Clss Grp			
WIM Group			
Fnct'l Class	-	Milepost	
Located On	WINANS LAKE		
Loc On Alias			
From Road	PLEASANT LAKE		
To Road	HAMBURG N		

More Detail ▶

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2018	4,380						
	2016	4,330	536	12				
	2014	4,820						
	2012	4,110						
	2010	4,590						

|<< < > >>| 1-5 of 7

Travel Demand Model

	Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

	Date	Int	Total
	Thu 10/4/2018	60	4,620
	Wed 10/3/2018	60	4,919
	Thu 5/5/2016	60	4,882
	Tue 7/1/2014	60	5,440
	Tue 7/17/2012	60	4,430
	Mon 6/21/2010	60	4,794
	Tue 8/21/2007	60	5,510
	Mon 5/22/2000	60	5,513

VOLUME TREND

Year	Annual Growth
2018	1%
2016	-5%
2014	8%
2012	-5%
2010	-2%
2007	-1%

Record |◀◀ ◀ 6 ▶ ▶▶| of 10 Goto Record go

Location ID	2786	MPO ID	22929
Type	LINK	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group		Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	
Seas Clss Grp			
WIM Group			
Fnct'l Class	-	Milepost	
Located On	WINANS LAKE		
Loc On Alias			
From Road	HAMBURG S		
To Road	MUSCH		

More Detail ▶

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2018	10,700						
	2015	9,930						
	2013	9,230						
	2010	8,860						
	2006	9,420						

|<< < > >>| 1-5 of 8

Travel Demand Model

	Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

	Date	Int	Total
	Wed 6/13/2018	60	11,979
	Tue 6/2/2015	60	11,057
	Wed 6/5/2013	60	10,522
	Thu 5/20/2010	60	10,134
	Tue 5/23/2006	60	10,232
	Mon 6/30/2003	60	10,564
	Thu 6/1/2000	60	10,447
	Wed 8/9/1989	60	6,727

VOLUME TREND

Year	Annual Growth
2018	3%
2015	4%
2013	1%
2010	-2%
2006	0%
2003	2%
2000	4%

Record 7 of 10 Goto Record go

Location ID	2819	MPO ID	22928
Type	LINK	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group		Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	HPMS
Seas Clss Grp			
WIM Group			
Fnct'l Class	-	Milepost	
Located On	WINANS LAKE		
Loc On Alias			
From Road	CHILSON		
To Road	PLEASANT LAKE		

More Detail

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2018	4,230						
	2016	4,120	506	12				
	2014	3,580						
	2012	3,920						
	2009	3,820						

|<< < > >>| 1-5 of 8

Travel Demand Model

	Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

	Date	Int	Total
	Thu 10/4/2018	60	4,516
	Wed 10/3/2018	60	4,681
	Thu 5/5/2016	60	4,650
	Mon 6/16/2014	60	3,950
	Wed 5/2/2012	60	4,391
	Tue 12/1/2009	60	3,987
	Mon 6/26/2006	60	4,710
	Wed 7/23/2003	60	5,817
	Mon 4/30/2001	60	4,780

VOLUME TREND

Year	Annual Growth
2018	1%
2016	7%
2014	-4%
2012	1%
2009	-4%
2006	-5%
2003	6%

Record | 8 | of 10 | Goto Record | go

Location ID	2923	MPO ID	9828
Type	LINK	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group		Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	
Seas Clss Grp			
WIM Group			
Fnct'l Class	-	Milepost	
Located On	HAMBURG		
Loc On Alias			
From Road	VAN ANTWERP		
To Road	WINANS LAKE W		

More Detail

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2018	6,170						
	2015	5,300						
	2013	4,960						
	2010	5,300						
	2008	5,650						

|<< < > >>| 1-5 of 6

Travel Demand Model

	Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

	Date	Int	Total
	Wed 7/25/2018	60	6,886
	Mon 11/16/2015	60	5,329
	Mon 6/10/2013	60	5,423
	Wed 8/4/2010	60	6,008
	Wed 5/21/2008	60	6,456
	Thu 5/19/2005	60	7,821

VOLUME TREND

Year	Annual Growth
2018	5%
2015	3%
2013	-2%
2010	-3%
2008	-5%

MDOT - Bureau of Transportation Planning

Hourly Count Report

10/30/2018
Page 1 of 1

County Livingston **Station** 46 **CS #** 47041 **CS MP** 18.18

Route Desc M-36 **PR #** 932308 **PR MP** 12.38

Station Desc 0.1 MILE WEST OF CHILSON ROAD **City** None

Direction E - W **Year** 2015

Date	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	24 Hour Tc
08/11/2015 Tuesday	0	0	0	0	0	0	0	0	0	779	826	925	1003	915	1041	1198	1367	1666	1446	922	875	651	348	169	**17420**
08/12/2015 Wednesday	87	42	23	38	114	378	779	958	870	856	868	932	1008	1010	1112	1247	1363	1568	1236	1131	995	697	335	154	**17832**
08/13/2015 Thursday	101	53	28	31	126	374	742	938	927	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**

08/11/2015: **AM High** 925 **AM High Hour** 12:00 **PM High** 1666 **PM High Hour** 18:00

08/12/2015: **AM High** 958 **AM High Hour** 08:00 **PM High** 1568 **PM High Hour** 18:00

08/13/2015: **AM High** 938 **AM High Hour** 08:00 **PM High** 0 **PM High Hour**

These volumes are raw axle counts and are not adjusted for the impact of vehicles with more than 2 axles

MDOT - Bureau of Transportation Planning

Hourly Count Report

10/30/2018
Page 1 of 1

County	Livingston	**Station**	12	**CS #**	47041	**CS MP**	23.26
Route Desc	M-36			**PR #**	931604	**PR MP**	1.98
Station Desc	W OF WHITMORE LK RD - GREEN OAK TWP			**City**	None		
Direction	E - W			**Year**	2009		

Date	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	24 Hour Total
04/07/2009 Tuesday	0	0	0	0	0	0	0	0	0	0	0	0	0	491	495	554	666	692	505	311	231	216	154	106	**8009**
04/08/2009 Wednesday	46	39	23	32	42	182	372	587	493	421	387	424	540	507	575	588	670	762	539	371	275	222	167	110	**8479**
04/09/2009 Thursday	75	42	23	29	33	182	362	547	499	424	473	440	564	0	0	0	0	0	0	0	0	0	0	0	**0**

Date	AM High	AM High Hour	PM High	PM High Hour
04/07/2009 Tuesday	0	01:00	692	18:00
04/08/2009 Wednesday	587	08:00	762	18:00
04/09/2009 Thursday	547	08:00	564	13:00

These volumes are raw axle counts and are not adjusted for the impact of vehicles with more than 2 axles

MDOT - Bureau of Transportation Planning

Hourly Count Report

10/30/2018
Page 1 of 1

County Livingston **Station** 12 **CS #** 47041 **CS MP** 23.26

Route Desc M-36 **PR #** 931604 **PR MP** 1.98

Station Desc W OF WHITMORE LK RD - GREEN OAK TWP **City** None

Direction E - W **Year** 2012

Date	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	24 Hour Total
05/21/2012 Monday	0	0	0	0	0	0	0	0	0	0	0	565	620	614	664	811	862	916	691	433	293	300	181	100	**10705**
05/22/2012 Tuesday	42	25	25	52	63	333	622	768	671	596	458	568	622	631	652	812	866	921	689	431	291	299	183	100	**10700**
05/23/2012 Wednesday	42	26	25	52	62	334	623	766	670	593	442	564	0	0	0	0	0	0	0	0	0	0	0	0	**564**

05/21/2012 Monday: **AM High** **565** **AM High Hour** **12:00** **PM High** **916** **PM High Hour** **18:00**

05/22/2012 Tuesday: **AM High** **768** **AM High Hour** **08:00** **PM High** **921** **PM High Hour** **18:00**

05/23/2012 Wednesday: **AM High** **766** **AM High Hour** **08:00** **PM High** **0** **PM High Hour**

These volumes are raw axle counts and are not adjusted for the impact of vehicles with more than 2 axles

MDOT - Bureau of Transportation Planning

Hourly Count Report

County Livingston **Station** 12 **CS #** 47041 **CS MP** 23.26

Route Desc M-36 **PR #** 931604 **PR MP** 1.98

Station Desc W OF WHITMORE LK RD - GREEN OAK TWP **City** None

Direction E - W **Year** 2015

Date	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	24 Hour Total
08/11/2015 Tuesday	0	0	0	0	0	0	0	0	0	0	433	492	612	569	556	669	769	776	559	351	268	290	179	95	**9166**
08/12/2015 Wednesday	56	28	21	32	60	239	465	638	499	510	424	454	522	577	620	592	785	764	588	386	390	319	191	75	**9198**
08/13/2015 Thursday	43	36	28	39	53	214	464	627	518	489	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Date	AM High	AM High Hour	PM High	PM High Hour
08/11/2015 Tuesday	**492**	**12:00**	**776**	**18:00**
08/12/2015 Wednesday	**638**	**08:00**	**785**	**17:00**
08/13/2015 Thursday	**627**	**08:00**	**0**	

These volumes are raw axle counts and are not adjusted for the impact of vehicles with more than 2 axles

Midwestern Consulting

Weekly Volumes

Unit ID: MCLLC-#2

Location: Winans Lake at Buckhorn_WB

Week of 10/29/2018

Start Time	10/29 Mon	10/30 Tue	10/31 Wed	11/01 Thu	11/02 Fri	11/03 Sat	11/04 Sun	Average
	WB	WB	WB	WB	WB	WB	WB	WB
00:00	-	7	13	16	13	-	-	12
01:00	-	4	3	4	3	-	-	4
02:00	-	4	2	1	3	-	-	3
03:00	-	3	2	4	3	-	-	3
04:00	-	2	2	3	5	-	-	3
05:00	-	19	13	15	20	-	-	17
06:00	-	56	69	58	61	-	-	61
07:00	-	108	84	101	84	-	-	94
08:00	-	87	88	113	86	-	-	94
09:00	0	85	89	76	90	-	-	68
10:00	0	115	119	105	16	-	-	71
11:00	0	103	141	117	0	-	-	72
12:00	75	156	125	155	-	-	-	128
13:00	138	130	135	136	-	-	-	135
14:00	165	136	180	171	-	-	-	163
15:00	245	245	246	204	-	-	-	235
16:00	307	267	288	246	-	-	-	277
17:00	316	327	346	299	-	-	-	322
18:00	194	227	122	204	-	-	-	187
19:00	140	167	128	136	-	-	-	143
20:00	111	93	142	115	-	-	-	115
21:00	43	74	102	54	-	-	-	68
22:00	38	33	44	49	-	-	-	41
23:00	22	19	17	23	-	-	-	20
Lane Total	1794	2467	2500	2405	384	-	-	2336
Day Total	1794	2467	2500	2405	384	-	-	2336
AM Peak	-	09:43	10:59	10:45	06:38	-	-	07:00
AM Count	-	120	142	129	98	-	-	94
PM Peak	16:43	17:01	16:54	16:45	-	-	-	17:00
PM Count	343	330	363	321	-	-	-	322

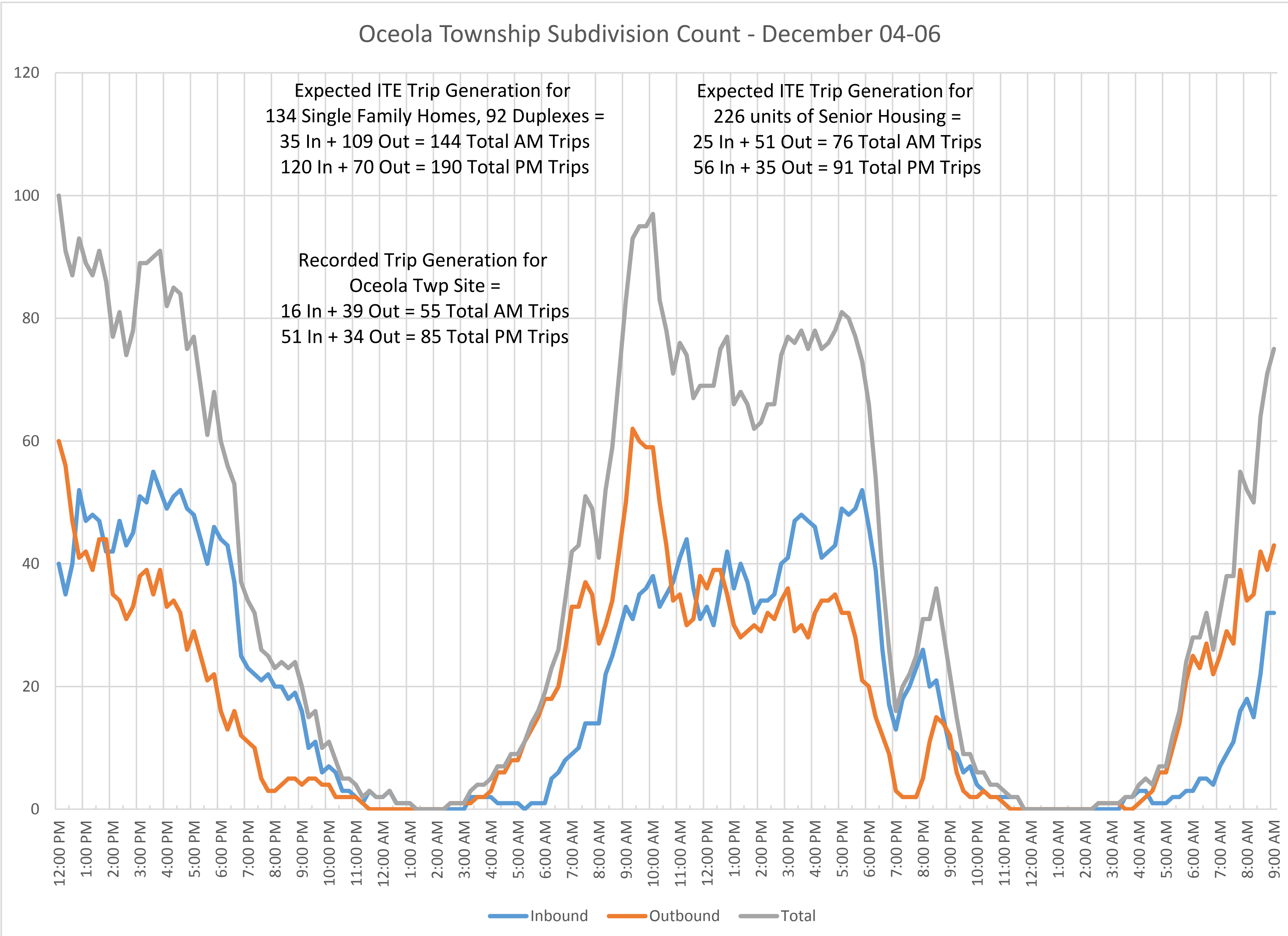
Midwestern Consulting

Weekly Volumes

Unit ID: MCLLC-#1
Location: Winans Lake at Buckhorn_EB

Week of 10/29/2018

Start Time	10/29 Mon	10/30 Tue	10/31 Wed	11/01 Thu	11/02 Fri	11/03 Sat	11/04 Sun	Average
	EB	EB	EB	EB	EB	EB	EB	EB
00:00	-	2	3	4	5	-	-	4
01:00	-	0	1	1	2	-	-	1
02:00	-	2	1	2	3	-	-	2
03:00	-	6	5	3	3	-	-	4
04:00	-	18	14	14	10	-	-	14
05:00	-	73	69	65	61	-	-	67
06:00	-	171	167	166	147	-	-	163
07:00	-	229	210	196	214	-	-	212
08:00	-	208	192	206	165	-	-	193
09:00	0	138	140	141	118	-	-	107
10:00	0	120	108	100	17	-	-	69
11:00	0	99	109	119	0	-	-	65
12:00	61	127	113	136	-	-	-	109
13:00	109	105	88	102	-	-	-	101
14:00	119	121	116	127	-	-	-	121
15:00	150	165	148	104	-	-	-	142
16:00	143	176	168	139	-	-	-	157
17:00	145	160	201	158	-	-	-	166
18:00	133	135	91	108	-	-	-	117
19:00	76	65	67	60	-	-	-	67
20:00	51	47	74	72	-	-	-	61
21:00	21	44	38	36	-	-	-	35
22:00	11	19	20	21	-	-	-	18
23:00	8	7	11	3	-	-	-	7
Lane Total	1027	2237	2154	2083	745	-	-	2002
Day Total	1027	2237	2154	2083	745	-	-	2002
AM Peak	-	07:38	07:29	07:39	06:53	-	-	07:00
AM Count	-	240	223	213	218	-	-	212
PM Peak	15:23	15:30	16:33	16:43	-	-	-	17:00
PM Count	166	192	211	159	-	-	-	166


Oceola Township Subdivision Count - December 04-06
Expected ITE Trip Generation for
134 Single Family Homes, 92 Duplexes =
35 In + 109 Out = 144 Total AM Trips
120 In + 70 Out = 190 Total PM Trips
Expected ITE Trip Generation for
226 units of Senior Housing =
25 In + 51 Out = 76 Total AM Trips
56 In + 35 Out = 91 Total PM Trips
Recorded Trip Generation for
Oceola Twp Site =
16 In + 39 Out = 55 Total AM Trips
51 In + 34 Out = 85 Total PM Trips
120
100
80
60
40
20
0
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM
10:00 PM
11:00 PM
12:00 AM
1:00 AM
2:00 AM
3:00 AM
4:00 AM
5:00 AM
6:00 AM
7:00 AM
8:00 AM
9:00 AM
10:00 AM
11:00 AM
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM
10:00 PM
11:00 PM
12:00 AM
1:00 AM
2:00 AM
3:00 AM
4:00 AM
5:00 AM
6:00 AM
7:00 AM
8:00 AM
9:00 AM
Inbound
Outbound
Total

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	650	39	12	165	59	24	14	48	196	13	58
Future Volume (veh/h)	68	650	39	12	165	59	24	14	48	196	13	58
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	72	691	37	15	204	48	39	23	54	206	14	57
Peak Hour Factor	0.94	0.94	0.94	0.81	0.81	0.81	0.61	0.61	0.61	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	674	1077	912	340	843	198	354	111	261	350	72	294
Arrive On Green	0.58	0.58	0.58	0.58	0.58	0.58	0.22	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	1128	1870	1585	727	1464	344	1329	496	1165	1322	322	1312
Grp Volume(v), veh/h	72	691	37	15	0	252	39	0	77	206	0	71
Grp Sat Flow(s),veh/h/ln	1128	1870	1585	727	0	1808	1329	0	1661	1322	0	1634
Q Serve(g_s), s	2.4	17.4	0.7	1.0	0.0	4.8	1.7	0.0	2.6	10.5	0.0	2.5
Cycle Q Clear(g_c), s	7.2	17.4	0.7	18.4	0.0	4.8	4.2	0.0	2.6	13.1	0.0	2.5
Prop In Lane	1.00		1.00	1.00		0.19	1.00		0.70	1.00		0.80
Lane Grp Cap(c), veh/h	674	1077	912	340	0	1041	354	0	373	350	0	367
V/C Ratio(X)	0.11	0.64	0.04	0.04	0.00	0.24	0.11	0.00	0.21	0.59	0.00	0.19
Avail Cap(c_a), veh/h	674	1077	912	340	0	1041	424	0	460	419	0	453
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.1	10.0	6.5	16.2	0.0	7.3	23.7	0.0	22.1	27.4	0.0	22.0
Incr Delay (d2), s/veh	0.3	2.9	0.1	0.2	0.0	0.6	0.2	0.0	0.4	2.2	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	6.0	0.2	0.2	0.0	1.5	0.5	0.0	1.0	3.3	0.0	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.4	12.9	6.5	16.4	0.0	7.9	23.9	0.0	22.5	29.7	0.0	22.4
LnGrp LOS	A	B	A	B	A	A	C	A	C	C	A	C
Approach Vol, veh/h		800			267			116			277	
Approach Delay, s/veh		12.3			8.4			22.9			27.8	
Approach LOS		B			A			C			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		47.7		22.3		47.7		22.3				
Change Period (Y+Rc), s		7.4		6.6		7.4		6.6				
Max Green Setting (Gmax), s		36.6		19.4		36.6		19.4				
Max Q Clear Time (g_c+I1), s		19.4		6.2		20.4		15.1				
Green Ext Time (p_c), s		4.4		0.5		1.2		0.6				
Intersection Summary												
HCM 6th Ctrl Delay			15.4									
HCM 6th LOS			B									

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	649	296	50	156	99	49
Future Volume (veh/h)	649	296	50	156	99	49
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	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	713	325	68	214	130	44
Peak Hour Factor	0.91	0.91	0.73	0.73	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1149	1179	352	1149	231	206
Arrive On Green	0.61	0.61	0.61	0.61	0.13	0.13
Sat Flow, veh/h	1870	1585	544	1870	1781	1585
Grp Volume(v), veh/h	713	325	68	214	130	44
Grp Sat Flow(s),veh/h/ln	1870	1585	544	1870	1781	1585
Q Serve(g_s), s	11.6	3.2	4.4	2.4	3.3	1.2
Cycle Q Clear(g_c), s	11.6	3.2	16.0	2.4	3.3	1.2
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1149	1179	352	1149	231	206
V/C Ratio(X)	0.62	0.28	0.19	0.19	0.56	0.21
Avail Cap(c_a), veh/h	1149	1179	352	1149	1094	974
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	5.9	2.0	10.8	4.1	19.9	19.0
Incr Delay (d2), s/veh	2.5	0.6	1.2	0.4	2.1	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	0.9	0.5	0.5	1.2	0.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	8.4	2.6	12.1	4.5	22.1	19.5
LnGrp LOS	A	A	B	A	C	B
Approach Vol, veh/h	1038			282	174	
Approach Delay, s/veh	6.6			6.3	21.4	
Approach LOS	A			A	C	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		36.0		12.8		36.0
Change Period (Y+Rc), s		* 6		6.5		* 6
Max Green Setting (Gmax), s		* 30		30.0		* 30
Max Q Clear Time (g_c+I1), s		13.6		5.3		18.0
Green Ext Time (p_c), s		5.2		0.4		1.3
Intersection Summary						
HCM 6th Ctrl Delay			8.3			
HCM 6th LOS			A			

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	278	417	9	1	103	44	2	2	5	180	2	116
Future Volume (veh/h)	278	417	9	1	103	44	2	2	5	180	2	116
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	305	458	7	1	154	45	3	3	6	222	2	94
Peak Hour Factor	0.91	0.91	0.91	0.67	0.67	0.67	0.75	0.75	0.75	0.81	0.81	0.81
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	767	1087	921	536	1087	921	321	113	226	403	7	316
Arrive On Green	0.58	0.58	0.58	0.58	0.58	0.58	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1183	1870	1585	928	1870	1585	1300	557	1113	1406	33	1557
Grp Volume(v), veh/h	305	458	7	1	154	45	3	0	9	222	0	96
Grp Sat Flow(s),veh/h/ln	1183	1870	1585	928	1870	1585	1300	0	1670	1406	0	1590
Q Serve(g_s), s	9.3	7.9	0.1	0.0	2.2	0.7	0.1	0.0	0.3	8.8	0.0	3.0
Cycle Q Clear(g_c), s	11.5	7.9	0.1	8.0	2.2	0.7	3.1	0.0	0.3	9.0	0.0	3.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.67	1.00		0.98
Lane Grp Cap(c), veh/h	767	1087	921	536	1087	921	321	0	339	403	0	323
V/C Ratio(X)	0.40	0.42	0.01	0.00	0.14	0.05	0.01	0.00	0.03	0.55	0.00	0.30
Avail Cap(c_a), veh/h	767	1087	921	536	1087	921	590	0	685	694	0	653
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.2	6.8	5.1	9.0	5.6	5.3	21.1	0.0	18.7	22.3	0.0	19.8
Incr Delay (d2), s/veh	1.5	1.2	0.0	0.0	0.3	0.1	0.0	0.0	0.0	1.2	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	2.3	0.0	0.0	0.6	0.2	0.0	0.0	0.1	2.6	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.7	8.0	5.2	9.0	5.9	5.4	21.1	0.0	18.7	23.5	0.0	20.3
LnGrp LOS	A	A	A	A	A	A	C	A	B	C	A	C
Approach Vol, veh/h		770			200			12			318	
Approach Delay, s/veh		8.7			5.8			19.3			22.5	
Approach LOS		A			A			B			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		40.3		18.2		40.3		18.2				
Change Period (Y+Rc), s		6.3		6.3		6.3		6.3				
Max Green Setting (Gmax), s		34.0		24.0		34.0		24.0				
Max Q Clear Time (g_c+I1), s		13.5		5.1		10.0		11.0				
Green Ext Time (p_c), s		3.7		0.0		0.9		0.9				
Intersection Summary												
HCM 6th Ctrl Delay			11.7									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	58	49	110	65	134	234
Future Vol, veh/h	58	49	110	65	134	234
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	77	77	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	63	53	143	84	151	263

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	750	185	0	0	227	0
Stage 1	185	-	-	-	-	-
Stage 2	565	-	-	-	-	-
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	379	857	-	-	1341	-
Stage 1	847	-	-	-	-	-
Stage 2	569	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	329	857	-	-	1341	-
Mov Cap-2 Maneuver	329	-	-	-	-	-
Stage 1	735	-	-	-	-	-
Stage 2	569	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.5	0	2.9
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	458	1341	-
HCM Lane V/C Ratio	-	-	0.254	0.112	-
HCM Control Delay (s)	-	-	15.5	8	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	1	0.4	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	278	0	0	97	1	0	0	0	6	0	3
Future Vol, veh/h	2	278	0	0	97	1	0	0	0	6	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	25	-	-	25	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	88	88	88	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	2	323	0	0	110	1	0	0	0	7	0	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	111	0	0	323	0	0	439	438	323	437	437	110
Stage 1	-	-	-	-	-	-	327	327	-	110	110	-
Stage 2	-	-	-	-	-	-	112	111	-	327	327	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1479	-	-	1237	-	-	528	512	718	530	513	943
Stage 1	-	-	-	-	-	-	686	648	-	895	804	-
Stage 2	-	-	-	-	-	-	893	804	-	686	648	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1479	-	-	1237	-	-	525	511	718	529	512	943
Mov Cap-2 Maneuver	-	-	-	-	-	-	525	511	-	529	512	-
Stage 1	-	-	-	-	-	-	685	647	-	893	804	-
Stage 2	-	-	-	-	-	-	890	804	-	685	647	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	0	10.9
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1479	-	-	1237	-	-	620
HCM Lane V/C Ratio	-	0.002	-	-	-	-	-	0.016
HCM Control Delay (s)	0	7.4	0	-	0	-	-	10.9
HCM Lane LOS	A	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	57	227	54	45	157	44
Future Vol, veh/h	57	227	54	45	157	44
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	50
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	87	87	88	88	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	66	261	61	51	169	47

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	112	0	-	0	480	87
Stage 1	-	-	-	-	87	-
Stage 2	-	-	-	-	393	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1478	-	-	-	545	971
Stage 1	-	-	-	-	936	-
Stage 2	-	-	-	-	682	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1478	-	-	-	517	971
Mov Cap-2 Maneuver	-	-	-	-	517	-
Stage 1	-	-	-	-	887	-
Stage 2	-	-	-	-	682	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	13.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1478	-	-	-	517	971
HCM Lane V/C Ratio	0.044	-	-	-	0.327	0.049
HCM Control Delay (s)	7.5	0	-	-	15.3	8.9
HCM Lane LOS	A	A	-	-	C	A
HCM 95th %tile Q(veh)	0.1	-	-	-	1.4	0.2

Intersection	
Intersection Delay, s/veh	7.4
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	249	485	472
Demand Flow Rate, veh/h	254	494	482
Vehicles Circulating, veh/h	68	251	189
Vehicles Exiting, veh/h	677	420	133
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	4.5	8.7	7.7
Approach LOS	A	A	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	254	494	482
Cap Entry Lane, veh/h	1287	1068	1138
Entry HV Adj Factor	0.980	0.981	0.980
Flow Entry, veh/h	249	485	472
Cap Entry, veh/h	1262	1048	1115
V/C Ratio	0.197	0.462	0.424
Control Delay, s/veh	4.5	8.7	7.7
LOS	A	A	A
95th %tile Queue, veh	1	2	2

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	918	0	0	251	4	0	0	0	27	0	19
Future Vol, veh/h	1	918	0	0	251	4	0	0	0	27	0	19
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	-	-	-	-	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	73	73	73	92	92	92	60	60	60
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	1020	0	0	344	5	0	0	0	45	0	32

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	349	0	0	1020	0	0	1385	1371	1020	1366	1366	344
Stage 1	-	-	-	-	-	-	1022	1022	-	344	344	-
Stage 2	-	-	-	-	-	-	363	349	-	1022	1022	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1210	-	-	680	-	-	121	146	287	124	147	699
Stage 1	-	-	-	-	-	-	285	313	-	671	637	-
Stage 2	-	-	-	-	-	-	656	633	-	285	313	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1210	-	-	680	-	-	115	146	287	124	147	699
Mov Cap-2 Maneuver	-	-	-	-	-	-	115	146	-	124	147	-
Stage 1	-	-	-	-	-	-	284	312	-	670	637	-
Stage 2	-	-	-	-	-	-	626	633	-	284	312	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	36.7
HCM LOS			A	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1210	-	-	680	-	-	188
HCM Lane V/C Ratio	-	0.001	-	-	-	-	-	0.408
HCM Control Delay (s)	0	8	0	-	0	-	-	36.7
HCM Lane LOS	A	A	A	-	A	-	-	E
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	62	316	87	35	630	218	157	94	22	94	72	111
Future Volume (veh/h)	62	316	87	35	630	218	157	94	22	94	72	111
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	70	359	65	39	708	223	183	109	17	106	81	80
Peak Hour Factor	0.88	0.88	0.88	0.89	0.89	0.89	0.86	0.86	0.86	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	169	1089	923	556	794	250	291	383	60	326	209	207
Arrive On Green	0.58	0.58	0.58	0.58	0.58	0.58	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	601	1870	1585	963	1364	429	1225	1580	246	1265	864	853
Grp Volume(v), veh/h	70	359	65	39	0	931	183	0	126	106	0	161
Grp Sat Flow(s),veh/h/ln	601	1870	1585	963	0	1793	1225	0	1826	1265	0	1717
Q Serve(g_s), s	9.2	7.9	1.4	1.7	0.0	36.1	11.7	0.0	4.5	6.0	0.0	6.3
Cycle Q Clear(g_c), s	45.2	7.9	1.4	9.7	0.0	36.1	18.0	0.0	4.5	10.4	0.0	6.3
Prop In Lane	1.00		1.00	1.00		0.24	1.00		0.13	1.00		0.50
Lane Grp Cap(c), veh/h	169	1089	923	556	0	1044	291	0	443	326	0	416
V/C Ratio(X)	0.41	0.33	0.07	0.07	0.00	0.89	0.63	0.00	0.28	0.33	0.00	0.39
Avail Cap(c_a), veh/h	169	1089	923	556	0	1044	291	0	443	326	0	416
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	34.1	8.6	7.3	11.1	0.0	14.5	32.9	0.0	24.7	28.9	0.0	25.3
Incr Delay (d2), s/veh	7.3	0.8	0.1	0.2	0.0	11.5	4.9	0.0	0.5	0.8	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	2.8	0.4	0.4	0.0	14.4	3.8	0.0	2.0	1.8	0.0	2.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.5	9.4	7.4	11.4	0.0	26.0	37.8	0.0	25.2	29.7	0.0	26.2
LnGrp LOS	D	A	A	B	A	C	D	A	C	C	A	C
Approach Vol, veh/h		494			970			309			267	
Approach Delay, s/veh		13.7			25.4			32.6			27.6	
Approach LOS		B			C			C			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		54.0		26.0		54.0		26.0				
Change Period (Y+Rc), s		7.4		6.6		7.4		6.6				
Max Green Setting (Gmax), s		46.6		19.4		46.6		19.4				
Max Q Clear Time (g_c+I1), s		47.2		20.0		38.1		12.4				
Green Ext Time (p_c), s		0.0		0.0		4.2		0.9				

Intersection Summary		
HCM 6th Ctrl Delay		23.9
HCM 6th LOS		C

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	323	182	68	682	403	129
Future Volume (veh/h)	323	182	68	682	403	129
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	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	351	198	72	718	486	107
Peak Hour Factor	0.92	0.92	0.95	0.95	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	906	1265	430	906	559	498
Arrive On Green	0.48	0.48	0.48	0.48	0.31	0.31
Sat Flow, veh/h	1870	1585	858	1870	1781	1585
Grp Volume(v), veh/h	351	198	72	718	486	107
Grp Sat Flow(s),veh/h/ln	1870	1585	858	1870	1781	1585
Q Serve(g_s), s	7.4	1.8	3.6	19.9	15.9	3.1
Cycle Q Clear(g_c), s	7.4	1.8	11.0	19.9	15.9	3.1
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	906	1265	430	906	559	498
V/C Ratio(X)	0.39	0.16	0.17	0.79	0.87	0.22
Avail Cap(c_a), veh/h	906	1265	430	906	863	768
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.1	1.4	13.6	13.4	20.0	15.6
Incr Delay (d2), s/veh	1.3	0.3	0.8	7.1	6.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	1.3	0.7	8.0	6.1	0.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	11.4	1.7	14.5	20.4	26.2	15.8
LnGrp LOS	B	A	B	C	C	B
Approach Vol, veh/h	549			790	593	
Approach Delay, s/veh	7.9			19.9	24.3	
Approach LOS	A			B	C	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		36.0		26.0		36.0
Change Period (Y+Rc), s		* 6		6.5		* 6
Max Green Setting (Gmax), s		* 30		30.0		* 30
Max Q Clear Time (g_c+I1), s		9.4		17.9		21.9
Green Ext Time (p_c), s		2.5		1.5		3.1
Intersection Summary						
HCM 6th Ctrl Delay			17.8			
HCM 6th LOS			B			

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	257	174	30	2	395	236	31	22	11	83	30	303
Future Volume (veh/h)	257	174	30	2	395	236	31	22	11	83	30	303
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	286	193	22	2	459	181	35	25	8	91	33	223
Peak Hour Factor	0.90	0.90	0.90	0.86	0.86	0.86	0.89	0.89	0.89	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	464	1073	909	733	1073	909	196	291	93	396	45	301
Arrive On Green	0.57	0.57	0.57	0.57	0.57	0.57	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	789	1870	1585	1166	1870	1585	1124	1358	434	1376	208	1408
Grp Volume(v), veh/h	286	193	22	2	459	181	35	0	33	91	0	256
Grp Sat Flow(s),veh/h/ln	789	1870	1585	1166	1870	1585	1124	0	1792	1376	0	1617
Q Serve(g_s), s	19.1	2.9	0.4	0.0	8.2	3.3	1.8	0.0	0.9	3.4	0.0	8.8
Cycle Q Clear(g_c), s	27.3	2.9	0.4	3.0	8.2	3.3	10.5	0.0	0.9	4.2	0.0	8.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.24	1.00		0.87
Lane Grp Cap(c), veh/h	464	1073	909	733	1073	909	196	0	383	396	0	346
V/C Ratio(X)	0.62	0.18	0.02	0.00	0.43	0.20	0.18	0.00	0.09	0.23	0.00	0.74
Avail Cap(c_a), veh/h	464	1073	909	733	1073	909	410	0	726	658	0	655
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.9	6.0	5.5	6.7	7.1	6.1	26.7	0.0	18.7	20.4	0.0	21.8
Incr Delay (d2), s/veh	6.0	0.4	0.0	0.0	1.2	0.5	0.4	0.0	0.1	0.3	0.0	3.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.4	0.9	0.1	0.0	2.5	0.8	0.5	0.0	0.4	1.0	0.0	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.9	6.4	5.5	6.7	8.4	6.6	27.1	0.0	18.8	20.6	0.0	24.9
LnGrp LOS	C	A	A	A	A	A	C	A	B	C	A	C
Approach Vol, veh/h		501			642			68			347	
Approach Delay, s/veh		14.6			7.9			23.1			23.8	
Approach LOS		B			A			C			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		40.3		19.0		40.3		19.0				
Change Period (Y+Rc), s		6.3		6.3		6.3		6.3				
Max Green Setting (Gmax), s		34.0		24.0		34.0		24.0				
Max Q Clear Time (g_c+I1), s		29.3		12.5		10.2		10.8				
Green Ext Time (p_c), s		1.3		0.2		3.2		1.4				

Intersection Summary			
HCM 6th Ctrl Delay			14.2
HCM 6th LOS			B

Intersection	
Int Delay, s/veh	10.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	150	149	306	90	73	181
Future Vol, veh/h	150	149	306	90	73	181
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	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	163	162	333	98	90	223

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	785	382	0	0	431	0
Stage 1	382	-	-	-	-	-
Stage 2	403	-	-	-	-	-
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	361	665	-	-	1129	-
Stage 1	690	-	-	-	-	-
Stage 2	675	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	328	665	-	-	1129	-
Mov Cap-2 Maneuver	328	-	-	-	-	-
Stage 1	627	-	-	-	-	-
Stage 2	675	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	33.2	0	2.4
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	439	1129	-
HCM Lane V/C Ratio	-	-	0.74	0.08	-
HCM Control Delay (s)	-	-	33.2	8.5	0
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	6	0.3	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	177	0	0	366	5	0	0	0	1	0	3
Future Vol, veh/h	2	177	0	0	366	5	0	0	0	1	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	25	-	-	25	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	95	95	95	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	221	0	0	385	5	0	0	0	1	0	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	390	0	0	221	0	0	616	617	221	612	612	385
Stage 1	-	-	-	-	-	-	227	227	-	385	385	-
Stage 2	-	-	-	-	-	-	389	390	-	227	227	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1169	-	-	1348	-	-	403	405	819	405	408	663
Stage 1	-	-	-	-	-	-	776	716	-	638	611	-
Stage 2	-	-	-	-	-	-	635	608	-	776	716	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1169	-	-	1348	-	-	400	404	819	404	407	663
Mov Cap-2 Maneuver	-	-	-	-	-	-	400	404	-	404	407	-
Stage 1	-	-	-	-	-	-	774	714	-	636	611	-
Stage 2	-	-	-	-	-	-	632	608	-	774	714	-

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

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1169	-	-	1348	-	-	571
HCM Lane V/C Ratio	-	0.002	-	-	-	-	-	0.008
HCM Control Delay (s)	0	8.1	0	-	0	-	-	11.4
HCM Lane LOS	A	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	85	93	255	197	63	116
Future Vol, veh/h	85	93	255	197	63	116
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	50
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	81	81	91	91	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	105	115	280	216	72	132

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	496	0	-	0	713	388
Stage 1	-	-	-	-	388	-
Stage 2	-	-	-	-	325	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1068	-	-	-	398	660
Stage 1	-	-	-	-	686	-
Stage 2	-	-	-	-	732	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1068	-	-	-	356	660
Mov Cap-2 Maneuver	-	-	-	-	356	-
Stage 1	-	-	-	-	614	-
Stage 2	-	-	-	-	732	-

Approach	EB	WB	SB
HCM Control Delay, s	4.2	0	13.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1068	-	-	-	356	660
HCM Lane V/C Ratio	0.098	-	-	-	0.201	0.2
HCM Control Delay (s)	8.7	0	-	-	17.6	11.8
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.7	0.7

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	609	562	177
Demand Flow Rate, veh/h	621	574	181
Vehicles Circulating, veh/h	286	99	364
Vehicles Exiting, veh/h	387	446	543
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	11.8	7.7	5.7
Approach LOS	B	A	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	621	574	181
Cap Entry Lane, veh/h	1031	1247	952
Entry HV Adj Factor	0.981	0.980	0.980
Flow Entry, veh/h	609	562	177
Cap Entry, veh/h	1011	1222	933
V/C Ratio	0.602	0.460	0.190
Control Delay, s/veh	11.8	7.7	5.7
LOS	B	A	A
95th %tile Queue, veh	4	2	1

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	15	496	2	4	1058	23	5	0	2	7	0	12
Future Vol, veh/h	15	496	2	4	1058	23	5	0	2	7	0	12
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	-	-	-	-	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	95	95	95	60	60	60	79	79	79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	557	2	4	1114	24	8	0	3	9	0	15

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1138	0	0	559	0	0	1734	1738	558	1716	1715	1114
Stage 1	-	-	-	-	-	-	592	592	-	1122	1122	-
Stage 2	-	-	-	-	-	-	1142	1146	-	594	593	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	614	-	-	1012	-	-	69	87	529	71	90	253
Stage 1	-	-	-	-	-	-	493	494	-	250	281	-
Stage 2	-	-	-	-	-	-	244	274	-	491	493	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	614	-	-	1012	-	-	62	83	529	68	85	253
Mov Cap-2 Maneuver	-	-	-	-	-	-	62	83	-	68	85	-
Stage 1	-	-	-	-	-	-	473	474	-	240	278	-
Stage 2	-	-	-	-	-	-	227	271	-	468	473	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0	55.3	40.2
HCM LOS			F	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	83	614	-	-	1012	-	-	126
HCM Lane V/C Ratio	0.141	0.027	-	-	0.004	-	-	0.191
HCM Control Delay (s)	55.3	11	0	-	8.6	0	-	40.2
HCM Lane LOS	F	B	A	-	A	A	-	E
HCM 95th %tile Q(veh)	0.5	0.1	-	-	0	-	-	0.7

HCM 6th Signalized Intersection Summary
1001: Chilson Commons/Chilson Road & M-36

11/30/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	78	747	45	14	190	68	28	16	55	225	15	67
Future Volume (veh/h)	78	747	45	14	190	68	28	16	55	225	15	67
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	83	795	44	17	235	59	46	26	65	237	16	67
Peak Hour Factor	0.94	0.94	0.94	0.81	0.81	0.81	0.61	0.61	0.61	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	601	1024	868	242	790	198	383	120	299	376	80	333
Arrive On Green	0.55	0.55	0.55	0.55	0.55	0.55	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	1085	1870	1585	655	1443	362	1315	474	1184	1306	315	1318
Grp Volume(v), veh/h	83	795	44	17	0	294	46	0	91	237	0	83
Grp Sat Flow(s),veh/h/ln	1085	1870	1585	655	0	1805	1315	0	1657	1306	0	1633
Q Serve(g_s), s	3.1	23.4	0.9	1.5	0.0	6.2	2.0	0.0	3.0	12.3	0.0	2.8
Cycle Q Clear(g_c), s	9.3	23.4	0.9	24.9	0.0	6.2	4.8	0.0	3.0	15.3	0.0	2.8
Prop In Lane	1.00		1.00	1.00		0.20	1.00		0.71	1.00		0.81
Lane Grp Cap(c), veh/h	601	1024	868	242	0	988	383	0	419	376	0	413
V/C Ratio(X)	0.14	0.78	0.05	0.07	0.00	0.30	0.12	0.00	0.22	0.63	0.00	0.20
Avail Cap(c_a), veh/h	601	1024	868	242	0	988	415	0	459	408	0	453
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.1	12.5	7.4	22.3	0.0	8.6	22.5	0.0	20.7	26.7	0.0	20.6
Incr Delay (d2), s/veh	0.5	5.8	0.1	0.6	0.0	0.8	0.2	0.0	0.4	3.4	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	8.9	0.3	0.2	0.0	2.0	0.6	0.0	1.2	3.9	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.6	18.3	7.5	22.8	0.0	9.3	22.7	0.0	21.0	30.1	0.0	20.9
LnGrp LOS	B	B	A	C	A	A	C	A	C	C	A	C
Approach Vol, veh/h		922			311			137			320	
Approach Delay, s/veh		17.1			10.1			21.6			27.7	
Approach LOS		B			B			C			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		45.7		24.3		45.7		24.3				
Change Period (Y+Rc), s		7.4		6.6		7.4		6.6				
Max Green Setting (Gmax), s		36.6		19.4		36.6		19.4				
Max Q Clear Time (g_c+I1), s		25.4		6.8		26.9		17.3				
Green Ext Time (p_c), s		4.3		0.6		1.1		0.4				
Intersection Summary												
HCM 6th Ctrl Delay			18.2									
HCM 6th LOS			B									

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	746	340	57	179	114	56
Future Volume (veh/h)	746	340	57	179	114	56
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	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	820	374	78	245	150	54
Peak Hour Factor	0.91	0.91	0.73	0.73	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1144	1181	291	1144	238	212
Arrive On Green	0.61	0.61	0.61	0.61	0.13	0.13
Sat Flow, veh/h	1870	1585	469	1870	1781	1585
Grp Volume(v), veh/h	820	374	78	245	150	54
Grp Sat Flow(s),veh/h/ln	1870	1585	469	1870	1781	1585
Q Serve(g_s), s	14.9	3.9	6.8	2.9	3.9	1.5
Cycle Q Clear(g_c), s	14.9	3.9	21.7	2.9	3.9	1.5
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1144	1181	291	1144	238	212
V/C Ratio(X)	0.72	0.32	0.27	0.21	0.63	0.25
Avail Cap(c_a), veh/h	1144	1181	291	1144	1089	969
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	6.6	2.1	14.1	4.3	20.1	19.1
Incr Delay (d2), s/veh	3.9	0.7	2.2	0.4	2.7	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.8	1.1	0.7	0.6	1.5	0.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	10.5	2.8	16.3	4.7	22.8	19.7
LnGrp LOS	B	A	B	A	C	B
Approach Vol, veh/h	1194			323	204	
Approach Delay, s/veh	8.1			7.5	22.0	
Approach LOS	A			A	C	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		36.0		13.1		36.0
Change Period (Y+Rc), s		* 6		6.5		* 6
Max Green Setting (Gmax), s		* 30		30.0		* 30
Max Q Clear Time (g_c+I1), s		16.9		5.9		23.7
Green Ext Time (p_c), s		5.6		0.5		1.1
Intersection Summary						
HCM 6th Ctrl Delay			9.6			
HCM 6th LOS			A			
Notes						

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	319	479	10	1	118	51	2	2	6	207	2	133
Future Volume (veh/h)	319	479	10	1	118	51	2	2	6	207	2	133
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	351	526	8	1	176	55	3	3	7	256	2	115
Peak Hour Factor	0.91	0.91	0.91	0.67	0.67	0.67	0.75	0.75	0.75	0.81	0.81	0.81
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	715	1054	893	461	1054	893	332	114	265	433	6	356
Arrive On Green	0.56	0.56	0.56	0.56	0.56	0.56	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1149	1870	1585	870	1870	1585	1275	498	1163	1405	27	1562
Grp Volume(v), veh/h	351	526	8	1	176	55	3	0	10	256	0	117
Grp Sat Flow(s),veh/h/ln	1149	1870	1585	870	1870	1585	1275	0	1661	1405	0	1589
Q Serve(g_s), s	12.8	10.3	0.1	0.0	2.7	0.9	0.1	0.0	0.3	10.4	0.0	3.7
Cycle Q Clear(g_c), s	15.5	10.3	0.1	10.4	2.7	0.9	3.8	0.0	0.3	10.7	0.0	3.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.70	1.00		0.98
Lane Grp Cap(c), veh/h	715	1054	893	461	1054	893	332	0	378	433	0	362
V/C Ratio(X)	0.49	0.50	0.01	0.00	0.17	0.06	0.01	0.00	0.03	0.59	0.00	0.32
Avail Cap(c_a), veh/h	715	1054	893	461	1054	893	548	0	661	671	0	632
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.1	8.0	5.8	11.1	6.3	6.0	21.0	0.0	18.1	22.3	0.0	19.4
Incr Delay (d2), s/veh	2.4	1.7	0.0	0.0	0.3	0.1	0.0	0.0	0.0	1.3	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	3.2	0.0	0.0	0.8	0.2	0.0	0.0	0.1	3.1	0.0	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.5	9.7	5.8	11.2	6.7	6.1	21.0	0.0	18.1	23.6	0.0	19.9
LnGrp LOS	B	A	A	B	A	A	C	A	B	C	A	B
Approach Vol, veh/h		885			232			13			373	
Approach Delay, s/veh		10.8			6.6			18.8			22.4	
Approach LOS		B			A			B			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		40.3		20.0		40.3		20.0				
Change Period (Y+Rc), s		6.3		6.3		6.3		6.3				
Max Green Setting (Gmax), s		34.0		24.0		34.0		24.0				
Max Q Clear Time (g_c+I1), s		17.5		5.8		12.4		12.7				
Green Ext Time (p_c), s		4.2		0.0		1.0		1.0				

Intersection Summary			
HCM 6th Ctrl Delay			13.1
HCM 6th LOS			B

Intersection	
Int Delay, s/veh	4.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	67	56	126	75	154	269
Future Vol, veh/h	67	56	126	75	154	269
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	77	77	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	73	61	164	97	173	302

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	861	213	0	0	261	0
Stage 1	213	-	-	-	-	-
Stage 2	648	-	-	-	-	-
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	326	827	-	-	1303	-
Stage 1	823	-	-	-	-	-
Stage 2	521	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	274	827	-	-	1303	-
Mov Cap-2 Maneuver	274	-	-	-	-	-
Stage 1	691	-	-	-	-	-
Stage 2	521	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.8	0	3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	394	1303	-
HCM Lane V/C Ratio	-	-	0.339	0.133	-
HCM Control Delay (s)	-	-	18.8	8.2	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	1.5	0.5	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	319	0	0	111	1	0	0	0	7	0	3
Future Vol, veh/h	2	319	0	0	111	1	0	0	0	7	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	25	-	-	25	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	88	88	88	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	2	371	0	0	126	1	0	0	0	8	0	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	127	0	0	371	0	0	503	502	371	501	501	126
Stage 1	-	-	-	-	-	-	375	375	-	126	126	-
Stage 2	-	-	-	-	-	-	128	127	-	375	375	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1459	-	-	1188	-	-	479	471	675	480	472	924
Stage 1	-	-	-	-	-	-	646	617	-	878	792	-
Stage 2	-	-	-	-	-	-	876	791	-	646	617	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1459	-	-	1188	-	-	477	470	675	479	471	924
Mov Cap-2 Maneuver	-	-	-	-	-	-	477	470	-	479	471	-
Stage 1	-	-	-	-	-	-	645	616	-	876	792	-
Stage 2	-	-	-	-	-	-	873	791	-	645	616	-

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

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1459	-	-	1188	-	-	560
HCM Lane V/C Ratio	-	0.002	-	-	-	-	-	0.019
HCM Control Delay (s)	0	7.5	0	-	0	-	-	11.6
HCM Lane LOS	A	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	6.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	66	261	62	52	180	51
Future Vol, veh/h	66	261	62	52	180	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	-	-	-	-	0	50
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	87	87	88	88	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	76	300	70	59	194	55

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	129	0	-	0	552	100
Stage 1	-	-	-	-	100	-
Stage 2	-	-	-	-	452	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1457	-	-	-	495	956
Stage 1	-	-	-	-	924	-
Stage 2	-	-	-	-	641	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1457	-	-	-	464	956
Mov Cap-2 Maneuver	-	-	-	-	464	-
Stage 1	-	-	-	-	866	-
Stage 2	-	-	-	-	641	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	16.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1457	-	-	-	464	956
HCM Lane V/C Ratio	0.052	-	-	-	0.417	0.057
HCM Control Delay (s)	7.6	0	-	-	18.2	9
HCM Lane LOS	A	A	-	-	C	A
HCM 95th %tile Q(veh)	0.2	-	-	-	2	0.2

Intersection	
Intersection Delay, s/veh	8.9
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	285	558	543
Demand Flow Rate, veh/h	290	570	554
Vehicles Circulating, veh/h	80	289	216
Vehicles Exiting, veh/h	779	481	154
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	4.9	10.7	9.1
Approach LOS	A	B	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	290	570	554
Cap Entry Lane, veh/h	1272	1028	1107
Entry HV Adj Factor	0.983	0.980	0.980
Flow Entry, veh/h	285	558	543
Cap Entry, veh/h	1250	1007	1085
V/C Ratio	0.228	0.555	0.500
Control Delay, s/veh	4.9	10.7	9.1
LOS	A	B	A
95th %tile Queue, veh	1	4	3

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	1055	0	0	288	5	0	0	0	31	0	22
Future Vol, veh/h	1	1055	0	0	288	5	0	0	0	31	0	22
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	-	-	-	-	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	73	73	73	92	92	92	60	60	60
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	1172	0	0	395	7	0	0	0	52	0	37

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	402	0	0	1172	0	0	1591	1576	1172	1569	1569	395
Stage 1	-	-	-	-	-	-	1174	1174	-	395	395	-
Stage 2	-	-	-	-	-	-	417	402	-	1174	1174	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1157	-	-	596	-	-	87	110	234	90	111	654
Stage 1	-	-	-	-	-	-	234	266	-	630	605	-
Stage 2	-	-	-	-	-	-	613	600	-	234	266	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1157	-	-	596	-	-	82	110	234	90	111	654
Mov Cap-2 Maneuver	-	-	-	-	-	-	82	110	-	90	111	-
Stage 1	-	-	-	-	-	-	234	265	-	629	605	-
Stage 2	-	-	-	-	-	-	579	600	-	234	265	-

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

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1157	-	-	596	-	-	140
HCM Lane V/C Ratio	-	0.001	-	-	-	-	-	0.631
HCM Control Delay (s)	0	8.1	0	-	0	-	-	66.8
HCM Lane LOS	A	A	A	-	A	-	-	F
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	363	100	40	724	251	180	108	25	108	83	128
Future Volume (veh/h)	71	363	100	40	724	251	180	108	25	108	83	128
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	81	412	80	45	813	260	209	126	20	121	93	99
Peak Hour Factor	0.88	0.88	0.88	0.89	0.89	0.89	0.86	0.86	0.86	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	90	1089	923	510	791	253	265	382	61	309	201	214
Arrive On Green	0.58	0.58	0.58	0.58	0.58	0.58	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	526	1870	1585	905	1358	434	1191	1575	250	1242	829	882
Grp Volume(v), veh/h	81	412	80	45	0	1073	209	0	146	121	0	192
Grp Sat Flow(s),veh/h/ln	526	1870	1585	905	0	1792	1191	0	1825	1242	0	1712
Q Serve(g_s), s	0.0	9.4	1.8	2.2	0.0	46.6	11.7	0.0	5.3	7.1	0.0	7.7
Cycle Q Clear(g_c), s	46.6	9.4	1.8	11.7	0.0	46.6	19.4	0.0	5.3	12.4	0.0	7.7
Prop In Lane	1.00		1.00	1.00		0.24	1.00		0.14	1.00		0.52
Lane Grp Cap(c), veh/h	90	1089	923	510	0	1044	265	0	443	309	0	415
V/C Ratio(X)	0.90	0.38	0.09	0.09	0.00	1.03	0.79	0.00	0.33	0.39	0.00	0.46
Avail Cap(c_a), veh/h	90	1089	923	510	0	1044	265	0	443	309	0	415
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.0	8.9	7.3	12.1	0.0	16.7	35.1	0.0	24.9	30.0	0.0	25.9
Incr Delay (d2), s/veh	70.3	1.0	0.2	0.3	0.0	35.2	15.5	0.0	0.6	1.1	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	3.3	0.5	0.4	0.0	24.5	5.2	0.0	2.3	2.1	0.0	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	110.3	9.9	7.5	12.4	0.0	51.9	50.6	0.0	25.6	31.2	0.0	27.0
LnGrp LOS	F	A	A	B	A	F	D	A	C	C	A	C
Approach Vol, veh/h		573			1118			355			313	
Approach Delay, s/veh		23.8			50.3			40.3			28.6	
Approach LOS		C			D			D			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		54.0		26.0		54.0		26.0				
Change Period (Y+Rc), s		7.4		6.6		7.4		6.6				
Max Green Setting (Gmax), s		46.6		19.4		46.6		19.4				
Max Q Clear Time (g_c+I1), s		48.6		21.4		48.6		14.4				
Green Ext Time (p_c), s		0.0		0.0		0.0		0.9				
Intersection Summary												
HCM 6th Ctrl Delay			39.5									
HCM 6th LOS			D									

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	371	209	78	784	463	148
Future Volume (veh/h)	371	209	78	784	463	148
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	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	403	227	82	825	558	130
Peak Hour Factor	0.92	0.92	0.95	0.95	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	857	1282	357	857	625	556
Arrive On Green	0.46	0.46	0.46	0.46	0.35	0.35
Sat Flow, veh/h	1870	1585	796	1870	1781	1585
Grp Volume(v), veh/h	403	227	82	825	558	130
Grp Sat Flow(s),veh/h/ln	1870	1585	796	1870	1781	1585
Q Serve(g_s), s	9.7	2.1	5.2	28.0	19.4	3.8
Cycle Q Clear(g_c), s	9.7	2.1	14.9	28.0	19.4	3.8
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	857	1282	357	857	625	556
V/C Ratio(X)	0.47	0.18	0.23	0.96	0.89	0.23
Avail Cap(c_a), veh/h	857	1282	357	857	817	727
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.2	1.4	17.4	17.2	20.1	15.0
Incr Delay (d2), s/veh	1.8	0.3	1.5	22.8	10.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	1.8	1.0	14.7	8.1	1.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.1	1.7	18.9	40.0	30.2	15.2
LnGrp LOS	B	A	B	D	C	B
Approach Vol, veh/h	630			907	688	
Approach Delay, s/veh	9.6			38.1	27.3	
Approach LOS	A			D	C	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		36.0		29.4		36.0
Change Period (Y+Rc), s		* 6		6.5		* 6
Max Green Setting (Gmax), s		* 30		30.0		* 30
Max Q Clear Time (g_c+I1), s		11.7		21.4		30.0
Green Ext Time (p_c), s		2.8		1.6		0.0

Intersection Summary						
HCM 6th Ctrl Delay			26.7			
HCM 6th LOS			C			

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	295	200	34	2	454	271	36	25	13	95	34	348
Future Volume (veh/h)	295	200	34	2	454	271	36	25	13	95	34	348
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	328	222	27	2	528	222	40	28	11	104	37	272
Peak Hour Factor	0.90	0.90	0.90	0.86	0.86	0.86	0.89	0.89	0.89	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	380	1025	869	667	1025	869	192	318	125	433	48	353
Arrive On Green	0.55	0.55	0.55	0.55	0.55	0.55	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	712	1870	1585	1131	1870	1585	1070	1278	502	1368	193	1421
Grp Volume(v), veh/h	328	222	27	2	528	222	40	0	39	104	0	309
Grp Sat Flow(s),veh/h/ln	712	1870	1585	1131	1870	1585	1070	0	1780	1368	0	1615
Q Serve(g_s), s	23.0	3.8	0.5	0.1	11.0	4.6	2.2	0.0	1.0	3.9	0.0	11.0
Cycle Q Clear(g_c), s	34.0	3.8	0.5	3.8	11.0	4.6	13.3	0.0	1.0	5.0	0.0	11.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.28	1.00		0.88
Lane Grp Cap(c), veh/h	380	1025	869	667	1025	869	192	0	443	433	0	401
V/C Ratio(X)	0.86	0.22	0.03	0.00	0.51	0.26	0.21	0.00	0.09	0.24	0.00	0.77
Avail Cap(c_a), veh/h	380	1025	869	667	1025	869	340	0	689	623	0	625
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.8	7.2	6.4	8.2	8.8	7.4	27.8	0.0	17.9	19.8	0.0	21.6
Incr Delay (d2), s/veh	22.0	0.5	0.1	0.0	1.8	0.7	0.5	0.0	0.1	0.3	0.0	3.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.8	1.2	0.1	0.0	3.6	1.3	0.6	0.0	0.4	1.1	0.0	3.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.8	7.7	6.5	8.2	10.7	8.1	28.3	0.0	18.0	20.1	0.0	24.8
LnGrp LOS	D	A	A	A	B	A	C	A	B	C	A	C
Approach Vol, veh/h		577			752			79			413	
Approach Delay, s/veh		28.2			9.9			23.2			23.6	
Approach LOS		C			A			C			C	

Timer - Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		40.3		21.7		40.3		21.7
Change Period (Y+Rc), s		6.3		6.3		6.3		6.3
Max Green Setting (Gmax), s		34.0		24.0		34.0		24.0
Max Q Clear Time (g_c+I1), s		36.0		15.3		13.0		13.0
Green Ext Time (p_c), s		0.0		0.2		3.8		1.6

Intersection Summary			
HCM 6th Ctrl Delay			19.4
HCM 6th LOS			B

Intersection	
Int Delay, s/veh	24.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	172	171	352	103	84	208
Future Vol, veh/h	172	171	352	103	84	208
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	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	187	186	383	112	104	257

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	904	439	0	0	495	0
Stage 1	439	-	-	-	-	-
Stage 2	465	-	-	-	-	-
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	307	618	-	-	1069	-
Stage 1	650	-	-	-	-	-
Stage 2	632	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	272	618	-	-	1069	-
Mov Cap-2 Maneuver	272	-	-	-	-	-
Stage 1	577	-	-	-	-	-
Stage 2	632	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	77.3	0	2.5
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	377	1069	-
HCM Lane V/C Ratio	-	-	0.989	0.097	-
HCM Control Delay (s)	-	-	77.3	8.7	0
HCM Lane LOS	-	-	F	A	A
HCM 95th %tile Q(veh)	-	-	11.6	0.3	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	203	0	0	421	6	0	0	0	1	0	3
Future Vol, veh/h	2	203	0	0	421	6	0	0	0	1	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	25	-	-	25	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	95	95	95	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	254	0	0	443	6	0	0	0	1	0	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	449	0	0	254	0	0	708	709	254	703	703	443
Stage 1	-	-	-	-	-	-	260	260	-	443	443	-
Stage 2	-	-	-	-	-	-	448	449	-	260	260	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1111	-	-	1311	-	-	350	359	785	352	362	615
Stage 1	-	-	-	-	-	-	745	693	-	594	576	-
Stage 2	-	-	-	-	-	-	590	572	-	745	693	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1111	-	-	1311	-	-	347	358	785	351	361	615
Mov Cap-2 Maneuver	-	-	-	-	-	-	347	358	-	351	361	-
Stage 1	-	-	-	-	-	-	743	691	-	592	576	-
Stage 2	-	-	-	-	-	-	587	572	-	743	691	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	0	12
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1111	-	-	1311	-	-	518
HCM Lane V/C Ratio	-	0.002	-	-	-	-	-	0.008
HCM Control Delay (s)	0	8.2	0	-	0	-	-	12
HCM Lane LOS	A	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	98	107	293	226	72	133
Future Vol, veh/h	98	107	293	226	72	133
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	50
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	81	81	91	91	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	121	132	322	248	82	151

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	570	0	-	0	820	446
Stage 1	-	-	-	-	446	-
Stage 2	-	-	-	-	374	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1002	-	-	-	345	612
Stage 1	-	-	-	-	645	-
Stage 2	-	-	-	-	696	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1002	-	-	-	300	612
Mov Cap-2 Maneuver	-	-	-	-	300	-
Stage 1	-	-	-	-	561	-
Stage 2	-	-	-	-	696	-

Approach	EB	WB	SB
HCM Control Delay, s	4.3	0	15.8
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1002	-	-	-	300	612
HCM Lane V/C Ratio	0.121	-	-	-	0.273	0.247
HCM Control Delay (s)	9.1	0	-	-	21.4	12.8
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0.4	-	-	-	1.1	1

Intersection	
Intersection Delay, s/veh	12.0
Intersection LOS	B

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	700	646	203
Demand Flow Rate, veh/h	714	658	207
Vehicles Circulating, veh/h	328	113	418
Vehicles Exiting, veh/h	443	512	624
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	16.4	9.0	6.4
Approach LOS	C	A	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	714	658	207
Cap Entry Lane, veh/h	988	1230	901
Entry HV Adj Factor	0.980	0.981	0.981
Flow Entry, veh/h	700	646	203
Cap Entry, veh/h	968	1206	884
V/C Ratio	0.723	0.535	0.230
Control Delay, s/veh	16.4	9.0	6.4
LOS	C	A	A
95th %tile Queue, veh	7	3	1

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	570	2	5	1216	26	6	0	2	8	0	14
Future Vol, veh/h	17	570	2	5	1216	26	6	0	2	8	0	14
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	-	-	-	-	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	95	95	95	60	60	60	79	79	79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	19	640	2	5	1280	27	10	0	3	10	0	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1307	0	0	642	0	0	1992	1996	641	1971	1970	1280
Stage 1	-	-	-	-	-	-	679	679	-	1290	1290	-
Stage 2	-	-	-	-	-	-	1313	1317	-	681	680	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	530	-	-	943	-	-	45	60	475	47	63	202
Stage 1	-	-	-	-	-	-	441	451	-	201	234	-
Stage 2	-	-	-	-	-	-	195	227	-	440	451	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	530	-	-	943	-	-	39	56	475	44	58	202
Mov Cap-2 Maneuver	-	-	-	-	-	-	39	56	-	44	58	-
Stage 1	-	-	-	-	-	-	416	426	-	190	229	-
Stage 2	-	-	-	-	-	-	174	222	-	412	426	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0	98.9	63.8
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	51	530	-	-	943	-	-	88
HCM Lane V/C Ratio	0.261	0.036	-	-	0.006	-	-	0.316
HCM Control Delay (s)	98.9	12	0	-	8.8	0	-	63.8
HCM Lane LOS	F	B	A	-	A	A	-	F
HCM 95th %tile Q(veh)	0.9	0.1	-	-	0	-	-	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	89	747	45	14	190	69	28	16	55	229	15	79
Future Volume (veh/h)	89	747	45	14	190	69	28	16	55	229	15	79
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	95	795	44	17	235	60	46	26	65	241	16	79
Peak Hour Factor	0.94	0.94	0.94	0.81	0.81	0.81	0.61	0.61	0.61	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	597	1019	863	239	783	200	375	121	302	380	70	346
Arrive On Green	0.54	0.54	0.54	0.54	0.54	0.54	0.26	0.26	0.26	0.26	0.26	0.26
Sat Flow, veh/h	1084	1870	1585	655	1437	367	1301	474	1184	1306	274	1353
Grp Volume(v), veh/h	95	795	44	17	0	295	46	0	91	241	0	95
Grp Sat Flow(s),veh/h/ln	1084	1870	1585	655	0	1804	1301	0	1657	1306	0	1627
Q Serve(g_s), s	3.7	23.6	0.9	1.5	0.0	6.2	2.0	0.0	3.0	12.5	0.0	3.2
Cycle Q Clear(g_c), s	9.9	23.6	0.9	25.0	0.0	6.2	5.3	0.0	3.0	15.5	0.0	3.2
Prop In Lane	1.00		1.00	1.00		0.20	1.00		0.71	1.00		0.83
Lane Grp Cap(c), veh/h	597	1019	863	239	0	983	375	0	423	380	0	416
V/C Ratio(X)	0.16	0.78	0.05	0.07	0.00	0.30	0.12	0.00	0.21	0.63	0.00	0.23
Avail Cap(c_a), veh/h	597	1019	863	239	0	983	403	0	459	408	0	451
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.4	12.6	7.5	22.5	0.0	8.7	22.7	0.0	20.5	26.6	0.0	20.6
Incr Delay (d2), s/veh	0.6	5.9	0.1	0.6	0.0	0.8	0.2	0.0	0.4	3.5	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	9.0	0.3	0.2	0.0	2.1	0.6	0.0	1.2	4.0	0.0	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.9	18.6	7.6	23.1	0.0	9.5	22.9	0.0	20.9	30.1	0.0	21.0
LnGrp LOS	B	B	A	C	A	A	C	A	C	C	A	C
Approach Vol, veh/h		934			312			137			336	
Approach Delay, s/veh		17.4			10.2			21.6			27.6	
Approach LOS		B			B			C			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		45.5		24.5		45.5		24.5				
Change Period (Y+Rc), s		7.4		6.6		7.4		6.6				
Max Green Setting (Gmax), s		36.6		19.4		36.6		19.4				
Max Q Clear Time (g_c+I1), s		25.6		7.3		27.0		17.5				
Green Ext Time (p_c), s		4.3		0.6		1.1		0.4				
Intersection Summary												
HCM 6th Ctrl Delay			18.4									
HCM 6th LOS			B									

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	746	344	61	179	115	57
Future Volume (veh/h)	746	344	61	179	115	57
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	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	820	378	84	245	151	55
Peak Hour Factor	0.91	0.91	0.73	0.73	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1143	1181	290	1143	239	212
Arrive On Green	0.61	0.61	0.61	0.61	0.13	0.13
Sat Flow, veh/h	1870	1585	467	1870	1781	1585
Grp Volume(v), veh/h	820	378	84	245	151	55
Grp Sat Flow(s),veh/h/ln	1870	1585	467	1870	1781	1585
Q Serve(g_s), s	14.9	3.9	7.4	2.9	3.9	1.5
Cycle Q Clear(g_c), s	14.9	3.9	22.3	2.9	3.9	1.5
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1143	1181	290	1143	239	212
V/C Ratio(X)	0.72	0.32	0.29	0.21	0.63	0.26
Avail Cap(c_a), veh/h	1143	1181	290	1143	1089	969
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	6.6	2.1	14.3	4.3	20.1	19.1
Incr Delay (d2), s/veh	3.9	0.7	2.5	0.4	2.8	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	1.1	0.8	0.6	1.5	0.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	10.5	2.8	16.8	4.7	22.9	19.7
LnGrp LOS	B	A	B	A	C	B
Approach Vol, veh/h	1198			329	206	
Approach Delay, s/veh	8.1			7.8	22.0	
Approach LOS	A			A	C	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		36.0		13.1		36.0
Change Period (Y+Rc), s		* 6		6.5		* 6
Max Green Setting (Gmax), s		* 30		30.0		* 30
Max Q Clear Time (g_c+I1), s		16.9		5.9		24.3
Green Ext Time (p_c), s		5.6		0.5		1.1
Intersection Summary						
HCM 6th Ctrl Delay			9.7			
HCM 6th LOS			A			

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	320	479	10	1	118	54	2	2	6	231	2	137
Future Volume (veh/h)	320	479	10	1	118	54	2	2	6	231	2	137
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	352	526	8	1	176	60	3	3	7	285	2	120
Peak Hour Factor	0.91	0.91	0.91	0.67	0.67	0.67	0.75	0.75	0.75	0.81	0.81	0.81
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	692	1028	871	441	1028	871	350	123	287	457	6	386
Arrive On Green	0.55	0.55	0.55	0.55	0.55	0.55	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	1144	1870	1585	870	1870	1585	1269	498	1163	1405	26	1563
Grp Volume(v), veh/h	352	526	8	1	176	60	3	0	10	285	0	122
Grp Sat Flow(s),veh/h/ln	1144	1870	1585	870	1870	1585	1269	0	1661	1405	0	1589
Q Serve(g_s), s	13.7	10.9	0.1	0.0	2.9	1.1	0.1	0.0	0.3	11.9	0.0	3.9
Cycle Q Clear(g_c), s	16.6	10.9	0.1	10.9	2.9	1.1	4.0	0.0	0.3	12.2	0.0	3.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.70	1.00		0.98
Lane Grp Cap(c), veh/h	692	1028	871	441	1028	871	350	0	410	457	0	392
V/C Ratio(X)	0.51	0.51	0.01	0.00	0.17	0.07	0.01	0.00	0.02	0.62	0.00	0.31
Avail Cap(c_a), veh/h	692	1028	871	441	1028	871	529	0	644	655	0	616
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.0	8.7	6.3	12.2	6.9	6.5	20.6	0.0	17.7	22.3	0.0	19.0
Incr Delay (d2), s/veh	2.7	1.8	0.0	0.0	0.4	0.2	0.0	0.0	0.0	1.4	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	3.6	0.0	0.0	0.9	0.3	0.0	0.0	0.1	3.6	0.0	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.7	10.6	6.3	12.2	7.3	6.7	20.6	0.0	17.7	23.7	0.0	19.5
LnGrp LOS	B	B	A	B	A	A	C	A	B	C	A	B
Approach Vol, veh/h		886			237			13			407	
Approach Delay, s/veh		11.8			7.2			18.4			22.4	
Approach LOS		B			A			B			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		40.3		21.6		40.3		21.6				
Change Period (Y+Rc), s		6.3		6.3		6.3		6.3				
Max Green Setting (Gmax), s		34.0		24.0		34.0		24.0				
Max Q Clear Time (g_c+I1), s		18.6		6.0		12.9		14.2				
Green Ext Time (p_c), s		4.1		0.0		1.0		1.1				

Intersection Summary			
HCM 6th Ctrl Delay			13.9
HCM 6th LOS			B

Intersection	
Int Delay, s/veh	5.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	83	64	126	87	159	269
Future Vol, veh/h	83	64	126	87	159	269
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	77	77	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	90	70	164	113	179	302

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	881	221	0	0	277	0
Stage 1	221	-	-	-	-	-
Stage 2	660	-	-	-	-	-
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	317	819	-	-	1286	-
Stage 1	816	-	-	-	-	-
Stage 2	514	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	264	819	-	-	1286	-
Mov Cap-2 Maneuver	264	-	-	-	-	-
Stage 1	680	-	-	-	-	-
Stage 2	514	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	21.6	0	3.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	374	1286	-
HCM Lane V/C Ratio	-	-	0.427	0.139	-
HCM Control Delay (s)	-	-	21.6	8.2	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	2.1	0.5	-

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	319	17	10	111	1	24	0	56	7	0	3
Future Vol, veh/h	2	319	17	10	111	1	24	0	56	7	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	25	150	-	25	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	88	88	88	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	2	371	20	11	126	1	26	0	61	8	0	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	127	0	0	391	0	0	525	524	371	564	543	126
Stage 1	-	-	-	-	-	-	375	375	-	148	148	-
Stage 2	-	-	-	-	-	-	150	149	-	416	395	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1459	-	-	1168	-	-	463	458	675	436	447	924
Stage 1	-	-	-	-	-	-	646	617	-	855	775	-
Stage 2	-	-	-	-	-	-	853	774	-	614	605	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1459	-	-	1168	-	-	457	453	675	393	443	924
Mov Cap-2 Maneuver	-	-	-	-	-	-	457	453	-	393	443	-
Stage 1	-	-	-	-	-	-	645	616	-	854	768	-
Stage 2	-	-	-	-	-	-	842	767	-	558	604	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.7	12.2	12.8
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	590	1459	-	-	1168	-	-	475
HCM Lane V/C Ratio	0.147	0.002	-	-	0.01	-	-	0.023
HCM Control Delay (s)	12.2	7.5	-	-	8.1	-	-	12.8
HCM Lane LOS	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.5	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	6.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	70	313	69	52	180	54
Future Vol, veh/h	70	313	69	52	180	54
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	50
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	87	87	88	88	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	80	360	78	59	194	58

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	137	0	-	0	628	108
Stage 1	-	-	-	-	108	-
Stage 2	-	-	-	-	520	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1447	-	-	-	447	946
Stage 1	-	-	-	-	916	-
Stage 2	-	-	-	-	597	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1447	-	-	-	416	946
Mov Cap-2 Maneuver	-	-	-	-	416	-
Stage 1	-	-	-	-	853	-
Stage 2	-	-	-	-	597	-

Approach	EB		WB		SB	
HCM Control Delay, s	1.4		0		18.3	
HCM LOS					C	

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1447	-	-	-	416	946
HCM Lane V/C Ratio	0.056	-	-	-	0.465	0.061
HCM Control Delay (s)	7.6	0	-	-	21	9.1
HCM Lane LOS	A	A	-	-	C	A
HCM 95th %tile Q(veh)	0.2	-	-	-	2.4	0.2

Intersection	
Intersection Delay, s/veh	9.6
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	289	563	599
Demand Flow Rate, veh/h	295	575	611
Vehicles Circulating, veh/h	85	315	216
Vehicles Exiting, veh/h	805	512	164
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	5.0	11.4	10.1
Approach LOS	A	B	B

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	295	575	611
Cap Entry Lane, veh/h	1265	1001	1107
Entry HV Adj Factor	0.980	0.980	0.981
Flow Entry, veh/h	289	563	599
Cap Entry, veh/h	1240	980	1086
V/C Ratio	0.233	0.575	0.552
Control Delay, s/veh	5.0	11.4	10.1
LOS	A	B	B
95th %tile Queue, veh	1	4	3

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	1059	0	0	289	5	0	0	0	31	0	22
Future Vol, veh/h	1	1059	0	0	289	5	0	0	0	31	0	22
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	-	-	-	-	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	73	73	73	92	92	92	60	60	60
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	1177	0	0	396	7	0	0	0	52	0	37

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	403	0	0	1177	0	0	1597	1582	1177	1575	1575	396
Stage 1	-	-	-	-	-	-	1179	1179	-	396	396	-
Stage 2	-	-	-	-	-	-	418	403	-	1179	1179	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1156	-	-	593	-	-	86	109	233	89	110	653
Stage 1	-	-	-	-	-	-	232	264	-	629	604	-
Stage 2	-	-	-	-	-	-	612	600	-	232	264	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1156	-	-	593	-	-	81	109	233	89	110	653
Mov Cap-2 Maneuver	-	-	-	-	-	-	81	109	-	89	110	-
Stage 1	-	-	-	-	-	-	232	263	-	628	604	-
Stage 2	-	-	-	-	-	-	578	600	-	232	263	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	67.8
HCM LOS			A	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1156	-	-	593	-	-	139
HCM Lane V/C Ratio	-	0.001	-	-	-	-	-	0.635
HCM Control Delay (s)	0	8.1	0	-	0	-	-	67.8
HCM Lane LOS	A	A	A	-	A	-	-	F
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	89	363	100	40	724	260	180	108	25	111	83	147
Future Volume (veh/h)	89	363	100	40	724	260	180	108	25	111	83	147
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	101	412	80	45	813	270	209	126	20	125	93	120
Peak Hour Factor	0.88	0.88	0.88	0.89	0.89	0.89	0.86	0.86	0.86	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	90	1089	923	510	783	260	246	382	61	309	180	232
Arrive On Green	0.58	0.58	0.58	0.58	0.58	0.58	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	521	1870	1585	905	1344	446	1168	1575	250	1242	741	957
Grp Volume(v), veh/h	101	412	80	45	0	1083	209	0	146	125	0	213
Grp Sat Flow(s),veh/h/ln	521	1870	1585	905	0	1790	1168	0	1825	1242	0	1698
Q Serve(g_s), s	0.0	9.4	1.8	2.2	0.0	46.6	10.7	0.0	5.3	7.4	0.0	8.7
Cycle Q Clear(g_c), s	46.6	9.4	1.8	11.7	0.0	46.6	19.4	0.0	5.3	12.6	0.0	8.7
Prop In Lane	1.00		1.00	1.00		0.25	1.00		0.14	1.00		0.56
Lane Grp Cap(c), veh/h	90	1089	923	510	0	1043	246	0	443	309	0	412
V/C Ratio(X)	1.12	0.38	0.09	0.09	0.00	1.04	0.85	0.00	0.33	0.40	0.00	0.52
Avail Cap(c_a), veh/h	90	1089	923	510	0	1043	246	0	443	309	0	412
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.0	8.9	7.3	12.1	0.0	16.7	36.0	0.0	24.9	30.2	0.0	26.2
Incr Delay (d2), s/veh	131.7	1.0	0.2	0.3	0.0	38.4	23.9	0.0	0.6	1.2	0.0	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	3.3	0.5	0.4	0.0	25.4	5.7	0.0	2.3	2.2	0.0	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	171.7	9.9	7.5	12.4	0.0	55.1	59.9	0.0	25.6	31.4	0.0	27.8
LnGrp LOS	F	A	A	B	A	F	E	A	C	C	A	C
Approach Vol, veh/h		593			1128			355			338	
Approach Delay, s/veh		37.2			53.4			45.8			29.1	
Approach LOS		D			D			D			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		54.0		26.0		54.0		26.0				
Change Period (Y+Rc), s		7.4		6.6		7.4		6.6				
Max Green Setting (Gmax), s		46.6		19.4		46.6		19.4				
Max Q Clear Time (g_c+I1), s		48.6		21.4		48.6		14.6				
Green Ext Time (p_c), s		0.0		0.0		0.0		0.9				
Intersection Summary												
HCM 6th Ctrl Delay			44.9									
HCM 6th LOS			D									

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	371	212	80	784	472	157
Future Volume (veh/h)	371	212	80	784	472	157
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	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	403	230	84	825	569	141
Peak Hour Factor	0.92	0.92	0.95	0.95	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	850	1285	351	850	634	565
Arrive On Green	0.45	0.45	0.45	0.45	0.36	0.36
Sat Flow, veh/h	1870	1585	794	1870	1781	1585
Grp Volume(v), veh/h	403	230	84	825	569	141
Grp Sat Flow(s),veh/h/ln	1870	1585	794	1870	1781	1585
Q Serve(g_s), s	9.9	2.1	5.4	28.4	19.9	4.1
Cycle Q Clear(g_c), s	9.9	2.1	15.3	28.4	19.9	4.1
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	850	1285	351	850	634	565
V/C Ratio(X)	0.47	0.18	0.24	0.97	0.90	0.25
Avail Cap(c_a), veh/h	850	1285	351	850	810	720
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.5	1.4	17.8	17.6	20.1	15.0
Incr Delay (d2), s/veh	1.9	0.3	1.6	24.5	10.7	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	1.8	1.0	15.3	8.4	1.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.4	1.7	19.5	42.1	30.8	15.2
LnGrp LOS	B	A	B	D	C	B
Approach Vol, veh/h	633			909	710	
Approach Delay, s/veh	9.8			40.0	27.7	
Approach LOS	A			D	C	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		36.0		30.0		36.0
Change Period (Y+Rc), s		* 6		6.5		* 6
Max Green Setting (Gmax), s		* 30		30.0		* 30
Max Q Clear Time (g_c+I1), s		11.9		21.9		30.4
Green Ext Time (p_c), s		2.8		1.6		0.0

Intersection Summary			
HCM 6th Ctrl Delay			27.6
HCM 6th LOS			C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	304	200	34	2	454	294	36	25	13	100	34	350
Future Volume (veh/h)	304	200	34	2	454	294	36	25	13	100	34	350
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	338	222	27	2	528	249	40	28	11	110	37	275
Peak Hour Factor	0.90	0.90	0.90	0.86	0.86	0.86	0.89	0.89	0.89	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	372	1023	867	665	1023	867	191	320	126	436	48	356
Arrive On Green	0.55	0.55	0.55	0.55	0.55	0.55	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	694	1870	1585	1131	1870	1585	1067	1278	502	1368	191	1423
Grp Volume(v), veh/h	338	222	27	2	528	249	40	0	39	110	0	312
Grp Sat Flow(s),veh/h/ln	694	1870	1585	1131	1870	1585	1067	0	1780	1368	0	1614
Q Serve(g_s), s	22.9	3.8	0.5	0.1	11.1	5.2	2.2	0.0	1.0	4.2	0.0	11.2
Cycle Q Clear(g_c), s	34.0	3.8	0.5	3.9	11.1	5.2	13.4	0.0	1.0	5.2	0.0	11.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.28	1.00		0.88
Lane Grp Cap(c), veh/h	372	1023	867	665	1023	867	191	0	446	436	0	404
V/C Ratio(X)	0.91	0.22	0.03	0.00	0.52	0.29	0.21	0.00	0.09	0.25	0.00	0.77
Avail Cap(c_a), veh/h	372	1023	867	665	1023	867	336	0	687	621	0	623
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.4	7.2	6.5	8.2	8.9	7.6	27.9	0.0	17.9	19.9	0.0	21.6
Incr Delay (d2), s/veh	28.5	0.5	0.1	0.0	1.9	0.8	0.5	0.0	0.1	0.3	0.0	3.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.6	1.2	0.1	0.0	3.7	1.5	0.6	0.0	0.4	1.2	0.0	4.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.9	7.7	6.6	8.2	10.8	8.4	28.4	0.0	17.9	20.2	0.0	24.8
LnGrp LOS	D	A	A	A	B	A	C	A	B	C	A	C
Approach Vol, veh/h		587			779			79			422	
Approach Delay, s/veh		32.5			10.0			23.2			23.6	
Approach LOS		C			A			C			C	

Timer - Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		40.3		21.9		40.3		21.9
Change Period (Y+Rc), s		6.3		6.3		6.3		6.3
Max Green Setting (Gmax), s		34.0		24.0		34.0		24.0
Max Q Clear Time (g_c+I1), s		36.0		15.4		13.1		13.2
Green Ext Time (p_c), s		0.0		0.2		3.9		1.6

Intersection Summary	
HCM 6th Ctrl Delay	20.7
HCM 6th LOS	C

Intersection	
Int Delay, s/veh	42.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	194	182	352	130	93	208
Future Vol, veh/h	194	182	352	130	93	208
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	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	211	198	383	141	115	257

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	941	454	0	0	524	0
Stage 1	454	-	-	-	-	-
Stage 2	487	-	-	-	-	-
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	292	606	-	-	1043	-
Stage 1	640	-	-	-	-	-
Stage 2	618	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	254	606	-	-	1043	-
Mov Cap-2 Maneuver	254	-	-	-	-	-
Stage 1	557	-	-	-	-	-
Stage 2	618	-	-	-	-	-

Approach	WB		NB		SB
HCM Control Delay, s	131.8		0		2.7
HCM LOS	F				

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	353	1043	-
HCM Lane V/C Ratio	-	-	1.158	0.11	-
HCM Control Delay (s)	-	-	131.8	8.9	0
HCM Lane LOS	-	-	F	A	A
HCM 95th %tile Q(veh)	-	-	16.3	0.4	-

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	203	36	55	421	6	33	0	20	1	0	3
Future Vol, veh/h	2	203	36	55	421	6	33	0	20	1	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	25	150	-	25	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	95	95	95	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	254	45	58	443	6	36	0	22	1	0	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	449	0	0	299	0	0	824	825	254	853	864	443
Stage 1	-	-	-	-	-	-	260	260	-	559	559	-
Stage 2	-	-	-	-	-	-	564	565	-	294	305	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1111	-	-	1262	-	-	292	308	785	279	292	615
Stage 1	-	-	-	-	-	-	745	693	-	513	511	-
Stage 2	-	-	-	-	-	-	510	508	-	714	662	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1111	-	-	1262	-	-	280	293	785	261	278	615
Mov Cap-2 Maneuver	-	-	-	-	-	-	280	293	-	261	278	-
Stage 1	-	-	-	-	-	-	743	691	-	511	487	-
Stage 2	-	-	-	-	-	-	484	485	-	692	660	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.9	16.5	12.9
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	370	1111	-	-	1262	-	-	459
HCM Lane V/C Ratio	0.156	0.002	-	-	0.046	-	-	0.009
HCM Control Delay (s)	16.5	8.2	-	-	8	-	-	12.9
HCM Lane LOS	C	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.5	0	-	-	0.1	-	-	0

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	103	122	343	226	72	138
Future Vol, veh/h	103	122	343	226	72	138
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	50
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	81	81	91	91	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	127	151	377	248	82	157

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	625	0	-	0	906	501
Stage 1	-	-	-	-	501	-
Stage 2	-	-	-	-	405	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	956	-	-	-	307	570
Stage 1	-	-	-	-	609	-
Stage 2	-	-	-	-	673	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	956	-	-	-	262	570
Mov Cap-2 Maneuver	-	-	-	-	262	-
Stage 1	-	-	-	-	521	-
Stage 2	-	-	-	-	673	-

Approach	EB		WB		SB	
HCM Control Delay, s	4.3		0		17.5	
HCM LOS					C	

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	956	-	-	-	262	570
HCM Lane V/C Ratio	0.133	-	-	-	0.312	0.275
HCM Control Delay (s)	9.3	0	-	-	24.9	13.7
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0.5	-	-	-	1.3	1.1

Intersection	
Intersection Delay, s/veh	13.6
Intersection LOS	B

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	720	680	220
Demand Flow Rate, veh/h	734	693	224
Vehicles Circulating, veh/h	363	122	418
Vehicles Exiting, veh/h	452	520	679
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	19.3	9.7	6.7
Approach LOS	C	A	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	734	693	224
Cap Entry Lane, veh/h	953	1218	901
Entry HV Adj Factor	0.981	0.981	0.982
Flow Entry, veh/h	720	680	220
Cap Entry, veh/h	935	1195	885
V/C Ratio	0.770	0.569	0.249
Control Delay, s/veh	19.3	9.7	6.7
LOS	C	A	A
95th %tile Queue, veh	8	4	1

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	17	573	2	5	1225	26	6	0	2	8	0	14
Future Vol, veh/h	17	573	2	5	1225	26	6	0	2	8	0	14
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	-	-	-	-	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	95	95	95	60	60	60	79	79	79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	19	644	2	5	1289	27	10	0	3	10	0	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1316	0	0	646	0	0	2005	2009	645	1984	1983	1289
Stage 1	-	-	-	-	-	-	683	683	-	1299	1299	-
Stage 2	-	-	-	-	-	-	1322	1326	-	685	684	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	525	-	-	939	-	-	44	59	472	46	61	200
Stage 1	-	-	-	-	-	-	439	449	-	199	232	-
Stage 2	-	-	-	-	-	-	193	225	-	438	449	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	525	-	-	939	-	-	38	55	472	43	56	200
Mov Cap-2 Maneuver	-	-	-	-	-	-	38	55	-	43	56	-
Stage 1	-	-	-	-	-	-	414	424	-	188	227	-
Stage 2	-	-	-	-	-	-	172	221	-	411	424	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0	104	65.7
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	49	525	-	-	939	-	-	86
HCM Lane V/C Ratio	0.272	0.036	-	-	0.006	-	-	0.324
HCM Control Delay (s)	104	12.1	0	-	8.9	0	-	65.7
HCM Lane LOS	F	B	A	-	A	A	-	F
HCM 95th %tile Q(veh)	0.9	0.1	-	-	0	-	-	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	84	752	45	14	197	68	28	16	55	225	15	72
Future Volume (veh/h)	84	752	45	14	197	68	28	16	55	225	15	72
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	89	800	44	17	243	59	46	26	65	237	16	72
Peak Hour Factor	0.94	0.94	0.94	0.81	0.81	0.81	0.61	0.61	0.61	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	594	1023	867	239	796	193	378	120	299	376	75	337
Arrive On Green	0.55	0.55	0.55	0.55	0.55	0.55	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	1077	1870	1585	652	1454	353	1309	474	1184	1306	296	1334
Grp Volume(v), veh/h	89	800	44	17	0	302	46	0	91	237	0	88
Grp Sat Flow(s),veh/h/ln	1077	1870	1585	652	0	1807	1309	0	1657	1306	0	1630
Q Serve(g_s), s	3.4	23.7	0.9	1.5	0.0	6.4	2.0	0.0	3.0	12.3	0.0	3.0
Cycle Q Clear(g_c), s	9.8	23.7	0.9	25.2	0.0	6.4	5.0	0.0	3.0	15.3	0.0	3.0
Prop In Lane	1.00		1.00	1.00		0.20	1.00		0.71	1.00		0.82
Lane Grp Cap(c), veh/h	594	1023	867	239	0	989	378	0	419	376	0	412
V/C Ratio(X)	0.15	0.78	0.05	0.07	0.00	0.31	0.12	0.00	0.22	0.63	0.00	0.21
Avail Cap(c_a), veh/h	594	1023	867	239	0	989	410	0	459	408	0	452
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.3	12.5	7.4	22.5	0.0	8.6	22.6	0.0	20.7	26.7	0.0	20.7
Incr Delay (d2), s/veh	0.5	5.9	0.1	0.6	0.0	0.8	0.2	0.0	0.4	3.4	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	9.0	0.3	0.2	0.0	2.1	0.6	0.0	1.2	3.9	0.0	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.8	18.5	7.5	23.1	0.0	9.4	22.8	0.0	21.0	30.1	0.0	21.0
LnGrp LOS	B	B	A	C	A	A	C	A	C	C	A	C
Approach Vol, veh/h		933			319			137			325	
Approach Delay, s/veh		17.3			10.1			21.6			27.6	
Approach LOS		B			B			C			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		45.7		24.3		45.7		24.3				
Change Period (Y+Rc), s		7.4		6.6		7.4		6.6				
Max Green Setting (Gmax), s		36.6		19.4		36.6		19.4				
Max Q Clear Time (g_c+I1), s		25.7		7.0		27.2		17.3				
Green Ext Time (p_c), s		4.3		0.6		1.2		0.4				
Intersection Summary												
HCM 6th Ctrl Delay			18.3									
HCM 6th LOS			B									

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	755	348	57	180	116	56
Future Volume (veh/h)	755	348	57	180	116	56
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	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	830	382	78	247	153	54
Peak Hour Factor	0.91	0.91	0.73	0.73	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1143	1181	285	1143	239	213
Arrive On Green	0.61	0.61	0.61	0.61	0.13	0.13
Sat Flow, veh/h	1870	1585	461	1870	1781	1585
Grp Volume(v), veh/h	830	382	78	247	153	54
Grp Sat Flow(s),veh/h/ln	1870	1585	461	1870	1781	1585
Q Serve(g_s), s	15.2	4.0	7.0	2.9	4.0	1.5
Cycle Q Clear(g_c), s	15.2	4.0	22.2	2.9	4.0	1.5
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1143	1181	285	1143	239	213
V/C Ratio(X)	0.73	0.32	0.27	0.22	0.64	0.25
Avail Cap(c_a), veh/h	1143	1181	285	1143	1089	969
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	6.7	2.1	14.4	4.3	20.1	19.0
Incr Delay (d2), s/veh	4.0	0.7	2.4	0.4	2.8	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	1.1	0.7	0.6	1.5	0.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	10.7	2.8	16.8	4.7	23.0	19.7
LnGrp LOS	B	A	B	A	C	B
Approach Vol, veh/h	1212			325	207	
Approach Delay, s/veh	8.2			7.6	22.1	
Approach LOS	A			A	C	

Timer - Assigned Phs	2	4	6
Phs Duration (G+Y+Rc), s	36.0	13.1	36.0
Change Period (Y+Rc), s	* 6	6.5	* 6
Max Green Setting (Gmax), s	* 30	30.0	* 30
Max Q Clear Time (g_c+I1), s	17.2	6.0	24.2
Green Ext Time (p_c), s	5.6	0.5	1.1

Intersection Summary	
HCM 6th Ctrl Delay	9.8
HCM 6th LOS	A

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	319	488	10	1	119	53	2	2	6	222	2	133
Future Volume (veh/h)	319	488	10	1	119	53	2	2	6	222	2	133
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	351	536	8	1	178	58	3	3	7	274	2	115
Peak Hour Factor	0.91	0.91	0.91	0.67	0.67	0.67	0.75	0.75	0.75	0.81	0.81	0.81
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	699	1038	880	442	1038	880	346	119	278	447	7	374
Arrive On Green	0.55	0.55	0.55	0.55	0.55	0.55	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	1144	1870	1585	862	1870	1585	1275	498	1163	1405	27	1562
Grp Volume(v), veh/h	351	536	8	1	178	58	3	0	10	274	0	117
Grp Sat Flow(s),veh/h/ln	1144	1870	1585	862	1870	1585	1275	0	1661	1405	0	1589
Q Serve(g_s), s	13.3	11.0	0.1	0.0	2.9	1.0	0.1	0.0	0.3	11.4	0.0	3.7
Cycle Q Clear(g_c), s	16.2	11.0	0.1	11.0	2.9	1.0	3.8	0.0	0.3	11.6	0.0	3.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.70	1.00		0.98
Lane Grp Cap(c), veh/h	699	1038	880	442	1038	880	346	0	398	447	0	381
V/C Ratio(X)	0.50	0.52	0.01	0.00	0.17	0.07	0.01	0.00	0.03	0.61	0.00	0.31
Avail Cap(c_a), veh/h	699	1038	880	442	1038	880	540	0	651	661	0	622
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.7	8.5	6.1	11.9	6.7	6.3	20.7	0.0	17.8	22.3	0.0	19.1
Incr Delay (d2), s/veh	2.6	1.8	0.0	0.0	0.4	0.1	0.0	0.0	0.0	1.4	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	3.5	0.0	0.0	0.9	0.3	0.0	0.0	0.1	3.4	0.0	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.3	10.3	6.1	11.9	7.1	6.4	20.7	0.0	17.9	23.6	0.0	19.6
LnGrp LOS	B	B	A	B	A	A	C	A	B	C	A	B
Approach Vol, veh/h		895			237			13			391	
Approach Delay, s/veh		11.5			6.9			18.5			22.4	
Approach LOS		B			A			B			C	

Timer - Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		40.3		21.0		40.3		21.0
Change Period (Y+Rc), s		6.3		6.3		6.3		6.3
Max Green Setting (Gmax), s		34.0		24.0		34.0		24.0
Max Q Clear Time (g_c+I1), s		18.2		5.8		13.0		13.6
Green Ext Time (p_c), s		4.2		0.0		1.0		1.0

Intersection Summary	
HCM 6th Ctrl Delay	13.6
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	4.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	72	64	126	81	159	269
Future Vol, veh/h	72	64	126	81	159	269
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	77	77	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	78	70	164	105	179	302

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	877	217	0	0	269	0
Stage 1	217	-	-	-	-	-
Stage 2	660	-	-	-	-	-
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	319	823	-	-	1295	-
Stage 1	819	-	-	-	-	-
Stage 2	514	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	266	823	-	-	1295	-
Mov Cap-2 Maneuver	266	-	-	-	-	-
Stage 1	683	-	-	-	-	-
Stage 2	514	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	19.8	0	3.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	390	1295	-
HCM Lane V/C Ratio	-	-	0.379	0.138	-
HCM Control Delay (s)	-	-	19.8	8.2	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	1.7	0.5	-

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	2	319	11	8	111	1	13	0	43	7	0	3
Future Vol, veh/h	2	319	11	8	111	1	13	0	43	7	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	25	150	-	25	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	88	88	88	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	2	371	13	9	126	1	14	0	47	8	0	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	127	0	0	384	0	0	521	520	371	549	532	126
Stage 1	-	-	-	-	-	-	375	375	-	144	144	-
Stage 2	-	-	-	-	-	-	146	145	-	405	388	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1459	-	-	1174	-	-	466	461	675	446	453	924
Stage 1	-	-	-	-	-	-	646	617	-	859	778	-
Stage 2	-	-	-	-	-	-	857	777	-	622	609	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1459	-	-	1174	-	-	461	457	675	412	449	924
Mov Cap-2 Maneuver	-	-	-	-	-	-	461	457	-	412	449	-
Stage 1	-	-	-	-	-	-	645	616	-	858	772	-
Stage 2	-	-	-	-	-	-	847	771	-	578	608	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.5	11.6	12.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	609	1459	-	-	1174	-	-	494
HCM Lane V/C Ratio	0.1	0.002	-	-	0.008	-	-	0.022
HCM Control Delay (s)	11.6	7.5	-	-	8.1	-	-	12.5
HCM Lane LOS	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0.1

Intersection						
Int Delay, s/veh	6.2					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	70	300	67	52	180	54
Future Vol, veh/h	70	300	67	52	180	54
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	50
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	87	87	88	88	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	80	345	76	59	194	58

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	135	0	-	0	611	106
Stage 1	-	-	-	-	106	-
Stage 2	-	-	-	-	505	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1449	-	-	-	457	948
Stage 1	-	-	-	-	918	-
Stage 2	-	-	-	-	606	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1449	-	-	-	426	948
Mov Cap-2 Maneuver	-	-	-	-	426	-
Stage 1	-	-	-	-	856	-
Stage 2	-	-	-	-	606	-

Approach	EB	WB	SB
HCM Control Delay, s	1.4	0	17.7
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1449	-	-	-	426	948
HCM Lane V/C Ratio	0.056	-	-	-	0.454	0.061
HCM Control Delay (s)	7.6	0	-	-	20.3	9
HCM Lane LOS	A	A	-	-	C	A
HCM 95th %tile Q(veh)	0.2	-	-	-	2.3	0.2

Intersection	
Intersection Delay, s/veh	9.4
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	289	560	585
Demand Flow Rate, veh/h	295	572	597
Vehicles Circulating, veh/h	82	315	216
Vehicles Exiting, veh/h	805	498	161
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	4.9	11.3	9.8
Approach LOS	A	B	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	295	572	597
Cap Entry Lane, veh/h	1269	1001	1107
Entry HV Adj Factor	0.980	0.980	0.981
Flow Entry, veh/h	289	560	585
Cap Entry, veh/h	1243	980	1086
V/C Ratio	0.232	0.572	0.539
Control Delay, s/veh	4.9	11.3	9.8
LOS	A	B	A
95th %tile Queue, veh	1	4	3

Intersection	
Int Delay, s/veh	10.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	1055	0	0	288	8	0	0	0	48	0	29
Future Vol, veh/h	6	1055	0	0	288	8	0	0	0	48	0	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	73	73	73	92	92	92	60	60	60
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	1172	0	0	395	11	0	0	0	80	0	48

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	406	0	0	1172	0	0	1611	1592	1172	1581	1581	395
Stage 1	-	-	-	-	-	-	1186	1186	-	395	395	-
Stage 2	-	-	-	-	-	-	425	406	-	1186	1186	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1153	-	-	596	-	-	84	107	234	88	109	654
Stage 1	-	-	-	-	-	-	230	262	-	630	605	-
Stage 2	-	-	-	-	-	-	607	598	-	230	262	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1153	-	-	596	-	-	77	105	234	87	107	654
Mov Cap-2 Maneuver	-	-	-	-	-	-	77	105	-	87	107	-
Stage 1	-	-	-	-	-	-	226	258	-	619	605	-
Stage 2	-	-	-	-	-	-	562	598	-	226	258	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	143.5
HCM LOS			A	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1153	-	-	596	-	-	129
HCM Lane V/C Ratio	-	0.006	-	-	-	-	-	0.995
HCM Control Delay (s)	0	8.1	0	-	0	-	-	143.5
HCM Lane LOS	A	A	A	-	A	-	-	F
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	6.9

HCM 6th Signalized Intersection Summary
1001: Chilson Commons/Chilson Road & M-36 11/30/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	81	371	100	40	734	251	180	108	25	108	83	137
Future Volume (veh/h)	81	371	100	40	734	251	180	108	25	108	83	137
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	92	422	80	45	825	260	209	126	20	121	93	109
Peak Hour Factor	0.88	0.88	0.88	0.89	0.89	0.89	0.86	0.86	0.86	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	90	1089	923	503	794	250	256	382	61	309	190	223
Arrive On Green	0.58	0.58	0.58	0.58	0.58	0.58	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	520	1870	1585	896	1363	430	1180	1575	250	1242	785	920
Grp Volume(v), veh/h	92	422	80	45	0	1085	209	0	146	121	0	202
Grp Sat Flow(s),veh/h/ln	520	1870	1585	896	0	1793	1180	0	1825	1242	0	1705
Q Serve(g_s), s	0.0	9.7	1.8	2.3	0.0	46.6	11.3	0.0	5.3	7.1	0.0	8.1
Cycle Q Clear(g_c), s	46.6	9.7	1.8	12.0	0.0	46.6	19.4	0.0	5.3	12.4	0.0	8.1
Prop In Lane	1.00		1.00	1.00		0.24	1.00		0.14	1.00		0.54
Lane Grp Cap(c), veh/h	90	1089	923	503	0	1044	256	0	443	309	0	413
V/C Ratio(X)	1.02	0.39	0.09	0.09	0.00	1.04	0.82	0.00	0.33	0.39	0.00	0.49
Avail Cap(c_a), veh/h	90	1089	923	503	0	1044	256	0	443	309	0	413
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.0	9.0	7.3	12.2	0.0	16.7	35.5	0.0	24.9	30.0	0.0	26.0
Incr Delay (d2), s/veh	101.0	1.0	0.2	0.4	0.0	38.4	18.9	0.0	0.6	1.1	0.0	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	3.4	0.5	0.4	0.0	25.5	5.4	0.0	2.3	2.1	0.0	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	141.0	10.0	7.5	12.6	0.0	55.1	54.5	0.0	25.6	31.2	0.0	27.3
LnGrp LOS	F	B	A	B	A	F	D	A	C	C	A	C
Approach Vol, veh/h		594			1130			355			323	
Approach Delay, s/veh		30.0			53.4			42.6			28.8	
Approach LOS		C			D			D			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		54.0		26.0		54.0		26.0				
Change Period (Y+Rc), s		7.4		6.6		7.4		6.6				
Max Green Setting (Gmax), s		46.6		19.4		46.6		19.4				
Max Q Clear Time (g_c+I1), s		48.6		21.4		48.6		14.4				
Green Ext Time (p_c), s		0.0		0.0		0.0		0.9				
Intersection Summary												
HCM 6th Ctrl Delay			42.7									
HCM 6th LOS			D									

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	372	214	78	785	481	148
Future Volume (veh/h)	372	214	78	785	481	148
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	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	404	233	82	826	580	130
Peak Hour Factor	0.92	0.92	0.95	0.95	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	843	1287	345	843	643	572
Arrive On Green	0.45	0.45	0.45	0.45	0.36	0.36
Sat Flow, veh/h	1870	1585	791	1870	1781	1585
Grp Volume(v), veh/h	404	233	82	826	580	130
Grp Sat Flow(s),veh/h/ln	1870	1585	791	1870	1781	1585
Q Serve(g_s), s	10.1	2.2	5.4	28.9	20.5	3.8
Cycle Q Clear(g_c), s	10.1	2.2	15.5	28.9	20.5	3.8
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	843	1287	345	843	643	572
V/C Ratio(X)	0.48	0.18	0.24	0.98	0.90	0.23
Avail Cap(c_a), veh/h	843	1287	345	843	803	715
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.8	1.4	18.2	18.0	20.1	14.8
Incr Delay (d2), s/veh	1.9	0.3	1.6	26.4	11.5	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	1.9	1.0	15.9	8.7	1.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.7	1.7	19.8	44.3	31.6	15.0
LnGrp LOS	B	A	B	D	C	B
Approach Vol, veh/h	637			908	710	
Approach Delay, s/veh	10.0			42.1	28.6	
Approach LOS	A			D	C	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		36.0		30.5		36.0
Change Period (Y+Rc), s		* 6		6.5		* 6
Max Green Setting (Gmax), s		* 30		30.0		* 30
Max Q Clear Time (g_c+I1), s		12.1		22.5		30.9
Green Ext Time (p_c), s		2.8		1.5		0.0

Intersection Summary						
HCM 6th Ctrl Delay			28.8			
HCM 6th LOS			C			

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	295	201	34	2	455	293	36	25	13	99	34	348
Future Volume (veh/h)	295	201	34	2	455	293	36	25	13	99	34	348
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	328	223	27	2	529	248	40	28	11	109	37	272
Peak Hour Factor	0.90	0.90	0.90	0.86	0.86	0.86	0.89	0.89	0.89	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	373	1025	869	666	1025	869	192	318	125	433	48	353
Arrive On Green	0.55	0.55	0.55	0.55	0.55	0.55	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	694	1870	1585	1130	1870	1585	1070	1278	502	1368	193	1421
Grp Volume(v), veh/h	328	223	27	2	529	248	40	0	39	109	0	309
Grp Sat Flow(s),veh/h/ln	694	1870	1585	1130	1870	1585	1070	0	1780	1368	0	1615
Q Serve(g_s), s	22.9	3.8	0.5	0.1	11.1	5.2	2.2	0.0	1.0	4.1	0.0	11.0
Cycle Q Clear(g_c), s	34.0	3.8	0.5	3.8	11.1	5.2	13.3	0.0	1.0	5.2	0.0	11.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.28	1.00		0.88
Lane Grp Cap(c), veh/h	373	1025	869	666	1025	869	192	0	443	433	0	401
V/C Ratio(X)	0.88	0.22	0.03	0.00	0.52	0.29	0.21	0.00	0.09	0.25	0.00	0.77
Avail Cap(c_a), veh/h	373	1025	869	666	1025	869	340	0	689	623	0	625
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.0	7.2	6.4	8.2	8.8	7.5	27.8	0.0	17.9	19.9	0.0	21.6
Incr Delay (d2), s/veh	24.3	0.5	0.1	0.0	1.9	0.8	0.5	0.0	0.1	0.3	0.0	3.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.0	1.2	0.1	0.0	3.6	1.4	0.6	0.0	0.4	1.2	0.0	3.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.3	7.7	6.5	8.2	10.7	8.3	28.3	0.0	18.0	20.2	0.0	24.8
LnGrp LOS	D	A	A	A	B	A	C	A	B	C	A	C
Approach Vol, veh/h		578			779			79			418	
Approach Delay, s/veh		29.5			9.9			23.2			23.6	
Approach LOS		C			A			C			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		40.3		21.7		40.3		21.7				
Change Period (Y+Rc), s		6.3		6.3		6.3		6.3				
Max Green Setting (Gmax), s		34.0		24.0		34.0		24.0				
Max Q Clear Time (g_c+I1), s		36.0		15.3		13.1		13.0				
Green Ext Time (p_c), s		0.0		0.2		3.9		1.6				
Intersection Summary												
HCM 6th Ctrl Delay			19.7									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	33.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	181	182	352	113	93	208
Future Vol, veh/h	181	182	352	113	93	208
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	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	197	198	383	123	115	257

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	932	445	0	0	506	0
Stage 1	445	-	-	-	-	-
Stage 2	487	-	-	-	-	-
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	296	613	-	-	1059	-
Stage 1	646	-	-	-	-	-
Stage 2	618	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	258	613	-	-	1059	-
Mov Cap-2 Maneuver	258	-	-	-	-	-
Stage 1	564	-	-	-	-	-
Stage 2	618	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	105.8	0	2.7
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	364	1059	-
HCM Lane V/C Ratio	-	-	1.084	0.108	-
HCM Control Delay (s)	-	-	105.8	8.8	0
HCM Lane LOS	-	-	F	A	A
HCM 95th %tile Q(veh)	-	-	14.2	0.4	-

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	203	19	45	421	6	20	0	17	1	0	3
Future Vol, veh/h	2	203	19	45	421	6	20	0	17	1	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	25	-	-	25	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	95	95	95	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	254	24	47	443	6	22	0	18	1	0	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	449	0	0	278	0	0	802	803	254	818	821	443
Stage 1	-	-	-	-	-	-	260	260	-	537	537	-
Stage 2	-	-	-	-	-	-	542	543	-	281	284	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1111	-	-	1285	-	-	302	317	785	295	309	615
Stage 1	-	-	-	-	-	-	745	693	-	528	523	-
Stage 2	-	-	-	-	-	-	525	520	-	726	676	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1111	-	-	1285	-	-	288	301	785	277	293	615
Mov Cap-2 Maneuver	-	-	-	-	-	-	288	301	-	277	293	-
Stage 1	-	-	-	-	-	-	743	691	-	526	497	-
Stage 2	-	-	-	-	-	-	497	495	-	707	674	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.8	14.8	12.7
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	406	1111	-	-	1285	-	-	471
HCM Lane V/C Ratio	0.099	0.002	-	-	0.037	-	-	0.009
HCM Control Delay (s)	14.8	8.2	0	-	7.9	0	-	12.7
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	0

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	103	119	333	226	72	138
Future Vol, veh/h	103	119	333	226	72	138
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	50
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	81	81	91	91	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	127	147	366	248	82	157

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	614	0	-	0	891	490
Stage 1	-	-	-	-	490	-
Stage 2	-	-	-	-	401	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	965	-	-	-	313	578
Stage 1	-	-	-	-	616	-
Stage 2	-	-	-	-	676	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	965	-	-	-	268	578
Mov Cap-2 Maneuver	-	-	-	-	268	-
Stage 1	-	-	-	-	528	-
Stage 2	-	-	-	-	676	-

Approach	EB	WB	SB
HCM Control Delay, s	4.3	0	17.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	965	-	-	-	268	578
HCM Lane V/C Ratio	0.132	-	-	-	0.305	0.271
HCM Control Delay (s)	9.3	0	-	-	24.2	13.5
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0.5	-	-	-	1.3	1.1

Intersection	
Intersection Delay, s/veh	13.2
Intersection LOS	B

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	720	669	217
Demand Flow Rate, veh/h	734	682	221
Vehicles Circulating, veh/h	352	122	418
Vehicles Exiting, veh/h	452	517	668
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	18.7	9.6	6.6
Approach LOS	C	A	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	734	682	221
Cap Entry Lane, veh/h	964	1218	901
Entry HV Adj Factor	0.981	0.981	0.982
Flow Entry, veh/h	720	669	217
Cap Entry, veh/h	945	1195	885
V/C Ratio	0.762	0.560	0.245
Control Delay, s/veh	18.7	9.6	6.6
LOS	C	A	A
95th %tile Queue, veh	8	4	1

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	570	2	5	1216	45	6	0	2	14	0	24
Future Vol, veh/h	25	570	2	5	1216	45	6	0	2	14	0	24
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	-	-	-	-	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	95	95	95	60	60	60	79	79	79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	28	640	2	5	1280	47	10	0	3	18	0	30

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1327	0	0	642	0	0	2026	2034	641	1989	1988	1280
Stage 1	-	-	-	-	-	-	697	697	-	1290	1290	-
Stage 2	-	-	-	-	-	-	1329	1337	-	699	698	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	520	-	-	943	-	-	43	57	475	45	61	202
Stage 1	-	-	-	-	-	-	431	443	-	201	234	-
Stage 2	-	-	-	-	-	-	191	222	-	430	442	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	520	-	-	943	-	-	34	51	475	41	55	202
Mov Cap-2 Maneuver	-	-	-	-	-	-	34	51	-	41	55	-
Stage 1	-	-	-	-	-	-	395	406	-	184	229	-
Stage 2	-	-	-	-	-	-	159	217	-	391	405	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0	119.1	96.1
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	44	520	-	-	943	-	-	83
HCM Lane V/C Ratio	0.303	0.054	-	-	0.006	-	-	0.58
HCM Control Delay (s)	119.1	12.3	0	-	8.8	0	-	96.1
HCM Lane LOS	F	B	A	-	A	A	-	F
HCM 95th %tile Q(veh)	1	0.2	-	-	0	-	-	2.6

Intersection	
Int Delay, s/veh	9.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	172	171	352	103	84	208
Future Vol, veh/h	172	171	352	103	84	208
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	250	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	187	186	383	112	104	257

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	904	439	0	0	495	0
Stage 1	439	-	-	-	-	-
Stage 2	465	-	-	-	-	-
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	307	618	-	-	1069	-
Stage 1	650	-	-	-	-	-
Stage 2	632	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	272	618	-	-	1069	-
Mov Cap-2 Maneuver	272	-	-	-	-	-
Stage 1	577	-	-	-	-	-
Stage 2	632	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	28.2	0	2.5
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	272	618	1069	-
HCM Lane V/C Ratio	-	-	0.687	0.301	0.097	-
HCM Control Delay (s)	-	-	43	13.3	8.7	0
HCM Lane LOS	-	-	E	B	A	A
HCM 95th %tile Q(veh)	-	-	4.6	1.3	0.3	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	363	100	40	724	251	180	108	25	108	83	128
Future Volume (veh/h)	71	363	100	40	724	251	180	108	25	108	83	128
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	81	412	80	45	813	260	209	126	20	121	93	99
Peak Hour Factor	0.88	0.88	0.88	0.89	0.89	0.89	0.86	0.86	0.86	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	105	1155	979	541	839	268	234	357	57	278	188	200
Arrive On Green	0.62	0.62	0.62	0.62	0.62	0.62	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	526	1870	1585	905	1358	434	1191	1575	250	1242	829	882
Grp Volume(v), veh/h	81	412	80	45	0	1073	209	0	146	121	0	192
Grp Sat Flow(s),veh/h/ln	526	1870	1585	905	0	1792	1191	0	1825	1242	0	1712
Q Serve(g_s), s	4.3	9.7	1.8	2.3	0.0	51.3	11.6	0.0	6.1	8.2	0.0	8.8
Cycle Q Clear(g_c), s	55.6	9.7	1.8	12.0	0.0	51.3	20.4	0.0	6.1	14.2	0.0	8.8
Prop In Lane	1.00		1.00	1.00		0.24	1.00		0.14	1.00		0.52
Lane Grp Cap(c), veh/h	105	1155	979	541	0	1107	234	0	414	278	0	388
V/C Ratio(X)	0.77	0.36	0.08	0.08	0.00	0.97	0.89	0.00	0.35	0.44	0.00	0.49
Avail Cap(c_a), veh/h	105	1155	979	541	0	1107	234	0	414	278	0	388
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	44.3	8.4	6.9	11.4	0.0	16.4	40.7	0.0	29.3	35.2	0.0	30.3
Incr Delay (d2), s/veh	41.3	0.9	0.2	0.3	0.0	20.6	33.0	0.0	0.7	1.5	0.0	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	3.4	0.5	0.5	0.0	22.4	6.8	0.0	2.7	2.5	0.0	3.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	85.6	9.3	7.1	11.7	0.0	37.0	73.7	0.0	30.0	36.8	0.0	31.7
LnGrp LOS	F	A	A	B	A	D	E	A	C	D	A	C
Approach Vol, veh/h		573			1118			355			313	
Approach Delay, s/veh		19.8			35.9			55.7			33.7	
Approach LOS		B			D			E			C	

Timer - Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		63.0		27.0		63.0		27.0
Change Period (Y+Rc), s		7.4		6.6		7.4		6.6
Max Green Setting (Gmax), s		55.6		20.4		55.6		20.4
Max Q Clear Time (g_c+I1), s		57.6		22.4		53.3		16.2
Green Ext Time (p_c), s		0.0		0.0		1.6		0.8

Intersection Summary	
HCM 6th Ctrl Delay	34.7
HCM 6th LOS	C

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	363	100	40	724	251	180	108	25	108	83	128
Future Volume (veh/h)	71	363	100	40	724	251	180	108	25	108	83	128
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	81	412	80	45	813	260	209	126	20	121	93	99
Peak Hour Factor	0.88	0.88	0.88	0.89	0.89	0.89	0.86	0.86	0.86	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	227	1089	923	510	1089	923	265	382	61	309	201	214
Arrive On Green	0.58	0.58	0.58	0.58	0.58	0.58	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	526	1870	1585	905	1870	1585	1191	1575	250	1242	829	882
Grp Volume(v), veh/h	81	412	80	45	813	260	209	0	146	121	0	192
Grp Sat Flow(s),veh/h/ln	526	1870	1585	905	1870	1585	1191	0	1825	1242	0	1712
Q Serve(g_s), s	10.8	9.4	1.8	2.2	25.7	6.6	11.7	0.0	5.3	7.1	0.0	7.7
Cycle Q Clear(g_c), s	36.4	9.4	1.8	11.7	25.7	6.6	19.4	0.0	5.3	12.4	0.0	7.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.14	1.00		0.52
Lane Grp Cap(c), veh/h	227	1089	923	510	1089	923	265	0	443	309	0	415
V/C Ratio(X)	0.36	0.38	0.09	0.09	0.75	0.28	0.79	0.00	0.33	0.39	0.00	0.46
Avail Cap(c_a), veh/h	227	1089	923	510	1089	923	265	0	443	309	0	415
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.8	8.9	7.3	12.1	12.3	8.3	35.1	0.0	24.9	30.0	0.0	25.9
Incr Delay (d2), s/veh	4.3	1.0	0.2	0.3	4.7	0.8	15.5	0.0	0.6	1.1	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	3.3	0.5	0.4	9.6	2.0	5.2	0.0	2.3	2.1	0.0	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.1	9.9	7.5	12.4	17.0	9.1	50.6	0.0	25.6	31.2	0.0	27.0
LnGrp LOS	C	A	A	B	B	A	D	A	C	C	A	C
Approach Vol, veh/h		573			1118			355			313	
Approach Delay, s/veh		12.5			15.0			40.3			28.6	
Approach LOS		B			B			D			C	

Timer - Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		54.0		26.0		54.0		26.0
Change Period (Y+Rc), s		7.4		6.6		7.4		6.6
Max Green Setting (Gmax), s		46.6		19.4		46.6		19.4
Max Q Clear Time (g_c+I1), s		38.4		21.4		27.7		14.4
Green Ext Time (p_c), s		2.8		0.0		6.4		0.9

Intersection Summary	
HCM 6th Ctrl Delay	20.0
HCM 6th LOS	B

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	371	209	78	784	463	148
Future Volume (veh/h)	371	209	78	784	463	148
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	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	403	227	82	825	558	130
Peak Hour Factor	0.92	0.92	0.95	0.95	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	925	1334	375	925	618	550
Arrive On Green	0.49	0.49	0.49	0.49	0.35	0.35
Sat Flow, veh/h	1870	1585	796	1870	1781	1585
Grp Volume(v), veh/h	403	227	82	825	558	130
Grp Sat Flow(s),veh/h/ln	1870	1585	796	1870	1781	1585
Q Serve(g_s), s	10.9	2.1	5.8	31.5	23.5	4.6
Cycle Q Clear(g_c), s	10.9	2.1	16.8	31.5	23.5	4.6
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	925	1334	375	925	618	550
V/C Ratio(X)	0.44	0.17	0.22	0.89	0.90	0.24
Avail Cap(c_a), veh/h	925	1334	375	925	870	774
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.8	1.2	18.2	18.0	24.5	18.3
Incr Delay (d2), s/veh	1.5	0.3	1.3	12.7	9.7	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	2.1	1.1	14.3	10.0	1.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.3	1.4	19.6	30.7	34.2	18.5
LnGrp LOS	B	A	B	C	C	B
Approach Vol, veh/h	630			907	688	
Approach Delay, s/veh	9.7			29.7	31.3	
Approach LOS	A			C	C	

Timer - Assigned Phs	2	4	6
Phs Duration (G+Y+Rc), s	45.0	33.9	45.0
Change Period (Y+Rc), s	* 6	6.5	* 6
Max Green Setting (Gmax), s	* 39	38.5	* 39
Max Q Clear Time (g_c+I1), s	12.9	25.5	33.5
Green Ext Time (p_c), s	3.0	1.9	2.7

Intersection Summary	
HCM 6th Ctrl Delay	24.5
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	13.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	194	182	352	130	93	208
Future Vol, veh/h	194	182	352	130	93	208
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	250	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	211	198	383	141	115	257

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	941	454	0	0	524	0
Stage 1	454	-	-	-	-	-
Stage 2	487	-	-	-	-	-
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	292	606	-	-	1043	-
Stage 1	640	-	-	-	-	-
Stage 2	618	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	254	606	-	-	1043	-
Mov Cap-2 Maneuver	254	-	-	-	-	-
Stage 1	557	-	-	-	-	-
Stage 2	618	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	39.3	0	2.7
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	254	606	1043	-
HCM Lane V/C Ratio	-	-	0.83	0.326	0.11	-
HCM Control Delay (s)	-	-	63.2	13.8	8.9	0
HCM Lane LOS	-	-	F	B	A	A
HCM 95th %tile Q(veh)	-	-	6.6	1.4	0.4	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	89	363	100	40	724	260	180	108	25	111	83	147
Future Volume (veh/h)	89	363	100	40	724	260	180	108	25	111	83	147
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	101	412	80	45	813	270	209	126	20	125	93	120
Peak Hour Factor	0.88	0.88	0.88	0.89	0.89	0.89	0.86	0.86	0.86	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	226	1089	923	510	1089	923	246	382	61	309	180	232
Arrive On Green	0.58	0.58	0.58	0.58	0.58	0.58	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	521	1870	1585	905	1870	1585	1168	1575	250	1242	741	957
Grp Volume(v), veh/h	101	412	80	45	813	270	209	0	146	125	0	213
Grp Sat Flow(s),veh/h/ln	521	1870	1585	905	1870	1585	1168	0	1825	1242	0	1698
Q Serve(g_s), s	14.2	9.4	1.8	2.2	25.7	6.9	10.7	0.0	5.3	7.4	0.0	8.7
Cycle Q Clear(g_c), s	39.9	9.4	1.8	11.7	25.7	6.9	19.4	0.0	5.3	12.6	0.0	8.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.14	1.00		0.56
Lane Grp Cap(c), veh/h	226	1089	923	510	1089	923	246	0	443	309	0	412
V/C Ratio(X)	0.45	0.38	0.09	0.09	0.75	0.29	0.85	0.00	0.33	0.40	0.00	0.52
Avail Cap(c_a), veh/h	226	1089	923	510	1089	923	246	0	443	309	0	412
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.1	8.9	7.3	12.1	12.3	8.4	36.0	0.0	24.9	30.2	0.0	26.2
Incr Delay (d2), s/veh	6.3	1.0	0.2	0.3	4.7	0.8	23.9	0.0	0.6	1.2	0.0	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	3.3	0.5	0.4	9.6	2.1	5.7	0.0	2.3	2.2	0.0	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.3	9.9	7.5	12.4	17.0	9.2	59.9	0.0	25.6	31.4	0.0	27.8
LnGrp LOS	C	A	A	B	B	A	E	A	C	C	A	C
Approach Vol, veh/h		593			1128			355			338	
Approach Delay, s/veh		13.6			15.0			45.8			29.1	
Approach LOS		B			B			D			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		54.0		26.0		54.0		26.0				
Change Period (Y+Rc), s		7.4		6.6		7.4		6.6				
Max Green Setting (Gmax), s		46.6		19.4		46.6		19.4				
Max Q Clear Time (g_c+I1), s		41.9		21.4		27.7		14.6				
Green Ext Time (p_c), s		1.9		0.0		6.5		0.9				

Intersection Summary			
HCM 6th Ctrl Delay			21.1
HCM 6th LOS			C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	304	200	34	2	454	294	36	25	13	100	34	350
Future Volume (veh/h)	304	200	34	2	454	294	36	25	13	100	34	350
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	338	222	27	2	528	249	40	28	11	110	37	275
Peak Hour Factor	0.90	0.90	0.90	0.86	0.86	0.86	0.89	0.89	0.89	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	392	730	619	636	730	619	168	314	123	411	47	350
Arrive On Green	0.11	0.39	0.39	0.11	0.39	0.39	0.25	0.25	0.25	0.25	0.25	0.25
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1067	1278	502	1368	191	1423
Grp Volume(v), veh/h	338	222	27	2	528	249	40	0	39	110	0	312
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1067	0	1780	1368	0	1614
Q Serve(g_s), s	5.1	6.0	0.8	0.0	17.6	8.3	2.7	0.0	1.2	5.0	0.0	13.3
Cycle Q Clear(g_c), s	5.1	6.0	0.8	0.0	17.6	8.3	16.0	0.0	1.2	6.2	0.0	13.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.28	1.00		0.88
Lane Grp Cap(c), veh/h	392	730	619	636	730	619	168	0	438	411	0	397
V/C Ratio(X)	0.86	0.30	0.04	0.00	0.72	0.40	0.24	0.00	0.09	0.27	0.00	0.79
Avail Cap(c_a), veh/h	656	730	619	900	730	619	249	0	574	516	0	521
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	28.4	15.5	13.9	12.6	19.0	16.2	33.4	0.0	21.4	23.8	0.0	25.9
Incr Delay (d2), s/veh	6.2	1.1	0.1	0.0	6.1	1.9	0.7	0.0	0.1	0.3	0.0	5.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.8	4.4	0.5	0.0	12.3	5.3	1.3	0.0	0.9	2.7	0.0	9.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.6	16.6	14.0	12.6	25.1	18.1	34.1	0.0	21.5	24.1	0.0	31.7
LnGrp LOS	C	B	B	B	C	B	C	A	C	C	A	C
Approach Vol, veh/h		587			779			79			422	
Approach Delay, s/veh		26.8			22.9			27.8			29.8	
Approach LOS		C			C			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	14.1	35.0		24.4	14.1	35.0		24.4				
Change Period (Y+Rc), s	6.3	6.3		6.3	6.3	6.3		6.3				
Max Green Setting (Gmax), s	18.7	28.7		23.7	18.7	28.7		23.7				
Max Q Clear Time (g_c+I1), s	2.0	8.0		18.0	7.1	19.6		15.3				
Green Ext Time (p_c), s	0.0	1.1		0.1	0.8	2.7		1.4				
Intersection Summary												
HCM 6th Ctrl Delay			25.9									
HCM 6th LOS			C									

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	371	212	80	784	472	157
Future Volume (veh/h)	371	212	80	784	472	157
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	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	403	230	84	825	569	141
Peak Hour Factor	0.92	0.92	0.95	0.95	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	917	1336	369	917	628	559
Arrive On Green	0.49	0.49	0.49	0.49	0.35	0.35
Sat Flow, veh/h	1870	1585	794	1870	1781	1585
Grp Volume(v), veh/h	403	230	84	825	569	141
Grp Sat Flow(s),veh/h/ln	1870	1585	794	1870	1781	1585
Q Serve(g_s), s	11.1	2.1	6.1	32.0	24.2	5.0
Cycle Q Clear(g_c), s	11.1	2.1	17.3	32.0	24.2	5.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	917	1336	369	917	628	559
V/C Ratio(X)	0.44	0.17	0.23	0.90	0.91	0.25
Avail Cap(c_a), veh/h	917	1336	369	917	862	767
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.2	1.1	18.8	18.5	24.5	18.3
Incr Delay (d2), s/veh	1.5	0.3	1.4	13.6	10.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	2.2	1.2	14.8	10.4	1.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.7	1.4	20.2	32.1	34.8	18.5
LnGrp LOS	B	A	C	C	C	B
Approach Vol, veh/h	633			909	710	
Approach Delay, s/veh	9.9			31.0	31.6	
Approach LOS	A			C	C	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		45.0		34.6		45.0
Change Period (Y+Rc), s		* 6		6.5		* 6
Max Green Setting (Gmax), s		* 39		38.5		* 39
Max Q Clear Time (g_c+I1), s		13.1		26.2		34.0
Green Ext Time (p_c), s		3.1		1.9		2.5

Intersection Summary	
HCM 6th Ctrl Delay	25.2
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

1001: Chilson Commons/Chilson Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	2.3	0.8	2.2	0.0	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.0	0.5
Total Del/Veh (s)	11.8	11.8	4.1	21.1	7.1	3.6	24.5	21.8	10.5	31.0	8.2	5.9	13.2
Vehicles Exited	69	655	40	11	202	62	24	13	48	194	39	58	1415
Hourly Exit Rate	69	655	40	11	202	62	24	13	48	194	39	58	1415
Input Volume	68	650	39	12	200	59	24	14	48	196	37	58	1405
% of Volume	101	101	103	92	101	106	100	93	99	99	105	100	101

1002: Merrill Road & M-36 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	3.9	0.4	0.3
Total Del/Veh (s)	13.5	6.2	28.7	5.3	16.8	6.8	11.4
Vehicles Exited	655	300	51	173	101	48	1328
Hourly Exit Rate	655	300	51	173	101	48	1328
Input Volume	656	296	50	171	99	49	1321
% of Volume	100	101	102	101	102	98	101

1003: CVS Driveway/Hamburg Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0		0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	11.6	7.1	1.6		6.2	1.3	20.7	16.6	3.9	24.0	1.6	3.9	9.8
Vehicles Exited	278	414	10	0	103	41	1	3	6	180	51	118	1205
Hourly Exit Rate	278	414	10	0	103	41	1	3	6	180	51	118	1205
Input Volume	278	418	9	1	103	44	2	2	5	180	49	116	1208
% of Volume	100	99	108	0	100	93	44	133	126	100	104	102	100

9001: Chilson Road & Winans Lake Road Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.3	0.3	0.2
Total Del/Veh (s)	10.7	5.6	1.5	0.7	3.2	1.9	3.0
Vehicles Exited	58	51	111	65	139	235	659
Hourly Exit Rate	58	51	111	65	139	235	659
Input Volume	58	49	110	65	134	234	650
% of Volume	100	104	101	100	104	101	101

9002: Site Driveway/Buckhorn Lane & Winans Lake Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.1	0.1	0.1
Total Del/Veh (s)	1.9	1.7	0.7	0.3	5.3	2.9	1.5
Vehicles Exited	2	288	99	1	6	4	400
Hourly Exit Rate	2	288	99	1	6	4	400
Input Volume	2	278	98	1	6	3	388
% of Volume	100	104	101	100	96	133	103

9003: Winans Lake Road & Hamburg Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.2	1.9	0.2
Total Del/Veh (s)	2.8	3.0	0.9	0.2	8.3	3.5	4.0
Vehicles Exited	59	236	60	45	152	44	596
Hourly Exit Rate	59	236	60	45	152	44	596
Input Volume	57	228	59	45	157	44	590
% of Volume	104	104	102	100	97	100	101

9004: Hamburg Road & Winans Lake Road Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.1	0.1	0.0
Total Del/Veh (s)	2.8	2.6	6.8	4.5	4.9	7.3	5.0
Vehicles Exited	141	49	50	320	230	208	998
Hourly Exit Rate	141	49	50	320	230	208	998
Input Volume	137	47	51	318	226	208	987
% of Volume	103	105	98	101	102	100	101

9005: Club Driveway/Lake Crest Drive & M-36 Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	1.2	1.3	2.7	1.8	14.7	6.0	1.9
Vehicles Exited	1	918	256	4	27	20	1226
Hourly Exit Rate	1	918	256	4	27	20	1226
Input Volume	1	918	252	4	27	19	1222
% of Volume	100	100	101	94	100	104	100

Total Network Performance

Denied Del/Veh (s)	0.7
Total Del/Veh (s)	32.8
Vehicles Exited	2240
Hourly Exit Rate	2240
Input Volume	17272
% of Volume	13

Intersection: 1001: Chilson Commons/Chilson Road & M-36

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (ft)	78	271	48	37	119	59	77	188	129
Average Queue (ft)	26	126	10	9	47	15	26	98	36
95th Queue (ft)	61	221	38	32	97	43	57	160	85
Link Distance (ft)		1963			1169	153	153		1615
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	500		110	160				130	
Storage Blk Time (%)		7			0			4	0
Queuing Penalty (veh)		8			0			3	0

Intersection: 1002: Merrill Road & M-36

Movement	EB	EB	WB	WB	NB	NB
Directions Served	T	R	L	T	L	R
Maximum Queue (ft)	252	100	90	100	100	60
Average Queue (ft)	118	28	34	32	42	18
95th Queue (ft)	209	71	73	78	83	44
Link Distance (ft)	2305			878		642
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		100	75		160	
Storage Blk Time (%)	8	0	3	1	0	
Queuing Penalty (veh)	25	0	5	0	0	

Intersection: 1003: CVS Driveway/Hamburg Road & M-36

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (ft)	177	169	25	7	68	38	16	22	141	112
Average Queue (ft)	74	69	2	0	20	10	1	4	73	34
95th Queue (ft)	140	141	14	5	54	30	8	18	121	77
Link Distance (ft)		436			517		112	112		789
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	450		180	150		250			75	
Storage Blk Time (%)		0							8	0
Queuing Penalty (veh)		0							9	0

Intersection: 9001: Chilson Road & Winans Lake Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	100	1	84
Average Queue (ft)	43	0	24
95th Queue (ft)	78	2	65
Link Distance (ft)	2273	1309	456
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9002: Site Driveway/Buckhorn Lane & Winans Lake Road

Movement	EB	SB
Directions Served	LT	LTR
Maximum Queue (ft)	3	33
Average Queue (ft)	0	8
95th Queue (ft)	3	30
Link Distance (ft)	2607	475
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 9003: Winans Lake Road & Hamburg Road

Movement	EB	WB	SB	SB
Directions Served	LT	TR	L	R
Maximum Queue (ft)	55	2	90	65
Average Queue (ft)	7	0	33	22
95th Queue (ft)	32	2	67	49
Link Distance (ft)	1442	1535	1863	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				50
Storage Blk Time (%)			2	0
Queuing Penalty (veh)			1	0

Intersection: 9004: Hamburg Road & Winans Lake Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	42	109	97
Average Queue (ft)	10	39	32
95th Queue (ft)	34	83	75
Link Distance (ft)	380	305	517
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9005: Club Driveway/Lake Crest Drive & M-36

Movement	EB	SB
Directions Served	LTR	LTR
Maximum Queue (ft)	2	72
Average Queue (ft)	0	25
95th Queue (ft)	2	54
Link Distance (ft)	781	371
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 52

1001: Chilson Commons/Chilson Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	2.5	0.5	2.4	0.0	0.0	0.0	4.6	2.6	4.7	0.0	0.0	0.0	0.7
Total Del/Veh (s)	135.8	8.9	2.9	27.2	24.2	24.2	56.1	25.0	11.8	34.5	15.9	18.6	26.2
Vehicles Exited	60	317	84	34	826	217	155	92	24	96	126	114	2145
Hourly Exit Rate	60	317	84	34	826	217	155	92	24	96	126	114	2145
Input Volume	62	316	87	35	822	218	157	94	22	94	126	111	2144
% of Volume	97	100	97	96	101	100	99	98	108	102	100	103	100

1002: Merrill Road & M-36 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.1	0.3	0.1	3.4	1.2	0.9
Total Del/Veh (s)	13.6	3.9	25.8	22.6	20.5	6.6	17.5
Vehicles Exited	327	188	63	702	395	131	1806
Hourly Exit Rate	327	188	63	702	395	131	1806
Input Volume	328	182	68	691	403	129	1802
% of Volume	100	103	92	102	98	102	100

1003: CVS Driveway/Hamburg Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.8	0.1	0.2	0.0	0.0	0.0	0.1	0.1	0.1	0.4	0.0	0.0	0.2
Total Del/Veh (s)	81.3	11.2	4.6	16.7	11.1	3.7	27.2	17.0	4.4	22.9	20.5	9.9	22.3
Vehicles Exited	257	176	29	1	401	239	27	22	11	82	27	301	1573
Hourly Exit Rate	257	176	29	1	401	239	27	22	11	82	27	301	1573
Input Volume	257	174	30	2	395	236	31	22	11	83	30	303	1574
% of Volume	100	101	97	50	101	101	86	100	98	99	90	99	100

9001: Chilson Road & Winans Lake Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.1
Total Del/Veh (s)	18.7	1.9	14.4	2.6	1.4	4.3	1.7	6.5
Vehicles Exited	148	71	149	301	91	74	186	1020
Hourly Exit Rate	148	71	149	301	91	74	186	1020
Input Volume	150	70	149	306	90	73	181	1019
% of Volume	99	102	100	98	101	102	103	100

9002: Site Driveway/Buckhorn Lane & Winans Lake Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1		0.1	0.0
Total Del/Veh (s)	3.5	1.7	1.7	1.2		4.3	1.7
Vehicles Exited	2	180	368	6	0	4	560
Hourly Exit Rate	2	180	368	6	0	4	560
Input Volume	2	177	372	5	1	3	560
% of Volume	89	102	99	120	0	133	100

9003: Winans Lake Road & Hamburg Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.3	2.1	0.3
Total Del/Veh (s)	7.1	4.6	3.6	1.4	12.7	4.8	4.4
Vehicles Exited	84	97	283	196	63	119	842
Hourly Exit Rate	84	97	283	196	63	119	842
Input Volume	85	94	285	197	63	116	840
% of Volume	99	103	99	99	100	102	100

9004: Hamburg Road & Winans Lake Road Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.5	6.2	6.6	4.2	3.4	5.7	5.7
Vehicles Exited	300	217	268	272	88	74	1219
Hourly Exit Rate	300	217	268	272	88	74	1219
Input Volume	307	217	272	268	86	74	1222
% of Volume	98	100	99	102	103	100	100

9005: Club Driveway/Lake Crest Drive & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0
Total Del/Veh (s)	8.4	1.6	0.5	7.0	6.2	5.2	22.4	5.2	26.5	12.2	5.0
Vehicles Exited	14	498	3	4	1074	24	5	2	6	13	1643
Hourly Exit Rate	14	498	3	4	1074	24	5	2	6	13	1643
Input Volume	15	496	2	4	1073	23	5	2	7	12	1640
% of Volume	95	100	150	100	100	103	100	89	89	108	100

Total Network Performance

Denied Del/Veh (s)	1.4
Total Del/Veh (s)	52.5
Vehicles Exited	3207
Hourly Exit Rate	3207
Input Volume	23472
% of Volume	14

Intersection: 1001: Chilson Commons/Chilson Road & M-36

Movement	EB	EB	EB	WB	WB	B4	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	T	L	TR	L	TR
Maximum Queue (ft)	211	159	51	230	640	1	179	127	126	168
Average Queue (ft)	81	69	17	39	293	0	105	51	59	84
95th Queue (ft)	203	128	42	150	564	1	179	103	110	145
Link Distance (ft)		1963			1169	781	153	153		1615
Upstream Blk Time (%)					0		11	0		
Queuing Penalty (veh)					0		0	0		
Storage Bay Dist (ft)	500		110	160					130	
Storage Blk Time (%)		1			21				0	2
Queuing Penalty (veh)		2			8				1	2

Intersection: 1002: Merrill Road & M-36

Movement	EB	EB	WB	WB	NB	NB
Directions Served	T	R	L	T	L	R
Maximum Queue (ft)	198	68	226	444	228	182
Average Queue (ft)	86	17	53	212	138	42
95th Queue (ft)	160	52	157	384	211	112
Link Distance (ft)	2305			878		642
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		100	75		160	
Storage Blk Time (%)	5	0	2	31	5	0
Queuing Penalty (veh)	9	0	10	21	6	0

Intersection: 1003: CVS Driveway/Hamburg Road & M-36

Movement	EB	EB	EB	B6	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	T	L	T	R	L	TR	L	TR
Maximum Queue (ft)	391	411	71	127	17	187	81	67	51	119	175
Average Queue (ft)	194	97	10	17	1	87	36	19	14	41	75
95th Queue (ft)	377	329	45	141	8	155	65	50	39	85	139
Link Distance (ft)		436		4563		517		112	112		789
Upstream Blk Time (%)	3	4						0			
Queuing Penalty (veh)	0	19						0			
Storage Bay Dist (ft)	450		180		150		250			75	
Storage Blk Time (%)	3	0				1				1	7
Queuing Penalty (veh)	7	0				2				3	6

Intersection: 9001: Chilson Road & Winans Lake Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	201	5	89
Average Queue (ft)	94	0	25
95th Queue (ft)	161	3	65
Link Distance (ft)	2273	1309	456
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9002: Site Driveway/Buckhorn Lane & Winans Lake Road

Movement	EB	SB
Directions Served	LT	LTR
Maximum Queue (ft)	14	32
Average Queue (ft)	1	4
95th Queue (ft)	8	21
Link Distance (ft)	2607	475
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 9003: Winans Lake Road & Hamburg Road

Movement	EB	WB	SB	SB
Directions Served	LT	TR	L	R
Maximum Queue (ft)	112	25	84	71
Average Queue (ft)	38	2	22	36
95th Queue (ft)	85	13	54	64
Link Distance (ft)	1442	1535	1863	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				50
Storage Blk Time (%)			1	2
Queuing Penalty (veh)			1	1

Intersection: 9004: Hamburg Road & Winans Lake Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	154	80	66
Average Queue (ft)	54	29	21
95th Queue (ft)	114	70	53
Link Distance (ft)	380	305	517
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9005: Club Driveway/Lake Crest Drive & M-36

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	R	LTR	LTR
Maximum Queue (ft)	115	41	4	32	52
Average Queue (ft)	17	2	0	6	14
95th Queue (ft)	72	18	4	25	39
Link Distance (ft)	781	2305		171	371
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			100		
Storage Blk Time (%)		0			
Queuing Penalty (veh)		0			

Network Summary

Network wide Queuing Penalty: 97

1001: Chilson Commons/Chilson Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	2.3	0.9	2.3	0.0	0.0	0.0	0.1	0.2	0.2	0.0	0.0	0.0	0.6
Total Del/Veh (s)	14.4	16.7	6.2	24.9	8.1	4.7	22.6	23.7	12.6	33.3	7.6	6.2	16.3
Vehicles Exited	77	758	46	14	228	69	28	16	56	221	44	66	1623
Hourly Exit Rate	77	758	46	14	228	69	28	16	56	221	44	66	1623
Input Volume	78	747	45	14	228	68	28	16	55	225	44	67	1614
% of Volume	99	101	102	100	100	101	100	98	102	98	101	98	101

1002: Merrill Road & M-36 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	3.8	0.5	0.3
Total Del/Veh (s)	18.7	8.9	45.1	6.3	17.4	9.1	15.5
Vehicles Exited	759	344	57	193	115	53	1521
Hourly Exit Rate	759	344	57	193	115	53	1521
Input Volume	753	340	57	197	114	56	1517
% of Volume	101	101	100	98	101	95	100

1003: CVS Driveway/Hamburg Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	13.8	8.0	1.6	12.5	7.0	1.5	17.7	20.6	4.9	24.7	1.3	4.4	10.9
Vehicles Exited	324	481	10	1	116	51	2	2	6	206	55	132	1386
Hourly Exit Rate	324	481	10	1	116	51	2	2	6	206	55	132	1386
Input Volume	319	480	10	1	118	51	2	2	6	207	56	133	1386
% of Volume	102	100	98	100	98	100	89	89	104	99	99	99	100

9001: Chilson Road & Winans Lake Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0		0.0	0.1	0.1	0.4	0.3	0.2
Total Del/Veh (s)	12.3		6.4	1.7	0.8	3.6	2.3	3.5
Vehicles Exited	68	0	57	125	77	150	264	741
Hourly Exit Rate	68	0	57	125	77	150	264	741
Input Volume	67	0	56	126	75	154	269	747
% of Volume	101	0	102	99	102	97	98	99

9002: Site Driveway/Buckhorn Lane & Winans Lake Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.2	0.1	0.0	0.0	0.1	0.1	0.1
Total Del/Veh (s)	5.6	1.9	0.8	0.3	6.3	3.2	1.7
Vehicles Exited	1	316	113	1	7	4	442
Hourly Exit Rate	1	316	113	1	7	4	442
Input Volume	2	319	112	1	7	3	445
% of Volume	50	99	100	100	97	133	99

9003: Winans Lake Road & Hamburg Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.3	1.9	0.2
Total Del/Veh (s)	3.0	3.3	1.1	0.2	9.5	3.8	4.5
Vehicles Exited	63	260	69	52	177	50	671
Hourly Exit Rate	63	260	69	52	177	50	671
Input Volume	66	262	67	52	180	51	679
% of Volume	95	99	103	100	98	98	99

9004: Hamburg Road & Winans Lake Road Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Total Del/Veh (s)	3.1	2.8	7.9	5.7	5.7	8.1	5.8
Vehicles Exited	155	56	59	369	261	237	1137
Hourly Exit Rate	155	56	59	369	261	237	1137
Input Volume	157	54	59	365	260	239	1135
% of Volume	99	103	100	101	100	99	100

9005: Club Driveway/Lake Crest Drive & M-36 Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)		0.0	0.0	0.1	0.2	0.2	0.0
Total Del/Veh (s)		1.5	2.9	2.4	23.8	10.8	2.4
Vehicles Exited	0	1063	288	4	32	23	1410
Hourly Exit Rate	0	1063	288	4	32	23	1410
Input Volume	1	1055	290	5	31	22	1404
% of Volume	0	101	99	84	103	105	100

Total Network Performance

Denied Del/Veh (s)	0.8
Total Del/Veh (s)	39.5
Vehicles Exited	2556
Hourly Exit Rate	2556
Input Volume	19842
% of Volume	13

Intersection: 1001: Chilson Commons/Chilson Road & M-36

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (ft)	92	385	160	44	144	54	96	206	160
Average Queue (ft)	31	174	18	11	56	17	31	113	43
95th Queue (ft)	69	319	88	35	115	44	71	183	108
Link Distance (ft)		1963			1169	153	153		1615
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	500		110	160				130	
Storage Blk Time (%)		14			0			7	0
Queuing Penalty (veh)		18			0			6	0

Intersection: 1002: Merrill Road & M-36

Movement	EB	EB	WB	WB	NB	NB
Directions Served	T	R	L	T	L	R
Maximum Queue (ft)	366	193	110	125	119	61
Average Queue (ft)	160	43	43	39	49	20
95th Queue (ft)	311	139	91	93	96	47
Link Distance (ft)	2305			878		642
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		100	75		160	
Storage Blk Time (%)	16	0	8	1	0	
Queuing Penalty (veh)	54	0	16	1	0	

Intersection: 1003: CVS Driveway/Hamburg Road & M-36

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (ft)	197	207	27	11	83	40	21	23	159	150
Average Queue (ft)	89	82	2	0	26	12	1	4	84	39
95th Queue (ft)	161	165	15	6	65	33	11	18	139	95
Link Distance (ft)		436			517		112	112		789
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	450		180	150		250			75	
Storage Blk Time (%)		0			0				11	0
Queuing Penalty (veh)		1			0				15	1

Intersection: 9001: Chilson Road & Winans Lake Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	98	9	93
Average Queue (ft)	47	0	29
95th Queue (ft)	79	6	74
Link Distance (ft)	2273	1309	456
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9002: Site Driveway/Buckhorn Lane & Winans Lake Road

Movement	EB	SB
Directions Served	LT	LTR
Maximum Queue (ft)	4	38
Average Queue (ft)	0	9
95th Queue (ft)	4	32
Link Distance (ft)	2607	475
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 9003: Winans Lake Road & Hamburg Road

Movement	EB	SB	SB
Directions Served	LT	L	R
Maximum Queue (ft)	64	101	71
Average Queue (ft)	9	39	25
95th Queue (ft)	38	77	54
Link Distance (ft)	1442	1863	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			50
Storage Blk Time (%)		4	0
Queuing Penalty (veh)		2	0

Intersection: 9004: Hamburg Road & Winans Lake Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	59	164	121
Average Queue (ft)	12	51	41
95th Queue (ft)	42	114	93
Link Distance (ft)	380	305	517
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9005: Club Driveway/Lake Crest Drive & M-36

Movement	EB	SB
Directions Served	LTR	LTR
Maximum Queue (ft)	5	98
Average Queue (ft)	0	30
95th Queue (ft)	6	68
Link Distance (ft)	781	371
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 114

1001: Chilson Commons/Chilson Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	11.0	10.7	11.1	0.0	0.0	0.0	39.2	36.2	30.1	0.0	0.0	0.0	7.2
Total Del/Veh (s)	541.2	30.3	22.4	69.5	65.1	70.3	88.2	31.6	19.6	38.2	17.1	21.7	66.5
Vehicles Exited	56	361	101	37	923	244	179	110	26	108	141	131	2417
Hourly Exit Rate	56	361	101	37	923	244	179	110	26	108	141	131	2417
Input Volume	71	363	100	40	946	251	180	108	25	108	144	128	2464
% of Volume	79	100	101	93	98	97	100	102	103	100	98	102	98

1002: Merrill Road & M-36 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.1	6.8	4.4	3.4	1.3	2.8
Total Del/Veh (s)	17.9	5.6	56.8	55.8	22.7	8.9	33.2
Vehicles Exited	378	206	75	793	462	147	2061
Hourly Exit Rate	378	206	75	793	462	147	2061
Input Volume	376	209	78	794	463	148	2069
% of Volume	100	99	96	100	100	99	100

1003: CVS Driveway/Hamburg Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	25.2	14.6	9.6	0.0	0.0	0.0	0.1	0.1	0.1	0.4	0.0	0.0	5.6
Total Del/Veh (s)	233.1	34.9	23.2	17.9	13.4	4.3	30.8	16.9	4.0	23.3	22.8	12.5	49.2
Vehicles Exited	253	185	31	1	453	268	34	24	14	95	35	348	1741
Hourly Exit Rate	253	185	31	1	453	268	34	24	14	95	35	348	1741
Input Volume	295	200	34	2	454	271	36	25	13	95	34	348	1807
% of Volume	86	92	91	50	100	99	94	96	110	100	103	100	96

9001: Chilson Road & Winans Lake Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.1
Total Del/Veh (s)	26.2	2.0	20.7	3.0	1.6	4.4	1.8	8.7
Vehicles Exited	168	78	166	338	99	80	211	1140
Hourly Exit Rate	168	78	166	338	99	80	211	1140
Input Volume	172	81	171	352	103	84	208	1172
% of Volume	98	96	97	96	96	96	101	97

9002: Site Driveway/Buckhorn Lane & Winans Lake Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.2	0.1	0.1	0.0
Total Del/Veh (s)	5.7	1.7	1.9	0.9	5.7	3.2	1.8
Vehicles Exited	1	196	415	6	1	4	623
Hourly Exit Rate	1	196	415	6	1	4	623
Input Volume	2	203	428	6	1	3	643
% of Volume	44	97	97	100	100	133	97

9003: Winans Lake Road & Hamburg Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.3	2.0	0.3
Total Del/Veh (s)	8.0	5.0	3.9	1.6	14.5	5.6	5.0
Vehicles Exited	92	107	315	217	73	135	939
Hourly Exit Rate	92	107	315	217	73	135	939
Input Volume	98	108	329	226	72	133	966
% of Volume	94	99	96	96	101	102	97

9004: Hamburg Road & Winans Lake Road Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	10.9	11.0	6.9	4.6	3.6	5.7	7.9
Vehicles Exited	350	251	288	284	98	86	1357
Hourly Exit Rate	350	251	288	284	98	86	1357
Input Volume	353	249	312	308	99	85	1406
% of Volume	99	101	92	92	99	101	96

9005: Club Driveway/Lake Crest Drive & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Del/Veh (s)	0.1	0.5	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Total Del/Veh (s)	25.9	7.3	1.8	18.3	15.0	10.9	168.5	73.9	116.2	92.9	14.3
Vehicles Exited	17	568	3	5	1228	27	5	2	6	14	1875
Hourly Exit Rate	17	568	3	5	1228	27	5	2	6	14	1875
Input Volume	17	570	2	5	1234	26	6	2	8	14	1885
% of Volume	101	100	150	100	100	103	80	89	77	98	99

Total Network Performance

Denied Del/Veh (s)	9.4
Total Del/Veh (s)	135.3
Vehicles Exited	3573
Hourly Exit Rate	3573
Input Volume	26973
% of Volume	13

Intersection: 1001: Chilson Commons/Chilson Road & M-36

Movement	EB	EB	EB	WB	WB	B4	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	T	L	TR	L	TR
Maximum Queue (ft)	456	841	72	240	1183	463	189	158	147	199
Average Queue (ft)	265	247	20	66	797	174	142	68	67	97
95th Queue (ft)	527	954	54	217	1442	650	206	136	120	165
Link Distance (ft)		1963			1169	781	153	153		1615
Upstream Blk Time (%)		2			14	0	41	1		
Queuing Penalty (veh)		0			174	1	0	0		
Storage Bay Dist (ft)	500		110	160					130	
Storage Blk Time (%)	11	2			41				1	3
Queuing Penalty (veh)	47	3			16				2	4

Intersection: 1002: Merrill Road & M-36

Movement	EB	EB	WB	WB	B27	NB	NB
Directions Served	T	R	L	T	T	L	R
Maximum Queue (ft)	260	129	275	829	161	238	331
Average Queue (ft)	109	22	122	473	26	160	71
95th Queue (ft)	206	81	305	889	186	240	224
Link Distance (ft)	2305			878	4563		642
Upstream Blk Time (%)				7			0
Queuing Penalty (veh)				55			0
Storage Bay Dist (ft)		100	75			160	
Storage Blk Time (%)	9	0	6	47		9	0
Queuing Penalty (veh)	20	0	45	37		14	0

Intersection: 1003: CVS Driveway/Hamburg Road & M-36

Movement	EB	EB	EB	B6	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	T	L	T	R	L	TR	L	TR
Maximum Queue (ft)	436	534	97	1609	12	221	79	74	58	134	204
Average Queue (ft)	398	424	16	753	1	108	40	25	16	45	96
95th Queue (ft)	532	701	65	1956	8	187	67	58	41	93	169
Link Distance (ft)		436		4563		517		112	112		789
Upstream Blk Time (%)	37	53						0			
Queuing Penalty (veh)	0	274						0			
Storage Bay Dist (ft)	450		180		150		250			75	
Storage Blk Time (%)	37	0				2				1	13
Queuing Penalty (veh)	87	1				6				5	12

Intersection: 9001: Chilson Road & Winans Lake Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	273	15	98
Average Queue (ft)	120	1	27
95th Queue (ft)	219	8	70
Link Distance (ft)	2273	1309	456
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9002: Site Driveway/Buckhorn Lane & Winans Lake Road

Movement	EB	SB
Directions Served	LT	LTR
Maximum Queue (ft)	14	30
Average Queue (ft)	1	4
95th Queue (ft)	10	21
Link Distance (ft)	2607	475
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 9003: Winans Lake Road & Hamburg Road

Movement	EB	WB	SB	SB
Directions Served	LT	TR	L	R
Maximum Queue (ft)	123	32	95	73
Average Queue (ft)	43	3	27	40
95th Queue (ft)	94	18	65	69
Link Distance (ft)	1442	1535	1863	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				50
Storage Blk Time (%)			1	2
Queuing Penalty (veh)			2	2

Intersection: 9004: Hamburg Road & Winans Lake Road

Movement	WB	B30	NB	SB
Directions Served	LR	T	TR	LT
Maximum Queue (ft)	257	7	104	68
Average Queue (ft)	88	0	34	22
95th Queue (ft)	209	12	80	54
Link Distance (ft)	380	1406	305	517
Upstream Blk Time (%)	1			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9005: Club Driveway/Lake Crest Drive & M-36

Movement	EB	B4	WB	WB	NB	SB
Directions Served	LTR	T	LT	R	LTR	LTR
Maximum Queue (ft)	419	15	415	47	50	88
Average Queue (ft)	70	1	83	4	13	26
95th Queue (ft)	291	29	460	42	56	90
Link Distance (ft)	781	1169	2305		171	371
Upstream Blk Time (%)	0				1	0
Queuing Penalty (veh)	1				0	0
Storage Bay Dist (ft)				100		
Storage Blk Time (%)			5			
Queuing Penalty (veh)			1			

Network Summary

Network wide Queuing Penalty: 809

1001: Chilson Commons/Chilson Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	2.3	0.9	2.4	0.0	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.0	0.6
Total Del/Veh (s)	14.1	16.6	6.2	30.3	8.0	4.3	24.2	19.8	12.0	33.7	7.7	6.8	16.2
Vehicles Exited	92	758	46	12	226	70	26	18	54	227	44	81	1654
Hourly Exit Rate	92	758	46	12	226	70	26	18	54	227	44	81	1654
Input Volume	89	747	45	14	228	69	28	16	55	229	44	79	1643
% of Volume	103	101	102	86	99	101	93	111	99	99	100	102	101

1002: Merrill Road & M-36 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	3.8	0.4	0.3
Total Del/Veh (s)	19.5	9.4	49.8	6.2	16.7	8.8	16.1
Vehicles Exited	756	352	60	194	115	55	1532
Hourly Exit Rate	756	352	60	194	115	55	1532
Input Volume	754	344	61	196	115	57	1527
% of Volume	100	102	99	99	100	96	100

1003: CVS Driveway/Hamburg Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	14.1	8.4	2.2	7.2	7.0	1.6	21.3	17.9	5.5	24.8	1.3	4.4	11.3
Vehicles Exited	315	487	10	1	116	54	2	2	6	228	58	134	1413
Hourly Exit Rate	315	487	10	1	116	54	2	2	6	228	58	134	1413
Input Volume	320	480	10	1	118	54	2	2	6	231	56	137	1418
% of Volume	99	101	98	100	98	100	89	89	104	99	103	98	100

9001: Chilson Road & Winans Lake Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0		0.0	0.0	0.0	0.3	0.4	0.2
Total Del/Veh (s)	13.1		7.1	1.9	1.0	3.8	2.4	4.0
Vehicles Exited	83	0	66	129	89	154	268	789
Hourly Exit Rate	83	0	66	129	89	154	268	789
Input Volume	83	0	64	126	87	159	269	788
% of Volume	100	0	103	103	103	97	100	100

9002: Site Driveway/Buckhorn Lane & Winans Lake Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Del/Veh (s)	0.5	0.1	0.8	0.0	0.0	0.2	0.2	0.2	0.1	0.1	0.1
Total Del/Veh (s)	5.5	2.3	1.9	2.2	0.9	0.2	7.0	4.3	6.8	2.9	2.5
Vehicles Exited	1	317	18	9	111	1	24	61	6	4	552
Hourly Exit Rate	1	317	18	9	111	1	24	61	6	4	552
Input Volume	2	319	17	10	112	1	24	56	7	3	552
% of Volume	50	99	106	88	99	100	101	109	83	133	100

9003: Winans Lake Road & Hamburg Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.3	2.0	0.2
Total Del/Veh (s)	3.1	3.3	1.1	0.2	10.8	4.0	4.7
Vehicles Exited	67	319	73	49	178	54	740
Hourly Exit Rate	67	319	73	49	178	54	740
Input Volume	70	313	75	52	180	54	744
% of Volume	95	102	98	94	99	100	99

9004: Hamburg Road & Winans Lake Road Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Total Del/Veh (s)	3.0	2.7	7.9	5.5	6.4	8.8	6.1
Vehicles Exited	151	56	58	365	285	269	1184
Hourly Exit Rate	151	56	58	365	285	269	1184
Input Volume	157	57	63	365	284	267	1193
% of Volume	96	99	92	100	100	101	99

9005: Club Driveway/Lake Crest Drive & M-36 Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)		0.0	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)		1.5	2.8	2.4	22.9	9.0	2.3
Vehicles Exited	0	1066	287	4	32	22	1411
Hourly Exit Rate	0	1066	287	4	32	22	1411
Input Volume	1	1060	291	5	31	22	1410
% of Volume	0	101	99	84	103	100	100

Total Network Performance

Denied Del/Veh (s)	0.8
Total Del/Veh (s)	39.7
Vehicles Exited	2668
Hourly Exit Rate	2668
Input Volume	20618
% of Volume	13

Intersection: 1001: Chilson Commons/Chilson Road & M-36

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (ft)	92	381	172	46	147	58	84	217	203
Average Queue (ft)	36	171	20	10	56	16	29	115	49
95th Queue (ft)	74	305	99	34	115	44	63	191	130
Link Distance (ft)		1963			1169	153	153		1615
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	500		110	160				130	
Storage Blk Time (%)		14			0			8	0
Queuing Penalty (veh)		19			0			7	0

Intersection: 1002: Merrill Road & M-36

Movement	EB	EB	WB	WB	NB	NB
Directions Served	T	R	L	T	L	R
Maximum Queue (ft)	396	241	130	131	116	70
Average Queue (ft)	168	50	47	40	47	21
95th Queue (ft)	337	170	103	96	91	51
Link Distance (ft)	2305			878		642
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		100	75		160	
Storage Blk Time (%)	16	0	10	2	0	0
Queuing Penalty (veh)	57	0	21	1	0	0

Intersection: 1003: CVS Driveway/Hamburg Road & M-36

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (ft)	192	198	29	12	80	40	21	28	167	162
Average Queue (ft)	90	88	3	1	25	13	2	4	91	44
95th Queue (ft)	161	173	17	7	62	34	11	19	147	109
Link Distance (ft)		436			517		112	112		789
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	450		180	150		250			75	
Storage Blk Time (%)		0			0				13	0
Queuing Penalty (veh)		1			0				18	1

Intersection: 9001: Chilson Road & Winans Lake Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	108	16	99
Average Queue (ft)	53	1	33
95th Queue (ft)	89	7	78
Link Distance (ft)	2273	1309	456
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9002: Site Driveway/Buckhorn Lane & Winans Lake Road

Movement	EB	EB	WB	NB	SB
Directions Served	L	R	L	LTR	LTR
Maximum Queue (ft)	3	1	21	67	32
Average Queue (ft)	0	0	2	30	9
95th Queue (ft)	2	1	13	53	32
Link Distance (ft)				347	468
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	150	25	150		
Storage Blk Time (%)		0			
Queuing Penalty (veh)		0			

Intersection: 9003: Winans Lake Road & Hamburg Road

Movement	EB	WB	SB	SB
Directions Served	LT	TR	L	R
Maximum Queue (ft)	70	4	109	71
Average Queue (ft)	10	0	42	26
95th Queue (ft)	42	4	83	56
Link Distance (ft)	1442	1535	1863	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				50
Storage Blk Time (%)			5	0
Queuing Penalty (veh)			3	0

Intersection: 9004: Hamburg Road & Winans Lake Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	52	153	157
Average Queue (ft)	12	53	46
95th Queue (ft)	40	111	112
Link Distance (ft)	380	305	517
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9005: Club Driveway/Lake Crest Drive & M-36

Movement	EB	SB
Directions Served	LTR	LTR
Maximum Queue (ft)	2	86
Average Queue (ft)	0	29
95th Queue (ft)	3	64
Link Distance (ft)	781	371
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 129

1001: Chilson Commons/Chilson Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	68.5	66.8	67.7	0.0	0.0	0.0	86.2	81.1	76.6	0.0	0.0	0.0	25.5
Total Del/Veh (s)	821.8	117.6	117.7	68.1	67.6	74.3	99.5	33.9	19.8	38.7	16.9	22.2	97.3
Vehicles Exited	56	306	84	37	914	255	172	106	24	110	143	143	2350
Hourly Exit Rate	56	306	84	37	914	255	172	106	24	110	143	143	2350
Input Volume	89	363	100	40	946	260	180	108	25	111	144	147	2512
% of Volume	63	84	84	93	97	98	96	98	95	99	99	97	94

1002: Merrill Road & M-36 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.1	5.7	3.7	3.4	1.3	2.5
Total Del/Veh (s)	17.4	5.3	56.2	54.4	22.0	8.4	32.6
Vehicles Exited	339	196	76	794	464	155	2024
Hourly Exit Rate	339	196	76	794	464	155	2024
Input Volume	377	212	80	795	472	157	2093
% of Volume	90	92	95	100	98	99	97

1003: CVS Driveway/Hamburg Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	27.6	14.7	16.6	0.0	0.0	0.0	0.1	0.1	0.1	0.4	0.0	0.0	5.8
Total Del/Veh (s)	241.7	36.6	24.8	11.8	13.1	4.6	29.5	16.4	4.8	22.6	23.9	12.7	49.6
Vehicles Exited	248	171	30	2	455	292	33	24	13	96	33	349	1746
Hourly Exit Rate	248	171	30	2	455	292	33	24	13	96	33	349	1746
Input Volume	304	200	34	2	454	294	36	25	13	100	34	350	1846
% of Volume	82	85	88	100	100	99	91	96	102	96	97	100	95

9001: Chilson Road & Winans Lake Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.1
Total Del/Veh (s)	32.0	1.9	26.5	3.1	1.7	5.2	2.2	10.9
Vehicles Exited	184	84	173	325	118	93	212	1189
Hourly Exit Rate	184	84	173	325	118	93	212	1189
Input Volume	194	81	182	352	130	93	208	1241
% of Volume	95	103	95	92	91	100	102	96

9002: Site Driveway/Buckhorn Lane & Winans Lake Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.3	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0
Total Del/Veh (s)	5.2	2.3	1.8	3.2	3.0	1.2	9.2	3.5	8.5	4.0	3.1
Vehicles Exited	1	194	36	55	414	6	31	19	1	4	761
Hourly Exit Rate	1	194	36	55	414	6	31	19	1	4	761
Input Volume	2	203	36	55	429	6	33	20	1	3	788
% of Volume	44	96	100	100	97	100	94	96	100	133	97

9003: Winans Lake Road & Hamburg Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.4	2.0	0.3
Total Del/Veh (s)	9.4	6.0	4.1	1.7	20.1	6.4	5.8
Vehicles Exited	98	115	361	210	71	139	994
Hourly Exit Rate	98	115	361	210	71	139	994
Input Volume	103	122	379	226	72	138	1040
% of Volume	95	94	95	93	98	101	96

9004: Hamburg Road & Winans Lake Road Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	13.6	13.4	7.3	4.9	3.5	5.8	9.2
Vehicles Exited	350	267	312	282	102	88	1401
Hourly Exit Rate	350	267	312	282	102	88	1401
Input Volume	353	267	345	308	107	92	1473
% of Volume	99	100	90	91	95	96	95

9005: Club Driveway/Lake Crest Drive & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Del/Veh (s)	1.2	0.6	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.2
Total Del/Veh (s)	23.2	6.7	1.8	17.2	13.1	11.0	72.7	13.5	58.0	45.1	12.0
Vehicles Exited	14	516	3	5	1232	25	6	2	8	14	1825
Hourly Exit Rate	14	516	3	5	1232	25	6	2	8	14	1825
Input Volume	17	573	2	5	1244	26	6	2	8	14	1897
% of Volume	84	90	150	100	99	95	96	89	103	98	96

Total Network Performance

Denied Del/Veh (s)	21.1
Total Del/Veh (s)	150.1
Vehicles Exited	3612
Hourly Exit Rate	3612
Input Volume	28019
% of Volume	13

Intersection: 1001: Chilson Commons/Chilson Road & M-36

Movement	EB	EB	EB	WB	WB	B4	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	T	L	TR	L	TR
Maximum Queue (ft)	536	1606	54	240	1219	518	181	153	162	208
Average Queue (ft)	398	718	16	66	834	165	144	64	69	103
95th Queue (ft)	665	2010	44	219	1471	622	210	132	131	176
Link Distance (ft)		1963			1169	781	153	153		1615
Upstream Blk Time (%)		19			15	0	51	2		
Queuing Penalty (veh)		0			189	1	0	0		
Storage Bay Dist (ft)	500		110	160					130	
Storage Blk Time (%)	42	2			42				2	4
Queuing Penalty (veh)	189	4			17				4	5

Intersection: 1002: Merrill Road & M-36

Movement	EB	EB	WB	WB	B27	NB	NB
Directions Served	T	R	L	T	T	L	R
Maximum Queue (ft)	241	89	275	821	67	238	331
Average Queue (ft)	100	19	121	470	8	162	68
95th Queue (ft)	196	67	305	864	81	239	210
Link Distance (ft)	2305			878	4563		642
Upstream Blk Time (%)				3			
Queuing Penalty (veh)				26			
Storage Bay Dist (ft)		100	75			160	
Storage Blk Time (%)	8		6	48		9	0
Queuing Penalty (veh)	17		43	38		15	0

Intersection: 1003: CVS Driveway/Hamburg Road & M-36

Movement	EB	EB	EB	B6	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	T	L	T	R	L	TR	L	TR
Maximum Queue (ft)	436	536	98	1608	19	227	121	68	56	140	212
Average Queue (ft)	403	435	15	730	1	108	46	23	16	47	98
95th Queue (ft)	519	691	60	1940	9	186	88	55	41	99	171
Link Distance (ft)		436		4563		517		112	112		789
Upstream Blk Time (%)	38	53						0			
Queuing Penalty (veh)	0	282						0			
Storage Bay Dist (ft)	450		180		150		250			75	
Storage Blk Time (%)	38	0				2				2	13
Queuing Penalty (veh)	90	1				6				6	13

Intersection: 9001: Chilson Road & Winans Lake Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	316	19	104
Average Queue (ft)	142	1	34
95th Queue (ft)	266	10	79
Link Distance (ft)	2273	1309	456
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9002: Site Driveway/Buckhorn Lane & Winans Lake Road

Movement	EB	EB	WB	NB	SB
Directions Served	LT	R	LT	LTR	LTR
Maximum Queue (ft)	15	11	72	62	33
Average Queue (ft)	1	0	11	25	4
95th Queue (ft)	8	6	44	50	22
Link Distance (ft)	2607		1813	353	475
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		25			
Storage Blk Time (%)	0	0	1		
Queuing Penalty (veh)	0	0	0		

Intersection: 9003: Winans Lake Road & Hamburg Road

Movement	EB	WB	SB	SB
Directions Served	LT	TR	L	R
Maximum Queue (ft)	131	30	124	74
Average Queue (ft)	47	4	29	41
95th Queue (ft)	104	19	77	70
Link Distance (ft)	1442	1535	1863	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				50
Storage Blk Time (%)			3	3
Queuing Penalty (veh)			5	2

Intersection: 9004: Hamburg Road & Winans Lake Road

Movement	WB	B30	NB	SB
Directions Served	LR	T	TR	LT
Maximum Queue (ft)	313	23	121	64
Average Queue (ft)	107	3	40	22
95th Queue (ft)	252	38	95	54
Link Distance (ft)	380	1406	305	517
Upstream Blk Time (%)	2			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9005: Club Driveway/Lake Crest Drive & M-36

Movement	EB	B4	WB	WB	NB	SB
Directions Served	LTR	T	LT	R	LTR	LTR
Maximum Queue (ft)	390	18	309	46	41	60
Average Queue (ft)	57	1	59	4	9	20
95th Queue (ft)	268	34	323	43	32	51
Link Distance (ft)	781	1169	2305		171	371
Upstream Blk Time (%)	0					
Queuing Penalty (veh)	1					
Storage Bay Dist (ft)				100		
Storage Blk Time (%)			4			
Queuing Penalty (veh)			1			

Network Summary

Network wide Queuing Penalty: 955

1001: Chilson Commons/Chilson Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	2.3	0.9	2.2	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.6
Total Del/Veh (s)	14.3	15.6	5.9	30.1	7.8	4.1	23.7	21.5	12.5	33.4	8.1	6.7	15.7
Vehicles Exited	83	723	43	13	223	68	26	15	54	211	40	68	1567
Hourly Exit Rate	86	749	45	13	231	70	27	16	56	218	41	70	1622
Input Volume	84	752	45	14	234	68	28	16	55	225	44	72	1637
% of Volume	103	100	99	96	98	103	96	96	102	97	95	97	99

1002: Merrill Road & M-36 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	3.8	0.4	0.3
Total Del/Veh (s)	18.2	8.5	45.3	6.4	17.1	9.4	15.1
Vehicles Exited	734	332	52	189	112	53	1472
Hourly Exit Rate	760	344	54	196	116	55	1524
Input Volume	765	348	57	197	116	56	1539
% of Volume	99	99	95	99	100	98	99

1003: CVS Driveway/Hamburg Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	13.8	8.2	1.9	7.8	6.9	1.6	17.0	11.3	5.0	24.9	1.2	4.3	11.1
Vehicles Exited	302	472	11	1	111	51	2	2	6	216	53	127	1354
Hourly Exit Rate	313	489	11	1	115	53	2	2	6	224	55	131	1402
Input Volume	319	490	10	1	119	53	2	2	6	222	56	133	1413
% of Volume	98	100	111	104	97	100	92	92	108	101	98	99	99

9001: Chilson Road & Winans Lake Road Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.4	0.4	0.2
Total Del/Veh (s)	14.2	7.1	1.8	0.9	3.6	2.5	3.9
Vehicles Exited	64	65	123	78	155	257	742
Hourly Exit Rate	66	67	127	81	160	266	768
Input Volume	72	64	126	81	159	269	770
% of Volume	92	105	101	100	101	99	100

9002: Site Driveway/Buckhorn Lane & Winans Lake Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Del/Veh (s)	0.8	0.1	1.4	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Total Del/Veh (s)	4.7	2.1	1.7	1.7	0.9	0.4	6.8	4.0	6.6	3.0	2.2
Vehicles Exited	1	309	10	8	108	1	12	41	6	3	499
Hourly Exit Rate	1	320	10	8	112	1	12	42	6	3	517
Input Volume	2	319	11	8	112	1	13	43	7	3	520
% of Volume	52	100	96	100	99	104	94	98	86	104	99

9003: Winans Lake Road & Hamburg Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.3	1.9	0.2
Total Del/Veh (s)	3.3	3.3	1.1	0.3	10.6	4.3	4.7
Vehicles Exited	66	292	68	51	171	54	702
Hourly Exit Rate	68	302	70	53	177	56	727
Input Volume	70	300	72	52	180	54	729
% of Volume	97	101	97	101	99	103	100

9004: Hamburg Road & Winans Lake Road Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.2	0.1	0.1	0.1	0.1
Total Del/Veh (s)	3.1	2.9	8.0	5.8	6.0	8.4	6.0
Vehicles Exited	150	57	56	352	276	245	1136
Hourly Exit Rate	155	59	58	364	286	254	1176
Input Volume	157	57	61	365	284	254	1178
% of Volume	99	104	95	100	101	100	100

9005: Club Driveway/Lake Crest Drive & M-36 Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	2.4	1.7	2.9	2.2	25.6	11.6	3.0
Vehicles Exited	6	1006	277	8	47	27	1371
Hourly Exit Rate	6	1042	287	8	49	28	1419
Input Volume	6	1055	290	8	48	29	1436
% of Volume	99	99	99	104	102	96	99

Total Network Performance

Denied Del/Veh (s)	0.8
Total Del/Veh (s)	38.6
Vehicles Exited	2560
Hourly Exit Rate	2650
Input Volume	20488
% of Volume	13

Intersection: 1001: Chilson Commons/Chilson Road & M-36

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (ft)	87	328	149	46	144	60	91	214	166
Average Queue (ft)	35	160	17	11	56	16	29	110	43
95th Queue (ft)	73	281	82	36	113	46	68	181	110
Link Distance (ft)		1963			1169	153	153		1615
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	500		110	160				130	
Storage Blk Time (%)		13			0			7	0
Queuing Penalty (veh)		17			0			6	0

Intersection: 1002: Merrill Road & M-36

Movement	EB	EB	WB	WB	NB	NB
Directions Served	T	R	L	T	L	R
Maximum Queue (ft)	329	217	105	135	112	72
Average Queue (ft)	156	45	41	41	48	22
95th Queue (ft)	290	148	90	100	91	54
Link Distance (ft)	2305			878		642
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		100	75		160	
Storage Blk Time (%)	15	0	7	2	0	
Queuing Penalty (veh)	53	0	15	1	0	

Intersection: 1003: CVS Driveway/Hamburg Road & M-36

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (ft)	195	187	29	10	85	44	16	23	164	151
Average Queue (ft)	88	86	3	0	26	12	1	4	88	41
95th Queue (ft)	162	162	18	6	63	34	9	17	144	99
Link Distance (ft)		436			517		112	112		789
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	450		180	150		250			75	
Storage Blk Time (%)		0			0				12	0
Queuing Penalty (veh)		1			0				17	1

Intersection: 9001: Chilson Road & Winans Lake Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	119	12	116
Average Queue (ft)	50	1	32
95th Queue (ft)	91	6	81
Link Distance (ft)	2273	1309	456
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9002: Site Driveway/Buckhorn Lane & Winans Lake Road

Movement	EB	WB	NB	SB
Directions Served	L	L	LTR	LTR
Maximum Queue (ft)	8	18	54	32
Average Queue (ft)	0	1	25	9
95th Queue (ft)	5	10	46	31
Link Distance (ft)			347	468
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	150	150		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9003: Winans Lake Road & Hamburg Road

Movement	EB	SB	SB
Directions Served	LT	L	R
Maximum Queue (ft)	72	109	68
Average Queue (ft)	11	41	27
95th Queue (ft)	43	85	57
Link Distance (ft)	1442	1863	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			50
Storage Blk Time (%)		5	0
Queuing Penalty (veh)		3	0

Intersection: 9004: Hamburg Road & Winans Lake Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	53	153	134
Average Queue (ft)	12	53	46
95th Queue (ft)	40	115	104
Link Distance (ft)	380	305	517
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9005: Club Driveway/Lake Crest Drive & M-36

Movement	EB	SB
Directions Served	LTR	LTR
Maximum Queue (ft)	36	117
Average Queue (ft)	2	38
95th Queue (ft)	20	85
Link Distance (ft)	781	371
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 113

1001: Chilson Commons/Chilson Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	10.8	10.0	12.5	0.0	0.0	0.0	46.8	39.3	38.5	0.0	0.0	0.0	7.8
Total Del/Veh (s)	629.4	49.4	37.3	76.6	69.2	74.8	89.6	31.5	18.1	37.3	16.8	22.0	76.3
Vehicles Exited	56	344	93	35	917	242	172	104	25	102	142	133	2365
Hourly Exit Rate	56	344	93	35	917	242	172	104	25	102	142	133	2365
Input Volume	81	371	100	40	956	251	180	108	25	108	144	137	2500
% of Volume	69	93	93	88	96	96	96	96	99	94	98	97	95

1002: Merrill Road & M-36 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.1	12.7	8.9	3.4	1.4	4.8
Total Del/Veh (s)	18.9	6.4	65.2	65.3	22.9	9.1	37.6
Vehicles Exited	350	201	77	790	484	149	2051
Hourly Exit Rate	350	201	77	790	484	149	2051
Input Volume	378	214	78	796	481	148	2095
% of Volume	93	94	98	99	101	101	98

1003: CVS Driveway/Hamburg Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	24.2	20.5	21.5	0.0	0.0	0.0	0.1	0.1	0.1	0.4	0.0	0.0	6.0
Total Del/Veh (s)	241.7	36.7	22.9	13.7	13.4	4.5	32.2	16.4	4.8	24.3	22.9	12.5	49.1
Vehicles Exited	243	174	32	2	457	292	37	26	13	96	32	350	1754
Hourly Exit Rate	243	174	32	2	457	292	37	26	13	96	32	350	1754
Input Volume	295	201	34	2	455	293	36	25	13	99	34	348	1836
% of Volume	82	86	93	100	100	100	102	104	102	97	94	101	96

9001: Chilson Road & Winans Lake Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.1
Total Del/Veh (s)	27.6	2.0	21.6	2.9	1.6	4.9	2.1	9.4
Vehicles Exited	172	78	178	325	103	90	205	1151
Hourly Exit Rate	172	78	178	325	103	90	205	1151
Input Volume	181	80	182	352	113	93	208	1211
% of Volume	95	97	98	92	91	97	98	95

9002: Site Driveway/Buckhorn Lane & Winans Lake Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.3	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0
Total Del/Veh (s)	4.4	2.0	1.6	2.9	2.7	1.1	8.4	3.5	2.9	3.9	2.7
Vehicles Exited	2	189	19	42	410	7	20	18	1	4	712
Hourly Exit Rate	2	189	19	42	410	7	20	18	1	4	712
Input Volume	2	203	19	45	428	6	20	17	1	3	744
% of Volume	89	93	101	94	96	117	101	104	100	133	96

9003: Winans Lake Road & Hamburg Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.4	2.1	0.3
Total Del/Veh (s)	9.1	5.8	4.1	1.7	17.9	6.0	5.5
Vehicles Exited	97	112	348	217	70	137	981
Hourly Exit Rate	97	112	348	217	70	137	981
Input Volume	103	119	369	226	72	138	1028
% of Volume	94	94	94	96	97	99	95

9004: Hamburg Road & Winans Lake Road Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.0	0.0	0.0
Total Del/Veh (s)	12.5	12.3	7.3	5.0	3.7	5.9	8.7
Vehicles Exited	356	268	304	287	105	83	1403
Hourly Exit Rate	356	268	304	287	105	83	1403
Input Volume	353	267	335	308	107	89	1459
% of Volume	101	100	91	93	98	94	96

9005: Club Driveway/Lake Crest Drive & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Del/Veh (s)	5.1	2.9	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.9
Total Del/Veh (s)	40.3	17.2	22.8	22.5	14.7	11.8	117.2	80.8	164.5	138.7	18.8
Vehicles Exited	23	535	2	5	1222	45	6	2	12	21	1873
Hourly Exit Rate	23	535	2	5	1222	45	6	2	12	21	1873
Input Volume	25	570	2	5	1235	45	6	2	14	24	1928
% of Volume	92	94	100	100	99	101	96	89	84	88	97

Total Network Performance

Denied Del/Veh (s)	11.2
Total Del/Veh (s)	149.1
Vehicles Exited	3636
Hourly Exit Rate	3636
Input Volume	27809
% of Volume	13

Intersection: 1001: Chilson Commons/Chilson Road & M-36

Movement	EB	EB	EB	WB	WB	B4	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	T	L	TR	L	TR
Maximum Queue (ft)	508	1133	62	239	1266	621	187	150	142	194
Average Queue (ft)	319	367	19	63	852	181	137	64	64	101
95th Queue (ft)	592	1272	55	212	1506	641	209	129	117	169
Link Distance (ft)		1963			1169	781	153	153		1615
Upstream Blk Time (%)		4			16	0	41	1		
Queuing Penalty (veh)		0			202	1	0	0		
Storage Bay Dist (ft)	500		110	160					130	
Storage Blk Time (%)	21	2			41				1	4
Queuing Penalty (veh)	94	4			16				2	4

Intersection: 1002: Merrill Road & M-36

Movement	EB	EB	WB	WB	B27	NB	NB
Directions Served	T	R	L	T	T	L	R
Maximum Queue (ft)	302	143	275	884	193	239	362
Average Queue (ft)	109	25	133	545	32	168	74
95th Queue (ft)	239	99	320	995	190	246	234
Link Distance (ft)	2305			878	4563		642
Upstream Blk Time (%)				10			
Queuing Penalty (veh)				81			
Storage Bay Dist (ft)		100	75			160	
Storage Blk Time (%)	9	0	5	49		10	0
Queuing Penalty (veh)	20	0	39	38		16	0

Intersection: 1003: CVS Driveway/Hamburg Road & M-36

Movement	EB	EB	EB	B6	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	T	L	T	R	L	TR	L	TR
Maximum Queue (ft)	436	536	99	1868	18	228	94	77	58	142	198
Average Queue (ft)	395	430	16	929	1	112	45	26	16	48	97
95th Queue (ft)	541	703	66	2310	10	191	77	60	43	101	168
Link Distance (ft)		436		4563		517		112	112		789
Upstream Blk Time (%)	41	56						0			
Queuing Penalty (veh)	0	294						0			
Storage Bay Dist (ft)	450		180		150		250			75	
Storage Blk Time (%)	41	0				2				2	13
Queuing Penalty (veh)	97	2				6				7	13

Intersection: 9001: Chilson Road & Winans Lake Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	303	11	108
Average Queue (ft)	127	1	33
95th Queue (ft)	238	7	77
Link Distance (ft)	2273	1309	456
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9002: Site Driveway/Buckhorn Lane & Winans Lake Road

Movement	EB	WB	NB	SB
Directions Served	LT	LT	LTR	LTR
Maximum Queue (ft)	18	61	52	31
Average Queue (ft)	1	9	21	4
95th Queue (ft)	9	37	44	21
Link Distance (ft)	2607	1813	353	475
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)	0	1		
Queuing Penalty (veh)	0	0		

Intersection: 9003: Winans Lake Road & Hamburg Road

Movement	EB	WB	SB	SB
Directions Served	LT	TR	L	R
Maximum Queue (ft)	139	35	112	74
Average Queue (ft)	48	3	29	41
95th Queue (ft)	107	19	74	70
Link Distance (ft)	1442	1535	1863	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				50
Storage Blk Time (%)			3	3
Queuing Penalty (veh)			4	2

Intersection: 9004: Hamburg Road & Winans Lake Road

Movement	WB	B30	NB	SB
Directions Served	LR	T	TR	LT
Maximum Queue (ft)	290	6	133	67
Average Queue (ft)	101	0	39	22
95th Queue (ft)	233	7	95	53
Link Distance (ft)	380	1406	305	517
Upstream Blk Time (%)	0			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9005: Club Driveway/Lake Crest Drive & M-36

Movement	EB	B4	WB	WB	NB	SB
Directions Served	LTR	T	LT	R	LTR	LTR
Maximum Queue (ft)	570	101	480	50	52	170
Average Queue (ft)	118	10	82	5	12	53
95th Queue (ft)	472	123	536	46	42	157
Link Distance (ft)	781	1169	2305		171	371
Upstream Blk Time (%)	2		0			
Queuing Penalty (veh)	11		0			
Storage Bay Dist (ft)				100		
Storage Blk Time (%)			3			
Queuing Penalty (veh)			2			

Network Summary

Network wide Queuing Penalty: 954

1001: Chilson Commons/Chilson Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	2.4	0.9	2.3	0.0	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.0	0.6
Total Del/Veh (s)	13.4	15.4	5.5	26.1	6.6	2.3	24.1	22.1	11.6	32.4	7.9	6.3	15.2
Vehicles Exited	76	747	45	13	230	69	26	16	56	223	44	68	1613
Hourly Exit Rate	76	747	45	13	230	69	26	16	56	223	44	68	1613
Input Volume	78	747	45	14	228	68	28	16	55	225	44	67	1614
% of Volume	98	100	100	93	101	101	93	98	102	99	101	101	100

1002: Merrill Road & M-36 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	3.8	0.5	0.3
Total Del/Veh (s)	18.2	8.3	47.9	6.5	17.3	8.6	15.0
Vehicles Exited	748	342	54	203	109	57	1513
Hourly Exit Rate	748	342	54	203	109	57	1513
Input Volume	753	340	57	197	114	56	1517
% of Volume	99	101	95	103	96	102	100

1003: CVS Driveway/Hamburg Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	12.0	8.2	2.2	9.6	9.6	2.0	22.7	25.3	6.0	23.9	1.4	4.1	10.7
Vehicles Exited	313	479	10	1	120	50	2	2	6	204	52	134	1373
Hourly Exit Rate	313	479	10	1	120	50	2	2	6	204	52	134	1373
Input Volume	319	480	10	1	118	51	2	2	6	207	56	133	1386
% of Volume	98	100	98	100	101	98	89	89	104	98	93	101	99

9001: Chilson Road & Winans Lake Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0		0.3	0.1	0.0	0.4	0.3	0.2
Total Del/Veh (s)	12.2		4.1	1.6	0.8	3.7	2.4	3.4
Vehicles Exited	65	0	56	126	74	154	271	746
Hourly Exit Rate	65	0	56	126	74	154	271	746
Input Volume	67	0	56	126	75	154	269	747
% of Volume	97	0	100	100	98	100	101	100

9002: Site Driveway/Buckhorn Lane & Winans Lake Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.5	0.1	0.0	0.0	0.1	0.1	0.1
Total Del/Veh (s)	4.2	1.8	0.7	0.1	5.1	2.9	1.6
Vehicles Exited	1	317	111	1	8	4	442
Hourly Exit Rate	1	317	111	1	8	4	442
Input Volume	2	319	112	1	7	3	445
% of Volume	50	99	99	100	110	133	99

9003: Winans Lake Road & Hamburg Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.3	2.0	0.2
Total Del/Veh (s)	3.2	3.4	1.1	0.2	9.5	3.9	4.5
Vehicles Exited	67	260	66	54	175	52	674
Hourly Exit Rate	67	260	66	54	175	52	674
Input Volume	66	262	67	52	180	51	679
% of Volume	101	99	98	103	97	101	99

9004: Hamburg Road & Winans Lake Road Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.2	0.1	0.1	0.1
Total Del/Veh (s)	3.0	2.7	7.7	5.5	5.6	8.0	5.7
Vehicles Exited	154	54	58	362	255	237	1120
Hourly Exit Rate	154	54	58	362	255	237	1120
Input Volume	157	54	59	365	260	239	1135
% of Volume	98	100	98	99	98	99	99

9005: Club Driveway/Lake Crest Drive & M-36 Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	1.0	1.4	3.0	2.3	20.1	8.5	2.3
Vehicles Exited	1	1049	292	5	30	21	1398
Hourly Exit Rate	1	1049	292	5	30	21	1398
Input Volume	1	1055	290	5	31	22	1404
% of Volume	100	99	101	105	97	95	100

Total Network Performance

Denied Del/Veh (s)	0.8
Total Del/Veh (s)	38.1
Vehicles Exited	2540
Hourly Exit Rate	2540
Input Volume	19842
% of Volume	13

Intersection: 1001: Chilson Commons/Chilson Road & M-36

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (ft)	84	346	149	42	120	51	58	84	214	147
Average Queue (ft)	30	160	16	10	43	16	16	29	109	37
95th Queue (ft)	65	280	76	33	94	42	44	65	181	97
Link Distance (ft)		1963			1169		153	153		1608
Upstream Blk Time (%)								0		
Queuing Penalty (veh)								0		
Storage Bay Dist (ft)	500		110	160		200			130	
Storage Blk Time (%)		13			0				6	0
Queuing Penalty (veh)		16			0				5	0

Intersection: 1002: Merrill Road & M-36

Movement	EB	EB	WB	WB	NB	NB
Directions Served	T	R	L	T	L	R
Maximum Queue (ft)	356	229	115	136	110	64
Average Queue (ft)	159	47	43	43	47	21
95th Queue (ft)	293	159	97	100	91	50
Link Distance (ft)	2305			878		642
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		100	75		160	
Storage Blk Time (%)	15	0	8	2		
Queuing Penalty (veh)	53	0	16	1		

Intersection: 1003: CVS Driveway/Hamburg Road & M-36

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (ft)	180	202	29	7	98	45	25	25	160	152
Average Queue (ft)	82	85	3	0	30	14	2	4	80	40
95th Queue (ft)	154	165	18	5	73	36	12	18	135	94
Link Distance (ft)		436			517		112	112		789
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	450		180	150		250			75	
Storage Blk Time (%)		0			0				9	0
Queuing Penalty (veh)		1			0				13	1

Intersection: 9001: Chilson Road & Winans Lake Road

Movement	WB	WB	NB	SB
Directions Served	L	R	TR	LT
Maximum Queue (ft)	76	62	14	113
Average Queue (ft)	34	27	1	32
95th Queue (ft)	64	52	8	80
Link Distance (ft)	2273		1309	444
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		250		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9002: Site Driveway/Buckhorn Lane & Winans Lake Road

Movement	SB
Directions Served	LTR
Maximum Queue (ft)	30
Average Queue (ft)	9
95th Queue (ft)	32
Link Distance (ft)	468
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 9003: Winans Lake Road & Hamburg Road

Movement	EB	WB	SB	SB
Directions Served	LT	TR	L	R
Maximum Queue (ft)	75	4	93	69
Average Queue (ft)	11	0	39	25
95th Queue (ft)	45	3	74	53
Link Distance (ft)	1442	1535	1863	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				50
Storage Blk Time (%)			3	0
Queuing Penalty (veh)			2	0

Intersection: 9004: Hamburg Road & Winans Lake Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	52	150	114
Average Queue (ft)	11	50	40
95th Queue (ft)	38	110	89
Link Distance (ft)	380	305	517
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9005: Club Driveway/Lake Crest Drive & M-36

Movement	EB	SB
Directions Served	LTR	LTR
Maximum Queue (ft)	3	83
Average Queue (ft)	0	28
95th Queue (ft)	4	62
Link Distance (ft)	781	371
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 110

1001: Chilson Commons/Chilson Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	2.5	0.6	2.5	0.0	0.0	0.0	27.4	26.4	24.3	0.0	0.0	0.0	3.7
Total Del/Veh (s)	43.9	9.4	3.5	18.2	12.0	6.6	76.3	29.3	16.9	40.3	16.8	21.0	19.1
Vehicles Exited	72	358	102	40	945	249	176	108	26	101	150	126	2453
Hourly Exit Rate	72	358	102	40	945	249	176	108	26	101	150	126	2453
Input Volume	71	363	100	40	946	251	180	108	25	108	144	128	2464
% of Volume	101	99	102	101	100	99	98	100	103	93	104	98	100

1002: Merrill Road & M-36 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.4	0.5	3.4	1.3	1.1
Total Del/Veh (s)	17.0	4.7	40.7	34.9	25.7	9.4	24.9
Vehicles Exited	368	209	75	792	463	151	2058
Hourly Exit Rate	368	209	75	792	463	151	2058
Input Volume	376	209	78	794	463	148	2069
% of Volume	98	100	96	100	100	102	99

1003: CVS Driveway/Hamburg Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0	0.0	0.0	0.4	0.2	0.3	0.4	0.1	0.0	0.0
Total Del/Veh (s)	27.2	6.9	1.7	23.8	24.6	8.2	42.2	21.4	5.9	28.9	28.0	16.0	19.0
Vehicles Exited	295	193	36	2	448	272	35	25	13	93	33	346	1791
Hourly Exit Rate	295	193	36	2	448	272	35	25	13	93	33	346	1791
Input Volume	295	200	34	2	454	271	36	25	13	95	34	348	1807
% of Volume	100	96	105	100	99	100	97	100	102	98	97	99	99

9001: Chilson Road & Winans Lake Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.1
Total Del/Veh (s)	22.6	2.1	9.1	3.0	1.7	5.3	2.1	6.6
Vehicles Exited	173	82	172	352	101	82	203	1165
Hourly Exit Rate	173	82	172	352	101	82	203	1165
Input Volume	172	81	171	352	103	84	208	1172
% of Volume	101	101	101	100	98	98	97	99

9002: Site Driveway/Buckhorn Lane & Winans Lake Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.1	0.3	0.1	0.1		0.1	0.2
Total Del/Veh (s)	2.8	1.7	2.0	1.2		4.7	1.9
Vehicles Exited	1	202	428	7	0	3	641
Hourly Exit Rate	1	202	428	7	0	3	641
Input Volume	2	203	428	6	1	3	643
% of Volume	44	100	100	117	0	100	100

9003: Winans Lake Road & Hamburg Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.3	2.0	0.3
Total Del/Veh (s)	9.3	6.3	4.1	1.8	18.0	5.6	5.6
Vehicles Exited	98	107	325	233	71	136	970
Hourly Exit Rate	98	107	325	233	71	136	970
Input Volume	98	108	329	226	72	133	966
% of Volume	100	99	99	103	98	102	100

9004: Hamburg Road & Winans Lake Road Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.0	0.0	0.0
Total Del/Veh (s)	11.3	10.9	8.5	6.3	3.7	5.9	8.6
Vehicles Exited	347	247	320	305	98	84	1401
Hourly Exit Rate	347	247	320	305	98	84	1401
Input Volume	353	249	312	308	99	85	1406
% of Volume	98	99	102	99	99	99	100

9005: Club Driveway/Lake Crest Drive & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Total Del/Veh (s)	12.0	2.8	4.1	9.4	7.2	6.1	33.2	6.3	36.6	18.7	6.2
Vehicles Exited	15	560	2	5	1232	28	5	2	8	14	1871
Hourly Exit Rate	15	560	2	5	1232	28	5	2	8	14	1871
Input Volume	17	570	2	5	1234	26	6	2	8	14	1885
% of Volume	90	98	100	100	100	107	80	89	103	98	99

Total Network Performance

Denied Del/Veh (s)	3.4
Total Del/Veh (s)	52.7
Vehicles Exited	3678
Hourly Exit Rate	3678
Input Volume	26973
% of Volume	14

Intersection: 1001: Chilson Commons/Chilson Road & M-36

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (ft)	122	162	63	123	293	103	178	158	162	195
Average Queue (ft)	51	77	21	25	161	41	130	63	64	93
95th Queue (ft)	100	134	50	78	254	80	199	129	127	164
Link Distance (ft)		1963			1169		153	153		1608
Upstream Blk Time (%)							29	2		
Queuing Penalty (veh)							0	0		
Storage Bay Dist (ft)	500		110	160		200			130	
Storage Blk Time (%)		2	0		6				2	3
Queuing Penalty (veh)		3	0		18				4	4

Intersection: 1002: Merrill Road & M-36

Movement	EB	EB	WB	WB	B27	NB	NB
Directions Served	T	R	L	T	T	L	R
Maximum Queue (ft)	254	103	275	694	6	239	381
Average Queue (ft)	107	18	88	339	0	178	88
95th Queue (ft)	202	65	243	629	6	257	268
Link Distance (ft)	2305			878	4563		642
Upstream Blk Time (%)				0			
Queuing Penalty (veh)				3			
Storage Bay Dist (ft)		100	75			160	
Storage Blk Time (%)	9	0	5	39		13	0
Queuing Penalty (veh)	20	0	39	30		20	0

Intersection: 1003: CVS Driveway/Hamburg Road & M-36

Movement	EB	EB	EB	WB	WB	WB	B8	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	T	L	TR	L	TR
Maximum Queue (ft)	255	124	47	21	345	264	12	89	62	158	228
Average Queue (ft)	137	39	9	2	163	70	1	28	17	53	110
95th Queue (ft)	230	94	33	12	287	176	21	69	44	115	194
Link Distance (ft)		436			517		1008	112	112		789
Upstream Blk Time (%)					0			1	0		
Queuing Penalty (veh)					0			0	0		
Storage Bay Dist (ft)	450		180	150		250				75	
Storage Blk Time (%)		0			11	0				2	19
Queuing Penalty (veh)		0			31	0				10	18

Intersection: 9001: Chilson Road & Winans Lake Road

Movement	WB	WB	NB	SB
Directions Served	L	R	TR	LT
Maximum Queue (ft)	162	106	24	105
Average Queue (ft)	72	51	2	32
95th Queue (ft)	129	87	12	77
Link Distance (ft)	2273		1309	444
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		250		
Storage Blk Time (%)	0			
Queuing Penalty (veh)	0			

Intersection: 9002: Site Driveway/Buckhorn Lane & Winans Lake Road

Movement	EB	SB
Directions Served	LT	LTR
Maximum Queue (ft)	13	30
Average Queue (ft)	1	3
95th Queue (ft)	8	19
Link Distance (ft)		475
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	150	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9003: Winans Lake Road & Hamburg Road

Movement	EB	WB	SB	SB
Directions Served	LT	TR	L	R
Maximum Queue (ft)	123	36	103	72
Average Queue (ft)	48	4	28	40
95th Queue (ft)	101	21	70	69
Link Distance (ft)	1442	1535	1863	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				50
Storage Blk Time (%)			2	2
Queuing Penalty (veh)			3	2

Intersection: 9004: Hamburg Road & Winans Lake Road

Movement	WB	NB	B29	SB
Directions Served	LR	TR	T	LT
Maximum Queue (ft)	269	198	3	70
Average Queue (ft)	93	54	0	22
95th Queue (ft)	208	140	4	55
Link Distance (ft)	380	305	1294	517
Upstream Blk Time (%)	0	0		
Queuing Penalty (veh)	0	0		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9005: Club Driveway/Lake Crest Drive & M-36

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	R	LTR	LTR
Maximum Queue (ft)	231	101	12	30	52
Average Queue (ft)	31	5	0	6	17
95th Queue (ft)	134	56	11	24	43
Link Distance (ft)	781	2305		171	371
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			100		
Storage Blk Time (%)		0			
Queuing Penalty (veh)		0			

Network Summary

Network wide Queuing Penalty: 205

1001: Chilson Commons/Chilson Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	2.4	0.9	2.4	0.0	0.0	0.0	0.1	0.1	0.2	0.0	0.0	0.0	0.6
Total Del/Veh (s)	13.9	15.6	5.5	31.6	6.8	2.3	23.5	21.4	12.4	34.4	7.7	7.0	15.7
Vehicles Exited	91	747	46	14	230	70	28	18	55	228	44	79	1650
Hourly Exit Rate	91	747	46	14	230	70	28	18	55	228	44	79	1650
Input Volume	89	747	45	14	228	69	28	16	55	229	44	79	1643
% of Volume	102	100	102	100	101	101	100	111	100	100	100	100	100

1002: Merrill Road & M-36 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.1	0.0	0.0	3.9	0.4	0.3
Total Del/Veh (s)	18.2	8.4	41.6	6.1	16.8	9.3	14.9
Vehicles Exited	752	345	61	200	112	58	1528
Hourly Exit Rate	752	345	61	200	112	58	1528
Input Volume	754	344	61	196	115	57	1527
% of Volume	100	100	100	102	97	102	100

1003: CVS Driveway/Hamburg Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0		0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	12.1	8.8	2.1		10.0	2.2	21.6	22.9	5.4	24.9	1.5	4.7	11.3
Vehicles Exited	312	485	11	0	122	54	2	2	6	231	55	135	1415
Hourly Exit Rate	312	485	11	0	122	54	2	2	6	231	55	135	1415
Input Volume	320	480	10	1	118	54	2	2	6	231	56	137	1418
% of Volume	98	101	107	0	103	100	89	89	104	100	98	99	100

9001: Chilson Road & Winans Lake Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0		0.3	0.0	0.0	0.4	0.4	0.2
Total Del/Veh (s)	13.7		4.1	1.8	1.0	3.7	2.5	3.7
Vehicles Exited	81	0	63	126	88	156	272	786
Hourly Exit Rate	81	0	63	126	88	156	272	786
Input Volume	83	0	64	126	87	159	269	788
% of Volume	97	0	98	100	101	98	101	100

9002: Site Driveway/Buckhorn Lane & Winans Lake Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Del/Veh (s)	1.0	0.1	0.9	0.0	0.0	0.0	0.2	0.1	0.1	0.1	0.1
Total Del/Veh (s)	4.0	2.2	2.2	2.0	0.9	0.7	6.6	4.3	6.8	3.3	2.4
Vehicles Exited	2	322	16	9	109	1	23	57	7	3	549
Hourly Exit Rate	2	322	16	9	109	1	23	57	7	3	549
Input Volume	2	319	17	10	112	1	24	56	7	3	552
% of Volume	100	101	94	88	97	100	97	102	97	100	100

9003: Winans Lake Road & Hamburg Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.3	1.9	0.2
Total Del/Veh (s)	3.2	3.3	1.1	0.3	11.2	4.2	4.8
Vehicles Exited	71	316	71	50	175	53	736
Hourly Exit Rate	71	316	71	50	175	53	736
Input Volume	70	313	75	52	180	54	744
% of Volume	101	101	95	96	97	98	99

9004: Hamburg Road & Winans Lake Road Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Total Del/Veh (s)	3.1	2.8	8.4	6.0	6.4	8.7	6.3
Vehicles Exited	158	55	59	363	287	262	1184
Hourly Exit Rate	158	55	59	363	287	262	1184
Input Volume	157	57	63	365	284	267	1193
% of Volume	100	97	94	99	101	98	99

9005: Club Driveway/Lake Crest Drive & M-36 Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	2.0	1.5	2.9	2.3	22.5	6.9	2.3
Vehicles Exited	1	1056	293	4	30	22	1406
Hourly Exit Rate	1	1056	293	4	30	22	1406
Input Volume	1	1060	291	5	31	22	1410
% of Volume	100	100	101	84	97	100	100

Total Network Performance

Denied Del/Veh (s)	0.8
Total Del/Veh (s)	38.8
Vehicles Exited	2666
Hourly Exit Rate	2666
Input Volume	20618
% of Volume	13

Intersection: 1001: Chilson Commons/Chilson Road & M-36

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (ft)	94	342	100	56	116	51	64	94	227	228
Average Queue (ft)	34	162	13	12	44	16	17	31	114	47
95th Queue (ft)	73	280	55	40	96	42	47	70	190	137
Link Distance (ft)		1963			1169		153	153		1608
Upstream Blk Time (%)								0		
Queuing Penalty (veh)								0		
Storage Bay Dist (ft)	500		110	160		200			130	
Storage Blk Time (%)		13							8	0
Queuing Penalty (veh)		18							8	0

Intersection: 1002: Merrill Road & M-36

Movement	EB	EB	WB	WB	NB	NB
Directions Served	T	R	L	T	L	R
Maximum Queue (ft)	368	227	119	130	104	67
Average Queue (ft)	156	46	44	41	47	23
95th Queue (ft)	294	150	93	95	89	53
Link Distance (ft)	2305			878		642
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		100	75		160	
Storage Blk Time (%)	15	0	7	1	0	
Queuing Penalty (veh)	53	0	15	1	0	

Intersection: 1003: CVS Driveway/Hamburg Road & M-36

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (ft)	177	202	30	6	109	49	20	26	163	188
Average Queue (ft)	82	89	3	0	34	15	2	4	91	45
95th Queue (ft)	149	172	18	5	81	37	11	19	148	118
Link Distance (ft)		436			517		112	112		789
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	450		180	150		250			75	
Storage Blk Time (%)		1			0				13	0
Queuing Penalty (veh)		2			0				19	1

Intersection: 9001: Chilson Road & Winans Lake Road

Movement	WB	WB	NB	SB
Directions Served	L	R	TR	LT
Maximum Queue (ft)	91	62	16	110
Average Queue (ft)	40	28	1	33
95th Queue (ft)	74	51	8	82
Link Distance (ft)	2273		1309	444
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		250		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9002: Site Driveway/Buckhorn Lane & Winans Lake Road

Movement	EB	WB	NB	SB
Directions Served	L	L	LTR	LTR
Maximum Queue (ft)	7	21	59	32
Average Queue (ft)	0	2	30	9
95th Queue (ft)	5	12	51	32
Link Distance (ft)			347	468
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	150	150		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9003: Winans Lake Road & Hamburg Road

Movement	EB	WB	SB	SB
Directions Served	LT	TR	L	R
Maximum Queue (ft)	78	3	117	73
Average Queue (ft)	12	0	44	28
95th Queue (ft)	49	3	89	59
Link Distance (ft)	1442	1535	1863	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				50
Storage Blk Time (%)			5	0
Queuing Penalty (veh)			3	0

Intersection: 9004: Hamburg Road & Winans Lake Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	57	161	161
Average Queue (ft)	12	55	49
95th Queue (ft)	41	122	113
Link Distance (ft)	380	305	517
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9005: Club Driveway/Lake Crest Drive & M-36

Movement	EB	SB
Directions Served	LTR	LTR
Maximum Queue (ft)	16	87
Average Queue (ft)	1	28
95th Queue (ft)	14	63
Link Distance (ft)	781	371
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 119

1001: Chilson Commons/Chilson Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	2.6	0.6	2.4	0.0	0.0	0.0	53.1	48.3	49.6	0.0	0.0	0.0	6.7
Total Del/Veh (s)	58.0	9.6	3.4	18.3	12.4	6.9	88.2	31.5	17.5	39.4	17.4	21.6	20.9
Vehicles Exited	84	356	100	37	943	263	173	107	26	109	148	146	2492
Hourly Exit Rate	84	356	100	37	943	263	173	107	26	109	148	146	2492
Input Volume	89	363	100	40	946	260	180	108	25	111	144	147	2512
% of Volume	94	98	100	93	100	101	96	99	103	98	103	99	99

1002: Merrill Road & M-36 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	2.0	1.1	3.4	1.3	1.4
Total Del/Veh (s)	17.9	4.8	42.6	36.9	26.2	9.6	26.0
Vehicles Exited	372	210	77	791	471	157	2078
Hourly Exit Rate	372	210	77	791	471	157	2078
Input Volume	377	212	80	795	472	157	2093
% of Volume	99	99	96	100	100	100	99

1003: CVS Driveway/Hamburg Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0	0.0	0.0	0.4	0.1	0.1	0.4	0.1	0.0	0.0
Total Del/Veh (s)	28.8	7.5	1.7	24.9	25.3	8.8	41.5	21.4	6.0	28.6	29.8	15.9	19.5
Vehicles Exited	300	197	36	2	445	286	36	23	13	101	35	349	1823
Hourly Exit Rate	300	197	36	2	445	286	36	23	13	101	35	349	1823
Input Volume	304	200	34	2	454	294	36	25	13	100	34	350	1846
% of Volume	99	98	105	100	98	97	99	92	102	101	103	100	99

9001: Chilson Road & Winans Lake Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.1
Total Del/Veh (s)	29.6	2.1	8.9	3.4	2.0	5.8	2.4	8.2
Vehicles Exited	195	86	180	347	133	91	207	1239
Hourly Exit Rate	195	86	180	347	133	91	207	1239
Input Volume	194	81	182	352	130	93	208	1241
% of Volume	101	106	99	99	103	98	99	100

9002: Site Driveway/Buckhorn Lane & Winans Lake Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Del/Veh (s)	0.6	0.3	0.0	0.0	0.1	0.0	0.1	0.1		0.1	0.1
Total Del/Veh (s)	4.6	2.4	2.0	3.3	2.9	1.4	9.2	4.1		5.5	3.1
Vehicles Exited	2	205	36	51	432	6	34	20	0	3	789
Hourly Exit Rate	2	205	36	51	432	6	34	20	0	3	789
Input Volume	2	203	36	55	429	6	33	20	1	3	788
% of Volume	89	101	100	93	101	100	103	101	0	100	100

9003: Winans Lake Road & Hamburg Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.3	2.1	0.3
Total Del/Veh (s)	10.9	6.6	4.3	1.9	25.0	7.4	6.6
Vehicles Exited	103	123	378	228	72	139	1043
Hourly Exit Rate	103	123	378	228	72	139	1043
Input Volume	103	122	379	226	72	138	1040
% of Volume	100	101	100	101	100	101	100

9004: Hamburg Road & Winans Lake Road Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.0	0.0	0.0
Total Del/Veh (s)	14.4	14.1	9.5	7.4	3.7	5.9	10.4
Vehicles Exited	350	276	335	303	107	94	1465
Hourly Exit Rate	350	276	335	303	107	94	1465
Input Volume	353	267	345	308	107	92	1473
% of Volume	99	103	97	98	100	102	99

9005: Club Driveway/Lake Crest Drive & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0
Total Del/Veh (s)	11.8	2.8	0.4	7.7	7.1	5.9	33.9	10.2	43.0	21.7	6.2
Vehicles Exited	15	567	2	5	1241	25	5	2	8	14	1884
Hourly Exit Rate	15	567	2	5	1241	25	5	2	8	14	1884
Input Volume	17	573	2	5	1244	26	6	2	8	14	1897
% of Volume	90	99	100	100	100	95	80	89	103	98	99

Total Network Performance

Denied Del/Veh (s)	5.5
Total Del/Veh (s)	55.8
Vehicles Exited	3805
Hourly Exit Rate	3805
Input Volume	28019
% of Volume	14

Intersection: 1001: Chilson Commons/Chilson Road & M-36

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (ft)	162	178	56	112	285	127	187	165	153	208
Average Queue (ft)	66	78	20	22	165	44	139	64	67	100
95th Queue (ft)	133	146	46	69	250	86	208	131	124	174
Link Distance (ft)		1963			1169		153	153		1608
Upstream Blk Time (%)							42	2		
Queuing Penalty (veh)							0	0		
Storage Bay Dist (ft)	500		110	160		200			130	
Storage Blk Time (%)		2			7				2	5
Queuing Penalty (veh)		4			21				4	5

Intersection: 1002: Merrill Road & M-36

Movement	EB	EB	WB	WB	B27	NB	NB
Directions Served	T	R	L	T	T	L	R
Maximum Queue (ft)	259	91	275	663	14	239	382
Average Queue (ft)	112	19	91	350	1	181	106
95th Queue (ft)	209	66	246	661	14	260	297
Link Distance (ft)	2305			878	4563		642
Upstream Blk Time (%)				1			
Queuing Penalty (veh)				6			
Storage Bay Dist (ft)		100	75			160	
Storage Blk Time (%)	11		5	40		14	0
Queuing Penalty (veh)	23		42	32		23	0

Intersection: 1003: CVS Driveway/Hamburg Road & M-36

Movement	EB	EB	EB	WB	WB	WB	B8	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	T	L	TR	L	TR
Maximum Queue (ft)	262	136	42	29	373	276	3	81	57	164	256
Average Queue (ft)	143	43	9	2	167	75	0	27	17	56	112
95th Queue (ft)	240	103	33	19	300	188	5	63	43	118	206
Link Distance (ft)		436			517		1008	112	112		789
Upstream Blk Time (%)					0			0			
Queuing Penalty (veh)					0			0			
Storage Bay Dist (ft)	450		180	150		250				75	
Storage Blk Time (%)					11	0				3	20
Queuing Penalty (veh)					35	0				12	20

Intersection: 9001: Chilson Road & Winans Lake Road

Movement	WB	WB	NB	SB
Directions Served	L	R	TR	LT
Maximum Queue (ft)	219	112	29	113
Average Queue (ft)	91	53	2	37
95th Queue (ft)	176	89	14	83
Link Distance (ft)	2273		1309	444
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		250		
Storage Blk Time (%)	1			
Queuing Penalty (veh)	2			

Intersection: 9002: Site Driveway/Buckhorn Lane & Winans Lake Road

Movement	EB	EB	WB	NB	SB
Directions Served	LT	R	LT	LTR	LTR
Maximum Queue (ft)	24	4	71	64	30
Average Queue (ft)	1	0	11	26	4
95th Queue (ft)	10	3	43	52	20
Link Distance (ft)		2607		353	475
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	150		150		
Storage Blk Time (%)			0		
Queuing Penalty (veh)			0		

Intersection: 9003: Winans Lake Road & Hamburg Road

Movement	EB	WB	SB	SB
Directions Served	LT	TR	L	R
Maximum Queue (ft)	141	32	146	74
Average Queue (ft)	53	4	34	43
95th Queue (ft)	116	22	98	73
Link Distance (ft)	1442	1535	1863	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				50
Storage Blk Time (%)			5	3
Queuing Penalty (veh)			7	2

Intersection: 9004: Hamburg Road & Winans Lake Road

Movement	WB	B30	NB	SB
Directions Served	LR	T	TR	LT
Maximum Queue (ft)	299	14	222	65
Average Queue (ft)	115	1	65	22
95th Queue (ft)	253	19	163	53
Link Distance (ft)	380	1406	305	517
Upstream Blk Time (%)	1		0	
Queuing Penalty (veh)	0		0	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 9005: Club Driveway/Lake Crest Drive & M-36

Movement	EB	WB	NB	SB
Directions Served	LTR	LT	LTR	LTR
Maximum Queue (ft)	214	43	40	58
Average Queue (ft)	32	3	7	18
95th Queue (ft)	135	29	27	47
Link Distance (ft)	781	2305	171	371
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)		0		
Queuing Penalty (veh)		0		

Network Summary

Network wide Queuing Penalty: 238

TRAFFIC SIGNAL TIMING PERMIT

PHASE	1	2	3	4	5	6	7	8	
APPROACH		EB & WB		NB					
MINIMUM GREEN		10		7					
PASSAGE		0.0		3.0					
MAXIMUM NO. 1		30		30					
MAXIMUM NO. 2		0		0					
YELLOW CHANGE		4.3		5.0					
RED CLEARANCE		1.7		1.5					
WALK		0		0					
PEDESTRIAN CLEARANCE		0		0					
EXTENDED PED. CLEARANCE		0		0					
REST IN WALK		0		0					
INITIALIZATION		4		1					
NON-ACT RESPONSE		0		0					
VEHICLE RECALL		3		0					
PEDESTRIAN RECALL		0		0					
NON-LOCK MEMORY		0		0					
DUAL ENTRY		0		0					

	CYCLE								O1	O2	O3
DIAL 1 SPLIT 1											
DIAL 2 SPLIT 1											
DIAL 3 SPLIT 1											
DIAL SPLIT											
DIAL SPLIT											
DIAL SPLIT											
	MODE										

PHASE

MAXIMUM # 1 TIMES: NORMAL

1

2 M-36

3

4 MERRILL ROAD

5

6

7

8

OVERLAPS

Overlap Phase	Load Bays	Phases Overlapped	T.G. (s)	Y (s)	R (s)	-G/Y	+GRN
A = EB M-36 RTGA		4	0.0	5.0	1.5		
=							
=							
=							

TIMING INSTALLED 02/21/12

REMARKS

NEW TRAFFIC SIGNAL INSTALLATION IN CONJUNCTION WITH JOB NUMBER 113862 A.

16-LOAD-SWITCH, BASE-MOUNTED EPAC TYPE CONTROLLER.

SEMI-ACTUATED OPERATION WITH WIRELESS LOOPS IN THE MERRILL ROAD APPROACH LANES.

RUNS FREE (MAXIMUM # 1 TIMES). PLACE A 10-SECOND DELAY IN THE MERRILL ROAD RIGHT-TURN APPROACH LANE.

PREPARED BY: HHH DATE: 10/04/11

FLASH HOURS: ☐ to ☐ ☐ ☐ DAILY ☐ NONE ☒

NIGHT FLASH:

FY = M-36 FR = MERRILL ROAD

CONFLICT FLASH:

FY = M-36 FR = MERRILL ROAD

CONTROLLER TYPE:
☒ EPAC
☐ Other:

PRE-EMPT ☐
COUNTDOWN PEDS ☐

LOCATION:
M-36 AT MERRILL ROAD

CITY/TWP: HAMBURG TOWNSHIP

COUNTY : LIVINGSTON

MILE POINT	CONTROL SECTION-SPOT #
19.35	47041-01-004

Job # (If Applicable): 113862 A

Page 3 included only if Pre-Empt Checked

ADVANCED TIMING PARAMETERS FORM

SYSTEM INFORMATION

Controller Type:
- [x] EPAC
- [ ] Other:

System Type:
- [ ] Closed Loop
  - [ ] Stand By
  - [ ] Group 1
  - [ ] Group 2
  - Address:
- [ ] TBC
- [ ] TBC/GPS
- [x] None
- [ ] Other:

If TBC, Synch by:
- [ ] TOD
- [ ] Event

Interconnect Type:
- [ ] Hardwire
- [ ] Fiber-Optic
- [ ] Radio
- [ ] Phone Drop
- [x] None
- [ ] Other:

If Phone Drop,
Phone #

Controller Status:
- [ ] Master
- [ ] Slave
- [x] Isolated
- [ ] TBC

If Slave,
Master Location:

Master
Spot # :

LEFT-TURN PHASING

Phase # / Description	*Permissive-Protected* Lead	*Permissive-Protected* Lag	*Protected-Only* Split	*Protected-Only* Lead	*Protected-Only* Lag
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

RING AND BARRIER STRUCTURE

	B1	B2	B3	B4
R1	2	4		
R2				
R3				
R4				

VEHICULAR AND PEDESTRIAN DETECTION

Approach	*Vehicular Detection* Movements and Call Delay (s): Left		Thru		Right		Type: Loop	Video	Other	*Pedestrian Detection* Push-Button Crossing Locations
NB MERRILL ROAD	☒		☐		☒	10	☐	☐	☒	
	☐		☐		☐		☐	☐	☐	
	☐		☐		☐		☐	☐	☐	
	☐		☐		☐		☐	☐	☐	
	☐		☐		☐		☐	☐	☐	
	☐		☐		☐		☐	☐	☐	

DISAPPEARING LEGEND CASE SIGNS

ADDITIONAL DIAL SPLIT DATA

		PHASE	1	2	3	4	5	6	7	8	O1	O2	O3
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											

COORDINATION DATA

Operation Mode	1
Coordination Mode	0
Maximum Mode	1
Correction Mode	0
Offset Mode	0
Force Mode	0
Max Dwell	0
Yield Period	0

REMARKS:

WIRELESS LOOPS HAVE BEEN PLACED IN THE MERRILL ROAD APPROACH LANES.

ADDITIONAL OVERLAP DATA

Overlap Phase	*Load Bays*	*Phases Overlapped*	T.G. (s)	Y (s)	R (s)	-G/Y	+GRN
=							
=							
=							
=							

PREPARED BY: HHH DATE: 10/04/11

☒ MDOT ☐ County ☐ City ☐ Consultant

LOCATION:
M-36 AT MERRILL ROAD

CONTROL SECTION-SPOT #
47041-01-004

CLEAR PAGE 2

PREEMPTION INFORMATION FORM

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SEL Ped Cl		Vehicle	Track																
SEL Yellow			Dwell																
SEL Red Cl			Cycle																
TRACK Green			Exit																
TRACK Ped Cl		Ped	Track																
TRACK Yellow			Dwell																
TRACK Red CL			Cycle																
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
RET Ped Cl			Track																
RET Yellow			Dwell																
RET Red Cl			Cycle																

☐ Locking

☐ Non-Locking

Delay (s)	
Extend (s)	
Duration (s)	
Max Call (s)	
Lockout (s)	
Link PE #	

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SEL Ped Cl		Vehicle	Track																
SEL Yellow			Dwell																
SEL Red Cl			Cycle																
TRACK Green			Exit																
TRACK Ped Cl		Ped	Track																
TRACK Yellow			Dwell																
TRACK Red CL			Cycle																
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
RET Ped Cl			Track																
RET Yellow			Dwell																
RET Red Cl			Cycle																

☐ Locking

☐ Non-Locking

Delay (s)	
Extend (s)	
Duration (s)	
Max Call (s)	
Lockout (s)	
Link PE #	

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SEL Ped Cl		Vehicle	Track																
SEL Yellow			Dwell																
SEL Red Cl			Cycle																
TRACK Green			Exit																
TRACK Ped Cl		Ped	Track																
TRACK Yellow			Dwell																
TRACK Red CL			Cycle																
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
RET Ped Cl			Track																
RET Yellow			Dwell																
RET Red Cl			Cycle																

☐ Locking

☐ Non-Locking

Delay (s)	
Extend (s)	
Duration (s)	
Max Call (s)	
Lockout (s)	
Link PE #	

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SEL Ped Cl		Vehicle	Track																
SEL Yellow			Dwell																
SEL Red Cl			Cycle																
TRACK Green			Exit																
TRACK Ped Cl		Ped	Track																
TRACK Yellow			Dwell																
TRACK Red CL			Cycle																
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
RET Ped Cl			Track																
RET Yellow			Dwell																
RET Red Cl			Cycle																

☐ Locking

☐ Non-Locking

Delay (s)	
Extend (s)	
Duration (s)	
Max Call (s)	
Lockout (s)	
Link PE #	

Preempt System Data

Ring	1	2	3	4	
MIN GRN/WLK (s)					
Priority	PE/FL	PE1/2	PE2/3	PE3/4	PE4/5	PE5/6
Status						

REMARKS :

PREPARED BY: HHH DATE: 10/04/11

LOCATION:

M-36 AT MERRILL ROAD

CONTROL SECTION-SPOT #
47041-01-004

CLEAR PAGE 3

TRAFFIC SIGNAL TIMING PERMIT

PHASE	1	2	3	4	5	6	7	8	
APPROACH		EB		NB		WB		SB	
MINIMUM GREEN		10		7		10		7	
PASSAGE		0.0		0.0		0.0		0.0	
MAXIMUM NO. 1		34		24		34		24	
MAXIMUM NO. 2		0		0		0		0	
YELLOW CHANGE		4.3		4.3		4.3		4.3	
RED CLEARANCE		2.0		2.0		2.0		2.0	
WALK		7		0		0		0	
PEDESTRIAN CLEARANCE		17		0		0		0	
EXTENDED PED. CLEARANCE		2		0		0		0	
REST IN WALK		0		0		0		0	
INITIALIZATION		4		1		4		1	
NON-ACT RESPONSE		0		0		0		0	
VEHICLE RECALL		3		0		3		0	
PEDESTRIAN RECALL		2		0		0		0	
NON-LOCK MEMORY		0		0		0		0	
DUAL ENTRY		0		0		0		0	

				CYCLE									O1	O2	O3
DIAL	1	SPLIT	1												
DIAL	2	SPLIT	1												
DIAL	3	SPLIT	1												
DIAL		SPLIT													
DIAL		SPLIT													
DIAL		SPLIT													
				MODE											

PHASE

1

2 EASTBOUND M-36

3

4 SOUTHBOUND HAMBURG ROAD

5

6 WESTBOUND M-36

7

8 NB DEVELOPMENT DRIVE

THE MODERNIZATION PROCESS AND THE CONSTRUCTION OF THE NEW WEST LEG COMPONENT OF THE INTERSECTION OCCURRED DURING PHASE # 1 OF THE DEVELOPMENT.

PHASE # 1 OF THE DEVELOPMENT HAS BEEN COMPLETED.
PHASE # 2 OF THE DEVELOPMENT IS CURRENTLY PENDING.

OVERLAPS

Overlap Phase	Load Bays	Phases Overlapped	T.G. (s)	Y (s)	R (s)	-G/Y	+GRN
=							
=							
=							
=							

TIMING INSTALLED 06/09/10

REMARKS

MODERNIZATION: PERMIT JOB.
16-LOAD-SWITCH, BASE-MOUNTED EPAC TYPE CONTROLLER.

A WEST LEG COMPONENT OF THE INTERSECTION HAS BEEN CONSTRUCTED DUE TO A NEW DEVELOPMENT.

SEMI-ACTUATED OPERATION.
RUNS FREE (MAXIMUM # 1 TIMES).

TIMING AS INSTALLED BY THE REGION ELECTRICIAN ON 6/9/2010.

PREPARED BY: HHH DATE: 06/11/10

FLASH HOURS:
23:00 to 04:00 DAILY ☒ NONE ☐

NIGHT FLASH:
FY = M-36 FR = HAMBURG RD. & DEVELOPMENT DR.

CONFLICT FLASH:
FY = M-36 FR = HAMBURG RD. & DEVELOPMENT DR.

CONTROLLER TYPE:
☒ EPAC
☐ Other:

PRE-EMPT ☐
COUNTDOWN PEDS ☐

LOCATION:
M-36 AT HAMBURG RD./DEVELOPMENT DR.
CITY/TWP: HAMBURG TOWNSHIP
COUNTY : LIVINGSTON

MILE POINT	CONTROL SECTION-SPOT #
20.52	47041-01-017

Job # (If Applicable): PERMIT

CLEAR PAGE 1 CLEAR ALL

Page 3 included only if Pre-Empt Checked

ADVANCED TIMING PARAMETERS FORM

SYSTEM INFORMATION

Controller Type:
- [x] EPAC
- [ ] Other:

System Type:
- [ ] Closed Loop
  - [ ] Stand By
  - [ ] Group 1
  - [ ] Group 2
  - Address:
- [ ] TBC
- [ ] TBC/GPS
- [x] None
- [ ] Other:

If TBC, Synch by:
- [ ] TOD
- [ ] Event

Interconnect Type:
- [ ] Hardwire
- [ ] Fiber-Optic
- [ ] Radio
- [ ] Phone Drop
- [x] None
- [ ] Other:

If Phone Drop, Phone #

Controller Status:
- [ ] Master
- [ ] Slave
- [x] Isolated
- [ ] TBC

If Slave, Master Location:

Master Spot # :

LEFT-TURN PHASING

Phase # / Description	*Permissive-Protected* Lead	*Permissive-Protected* Lag	*Protected-Only* Split	*Protected-Only* Lead	*Protected-Only* Lag
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

RING AND BARRIER STRUCTURE

	B1				B2				B3				B4			
R1	2				4											
R2																
R3																
R4																

VEHICULAR AND PEDESTRIAN DETECTION

Approach	*Vehicular Detection* Movements and Call Delay (s): Left		Thru		Right		Type: Loop	Video	Other	*Pedestrian Detection* Push-Button Crossing Locations
SB HAMBURG ROAD	☒		☐		☒	10	☒	☐	☐	
DEVELOPMENT DRIVE	☐		☐		☐		☐	☒	☐	
	☐		☐		☐		☐	☐	☐	
	☐		☐		☐		☐	☐	☐	
	☐		☐		☐		☐	☐	☐	
	☐		☐		☐		☐	☐	☐	

DISAPPEARING LEGEND CASE SIGNS

ADDITIONAL DIAL SPLIT DATA

		PHASE	1	2	3	4	5	6	7	8	O1	O2	O3
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											

COORDINATION DATA

Operation Mode	1
Coordination Mode	0
Maximum Mode	0
Correction Mode	2
Offset Mode	0
Force Mode	0
Max Dwell	0
Yield Period	0

REMARKS:

THE HAMBURG ROAD APPROACH IS ACTUATED VIA TRAFFIC LOOPS AND THE DEVELOPMENT DRIVE IS ACTUATED VIDEO DETECTION (CAMERA).

ADDITIONAL OVERLAP DATA

Overlap Phase	*Load Bays*	*Phases Overlapped*	T.G. (s)	Y (s)	R (s)	-G/Y	+GRN
=							
=							
=							
=							

PREPARED BY: HHH DATE: 06/11/10

☒ MDOT ☐ County ☐ City ☐ Consultant

LOCATION:

M-36 AT HAMBURG RD./DEVELOPMENT DR.

CONTROL SECTION-SPOT #

47041-01-017

CLEAR PAGE 2

PREEMPTION INFORMATION FORM

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SEL Ped Cl		Vehicle	Track																
SEL Yellow			Dwell																
SEL Red Cl			Cycle																
TRACK Green			Exit																
TRACK Ped Cl		Ped	Track																
TRACK Yellow			Dwell																
TRACK Red CL			Cycle																
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
RET Ped Cl			Track																
RET Yellow			Dwell																
RET Red Cl			Cycle																

☐ Locking

☐ Non-Locking

Delay (s)	
Extend (s)	
Duration (s)	
Max Call (s)	
Lockout (s)	
Link PE #	

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SEL Ped Cl		Vehicle	Track																
SEL Yellow			Dwell																
SEL Red Cl			Cycle																
TRACK Green			Exit																
TRACK Ped Cl		Ped	Track																
TRACK Yellow			Dwell																
TRACK Red CL			Cycle																
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
RET Ped Cl			Track																
RET Yellow			Dwell																
RET Red Cl			Cycle																

☐ Locking

☐ Non-Locking

Delay (s)	
Extend (s)	
Duration (s)	
Max Call (s)	
Lockout (s)	
Link PE #	

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SEL Ped Cl		Vehicle	Track																
SEL Yellow			Dwell																
SEL Red Cl			Cycle																
TRACK Green			Exit																
TRACK Ped Cl		Ped	Track																
TRACK Yellow			Dwell																
TRACK Red CL			Cycle																
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
RET Ped Cl			Track																
RET Yellow			Dwell																
RET Red Cl			Cycle																

☐ Locking

☐ Non-Locking

Delay (s)	
Extend (s)	
Duration (s)	
Max Call (s)	
Lockout (s)	
Link PE #	

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SEL Ped Cl		Vehicle	Track																
SEL Yellow			Dwell																
SEL Red Cl			Cycle																
TRACK Green			Exit																
TRACK Ped Cl		Ped	Track																
TRACK Yellow			Dwell																
TRACK Red CL			Cycle																
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
RET Ped Cl			Track																
RET Yellow			Dwell																
RET Red Cl			Cycle																

☐ Locking

☐ Non-Locking

Delay (s)	
Extend (s)	
Duration (s)	
Max Call (s)	
Lockout (s)	
Link PE #	

Preempt System Data

Ring	1	2	3	4		
MIN GRN/WLK (s)						
Priority	PE/FL	PE1/2	PE2/3	PE3/4	PE4/5	PE5/6
Status						

REMARKS :

PREPARED BY: HHH DATE: 06/11/10

LOCATION:

M-36 AT HAMBURG RD./DEVELOPMENT DI

CONTROL SECTION-SPOT #

47041-01-017

CLEAR PAGE 3

TRAFFIC SIGNAL TIMING PERMIT

PHASE	1	2	3	4	5	6	7	8
APPROACH	EB & WB	NB & SB						
MINIMUM GREEN	10	7						
PASSAGE	0.0	4.0						
MAXIMUM NO. 1	54	26						
MAXIMUM NO. 2	54	26						
YELLOW CHANGE	4.4	3.6						
RED CLEARANCE	3.0	3.0						
WALK	7	8						
PEDESTRIAN CLEARANCE	22	24						
EXTENDED PED. CLEARANCE	2	2						
REST IN WALK	0	0						
INITIALIZATION	4	1						
NON-ACT RESPONSE	0	0						
VEHICLE RECALL	3	0						
PEDESTRIAN RECALL	2	0						
NON-LOCK MEMORY	0	0						
DUAL ENTRY	0	0						

	CYCLE	1	2	3	4	5	6	7	8	O1	O2	O3
DIAL 1 SPLIT 1	70	44	26							0		
DIAL 2 SPLIT 1	70	44	26							0		
DIAL 3 SPLIT 1	80	54	26							0		
DIAL SPLIT												
DIAL SPLIT												
DIAL SPLIT												
	MODE	1	0									

PHASE

1 M-36

2 Chilson Road

3

4

5

6

7

8

D1/S1/O1: Normal
D2/S1/O1: 06:00 - 09:00 Monday - Friday
D3/S1/O1: 15:00 - 19:00 Monday - Friday

The Calculated Pedestrian Clearance Time (CPCT) for the Chilson Road Pedestrians is 27.0 seconds, but a value of 24.0 seconds [CPCT - Buffer Interval (3.0 seconds)] has been used to help reduce impacts on progression along the M-36 Corridor.

OVERLAPS

Overlap Phase	Load Bays	Phases Overlapped	T.G. (s)	Y (s)	R (s)	-G/Y	+GRN
=							
=							
=							
=							

TIMING INSTALLED

REMARKS

Pole-Mounted, Epac Type Controller.

The pedestrian pushbuttons have been replaced and the ramps have been upgraded in order to meet compliance with the Americans with Disabilities Act (ADA).

The Pedestrian Clearance Times are based on a walking speed of 3.5 feet per second.

Equipped with CONVENTIONAL TRAFFIC LOOPS in the Chilson Road approach lanes.

PREPARED BY: HHH DATE: 09/16/14

FLASH HOURS:

21:30 to 06:00 DAILY ☒ NONE ☐

NIGHT FLASH:

FY = M-36 FR = Chilson Road

CONFLICT FLASH:

FY = M-36 FR = Chilson Road

CONTROLLER TYPE:

☒ EPAC
☐ Other:

PRE-EMPT ☐
COUNTDOWN PEDS ☐

LOCATION:
M-36 at Chilson Road

CITY/TWP: Hamburg Township

COUNTY : Livingston

MILE POINT	CONTROL SECTION-SPOT #
18.51	47041-01-012

Job # (If Applicable): 124469 A

Page 3 included only if Pre-Empt Checked

ADVANCED TIMING PARAMETERS FORM

SYSTEM INFORMATION

Controller Type:
- ☒ EPAC
- ☐ Other:

System Type:
- ☐ Closed Loop
  - ☐ Stand By
  - ☐ Group 1
  - ☐ Group 2
  - Address:
- ☒ TBC
- ☐ TBC/GPS
- ☐ None
- ☐ Other:

If TBC, Synch by:
- ☒ TOD
- ☐ Event

Interconnect Type:
- ☐ Hardwire
- ☐ Fiber-Optic
- ☐ Radio
- ☐ Phone Drop
- ☐ None
- ☐ Other:

If Phone Drop, Phone #

Controller Status:
- ☐ Master
- ☐ Slave
- ☐ Isolated
- ☒ TBC

If Slave, Master Location:

Master Spot # :

LEFT-TURN PHASING

Phase # / Description	*Permissive-Protected* Lead	*Permissive-Protected* Lag	*Protected-Only* Split	*Protected-Only* Lead	*Protected-Only* Lag
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

RING AND BARRIER STRUCTURE

	B1				B2				B3				B4			
R1	1				2											
R2																
R3																
R4																

VEHICULAR AND PEDESTRIAN DETECTION

Approach	*Vehicular Detection* Movements and Call Delay (s) Left		Thru		Right		Type Loop	Video	Other	*Pedestrian Detection* Push-Button Crossing Locations
Northbound Chilson Road	☒		☒		☐		☒	☐	☐	M-36 at the EAST leg
Southbound Chilson Road	☒		☒		☐		☒	☐	☐	M-36 at the WEST leg
	☐		☐		☐		☐	☐	☐	
	☐		☐		☐		☐	☐	☐	
	☐		☐		☐		☐	☐	☐	
	☐		☐		☐		☐	☐	☐	

DISAPPEARING LEGEND CASE SIGNS

ADDITIONAL DIAL SPLIT DATA

		PHASE	1	2	3	4	5	6	7	8	O1	O2	O3
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											

COORDINATION DATA

Operation Mode	1
Coordination Mode	0
Maximum Mode	0
Correction Mode	2
Offset Mode	0
Force Mode	0
Max Dwell	0
Yield Period	0

REMARKS:

ADDITIONAL OVERLAP DATA

Overlap Phase	*Load Bays*	*Phases Overlapped*	T.G. (s)	Y (s)	R (s)	-G/Y	+GRN
=							
=							
=							
=							

PREPARED BY: HHH DATE: 09/16/14

☒ MDOT ☐ County ☐ City ☐ Consultant

LOCATION: M-36 at Chilson Road

CONTROL SECTION-SPOT # 47041-01-012

CLEAR PAGE 2

PREEMPTION INFORMATION FORM

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SEL Ped Cl		Vehicle	Track																
SEL Yellow			Dwell																
SEL Red Cl			Cycle																
TRACK Green			Exit																
TRACK Ped Cl		Ped	Track																
TRACK Yellow			Dwell																
TRACK Red CL			Cycle																
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
RET Ped Cl			Track																
RET Yellow			Dwell																
RET Red Cl			Cycle																

☐ Locking

☐ Non-Locking

Delay (s)	
Extend (s)	
Duration (s)	
Max Call (s)	
Lockout (s)	
Link PE #	

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SEL Ped Cl		Vehicle	Track																
SEL Yellow			Dwell																
SEL Red Cl			Cycle																
TRACK Green			Exit																
TRACK Ped Cl		Ped	Track																
TRACK Yellow			Dwell																
TRACK Red CL			Cycle																
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
RET Ped Cl			Track																
RET Yellow			Dwell																
RET Red Cl			Cycle																

☐ Locking

☐ Non-Locking

Delay (s)	
Extend (s)	
Duration (s)	
Max Call (s)	
Lockout (s)	
Link PE #	

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SEL Ped Cl		Vehicle	Track																
SEL Yellow			Dwell																
SEL Red Cl			Cycle																
TRACK Green			Exit																
TRACK Ped Cl		Ped	Track																
TRACK Yellow			Dwell																
TRACK Red CL			Cycle																
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
RET Ped Cl			Track																
RET Yellow			Dwell																
RET Red Cl			Cycle																

☐ Locking

☐ Non-Locking

Delay (s)	
Extend (s)	
Duration (s)	
Max Call (s)	
Lockout (s)	
Link PE #	

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SEL Ped Cl		Vehicle	Track																
SEL Yellow			Dwell																
SEL Red Cl			Cycle																
TRACK Green			Exit																
TRACK Ped Cl		Ped	Track																
TRACK Yellow			Dwell																
TRACK Red CL			Cycle																
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
RET Ped Cl			Track																
RET Yellow			Dwell																
RET Red Cl			Cycle																

☐ Locking

☐ Non-Locking

Delay (s)	
Extend (s)	
Duration (s)	
Max Call (s)	
Lockout (s)	
Link PE #	

Preempt System Data

Ring	1	2	3	4	
MIN GRN/WLK (s)					
Priority	PE/FL	PE1/2	PE2/3	PE3/4	PE4/5	PE5/6
Status						

REMARKS :

PREPARED BY: HHH DATE: 09/16/14

LOCATION:

M-36 at Chilson Road

CONTROL SECTION-SPOT #

47041-01-012

CLEAR PAGE 3

FAX 810-231-4295
PHONE 810-231-1000

P.O. Box 157
10405 Merrill Road
Hamburg, Michigan 48139

A GREAT PLACE TO GROW

HAMBURG TOWNSHIP PLANNING COMMISSION
WEDNESDAY, NOVEMBER 28, 2018 7:00 P.M.
HAMBURG TOWNSHIP HALL BUILDING
10405 MERRILL ROAD, HAMBURG, MICHIGAN

1. CALL TO ORDER

2. PLEDGE TO THE FLAG

3. APPROVAL OF AGENDA

4. APPROVAL OF MINUTES

September 19, 2018 Planning Commission Minutes

5. CALL TO THE PUBLIC

6. OLD BUSINESS

7. NEW BUSINESS

A. **Site Plan (SP18-005) and Special Use Perm Applications (SUP 18-001)** to consider a 4,800 square foot addition to the existing 6,720 square foot shop building on the southeast corner of the property at 7750 East M-36 (4715-25-200-065). The project is considered a major amendment to the Special Use Permit granted in 2014 which allowed CEI an architectural sheet metal and roofing company, to be located on the subject property because the proposed addition will increase the buildings usable floor area by more than twenty five percent (25%) (Section 3.5.8 (A)(1)).The proposed addition is also considered a major amendment to the original approved site plan the addition because the project is larger than 2,000 square feet. (Section 4.9.4 (B)(1)).

- The Planning Commission Chair opens the public hearing;
- The Planning Department representative introduces the project;
- The Project Applicant and their team presents the project to the Commission;
- The project is open to Public Comments (3 minutes maximum comment period per person);
- The Planning Commission Chair closes the public hearing portion of the meeting; and
- The Planning Commissioners reviews the application and project materials, the staff report prepared by planning staff and the comments and any other materials presented at the hearing, and makes a decision on project.

  ** Throughout the hearing process the Planning Commission can ask questions of any persons (Township staff, the development team, and the public) about the project.*

  *** All questions should be asked through the Planning Commission Chair. This will allow the*

B. **Preliminary Site Plan Application for an Open Space Planned Unit Development (OSPUD 18-001)** to allow construction a 154 unit single family housing development on the properties at 4715-14-400-008 (8.5 Acres) and 4715-23-100-002 (77.19 Acres). This development proposes a mix of property sizes and types that will be clustered on the site in order to help preserve the existing wetlands and other sensitive areas of the site.

- The Planning Commission Chair opens the public hearing;
- The Planning Department representative introduces the project;
- The Project Applicant and their team presents the project to the Commission;
- The project is open to Public Comments (3 minutes maximum comment period per person);
- The Planning Commission Chair closes the public hearing portion of the meeting; and
- The Planning Commissioners reviews the application and project materials, the staff report prepared by planning staff and the comments and any other materials presented at the hearing, and makes a decision on project.

  ** Throughout the hearing process the Planning Commission can ask questions of any persons (Township staff, the development team, and the public) about the project.*

  *** All questions should be asked through the Planning Commission Chair. This will allow the*

8. ZONING ADMINISTRATOR'S REPORT

9. ADJOURNMENT

.

FAX 810-231-4295
PHONE 810-231-1000

Hamburg Township
a great place to grow

P.O. Box 157
10405 Merrill Road
Hamburg, Michigan 48139

Planning Commission
Hamburg Township
10405 Merrill Rd., P.O. Box 157
Hamburg Township, Michigan 48139
September 19, 2018
7:00p.m.

1. CALL TO ORDER:

Present: Goetz, Hamlin, Menzies, Muck, Muir & Priebe
Absent: Leabu
Also Present: Amy Steffens, Planning & Zoning Administrator

2. PLEDGE TO THE FLAG:

3. APPROVAL OF THE AGENDA:

Chairman Goetz stated that we need to add an item 7b to discuss Section 8-18, Supplementary Height Restrictions

Motion by Priebe, supported by Menzies

To approve the agenda as amended

Voice vote: Ayes: 6 Nays: 0 Absent: 1 MOTION CARRIED

4. APPROVAL OF MINUTES:

a. August 15, 2018 Planning Commission Minutes

Motion by Menzies, supported by Muir

To approve the August 15, 2018 minutes as presented

Voice vote: Ayes: 6 Nays: 0 Absent: 1 MOTION CARRIED

5. CALL TO THE PUBLIC:

Menzies opened the call to the public. Hearing no public comment, the call was closed.

6. **OLD BUSINESS:** None

7. NEW BUSINESS:

a. MSP 18-004: Waiver to the sign regulations to permit a 73-inch tall freestanding monument sign (72-inch freestanding monument permitted, Section 18.4.Q.), and the installation of two 33.08-square foot wall signs with 22.5-inch tall channel letters (26.4-square foot wall signs permitted; 18-inch tall channel letters permitted, Section 18.10.D.1.).

Planning/Zoning Administrator Steffens stated that the subject site is a 1.5-acre parcel that fronts onto M-36 to the east and is improved with a 12,942-square foot pharmacy. The site is zoned in the Village Center (VC) district; a funeral home is located to the east, a post office to the north, a veterinarian office to the south, and a vacant residentially-zoned parcel to the west. The pharmacy parcel was developed to be part of the larger Village of Hamburg commercial development that received site plan approval in 2007. Final site plan approval was granted with the following condition: “that the sign details will be submitted at a future date, and are not approved at this time. Future plans must conform to the existing ordinance, and must reflect the intent of the district.” On March 11, 2008, the township issued a permit for the monument sign, two wall signs, and a number of directional signs. It appears that no further sign review has been done by the Planning Commission. There are a number of signs proposed, but it is important to remember that most of the signs in the packet are exempt from the sign regulations. She has prepared a table to show what is existing, proposed and what is required. She stated that Signs 1, 2, and 3 are the subjects of waiver requests because of their size. The existing internally illuminated freestanding sign (sign 1) is 6-foot, 1-inch tall, double-sided, with a sign face of 12.4 square feet and is located in the east front yard of the development. The existing sign face will be removed and replaced with a sign face of the exact same size. The acrylic sign face will be internally illuminated, with aluminum wrapped- channel set letters. Existing signs 2 and 3 are 35.4-square foot channel letterset wall signs that will be replaced with a 33.08-square foot internally illuminated, red, acrylic channel letters, one on the east façade of the pharmacy building and one on the north façade of the building. The ordinance permits signs comprised of channel letters to be ten percent larger in size, which would permit the two proposed wall signs to be 26.4 square feet each. The overall size would require a waiver by the Planning Commission. Additionally, the sign ordinance allows individual channel letters to be a maximum of 18 inches tall; the proposed channel letters would be 24.5 inches tall. That is what is existing, they are just replacing it. The increased channel letter height would require the Planning Commission grant a waiver. The other signs are either going to be removed, they are exempt or as in the case of a couple of the directional, free-standing signs they are existing and no changes are proposed. Signs 4, 5, 7, 8, and 15 are exempt under Section 18.5 because they either are not visible from a street, other public place, or an adjacent property. Signs 6 and 14 are to be removed. Signs 9 through 12, all two-square foot parking lot directional signs, are existing and no changes are proposed. These signs are larger than the permitted 18-square inches and should be brought into compliance if they are replaced in the future.

Steffens reviewed Section 4.5.7 which are the Standards for Site Plan Review. She stated that the freestanding monument sign will be located approximately 20 feet from the right-of-way of M-36, approximately 45 feet from the traveled roadway of M-36, and approximately 300 feet from the intersection of M-36 and Hamburg Road. The sign will be approximately 800 feet from the residential property on Hamburg Road to the north. There is landscaping at the entry to the integrated commercial project at the intersection of M-36 and Hamburg Road and throughout the development. There is no landscaping around the monument sign that would obscure visibility of the sign to traffic along M-36. There are commercial businesses to the east across M-36 and to the south and north. Due to the monument sign’s location on the south of the building, traffic traveling eastbound on M-36 is not likely to see the monument sign and instead would see the pharmacy building and wall signs. Traffic traveling westbound on M-36 would have a clearer view of the monument sign but would not be able to clearly see the wall signs until they have passed the building. Only the freestanding and wall signs in the submitted application are visible from M-36 or neighboring properties. The proposed freestanding sign will not meet the size requirements of the zoning regulations because it would be one inch too tall. However, the entire sign is not 1 inch too tall. The sign is brick wrapped but then there is a curved edge on top and at the end is a decorative edge. The total sign height is 69 inches but increases to 73 inches at the apex of the curve. The sign face area is 12 square feet, where 24 square feet is permitted. The two proposed wall signs would be 33.08 square feet, where 26.4 square feet is permitted, with 22.5-inch tall channel letters. The overall size would require a waiver by the Planning Commission, as would the 22.5-inch tall channel letters because the ordinance permits a maximum of 18-inch tall letters. The monument sign will utilize internally illuminated individual channel letters within a 12- square foot sign face. The wall signs will also be internally illuminated channel letters. All illuminated signs are required to meet the sign ordinance requirements from Section

18.4.T. Additionally, the signs lighting standards from Section 9.11.5 must also be met. Steffens stated that this site is designated as Village Core (VC) district in the future land map of the Village Center Master Plan. The Village Core district sign standards follow the sign ordinance requirements for size and location. However, the district also specifies that all signs shall be externally illuminated, not internally illuminated.

Steffens stated that Article 18 does allow the Planning Commission to waive some of the standards only in Article 18 if the findings are met. Only signs 1, 2 and 3 are under consideration by the Planning Commission for the waiver approval. She reviewed the Sign Regulation waivers and the findings.

The question was asked if this is standard CVS signage. Mr. Patrick Stevens from Allied Signs stated that yes CVS is going through a corporate plan and imaging change. It is slightly changed with the heart logo. They are proposing to replace the existing signs with the same size signs that are there. They are not trying to get anything more, actually slightly smaller. The height of the letters are not excessive. They need to get the height to get the readability from the road. In the case of the monument sign and the one inch, there was no intent there to make it larger. They are hoping that you can see that they have met the spirit of the ordinance and hoping to proceed.

Discussion was held on the illumination. Mr. Stevens stated that they are internally illuminated with LEDs and the lighting comes through the face of the letter. Discussion was held on the design standard that specifies that all signs shall be externally illuminated, not internally illuminated. Steffens stated that is a design standard for future land use, not a zoning regulation.

Discussion was held on the timing of the lighting. Steffens stated that timer controls is a requirement of the zoning ordinance. The Planning Commission could consider that issue down the road if CVS ever had an issue. Further discussion was held on the times the lights are on. Discussion was held on enforcement. Discussion was held on the timing if the site were to go to 24 hours. Steffens stated that there is other site lighting that would have to be considered if they were ever to go 24 hours. It was stated that this may or may not happen in the future, and the Commission should look at what is now being proposed. If something changes, it would come back before the Commission.

Commissioner Priebe stated that she appreciates the fact the proposed signage is smaller rather than larger.

Motion by Muir, supported by Priebe

Approval of Sign 1: The Planning Commission approves the requested sign waiver to permit a 73-inch monument sign at 7420 E M-36 because the project meets the sign waiver requirements in Article 18, Section 18.11 in the township zoning ordinance as stated at the meeting tonight and in the staff report.

Voice vote: Ayes: 6 Nays: 0 Absent: 1 MOTION CARRIED

Motion by Muir, supported by Menzies

Approval of Sign 2: The Planning Commission approves the requested sign waiver to permit a 33.08-square foot wall sign with 22.5-inch tall channel letters on the east façade of the pharmacy building at 7420 E M-36 because the project meets the sign waiver requirements in Article 18, Section 18.11 in the township zoning ordinance as stated at the meeting tonight and in the staff report.

Voice vote: Ayes: 6 Nays: 0 Absent: 1 MOTION CARRIED

Motion by Muir, supported by Priebe

Approval of Sign 3: The Planning Commission approves the requested sign waiver to permit a 33.08-square foot wall sign with 22.5-inch tall channel letters on the north façade of the pharmacy building at 7420 E M-36 because the project meets the sign waiver requirements in Article 18, Section 18.11 in the township zoning ordinance as stated at the meeting tonight and in the staff report.

Voice vote: Ayes: 6 Nays: 0 Absent: 1 MOTION CARRIED

b. Section 8.18 Supplementary Height Restrictions

Chairman Goetz stated that this was requested to be placed on the agenda for interpretation.

This is in response to a code complaint. The neighbor had installed a 55 foot lattice tower within the setback, The complainant did not like the location of the tower plus it is 55 feet tall. We sent a code complaint letter to the property owner and he responded back that there is nothing on that tower except his Wi-Fi signal booster and asked why could he not have it under Section 8.18, Supplementary Height Restrictions. She was trying to regulate our Accessory Structures height requirements which is far less than 55 feet. The property owner submitted a letter explaining the tall tower and the purpose of the signal booster. His contention is that many people are getting rid of their cable providers and going to streaming services like Netflix. She would like some interpretation by the Planning Commission of Section 8.18. She reviewed the ordinance. He is calling on Section 8.18.2 B: Any structure permitted as an exception to a height limitation shall be erected no higher than such height as may be necessary to accomplish the purpose for which it is intended to serve. In his letter he explains signals, wi-fi and the need to get over his neighbor's house, trees, etc. to boost his signal. She would like some guidance and interpretation of this section and whether we can apply it to this type of situation.

Discussion was held on the definition of Accessory Structure. It was stated that Section 8.18 clearly says that antennae and electronic devices can exceed the height limitations. It was stated that we don't want to see them everywhere. It was stated that it is much like the Ham radio towers.

Steffens asked what can we reasonably expect from a homeowner. She is concerned that there is no upper limit. It would be difficult to expect the homeowner to prove that it is the minimum necessary to take advantage of the Supplementary High Regulation exception. How do we practically apply it? Discussion was held on satellite reception and the interference with trees, etc. It was stated that if we want to regulate them, we would have to adopt an ordinance. Steffens stated that she can look at how other municipalities deal with such issues if you believe a text amendment is in order. Discussion was held on the possible number of cases.

The interpretation of the Commission was that this homeowner can have the tower based on the current ordinance. Discussion was held on the concerns that it is structurally sound, what happens if it falls, etc. Discussion was further held on how to determine if it is the minimum necessary, etc. Discussion was held on some type of installation standards from the manufacturer. Discussion was held on the potential for a lot of these towers. It was further stated that many of the Homeowner's Associations restrict towers, etc.

Steffens asked for this case, is this site specific evidence enough that a 55 foot tower is the minimum necessary for the exception. Discussion was held on the location on the site. Steffens stated that it is in the side-yard setback. She stated that any structure should meet the setback. There are two issues; the location and the height. If it is going to be allowed, then it should be moved to a compliant location. Steffens stated that she has nothing that tells her that 55 feet is the minimum necessary.

Discussion was held on researching how other communities handle these types of towers. Steffens stated that she may be able to get some more information as to how a height may be determined based on signal strength, etc.

It was stated that this is an accessory structure and the homeowner should have made application for a permit. Steffens stated that what she is hearing is that at the very least, he needs to move the tower to meet the setback requirements or apply for a variance. It was stated that we still don't know if it is the minimum necessary. Steffens stated that the only way to clear up the code enforcement is to issue a permit. The question was asked if the Planning Commission has the right to issue a stay on the code enforcement for further review. Steffens stated that the Planning Commission does not have the authority. He would have to go to the ZBA for interpretation. She stated that she could issue a violation letter and tell him he has to remove it and he can appeal that to the ZBA. It was further stated that he could then point to others and we would have to do the same.

Planning Commission is then directing staff to come back at the next meeting with additional information on how to address the conditions under which an exception can be given under 8.18.2. It was stated that under these conditions, we should considered fall zone, setback and under what conditions an engineer review is required, etc.

8. ZONING ADMINISTRATOR'S REPORT: None

Discussion was held on the Commissioners being provided a full Zoning Ordinance. Steffens stated that our Zoning Ordinance is not codified. We have been working on it for quite some time. It is easier to direct people to go on-line for the ordinance because it does show all the amendments. It needs to be codified into one ordinance.

Commissioner Menzies stated that at the last Board meeting, Amy gave a presentation on the Master Plan update. Discussion was held on the Master Plan Open House. Steffens stated that in August we had 75 people here. We had different work station set up with aerials and asked people what they wanted to see. We had a visual preference exercise specific to Village Center. We did receive a lot of input.

The question was asked if we heard anything more from the apartments. Steffens stated that it appears not to be going anywhere. Their site plan approval expires in January.

9. ADJOURNMENT:

Motion by Menzies, supported by Priebe

To adjourn the meeting

Voice vote: Ayes: 6 Nays: 0 Absent: 1 MOTION CARRIED

The Regular Meeting of the Planning Commission was adjourned at 8:10 p.m.

Respectfully submitted,

____
Julie C. Durkin
Recording Secretary

The minutes were approved
As presented/Corrected:_________________________

____
Fred Goetz, Chairperson

PHONE: 810-231-1000
FAX: 810-231-4295

Hamburg Township
a great place to grow

P.O. Box 157
10405 Merrill Road
Hamburg, Michigan 48139-0157

To: Planning Commissioners

From: Scott Pacheco, AICP
Hamburg Township
Planning and Zoning Director

Date: November 28, 2018

Agenda Item: 7A

Project address: **7750 E. M-36**
(TID 15-25-200-065)

Description: **Special Use Permit (SUP 18-001) and Site Plan Amendments (SP 18-005)** Public Hearing and Review to consider the construction of a new 4,800 square foot addition to the existing shop building on the subject property.

Owner: Genoa Group, LLC

Applicant: CEI

Agent: Kristine Lindsey

PROJECT DESCRIPTION:
The proposed project is to allow the construction of a 4,800 square foot (60' X 80') addition to the existing 6,720 square foot (96' X 70') shop building. There is also an existing 7,258 square foot main building, 7,200 square foot cold storage barn, and a 2,260 square foot open sided lean to shed on the site. The existing main structure, shop building and open lean-to shed where built as a part of the 1997 approvals for the Mans Lumber site plan review. In 2014 a special use permit was approved to allow CEI an architectural sheet metal processing and roofing establishment use to be allowed within the existing buildings on the subject site. In 2015 the site plan was amended by CEI to add the 7,200 square foot storage barn to the site.

The project is considered a major amendment to the Special Use Permit under section 3.5.8 (A) of the zoning ordinance because the project will increase the building's usable floor area by more than twenty five percent. Therefore the Special Use Permit application needed to be resubmitted under the regulations. Also the project is considered a major amendment to the site plan under Section 4.9.4 (B)(1) of the zoning ordinance because the addition is greater than 2,000 square feet. Amendments to an existing special use permit and site plan can be approved by the Planning Commission under Sections 3.5.8 (A) and 4.6.

The new addition to the shop building will be used for cold storage of materials. According to the business owner and applicant, CEI will be purchasing a new machine to form/cut larger composite panels. This machine will be located in the existing portion of the shop building and is slightly bigger than the existing machine they use. Because of this a few of the metal storage racks will be moved from the existing portion of the shop into the new addition. However, mostly there will be new racks for increased inventory that CEI will have because of the new machine and the increase in business. No new jobs are created by the new addition or use of the property.

PROJECT HISTORY:

The subject property at 7750 E M.36 was originally approved as a Man's Lumber site in 1997. The approval included the existing main office building, shop building and lean-too shed structure. Also suggested as a part of the original approvals was that the future development of the site would included three additional building along M-36 with parking behind each of the building. These future building and parking would be located between M-36 and the lumber storage area on the south side of the site.

In early 2014 the applicant (CEI) applied for a Special Use Permit (SUP) to allow their business, an architectural sheet metal processing and roofing establishment, to be located at the subject site (7750 E. M-36). In May of 2014 the Planning Commission approved the proposed use. The original approvals of this SUP where based on the facts that the existing office building would have an office and retail use, the existing area used as the lumber yard for Mans Lumber would be used for the sheet metal processing and storage and the areas proposed for future building site along M-36 would not be impacted by the use. Also as a condition of project approval an 8-foot multi-use path would be required to be installed along the north portion of the site. The portion of the trail east of the existing driveway would be required to be installed immediately while the remainder of the pathway would need to be installed within 5 years of the May 2014 approvals or upon development of the west side of the site whichever came first (Exhibit 1). The 8-foot multi-use pathway has been installed on the east side of the site and the property owners are required to install the pathway on the west side of the site by May of 2019.

In early 2015 CEI applied for an amendment to the site plan approval to allow a new barn be built on the south west side of the property. This site plan application was approved because the new storage barn was built over an existing paved storage area and did not change the use of the property. (Exhibit 2)

ZONING ANALYSIS:

The below table summarizes all the zoning regulations that apply for the proposed project

Table 1
Development Review Compliance Table

Criteria/Regulation	Required by Regulations	Proposed Project	Status
VC Setbacks: Front Yard: RearYard: (W)Minimum Side: (E)Minimum Side:	 30’ 25’ 20’ 20’	 N/A 47’ N/A 37’	 ✓ ✓ ✓ ✓
Number of Stories/ Height	2.5 story/ 35 feet	1 story/21 feet	✓
Lot Size:	43,560 square feet	307,968 square feet	✓
Lot Coverage: **Building:** **Total Impermeable:**	 50% of Lot Size 80% of Lot Size	 <50% <80%	 ✓ ✓
Lot Coverage: No new impermeable area is proposed as a part of this project. The new addition is located on an existing paved area.			
Section 7.7.9.1 VC General Design Standards **A. General: The overall design and mixture of uses shall be consistent with the intent of this district. Compatibility of uses shall be determined by the following:**			
1. The uses shall not create noise, dust, odors, fumes or other nuisances that will have an obnoxious effect on surrounding residences. The proposed addition will not change the use on the property. No complaints have been received by the Township in the 4 years that the business has been located on this site.			✓
2. Traffic volumes generated by the use shall not have a negative impact on surrounding residential character. All traffic must access the site from M-36. The traffic levels in this location on M-36 is not a problem.			✓
3. Architecture shall meet the requirements of Section 4.5.7			**See Below**
4. Location and use of yards shall contribute to the continuation of open space areas within the immediate vicinity. The front area of the site provides a large buffer from the storage area and the 8 foot pathway will provide good accesses through this site to the adjacent properties along M-36.			✓
5. Location and design of landscaping and pedestrian areas shall be compatible with and enhance the area pedestrian and open space network.			✓

Criteria/Regulation	Required by Regulations	Proposed Project	Status
Landscaping between M-36 and the improvements on the property were required as a part of the original 2014 approvals. This landscaping and the new 8 foot pathway that will be completed by May of 2019 helps to enhance the area pedestrian and open space network.			
6. Location, size and types of architectural projections such as porches or awnings shall be compatible with other structures along the same block.			**N/A**
7. Location, scale and design of signs shall be consistent with the character of other signs, street elements structures and uses located along the same street.			**N/A**
8. Residential development shall be designed to be compatible with surrounding land uses, while providing a mixture of housing types to meet the varied needs of Township residents.			**N/A**
B. Sidewalks/Pedestrian Circulation			
1. Site design shall demonstrate a special sensitivity to pedestrian circulation and safety. The 8 foot wide pathway running along M-36 will provide a safe pedestrian route in front of this property.			✓
2. Sidewalks at least five (5) feet wide and at least seven (7) feet wide where abutting parking shall be provided along public streets and private roads; bikepaths shall be required in locations designated in the Hamburg Village Master Plan or to provide linkages with existing or planned bikepaths.			✓
3. All developments shall provide pedestrian linkages between public sidewalks and the building entrances.			✓
Lighting:			
Section 9.11.4 1. **Exterior lighting shall be fully shielded and directed downward toward the Earths surface, away from residential uses, roads, glass, water or other reflective materials which would create excessive off-site glare or incident rays.** The changes proposed to the existing lighting is the existing two downward facing led lights on the south elevation of the existing shop building will be moved to the south elevation of the proposed new addition, while three new downward facing LED lights matching the existing will be placed on both the east and west sides of the new addition. 2. **The Zoning Administrator and/or Planning Commission may approve decorative light fixtures as an alternative to shielded fixtures when it can be proven that there will be no off-site glare and the proposed fixtures will improve the appearance of the site.** The fixture are flat LED lights with no exposed bulbs. Staff suggests that as a condition the Planning Commission require a lighting study that shows the			

Criteria/Regulation	Required by Regulations	Proposed Project	Status

proposed lighting fixtures and the location of the lighting will not have any off-site glare.

3. **Lights on poles shall not be taller than the building whose area they illuminate nor taller than fifteen (15) feet whichever is shorter. Lights on poles may exceed fifteen (15) feet up to twenty (20) feet if the fixtures are located a minimum of seventy-five (75) feet from any planned, zoned or used residential areas.**
   No new light poles are proposed as a part of this project.

4. **Lighting shall not be of a flashing, moving or intermittent type.**
   None of the existing or proposed lighting is flashing, moving or intermittent.

5. **Except where used for security purposes, all outdoor lighting fixtures, existing or hereafter installed and maintained shall be turned off between 11:00 p.m. and sunrise, except when used for commercial and industrial uses, such as in sales, assembly and repair areas, where such use is open for business after 11:00 p.m. but only for so long as such use open for business. Businesses with light fixtures used for security purposes are encouraged to use a motion detection devise which is directed to detect motion within the property.**
   The final site plan shall include a note that states all outdoor lighting shall be turned off between 11:00 pm and sunrise and that all light fixtures used for security purposes are to be on motion detection devises.

6. **Any light fixture must be placed in such a manner that no light emitting surface is visible from any residential area or public/private roadway, walkway, trail or other public way when viewed at ground level.**
   The existing light fixtures that will be moved from the south side of the existing shop to the south side of the addition and are LED lights directed toward the ground and not in a manner where the light emitting surface is visible from any residential area or public/private roadway, walkway, trail or other public way when viewed at ground level.

7. **The intensity of light within a site shall not exceed ten (10) footcandles or one (1) footcandle at any property line, except where it abuts a residentially used or zoned site whereby a maximum of 0.5 footcandles is permitted. The only exception is with gas station canopy and automobile dealership lighting, where a maximum of twenty (20) footcandles is permitted within the site but the above standards shall apply to intensity at the property line.**
   No light study was submitted with this application.

Criteria/Regulation	Required by Regulations	Proposed Project	Status
Lighting Recommended Conditions: If the Planning Commission approved this project staff suggest that the following be made conditions of project approval: 1) The final site plan shall include a note that states "All outdoor lighting shall be turned off between 11:00 pm and sunrise and that all light fixtures used for security purposes are to be on motion detection devises. 2) Prior to issuance of a land use permit by the Zoning Department a lighting study shall be completed that shows that light within a site shall not exceed ten (10) footcandles or one (1) footcandle at the property line, except where it abuts a residentially used or zoned site whereby a maximum of 0.5 footcandles is permitted. The only exception is with gas station canopy and automobile dealership lighting, where a maximum of twenty (20) footcandles is permitted within the site but the above standards shall apply to intensity at the property line.			
Parking: **Regular Parking Stalls** **General Office (7,280 sq. ft.)**	1 parking space for each 400 square feet	18 Parking Spaces Required	✓
Warehouses Barn (7,200 sq. ft.)	1 parking space for each 800 square feet	9 Parking Spaces Required	✓
Industrial Manufacturing Shop 6,720 plus addition 4,800	One (1) parking space for each employee expected to work on the two (2) shifts which have the greatest number of employees every day, plus ten (10) parking spaces for visitor parking purposes.	27 Parking Spaces Required	✓
Loading Spaces	Commercial Buildings over 5000 square feet of gross floor area require 1 truck loading space at least 12	The entire storage yard at the rear of the site is paved	✓

Criteria/Regulation	**Required by Regulations**	**Proposed Project**	**Status**
	feet X 25 feet with 14 feet in clearance.		
General Parking Requirements: 1. Off-street parking for non-residential uses shall be located on the same lot or parcel or within three hundred (300) feet of the building it is intended to serve provided the provisions of Section 10.2.2., Collective Parking, are met. 2. A minimum area of 200 square feet shall be provided for each vehicle parking space and each space shall be designated and reserved for parking. 3. A suitable means of ingress and egress shall be provided and located to minimize traffic congestion and interference with pedestrian movement. The location of all entrances and exits and directional signs, shall be approved by the Planning Commission, and where required by the Livingston County Road Commission and the Michigan Department of Transportation. 4. Parking areas with a capacity of four or more vehicles shall be hard surfaced (either concrete, bituminous asphalt or other stabilized engineered surface) prior to occupancy and shall provide adequate drainage facilities to dispose of all collected surface water. The requirement for paving may be waived by the Planning Commission through paragraph 10.2.1.I. 5. Except for single-family residential lots, lighting shall be provided for use when a parking area is in operation. The installation of such lighting shall be so hooded or shielded as to reflect the light away from abutting or neighboring property. 6. When required off-street parking in a non-residential district abuts a residential district, there shall be located a landscaped buffer strip fifteen (15) feet wide and parallel to the mutual boundary. The buffer strip shall be composed of trees and/or foliage. In lieu of a buffer strip, the Planning Commission may permit or require a solid fence or wall between six (6) and eight (8) feet in height shall be located along the mutual boundary. 7. Federal and State requirements regarding handicapped parking and access shall apply.			✓ ✓ ✓ ✓ **Lighting is provided for 34 of the 54 parking spaces** ✓ ✓*
Section 7.7.9.1 **Parking/Loading Areas** 1. The amount of parking for nonresidential uses required under Article 10 "Parking and Loading" may be reduced			**N/A**

Criteria/Regulation	Required by Regulations	Proposed Project	Status
by the Planning commission by up to fifty percent (50%) upon a finding that patrons will be able to walk to the use from nearby residential areas, patrons are parked at other uses and visiting several uses, and/or on-street parking is available.			
2. Off street parking lots shall be located behind the front line of the principal building. Where this is not feasible or practical, the Planning Commission may permit off street parking within the front yard. Parking lots must be setback from any front lot line a minimum of twenty (20) feet.			✓
3. All off street parking spaces or loading areas must be screened from view of any public road or pedestrian path right-of-way, or private road or pedestrian path easement by an evergreen hedge row or masonry wall, which is consistent with building architecture and site design, at least three (3) feet in height.			✓
4. Where parking or loading areas abut a residential use, a six (6) foot tall masonry wall, which is consistent with building architecture and site design, shall be constructed between the parking lot or loading area and the adjacent residential use. The Planning Commission may substitute the masonry wall with one or more rows of six (6) foot tall evergreens.			✓
5. Loading/unloading from secondary streets may be permitted by the Planning Commission rather than the required on-site loading, upon demonstration by the applicant that through traffic flow and access to neighboring uses will not be disrupted.			**N/A**
Parking: Staff Analysis The existing site has 52 regular and 2 handy cap parking spots depicted on the paved area. There is also a large paved area that is fenced on the south portion of the site that is used for storage, shipping and loading. **Parking Recommended Condition:** If the Planning Commission approved this project staff suggest that prior to issuance of a building permit the building department will verify that all Federal and State requirements regarding handicapped parking, loading and access are met.			

STANDARDS FOR APPROVAL:

Section 3.5.3. Basis of Determinations Special Use Permit Review

A. Compatibility with the Master Plan: Will be harmonious and in accordance with the general objectives or any specific objectives of the Hamburg Township Master Plan.

The proposed use as an architectural sheet metal processing and roofing establishment is not changing this use was approved in 2014 by the Planning Commission. The new building will slightly expand this use on the site by allowing area for more processing and storage of the roofing materials.

As stated in the original 2014 SUP approval the future land use designation for this site is Village Center Gateway District and is intended to provide for community wide retail uses while integrating smaller scale shops. These districts should connect to adjacent residential streets and create a unified pedestrian network to neighborhoods and open spaces.

The proposed addition is to the shop located on the southeast corner of the site. This addition will not interfere with the pedestrian path along the north side of the site or and future building locations along the front (north) of the site.

The township has not received any complaints about this operation since it opened in 2014.

B. Compatibility with Surrounding Area: Will able designed, constructed, operated, and maintained so as to be harmonious and appropriate in appearance with the existing or intended character of the general vicinity, will not change the essential character of the area, and will not be hazardous or disturbing to existing or future nearby uses. In determining whether a special land use will be compatible and not create a significant detrimental impact, as compared to the impacts of permitted uses, consideration shall be given to the degree of impact the special land use may have on adjacent property, as compared with the expected value to the community. The following types of impacts shall be considered:

1. **Use activities, processes, materials, equipment or conditions of operation;**
2. **vehicular circulation and parking areas;**
3. **outdoor activity, storage and work areas;**
4. **hours of operation;**
5. **production of traffic, noise, vibration, smoke, fumes, odors, dust, glare, and light;**
6. **impacts on adjacent property values; and**
7. **the relative ease by which the impacts above will be mitigated.**

The use was approved in 2014 with the statement that "*The site can be compatible with the surrounding area, provided that the activities do not create noise, dust, odor, fumes, or other nuisances that will have an obnoxious effect on surrounding residences. In addition, the screening shall be maintained and repaired when necessary, and the undeveloped portions are developed in accordance with the Village Center Regulations.*"

The proposed activities on the site will only change and expand slightly as stated previously a new machine which is slightly bigger than the existing machine will be brought into the existing shop building to cut and form composite roofing panels. The new addition will be uses as cold storage for the composite panels.

Since 2014 when CEI started their operation at 7750 E. M36 the Township has not received any complaints from neighboring property owners about the use of the property.

C. Improvement to the Immediate Vicinity: Will be an improvement in relation to property in the immediate vicinity and to the Township as a whole.

The original project fixed the dilapidated fence around the storage area on the south side of the property and included the installation of the 8 foot wide pathway along the north side of the property. The project also removed the access driveway off of Hall Road by fencing off this access point.

The portion of the 8 foot pathway east of the driveway was installed and the portion of the 8 foot pathway west of the driveway is required to be installed by May of 2019 (within 5 years of the original approval). The applicant have already started the Land Use Permit process for installation of this section of the multi-use pathway.

The new project will add a 60 by 80 foot addition to the south side of the shop building. The new building will extend south past the access point that was fenced off.

This addition will extend the east side of the shop building along Hall Drive. There is and existing 8 foot fence that helps to screen the structure from Hall Road. To provide additional screening of the new building from Hall Road, staff suggests that the applicant remove the driveway approach in this location and regrade and plant vegetation to make the rest of the shoulder along Hall Road in this location.

Recommended Condition:

If the Planning Commission approved this project staff suggest that as a condition of project approval the applicant shall remove the driveway approach off of Hall Road. Once the approach is removed the area shall be graded and landscaped to match the rest of the shoulder along Hall Road.

D. Impact of Traffic on the Street System: The location and design of the proposed special land use shall minimize the negative impact on the street system in consideration of items such as vehicle trip generation (i.e. volumes), types of traffic, access location and design, circulation and parking design, street and bridge capacity, traffic operations at proposed access points, and traffic operations at nearby intersections and access points. The Township may require submittal of a traffic impact study to ensure compliance with this standard. Such a traffic study shall be in accordance with standard practices and procedures, and prepared by a qualified traffic professional. The Township may require mitigation to maintain traffic operations at a level that is consistent with other types of permitted uses in the district. Route and operational restrictions (such as hours, cleaning of dust, or debris) may be established for construction traffic to minimize negative impacts.

The proposed use was approved in May of 2014 as a part of the approval the applicants closed off access to the site from Hall Road to limit the impacts on the adjacent neighbors along this roadway.

The new addition to the shop area will be used mainly for storage and will not significantly increase the traffic to and from the site. No new employees will be located at the site due to the new addition. The site is accessed from M-36 and the traffic along M-36 at this location is not at or near capacity.

E. **Impact on the Overall Environment: The proposed special land use shall not have an unacceptable significant adverse effect on the quality of the natural environment in comparison to the impacts associated with typical permitted uses. The Planning Commission may require a quantitative comparison of the impacts of typical permitted uses and the special land use to assist in making this determination (such as an overlay of conceptual development plans, on a natural features map, illustrating other site development options to demonstrate the impacts have been minimized to the extent practical). If the cumulative impact creates or contributes to a significant environmental problem, mitigation shall be provided to alleviate the impacts associated with the environmental problem, mitigations shall be provided to alleviate the impacts associated with the requested use.**
The new addition will be located on an existing paved area no new impervious surface will be added to the site. No changes are proposed which will impact the existing vegetation on site.

F. **Public Services Impact: Will be served adequately by essential public services and facilities or that the persons responsible for the establishment of the proposed use will provide adequately any such service or facility, will not create excessive additional public costs and will not be detrimental to the economic welfare of the Township. Public facilities shall include, but not be limited to: streets, pedestrian or bicycle facilities, police and fire protection, drainage systems, water and sewage facilities, and schools.**
The proposed project will increase the square footage of the shop building by 4,800 square feet. The Fire and Police department have reviewed the plans. Prior to receiving a land use permit all projects require sign off from the Township utilities and fire districts.

G. **Compliance with Zoning Ordinance Standards: Will be consistent with the intent and purposes of this Ordinance and be designed, constructed, operated, and maintained to meet the stated intent of the zoning district.**
Please see the "*Table 1 Development Review Compliance Table*" on pages 2-9 for analysis on the project compliance and consistency with the intent and purpose of the Township's Zoning Ordinance.

Section 4.4.3.Standards for Site Plan Review.

A. **The proposed development conforms to all provisions of the Zoning Ordinances.**
Please see the "Table 1 Development Review Compliance Table" on pages 2-9 for analysis on the project compliance and consistency with the intent and purpose of the Township's Zoning Ordinance.

B. **All required information has been provided.**

Project plans and a description of the use of the new area have been submitted along with the Site Plan and Special Use Permit applications.

C. The movement of vehicular and pedestrian traffic within the site and in relation to access streets and sidewalks will be safe and convenient.
As a part of the original SUP approvals in May of 2014 the applicant closed off the access to this site from Hall Road and proposed the construction of an 8' wide multi use pathway along the north property line.

The new addition to the Shop building will not alter the traffic patterns or the pedestrian access on the site.

D. The proposed development will be harmonious with existing and future uses in the immediate area and the community.
The uses along M-36 are commercial in nature and the proposed addition will not impact the future development of the site along M-36 as it is in the storage area at the south side of the site.

The uses to the west along Hall Road are residential and by blocking the access to this site from Hall Road has made this development more harmonious with the properties to the west along Hall Road.

The properties to the east are residential. However, they are separated from the site by an 80 foot wide property that was previously used as an access roadway (learning Lane) for the old Hamburg Elementary school site. This strip of land is proposed to be future access roadway and landscape area to a residential apartment complex on the vacant sites south of the subject property. This roadway access will provide a good buffer to the homes east of the subject site.

The properties south of the subject site are residential and vacant. The vacant site has an approved proposal to allow 24 apartment units as a part of a larger 208 apartment unit complex. The proposed addition to the shop building will be on the southeast side of the subject site, with the existing landscaping and the landscaping that was required as a part of the apartment complex approval; the new addition will have minimal impacts on the apartment project and the residential property south of the subject site.

E. The proposed development provides the necessary infrastructure improvements, such as roads, drainage, pedestrian facilities and utilities, to serve the site, and be adequately coordinated with the current and future use of adjacent properties.
As previously stated the 8 foot multi-use trail along M-36 will be completed by May of 2019 as required in the original 2014 approval of the Special Use Permit to allow CEI to occupy this site.

The proposed project will increase the square footage of the shop building by 4,800 square feet. The Fire and Police department have reviewed the plans. Prior to issuance of a land use permit all projects within the Township require approval from the Township Utilities and Fire Departments.

F. **The applicable requirements of Township, County and State agencies are met regarding grading and surface drainage and for the design and construction of storm sewers, storm water holding facilities, water mains, and sanitary sewers.**
The new addition will be located on an existing paved area of the site. No grading is proposed as a part of this project.

Suggested Conditions:
Prior to issuance of a land use or building permit all local, county and state regulations will need to be reviewed and approved for this project. A list of the agencies that may be required to review this project including but are not limited to; the Livingston County Drain Commission, Road Commission, Building Department, Health Department, and Water Authority, and the Hamburg Township Utilities and Fire Departments.

G. **Natural resources will be preserved to the maximum extent possible in the site design by developing in a manner which will not detrimentally affect or destroy natural features such as lakes, ponds, streams, wetlands, steep slopes, and woodlands.**
The new addition will be located on an area currently developed. No natural features will be impacted by the new addition.

H. **The proposed development shall respect the natural topography to the maximum extent possible by minimizing the amount of cutting, filling, and grading required.**
The new addition is located on an existing flat paved area and no cutting, filling, or grading will be required as a part of this project.

I. **The proposed development will not cause soil erosion or sedimentation.**
As a part of the Building Permit process the Livingston County Drain Commission (LCDC) will require a soil erosion or sedimentation control permit prior to issuance of a building permit.

J. **Landscaping, including trees, shrubs and other vegetative material is provided to maintain, improve and/or restore the aesthetic quality of the site.**
The project does not proposed any new landscaping. However, staff suggests that because of the location of the new addition the developer should remove the paved access point along Hall Drive to allow for new landscaping to help screen this structure from adjacent property owners and people driving along Hall Road.

Recommended Condition:
If the Planning Commission approved this project staff suggest that as a condition of project approval the applicant remove the concreate driveway access off of hall road and grade and landscape the area the match the rest of the shoulder along Hall Road. Livingston County Road Commission and Drain Commission approval would be required.

K. **Conformance to the adopted Hamburg Township Engineering and Design Standards. (Amended 3/10/87)**
The proposed addition is located on an existing paved area, therefor, no new drainage improvements will be required as part of this project.

L. **All proposed commercial, office, industrial, institutional and multiple family development shall utilize quality architecture to ensure that buildings are compatible with surrounding uses, protect the investment of adjacent landowners, blend harmoniously into the streetscape and meet the objectives the Township Master Plan. New buildings, additions and renovations shall be designed to preserve or complement the design character of existing development provide visual harmony between old and new buildings, and create a positive image for the Township's various commercial shopping nodes. Commercial, office, industrial, institutional and multiple family architecture shall be reviewed by the Planning Commission under the following criteria:**

1. **Buildings shall front towards and relate to the public street. Buildings shall be located to create a define streetscape through uniform setbacks and proper relationship to adjacent structures. Proper relationship to existing structures in the area shall be maintained through building mass, proportion, scale, roof line shapes and rhythm. Buildings within the area designated on the M-36 Corridor Plan/Master Plan as the "Hamburg Village" shall be compatible with the historic character of the unincorporated place commonly referred to as the "Old Hamburg Village."**
2. **Building materials and colors shall relate well and be harmonious with the surrounding area. Roof shape and materials shall be architecturally compatible with adjacent buildings and enhance the predominant streetscape. For any side of a principal building facing a public or private street, at least fifty percent (50%) of the facade shall be constructed of, or covered with, the following materials:**
   a. **Brick;**
   b. **Fluted or scored concrete block;**
   c. **Cut stone;**
   d. **Vinyl siding;**
   e. **Wood siding;**
   f **Glass; or,**
   g. **Other materials similar to the above as determined by the Planning Commission.**
3. **Buildings shall possess architectural variety, but enhance the overall cohesive community character. Buildings shall provide architectural features, details and ornaments such as archways, colonnades, towers, cornices or peaked roof lines.**
4. **Building walls over 100 feet in length shall be broken up with a combination of the following: varying building lines, windows, architectural accents and trees.**

5. **Building entrances shall utilize windows, canopies and awnings; provide unity of scale, texture, and color; and provide a sense of place.**
6. **Where the rear facade of a building will be visible from a residential zoning district, or the rear of the site will be used for public access or parking, such rear facade shall be constructed to a finished quality comparable to the front facade.**
7. **Signs, landscaping, lighting and other site elements shall be coordinated and compatible with the building design, as well as harmonious with other nearby developments. Developments shall provide site features such as decorative entry signs, ornamental lighting, pedestrian plazas and/or pedestrian furniture.**

   The addition is to the existing shop building and does not impact the main office building on the north portion of the site. The addition will not be visible from M-36 and the future development of the site along M-36 will not be impacted by the proposed addition. The existing shop building and the addition are within the fenced in storage area and are screened from the surrounding properties by the 8 foot solid fence. Also as a part of the approvals of the apartment project, addition landscaping was proposed along the shared property line to further screen the CEI building and uses from the future apartments.

<u>Section 7.7.9.1 Additional Approval Standards for the Village Center</u>

A. Compatibility with Adjacent Uses: The proposal shall be designed, constructed, and maintained to be compatible with permitted uses on surrounding land to the extent that is reasonably feasible, giving consideration to economic and site conditions. Consideration may be given to:

1. **The location and screening of vehicular circulation and parking areas in relation to surrounding development, to the maximum extent feasible.**
2. **The location and screening of outdoor storage, outdoor activity and work areas, and mechanical equipment in relation to surrounding development.**
3. **The bulk, placement, and materials of construction of the proposed use in relation to surrounding development shall be compatible as determined by the general requirements listed in Section 7.7.9.1.A.**
4. **Proposed site amenities.**
5. **The site grading and stormwater drainage plan.**

The proposed project includes a 60’ by 80’ addition to and existing 70’ by 90’ shop building on the southeast corner of the subject site. This building is uses to form, cut, and store metal and composite roofing panels. The new addition is located within the existing paved storage area on the site; therefore no new water runoff or grading will be created or required as a part of this project. There is an existing eight foot fence around the southern portion of this site where the addition is located providing screening for the buildings and storage areas. The proposed addition will not impact the 8 foot multi use trail that runs along the north side of this site and was required to be built as a part of the 2014 SUP to allow CEI on the subject site.

B. **Transportation and Access: The proposed use shall be designed to minimize the impact of traffic generated by the use to the extent that is reasonably feasible, giving consideration to economic and site conditions. Consideration may be given to the following:**
   1. **Relationship between the proposed development and existing and proposed streets.**
   2. **Estimated traffic generated by the proposed use.**
   3. **Location and access to on-street parking.**
   4. **Location and access to off-street parking.**
   5. **Provisions for vehicular traffic.**
   6. **Continuation of the planned street network for the village.**

   The Planning Commission may require a traffic impact study for special uses.

   As stated before as a part of the original special use permit to allow this business to occupy the subject site the applicants closed the access point to Hall Road and required all future truck traffic through the driveway at M-36. M-36 in this location has minimal traffic for a public state highway.

C. **Building Architecture: In determining the appropriateness of buildings, design elements shall be evaluated in relation to existing and proposed surrounding buildings and uses. The shall meet the standards of Section 7.7.9.1.D.**

   The proposed addition will extend the eastern wall of the shop building. There is an eight foot tall fence surrounding the existing storage area and building to provide screening from off site.

   To further screen this structure from Hall Road staff suggest the applicant remove the paved driveway apron and grade and landscape the area to match the rest of the roadway shoulder in that area.

D. **Emergency Access: All buildings or groups of buildings shall be so arranged as to permit convenient and direct emergency vehicle access.**

   The Hamburg Fire Department has reviewed the project and had no concerns.

E. **Health and Safety Concerns: Any use shall comply with applicable Federal, state, county, and local health and pollution laws and regulations related to noise; dust, smoke and other air pollutants; vibration; glare and heat; fire and explosive hazards; gases; electromagnetic; radioactive materials; and toxic and hazardous materials. The Planning Commission may require a environmental impact study for special uses.**

   The use of the site as architectural sheet metal processing and roofing establishment was approved in 2014 the proposed addition to the shop building will expand this use slightly; however, the new additional building area will not increase the noise; dust, smoke and other air pollutants; vibration; glare and heat; fire and explosive hazards; gases; electromagnetic; radioactive materials; and toxic and hazardous materials used on the site.

F. **Screening: Off-street parking, outside refuse, storage areas, and mechanical and electrical equipment which are within sight of adjacent residential districts or public roads shall be adequately screened.**
The site currently has an 8 foot tall solid fence around the storage are to provide screening from the adjacent neighbors and the traveled roadways. Landscaping was originally approved and planted as a part of the 2014 SUP, between M-36 and the storage area on the west side of the site to further screen the project.

G. **Appearance: Signs and other site features shall be designed and located on the site so that the proposed development is aesthetically pleasing and harmonious with nearby developments.**
The project is an addition to the south of the shop building. There is currently an 8 foot fence between this structure and the east and south property lines. This fence will help screen the structures from the surrounding properties. No new signage is proposed as a part of this project.

RECOMMENDATION:

The Planning Commission should review the project and make a decision (approve/deny) on the Amendment to the Special Use Permit and the Site Plan at 7750 E M-36. In the review of the project the Planning Commission should consider if the project meets the discretionary standards listed above.

An amendment to an existing special use permit and site plan can be approved by the Planning Commission under Sections 3.5.8 (A) and 4.6.

EXAMPLE MOTIONS:

Approval

The Planning Commission approves the Special Use Permit and Site Plan Amendments (SUP18-001 and SP18-005)) to allow the new 4,800 square foot addition to be built on the south side of the existing shop building at 7750 E- M-36 (TID15-25-200-065); because the project with the following recommended conditions will meet all the discretionary standards for Special Use Permits under Article 3 , Site Plan Review under Article 4, Projects within the Village Center Area under Article 7 as described at this hearing and as presented in the November 28, 2018 Staff Report.

Conditions of Approval:

1) The final site plan shall include a note that states "All outdoor lighting shall be turned off between 11:00pm and sunrise and that all light fixtures used for security purposes are to be on motion detection devises.
2) Prior to issuance of a land use permit by the Zoning Department a lighting study shall be submitted that shows that light within a site shall not exceed ten (10) footcandles or one (1) footcandle at any property line, except where it abuts a residentially used or zoned site whereby a maximum of 0.5 footcandles is permitted. The only exception is with gas station canopy and automobile dealership lighting, where a maximum of twenty (20) footcandles is permitted within the site but the above standards shall apply to intensity at the property line.
3) Prior to issuance of a building permit the building department will verify that all Federal and State requirements regarding handicapped parking, loading and access

are met.

4) As a part of the project the Zoning Permit shall include the removal of the driveway approach off of Hall Road. Once the approach is removed the area shall be graded and landscaped to match the rest of the shoulder along Hall Road.
5) Prior to issuance of a land use or building permit all local, county and state regulations will need to be reviewed and approved for this project. A list of the agencies that may be required to review this project including but are not limited to; the Livingston County Drain Commission, Road Commission, Building Department, Health Department, and Water Authority, and the Hamburg Township Utilities and Fire Departments.

Denial Motion: (Planning Commission fills in the standards that the project does not meet)

The Planning Commission denies the Special Use Permit and Site Plan Amendments (SUP18-001 and SP18-005)) to allow the new 4,800 square foot addition to be built on the south side of the existing shop building at 7750 E- M-36 (TID15-25-200-065); because the project will **not** meet discretionary standards for Special Use Permits under Article 3 Section 3._.__ __. __, and ___ , or Site Plan Review under Article 4 Section 4.__.__ (__, __, and __), or for Projects within the Village Center Area under Article 7, Section 7.7.9.1 (__) (__, and __) as described at this hearing tonight and as presented in the November 28, 2018 Staff Report.

Exhibits:

Exhibit A: May 14, 2014 CEI Special Land Use Report
Exhibit B: March 11, 2015 CEI Site Plan Review Report
Exhibit C: 2018 Site Plan Review and Special Land Use Application Forms and Materials
Exhibit D: Site Plan for Proposed Addition

McKenna ASSOCIATES COMMUNITY PLANNING AND DESIGN

May 9, 2014

Planning Commission
Hamburg Township
P.O. Box 157
10405 Merrill Road
Hamburg Township, Michigan 48139

Attn:	Scott Pacheco
Subject:	#14-001: Special Land Use Review for CEI Michigan, LLC. Plans dated June 11, 1997
Location:	7750 E. M-36, Hamburg Township
Zoning:	VC, Village Center District
Applicant:	Genoa Group, LLC.

Dear Commissioners,

Per your request, we have reviewed the above referenced special land use application for a proposed architectural sheet metal processing and roofing establishment at 7750 E. M-36. The subject site, a former lumber yard, contains two buildings, two paved access drives, and a paved parking lot with 35 spaces. A fenced in gravel area with an open-sided storage shed is also located on the rear of the property.

No new buildings are proposed as part of this application. However, the applicant, in addition to using the existing buildings and parking lots for the above requested use, proposes to repair damaged sections of the existing wood fencing, remodel the interior of the of the office building and warehouse, and repair exterior metal siding on the buildings as needed.

Aerial photo of the subject site, outlined in orange (image date 2014).

APPROVAL PROCEDURES

The site is zoned VC, Village Center District where the proposed architectural sheet metal processing and roofing establishment is considered a special land use, and subject to the provisions set forth in *Section 3.5.3* of the Zoning Ordinance. The Planning Commission must conduct a public hearing to receive any comments from the public. After the public hearing, the Planning Commission may approve, deny, or approve with conditions the special land use.

We have reviewed the above request with the Township's Zoning Ordinance and other applicable Plans, observations of site conditions, and sound planning and design principles in mind. We offer the following comments for your consideration. Text identified with an <u>underline</u> highlights issues that require Planning Commission consideration and must be addressed to your satisfaction.

SPECIAL LAND USE REVIEW

Section 3.5.3 of the Zoning Ordinance provides the standards to evaluate special land use requests. The following report details the findings of these standards in relation to the above referenced proposal.

1. **Compatibility with the Master Plan**. Will be harmonious and in accordance with the general objectives or any specific objectives of the Hamburg Township Master Plan.

LOCATION	EXISTING LAND USE	ZONING	FUTURE LAND USE
Subject Site	Commercial	VC, Village Center	Village Gateway District
North	Commercial / Institutional	VC, Village Center	Village Gateway District
South	Single Family Residential	GI, General Industrial	Village Gateway District / Village Residential-10
East	Commercial	VC, Village Center	Village Gateway District
West	Single Family Residential	VC, Village Center	Village Gateway District

Finding: The subject site is designated as VC, Village Center Gateway District on the Future Land Use Map. The Village Center Gateway District is also discussed in the Village Center Plan. The intent of the Village Gateway District is to provide for community-wide retail uses while integrating smaller scale shops. These districts should connect to adjacent residential streets and create a unified pedestrian network to neighborhoods and open spaces. The general character of the district is predominately commercial uses with a strong pedestrian connection tied to building placemen, orientation and entries which reinforce pedestrian pathways.

Additionally, the subject site is located along M-36 and falls under the M-36 Corridor Plan which contains site design standards for streetscapes. The Plan specifically states that a bikepath be installed for all redevelopment of existing parcels along the frontage of M-36. In keeping with other sites in the Village Center District, the bikepath should be eight feet in width and extend along the entire linear frontage of the property. As redevelopment continues to occur along the M-36 corridors, the bikepaths will be linked, providing a comprehensive pedestrian network.

<u>*The proposed use can be compatible with the Master Plan, provided that the existing office building and future building site are maintained/developed in accordance with the Village Center regulations and a pedestrian pathway is provided, as specified by the Township's Zoning Ordinance, Village Center Plan, and M-36 Plan. Per Section 7.7.9.1.I of the Zoning Ordinance, pedestrian scale lighting along M-36 is also required. The applicant must provide the required bikepath and lighting along the M-36 frontage. It is recommended that a timeline for completion is established between the applicant and the Planning Commission so that these improvements may be accomplished in a reasonable but flexible timeframe.*</u>

2. **Compatibility with Surrounding Area**. Will be designed, constructed, operated, and maintained so as to be harmonious and appropriate in appearance with the existing or intended character of the general vicinity, will not change the essential character of the area, and will not be hazardous or disturbing to existing or future nearby uses. In determining whether a special land use will be compatible and not create a significant detrimental impact, as compared to the impacts of permitted uses, consideration shall be given to the degree of impact the special land use may have on adjacent property, as compared with the expected value to the community. The following types of impacts shall be considered:
   - Use activities, processes, materials, equipment or conditions of operations;
   - Vehicular circulation and parking area;
   - Outdoor activity, storage and work areas;
   - Hours of operation;
   - Production of traffic, noise, vibration, smoke, fumes, odors, dust, glare, and light;
   - Impacts on adjacent property values; and
   - The relative ease by which the impacts above will be mitigated.

   Finding: <u>The site can be compatible with the surrounding area, provided that the proposed activities do not create noise, dust, odors, fumes, or other nuisances that will have an obnoxious effect on surrounding residences. In addition, the screening shall be maintained and repaired where necessary, and the undeveloped portions are developed in accordance with the Village Center regulations.</u>

3. **Improvement to the Immediate Vicinity.** Will be an improvement in relation to property in the immediate vicinity and to the Township as a whole.

   Finding: The site plan indicates that the existing fence and buildings will be repaired as necessary, improving the overall site conditions. The installation of a bikepath and pedestrian scale lighting along M-36 will also improve the site and accessibility for Township residents and visitors. In addition, the number of employees indicated by the applicant will contribute to the commercial viability of the Village Center.

4. **Impact of Traffic on the Street System.** The location and design of the proposed special land use shall minimize the negative impact on the street system in consideration of items such as vehicle trip generation (i.e. volumes), types of traffic, access location and design, circulation and parking design, street and bridge capacity, traffic operations at proposed access points, and traffic operations at nearby intersections and access points.

   Finding: <u>This standard can be met, provided that the impact of traffic and occurrences of deliveries is addressed to the satisfaction of the Planning Commission. Route and operational restrictions (such as hours, cleaning of dust or debris) may be established for construction traffic to minimize negative impacts.</u>

5. **Impact on the Overall Environment.** The proposed special land use shall not have an unacceptable significant adverse effect on the quality of the natural environment in comparison to the impacts associated with typical permitted uses.

   Finding: This condition is met; no changes are proposed which will impact the existing vegetation on site. Improvements and maintenance to the existing vegetation are proposed as part of this application.

6. **Public Services Impact.** Will be served adequately by essential public services and facilities or the persons responsible for the establishment of the proposed use will provide adequately any such service or facility, will not create excessive additional public costs and will not be detrimental to the economic welfare of the Township.

   Finding: This condition is met; the use will occupy an existing site and no additional public services will be required.

7. **Compliance with Zoning Ordinance Standards.** Will be consistent with the intent and purposes of this Ordinance and be designed, constructed, operated and maintained to meet the stated intent of the zoning district.

   Finding: *This condition can be met, provided that the pedestrian bikepath and lighting, as required in Section 7.7.9.1, are installed.*

RECOMMENDATION
We welcome new business and the economic benefits that it will bring to the community. Based on our findings herein:

We recommend that the Planning Commission recommend approval to the Township Board for the special land use of an architectural sheet metal processing and roofing establishment at 7750 E. M-36, subject to the following conditions:

I. *A pedestrian bikepath and lighting, as required in Section 7.7.9.1 of the Zoning Ordinance, are installed along the entire M-36 frontage.*
II. *The impact of traffic and occurrences of deliveries is addressed to the satisfaction of the Planning Commission.*

We look forward to reviewing these findings and recommendations with you. In the meantime, if you have any questions, please feel free to contact us.

Respectfully submitted,

McKENNA ASSOCIATES

John Jackson, AICP
Executive Vice President

Laura E. Haw
Laura Haw
Assistant Planner

McKenna ASSOCIATES COMMUNITY PLANNING AND DESIGN

March 11, 2015

Planning Commission
Hamburg Township
P.O. Box 157
10405 Merrill Road
Hamburg Township, Michigan 48139

Attn: Scott Pacheco
Subject: **#15-002: Site Plan Review for CEI Michigan Pole Barn**
Application dated February 19, 2015
Location: 7750 E. M-36, Hamburg Township
Zoning: VC, Village Center District
Applicant: CEI Michigan, LLC.

Dear Commissioners,

Per your request, we have reviewed the above referenced site plan application for a proposed pole barn (accessory structure) to the existing sheet metal processing and roofing establishment at 7750 E. M-36. The subject site is approximately 7 acres in sizes and zoned the VC, Village Center District where the subject use is considered a special land use.

We have reviewed the above request with the Township's Zoning Ordinance and other applicable Plans, observations of site conditions, and sound planning and design principles in mind. We offer the following comments for your consideration. Text identified with an underline highlights issues that require Planning Commission consideration and must be addressed to your satisfaction.

PAST APPROVAL

In May 2014, CEI Michigan received a special land use permit for their establishment. At that time, no new buildings were proposed. Conditions of the 2014 special land use permit are as follows:

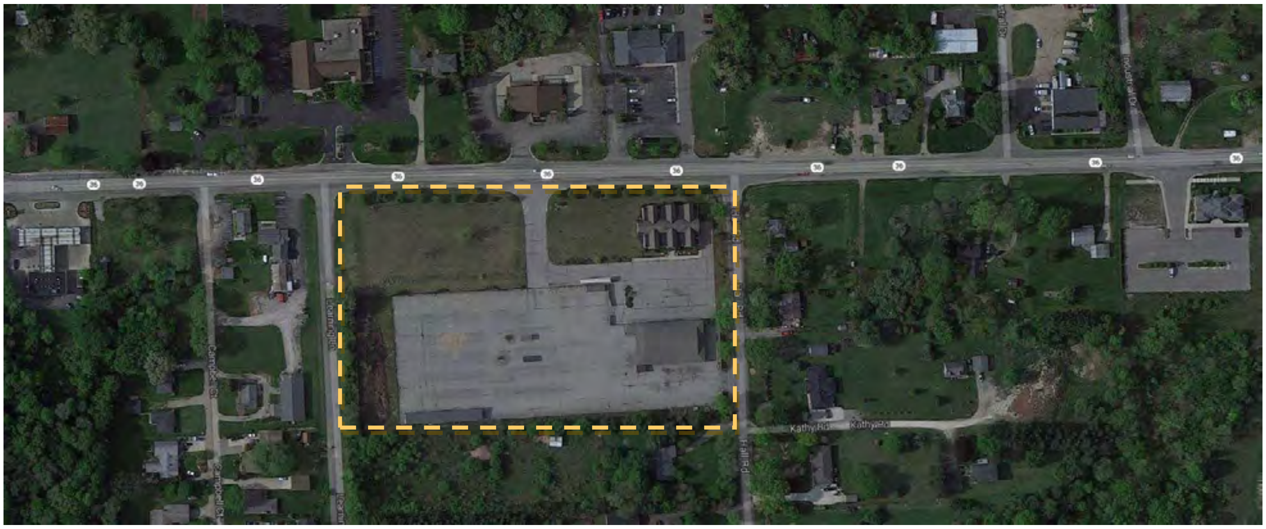
A. An eight foot pedestrian path (cement or asphalt) shall be placed in the front of the building from the driveway east to Hall Road.
B. Deliveries enter and exit off M-36 and the approach on Hall Road shall only be used for emergencies.
C. The remainder of the pedestrian path, from the driveway to Learning Lane, shall be installed within 5 years or upon development of the site.

Approval of the proposed accessory building does require that conditions #1 and #2 are met. However, the proposed accessory barn is not considered as a development of the site and thus, condition #3 does not apply.

To date, condition #1 (the 8 foot pedestrian path) has not been constructed. The applicant must agree to install the pedestrian path prior to the issuance of building permits for the proposed accessory structure or by another date specified by the Planning Commission.

EXISTING CONDITIONS

The aerial photo below highlights existing site conditions (*source: Google 2015*).



SITE PLAN REVIEW

The following standards apply to all site plan reviews, per *section 4.5.7.*

A. **The proposed development conforms to all provisions of the Zoning Ordinances.**

   i. **Zoning and Land Use.** The subject site is zoned VC, Village Center District where accessory building, including pole barns, are a permitted use, requiring site plan approval. The proposed pole barn will be used for the cold storage of roofing materials instead of just storing items outside and will be located on a paved surface within the existing fenced in area on the rear of the site.

   ii. **Dimensional Requirements.** The proposed accessory building is located to the rear of the principal building and in compliance with the required 5-foot side-yard and 5-foot rear-yard setback requirements. Additionally, the proposed building will occupy less than 30 percent of the rear yard and is at least 10 feet from any existing structure.

   iii. **Trash Enclosure.** Trash collection and disposal is currently provided by an existing dumpster that is located within the fenced in area.

B. **All required information has been provided.** <u>The site plan is missing some key information, such as the species and quantity of proposed plant material, the dimensions/location of the pedestrian pathway and any existing vegetation. These items should be noted on a revised site plan.</u>

C. **The movement of vehicular and pedestrian traffic within the site and in relation to access streets and sidewalks will be safe and convenient.**

   i. **Off-Street Parking.** No change to off-street parking is proposed as part of this application. The parking calculation will not be impacted by the proposed accessory building as it will be used for cold storage of materials that are currently stored outside.

   ii. **Pedestrian Pathway.** <u>An 8 foot pedestrian pathway must be installed prior to the issuance of building permits or by another date specified by the Planning Commission.</u>

D. **The proposed development will be harmonious with existing and future uses in the immediate area and the community.** This standard can be met, provided that deliveries enter and exit off M-36 and the approach on Hall Road shall only be used for emergencies, the pedestrian pathway is provided, and the fence is repaired.

E. **The proposed development provides the necessary infrastructure improvements, such as roads, drainage, pedestrian facilities and utilities, to serve the site, and be adequately coordinated with the current and future use of adjacent properties.** This standard can be met, provided the 8 foot pedestrian path is installed.

F. **The applicable requirements of Township, County and State agencies are met regarding grading and surface drainage and for the design and construction of storm sewers, storm water holding facilities, water mains, and sanitary sewers.** This condition is met; no change to the amount of impervious pavement or existing gravel is proposed as part of this application.

G. **Natural resources will be preserved to the maximum extent possible in the site design by developing in a manner which will not detrimentally affect or destroy natural features such as lakes, ponds, streams, wetlands, steep slopes, and woodlands.** This condition can be met; please see comments under condition "J' below.

H. **The proposed development shall respect the natural topography to the maximum extent possible by minimizing the amount of cutting, filling, and grading required.** This condition is met; no change to the existing topography is proposed as part of this application.

I. **The proposed development will not cause soil erosion or sedimentation.** This condition is met; existing soil conditions will not be impacted by the proposed development.

J. **Landscaping, including trees, shrubs and other vegetative material is provided to maintain, improve and/or restore the aesthetic quality of the site.** The installation of the 8 foot pedestrian pathway shall avoid the removal or relocation of existing vegetation along M-36. The site plan should be revised to show the location of the pathway and existing and proposed vegetation.

Additionally, vegetation is proposed along the fenced area. However, this area is planned to be developed as an access corridor in the future. It is recommended that vegetation is added to other areas of the site, such as around the existing office building. Information regarding the quantity and species must be provided on a revised site plan.

K. **Conformance to the adopted *Hamburg Township Engineering and Design Standards*.** No change to the amount of impervious surface is proposed as part of this application as the pole barn will be located on an existing paved surface. For this reason, an engineering review is not necessary.

L. **All proposed commercial, office, industrial, institutional and multiple family development shall utilize quality architecture to ensure that buildings are compatible with surrounding uses, protect the investment of adjacent landowners, blend harmoniously into the streetscape and meet the objectives the Township Master Plan. New buildings, additions and renovations shall be designed to preserve or complement the design character of existing development provide visual harmony between old and new buildings, and create a positive image for the Township's various commercial shopping nodes. Commercial, office, industrial, institutional and multiple family architecture shall be reviewed by the Planning Commission under the following criteria:**

   i. **Buildings shall front towards and relate to the public street. Buildings shall be located to create a define streetscape through uniform setbacks and proper relationship to adjacent structures. Proper relationship to existing structures in the area shall be maintained through building mass, proportion, scale, roof line shapes and rhythm. Buildings within the area designated on the M-36 Corridor**

Plan/Master Plan as the "Hamburg Village" shall be compatible with the historic character of the unincorporated place commonly referred to as the "Old Hamburg Village."

ii. Building materials and colors shall relate well and be harmonious with the surrounding area. Roof shape and materials shall be architecturally compatible with adjacent buildings and enhance the predominant streetscape. For any side of a principal building facing a public or private street, at least fifty percent (50%) of the facade shall be constructed of, or covered with, the following materials: a. Brick; b. Fluted or scored concrete block; c. Cut stone; d. Vinyl siding; e. Wood siding; e. Glass; or, f. Other materials similar to the above as determined by the Planning Commission.

iii. Buildings shall possess architectural variety, but enhance the overall cohesive community character. Buildings shall provide architectural features, details and ornaments such as archways, colonnades, towers, cornices or peaked roof lines.

iv. Building walls over 100 feet in length shall be broken up with a combination of the following: varying building lines, windows, architectural accents and trees.

v. Building entrances shall utilize windows, canopies and awnings; provide unity of scale, texture, and color; and provide a sense of place.

vi. Where the rear facade of a building will be visible from a residential zoning district, or the rear of the site will be used for public access or parking, such rear facade shall be constructed to a finished quality comparable to the front facade.

vii. Signs, landscaping, lighting and other site elements shall be coordinated and compatible with the building design, as well as harmonious with other nearby developments. Developments shall provide site features such as decorative entry signs, ornamental lighting, pedestrian plazas and/or pedestrian furniture.

At 7,200 square feet and 16 feet in height, the proposed pole barn is comprised of steel siding and features a shingled, pitched roof. The above architecture and building design standards are not met for this development. However, the pole barn is considered an accessory structure and is located towards the rear of the property, within an enclosed area which minimizes its visibility from M-36.

Future development of the site, closest to M-36 will be required adhere to these standards.

No exterior building lighting is shown on the site plan. <u>The applicant should address if they will be adding any exterior lighting, including security lighting, to the building.</u>

<u>The architecture and building design should be addressed to the satisfaction of the Planning Commission.</u>

RECOMMENDATION

The information in this review demonstrates that the proposed accessory pole barn at CEI Michigan, LLC is a compatible addition, provided that the site is brought into compliance with the Zoning Ordinance and the conditions of the previously approved special land use permit are met. Based on these findings:

We respectfully recommend the Planning Commission grant site plan approval for the proposed accessory pole barn at 7750 E. M-36, contingent on the following:

I. *The requirements of the special land use permit are met, including:*
   a. *The construction of an 8 foot pedestrian path.*
   b. *Deliveries shall only enter and exit off M-36 and the approach on Hall Road shall only be used for emergencies.*
   c. *The remainder of the pedestrian path, from the driveway to Learning Lane, shall be installed within 5 years or upon development of the site.*

II. *Landscaping is addressed to the satisfaction of the Planning Commission.*

III. *The fence is repaired as necessary.*

IV. *The applicant provides additional details on the lighting of the building. If exterior lighting is proposed, it must be reviewed and approved for compliance with the Zoning Ordinance.*

V. *The architecture and building design is addressed to the satisfaction of the Planning Commission.*

VI. *The site plan be revised to include necessary information and submitted for administrative review.*

We look forward to reviewing these findings and recommendations with you. In the meantime, if you have any questions, please feel free to contact us.

Respectfully submitted,

McKENNA ASSOCIATES

John Jackson, AICP
Executive Vice President

Laura Haw
Associate Planner

Exhibit 3:

MSP 18-0005

Hamburg Township

a great place to grow

SCANNED

RECEIVED
FAX 810-231-4295
PHONE 810-231-1000

SEP 14 2018

Hamburg Township
Planning and Zoning Department

P.O. Box 157
10405 Merrill Road
Hamburg, Michigan 48139

SITE PLAN APPROVAL APPLICATION

Please note: All required information, copies, fees, and other materials as appropriate must be submitted and complete before the Township Planning Commission will set a public hearing date on the Site Plan Approval Application.

Application fees and review fees are required at the time of application.
In the case of separate applications for Preliminary and Final reviews, separate application and review fees shall be collected. Review fees shall be placed into a non-interest bearing escrow account. Upon final review, review fee balances shall be returned upon receipt of final billing. The applicant shall be responsible for all costs incurred.

Note: Acreage calculations based upon the acreage being developed or utilized for the project (parking, buildings, walks, storm water retention etc.)

The undersigned hereby makes application for a Site Plan Approval for: (Check all that apply)

1. **TYPE OF PROJECT:** ☐ Open Space ☐ Echo ☐ Residential ☐ Condominium
☐ Apartments ☒ Commercial ☐ Industrial ☐ PUD ☐ Hardship PUD

2. **TYPE OF APPLICATION:** ☐ Preliminary Site Plan ☐ Optional Conceptual Site Plan Review by Planning Commission
☐ Final Site Plan ☐ Combined – Preliminary/Final Site Plan
☐ Minor Site Plan ☒ Site Plan Amendment (less than 25% area of site being changed) ☐ Site Plan Amendment (26% or more or site being changed)

3. **PROJECT NAME:** CEI Michigan, LLC Warehouse Expansion Submittal Date: ____
4. **PROJECT ADDRES:** 7750 E. M-36, Whitmore Lake, MI 48189

Tax Code Numbers: 15 - ____ 15 - ____ 15 ____
15 - ____ 15 - ____ 15 - ____

○ Metes & Bounds Parcel ○ Subdivision ____ Lot Numbers: ____

Zoning District Classification: ____ Floodplain Classification: ____

Number of Lots Proposed: ____ Acreage of Project: ____

5. **PROJECT DESCRIPTION:** Expansion of the CEI Warehouse by an addition of a 60'x80'x16' section on the South east side of the current structure. Construction will be like the rest of the polebarn.

LEGAL DESCRIPTION

Part of the Northeast 1/4 of Section 25, Town 1 North, Range 5 East, Michigan described as: Commencing at the enter of said Section 25; thence N89°35'12"E along the East and West 1/4 line of said Section, 647.10 feet; thence N00°10'W 296.00 feet tc the P.O.B.; thence N00°10'W 458.80 feet to the centerline of M-36; therce S88°50E, along said centerline, 682.48 feet to the centerline of Hall Road; thence S00°06'15"E along said centerline 436.00 feet; thence S89°14'57"W579.17 feet to the P.O.B. 7.00 TOTAL ACRES.

Scope of Work:

1) Construct 60' x 80' x 16' Cold Storage Addition to be attached to Existing Warehouse Structure.

2) Remove and Reinstall Two (2) Existing Downward Facing LED Lights on Existing South Elevation: to be placed on New Cold Storage addition on the South Elevation. New lights on East and West Elevations to Match Existing.

3) New Insulated Siding Construction, Sheet Metal Flashings, Trims, Gutters and Downspouts on New Cold Storage Addition: Color to Match Existing.

4) New asphalt shingles with applicable underlayments to be installed on 3:12 Pitch: Color to Match Existing.

5) Install New 8' Concrete Walk / Bike Patch along M-36: per 'Special Use Permit', granted 21 May 2014.

LEGEND

- PROPERTY LINE
- EXISTING OVERHEAD ELECTRIC AND TELEPHONE
- EXISTING FENCE
- PROPOSED SANITARY SEWER
- PROPOSED 6' WOOD SCREEN FENCE
- BUILDING SETBACK LINES
- PROPOSED STORM PIPING
- PROPOSED DUMPSTER LOCATION
- HANDICAP ACCESSIBLE PARKING SPACE
- PROPOSED LIGHT FIXTURE
- PROPOSED WELL WITH 75' RADIUS ISOLATION

19 Nov 2018

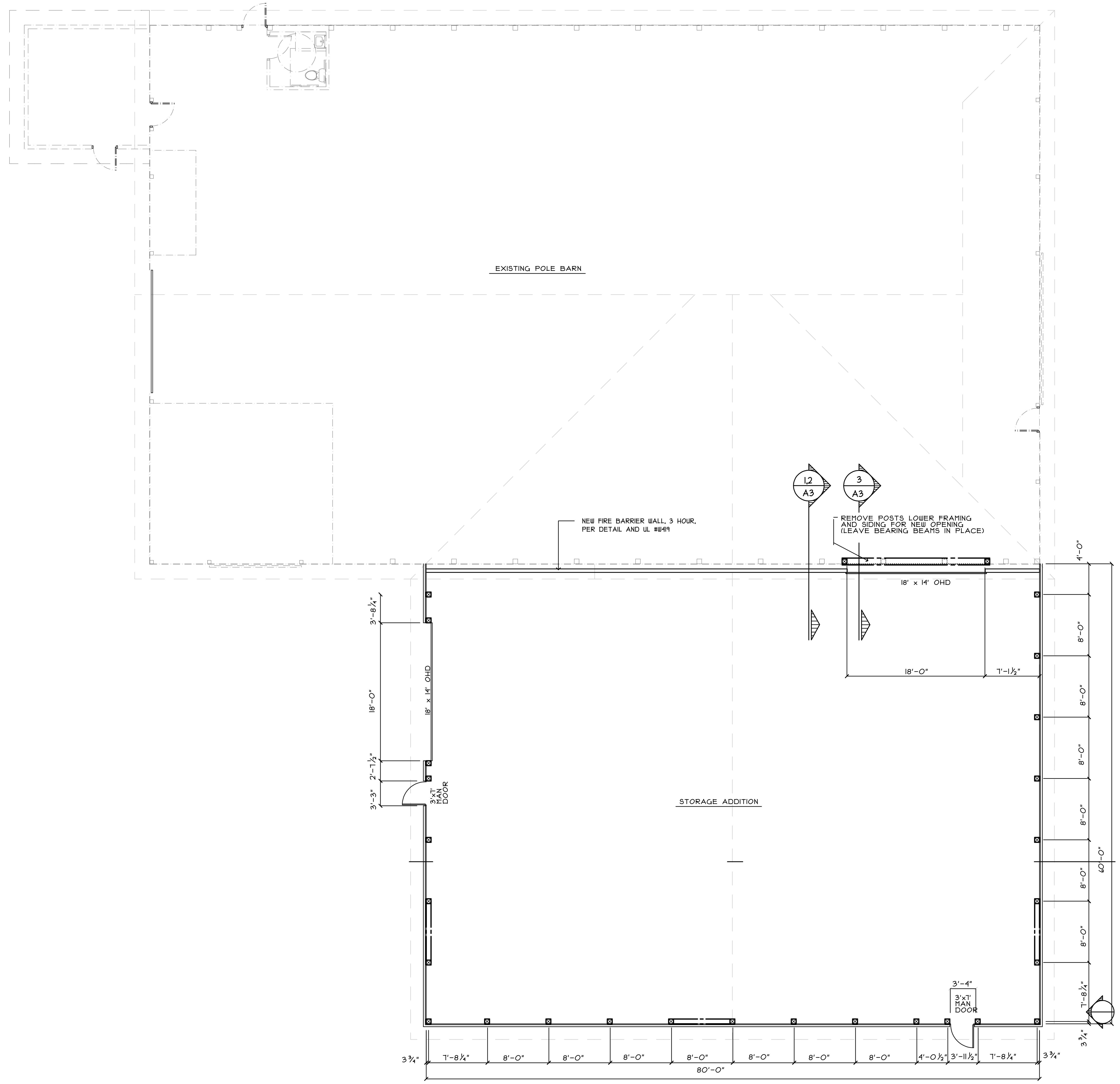
Proposed Plot Plan for:
CEI Michigan, LLC
7750 E M-36, Whitmore Lake

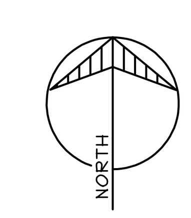
EQUINOX
Daniel C. Schrauben, P.E. Licensed Civil Engineer
David R. Beschke, A.S.L.A. Registered Landscape Architect
Equinox, Inc. 7600 Grand River Rd. Suite 100 Brighton, MI 48116-9309 810-220-0330

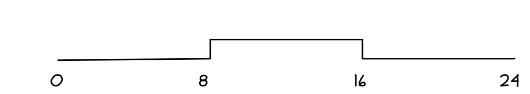
DRAWN BY: DRB
SCALE: 1" = 40'
DATE: 3 /27/95
REVISED: 05/15/95 05/30/95 07/05/95 03/21/97 04/09/97 05/13/97 06/11/97

RECEIVED
NOV 01 1997
LIV. CTY. HEALTH DEPT.

SHEET: 1 OF 6







MICHIGAN BUILDING CODE INFO:

PROPOSED USE GROUP - S1 MODERATE HAZARD STORAGE
PROPOSED CONSTRUCTION TYPE - 5B
PROPOSED BUILDING ADDITION AREA - 4,822 S.F.
EXISTING BUILDING AREA - 8,434 S.F.
PROPOSED TOTAL BUILDING AREA - 13,256 S.F.
BASE ALLOWABLE BUILDING AREA - 9000 S.F.
ALLOWABLE AREA INCREASE (OPEN PERIM) - 0.75 = 6,750 S.F.
TOTAL ALLOWABLE BUILDING AREA - 15,750S.F.

OCCUPANCY - 13,256/500 = 27 OCCUPANTS FOR EGRESS
EXITS REQUIRED - 2
MAXIMUM TRAVEL DISTANCE - 200 FT.
PROPOSED MAXIMUM TRAVEL DISTANCE - 60 FT. IN ADDITION

PROPOSED ADDITION TO BE SEPARATED FROM EXISTING BUILDING BY A FIRE BARRIER WALL (SECTION 707) RATED AT 3 HOURS, PER WALL DESIGN #W419. OPENING TO BE 3 HOUR RATED, 14'x18', UL LABEL 263.

EXIT AND EGRESS LIGHTING REQUIRED - 90 MINUTE BACK UP BATTERY.

STRUCTURE IS DESIGNED FOR 12 EMPLOYEES REGULAR WORK AREA
EXISTING SINGLE OCCUPANT TOILET FACILITIES ARE PROPOSED TO REMAIN.
ADJACENT OFFICE BUILDING HAS ADDITIONAL TOILET FACILITIES.

ROOF DESIGN LOAD: 25PSF LIVE LOAD, 14 PSF DEAD LOAD, 39PSF TOTAL
BASIC WIND SPEED: 90 MPH
BUILDING CATEGORY: III, EXPOSURE B, CLADDING LOAD 15.2PSF
SEISMIC DESIGN CATEGORY B

PRE-ENGINEERED TRUSS DESIGNER TO TAKE THESE ELEMENTS INTO CONSIDERATION IN THE DESIGN OF THE ROOF SYSTEM.

PRESUMED SOIL BEARING CAPACITY OF 3000 PSF TO BE VERIFIED AT BOTTOM OF FOOTING EXCAVATION.

Lindhout Associates
architects aia pc
10465 citation drive, brighton, michigan 48116-9510
www.lindhout.com (810)227-5668 fax:(810)227-5855

CEI
MICHIGAN, LLC
PH: 1-517-548-0039
FX: 1-517-548-0182

dr: PWL	
ck'd: pwl	
app'd:	
date	issued for
11.15.2018	OWNER REVIEW

COLD STORAGE ADDITION for:
CEI ROOFING
HAMBURG TWP., MI

POLE BARN PLAN & ELEVATIONS

A1.0

18078

FILE LOCATION: H:\18078 - CEI Roofing Barn Addition\dwg\A1 FLOOR PLAN
DATE PLOTTED: 11/1/2018 PLOTTED BY: pat lindhout

Lindhout Associates
architects aia pc
10465 citation drive, brighton, michigan 48116-9510
www.lindhout.com (810)227-5668 fax:(810)227-5855

consultant

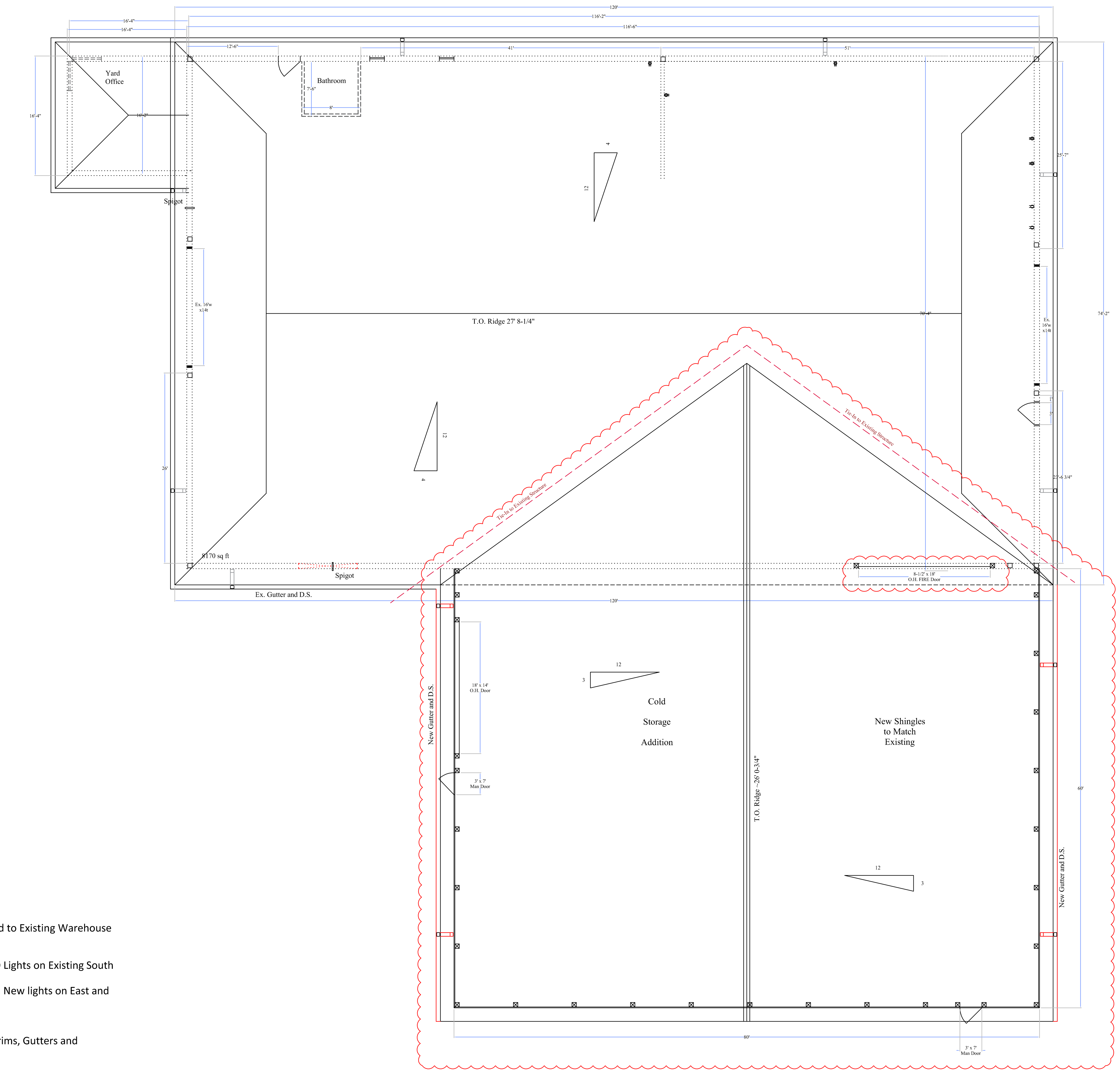
dr:	PWL		
ck'd:	PWL		
app'd:	XXX		
		11-1-2018	OWNER REVIEW
		date	issued for

STORAGE BUILDING ADDITION for:
C E I ROOFING
HAMBURG, MICHIGAN

WALL SECTIONS

A3

18078



Scope of Work:

1) Construct 60' x 80' x 16' Cold Storage Addition to be attached to Existing Warehouse Structure.

2) Remove and Reinstall Two (2) Existing Downward Facing LED Lights on Existing South Elevation:
to be placed on New Cold Storage addition on the South Elevation. New lights on East and West
Elevations to Match Existing.

3) New Insulated Siding Construction, Sheet Metal Flashings, Trims, Gutters and Downspouts on
New Cold Storage Addition: Color to Match Existing.

4) New asphalt shingles with applicable underlayments to be installed on 3:12 Pitch: Color to Match Existing.

5) Install New 8' Concrete Walk / Bike Patch along M-36: per 'Special Use Permit', granted 21 May 2014.

CEI

MICHIGAN, LLC

PH: 1-517-548-0039

FX: 1-517-548-0182

7750 East M-36

Whitmore Lake, MI 48189-9715

Post Office Box 310

Hamburg, Michigan 48139

SYMBOL KEY

Notes:

CEI Michigan, LLC

7750 East Michigan 36

Whitmore Lake, MI 48186

(517) 548-0039

REV: 25 October 2018

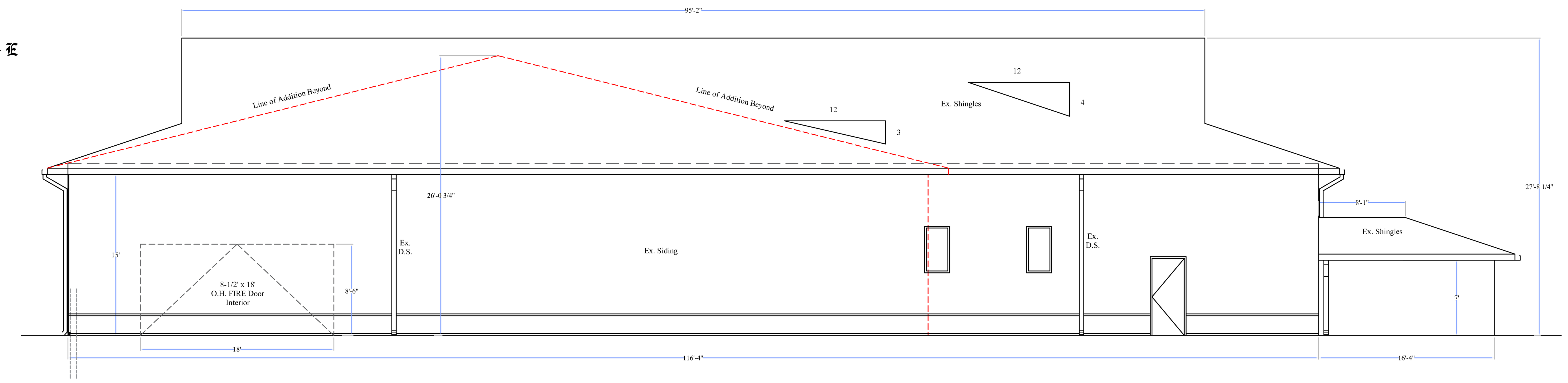
DATE: 10 April 2014

DWG PATH: I:/Hmbrg/JB/NewOfBldg

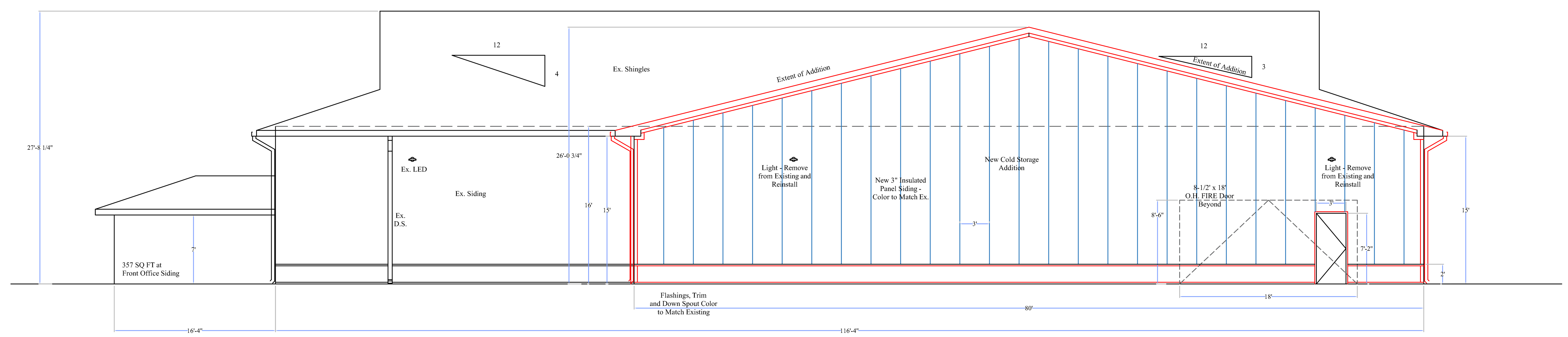
New Shop Plan

A-1a

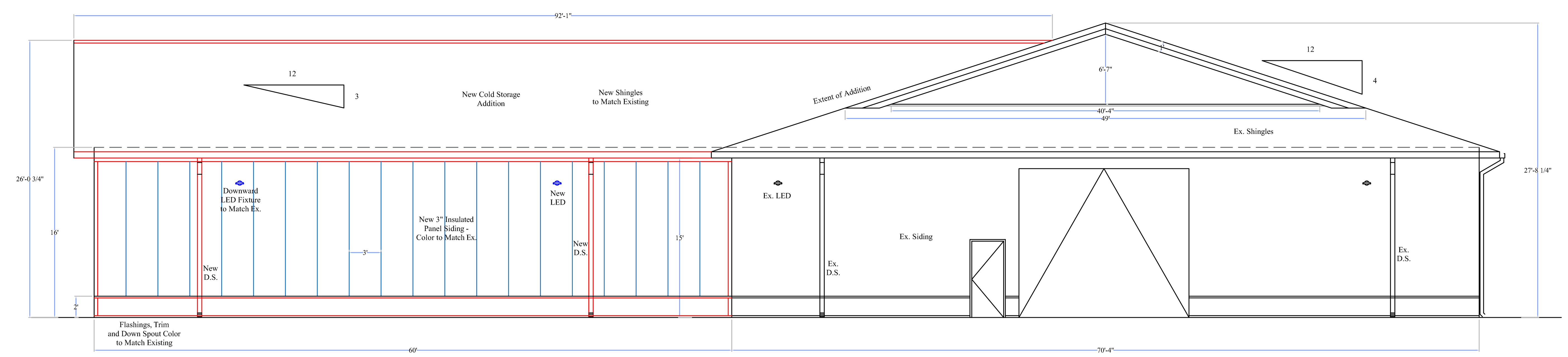
SCALE: 1/8" = 1'



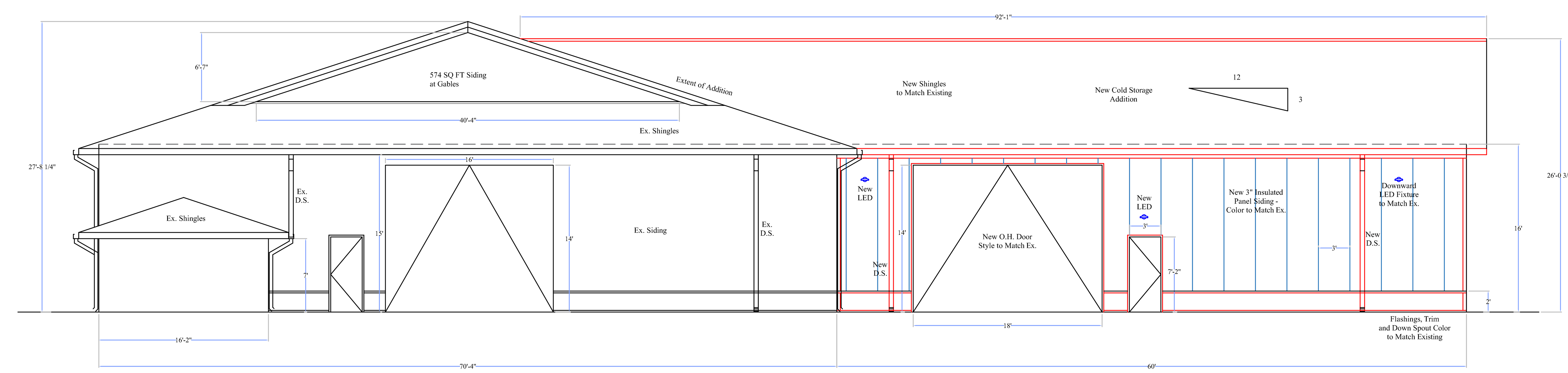
North Elevation



South Elevation



East Elevation



West Elevation

Scope of Work:

1) Construct 60' x 80' x 16' Cold Storage Addition to be attached to Existing Warehouse Structure.

2) Remove and Reinstall Two (2) Existing Downward Facing LED Lights on Existing South Elevation:
to be placed on New Cold Storage addition on the South Elevation. New lights on East and West
Elevations to Match Existing.

3) New Insulated Siding Construction, Sheet Metal Flashings, Trims, Gutters and Downspouts on
New Cold Storage Addition: Color to Match Existing.

4) New asphalt shingles with applicable underlayments to be installed on 3:12 Pitch: Color to Match Existing.

5) Install New 8' Concrete Walk / Bike Patch along M-36: per 'Special Use Permit', granted 21 May 2014.

CEI

MICHIGAN, LLC

PH: 1-517-548-0039
FX: 1-517-548-0182

7750 East M-36
Whitmore Lake, MI 48189-9715
Post Office Box 310
Hamburg, Michigan 48139

SYMBOL KEY

Notes:

CEI Michigan, LLC
7750 East Michigan 36
Whitmore Lake, MI 48186
(517) 548-0039

REV:
DATE: 25 October 2018
DWG PATH: I:/Hmbrg/JB/NewOfBldg

Shop Elevation Plan

A-1b

SCALE: 1/8" = 1'

PHONE: 810-231-1000
FAX: 810-231-4295

Hamburg Township
a great place to grow

P.O. Box 157
10405 Merrill Road
Hamburg, Michigan 48139-0157

To:	Planning Commissioners
From:	Scott Pacheco, AICP Hamburg Township Township Planner
Date:	November 28, 2018
Agenda Item:	7B
Project address:	**6716 Winans Lake Road** **(TID 15-23-100-002 and 15-14-400-008)**
Description:	**Preliminary Site Plan Application for an Open Space Planned Unit Development (OSPUD 18-001)** to allow construction a 154 unit single family housing development on the properties at 4715-14-400-008 (8.5 Acres) and 4715-23-100-002 (77.19 Acres). This development proposes a mix of property sizes and types that will be clustered on the site in order to help preserve the existing wetlands and other sensitive areas of the site.
Owner:	M. Eleanor Forlenza
Applicant:	Pine Cove Building Co.
Agent:	Midwestern Consulting

PROJECT ANALYSIS:

The applicants submitted conceptual plans and pre-application meetings regarding the project where held on March 21, 2018 and October 17, 2018. These meetings where designed to allow the applicants the opportunity to submit a conceptual plan prior to making a formal application to the Township in order to receive comments from township professional and interested parties. These meeting included Township Planning, Fire, Police and Utilities staff members, County Drain and Road Commission staff, Township Consultants, and select Township Planning Commissioners and Board Members. Also through the process the Township Planning Staff and Consultants has met multiple times with the developer to discuss the project.

On September 4, 2018 the applicant submitted to the Township for Preliminary Site Plan review for the Open Space Planned Unit Development project as described above. The Township's Planning Consultants, McKenna Associates, and the Township Engineering Consultants, Process Results have both reviewed the preliminary site plan. Both their reviews are attached as **Exhibit A and B**, respectively. Also attached to his memorandum are all the materials submitted by the applicant regarding this process (**Exhibits C-K**). Because of the length of the traffic study (**Exhibit H**) only the text of the report is attached to this memo the rest of the report can be viewed on the Townships Web Page listed under the Exhibits. Also because of the length and timing of the report the public correspondence (**Exhibit L**) on the project will be forwarded to the Planning Commissioners separately the correspondence received prior to the meeting will be forwarded to the Commissioners electronically and hard copies will also be presented on the dias the night of the meeting.

EXHIBITS

Exhibit A: McKenna Associates, Township Planning Consultant's Nov 21, 2018 review letter
Exhibit B: Process Results, Township Engineering Consultant's Oct 10, 2018 review letter
Exhibit C: Application material
Exhibit D: November 20, 2018 site plan
Exhibit E: November 14, 2018 proposed elevations
Exhibit F: Natural features impact statement
Exhibit G: Protected species evaluation
Exhibit H: Traffic impact study (Text only for full study see following webpage http://www.hamburg.mi.us/government/boardroom_(boards_commissions)/planning_commission/2018.php)
Exhibit I: LCRC site distance approval
Exhibit J: November 19, 2018 applicant response
Exhibit K: Applicant list of exemplary project items
Exhibit L: Correspondence (Will be distributed to the Planning Commissioner prior to or at the hearing depending on when received)

MCKENNA

November 21, 2018

Planning Commission
Township of Hamburg
PO Box 157
10405 Merrill Road
Hamburg, MI 48139

Attention: Amy Steffens, AICP, Planning and Zoning Administrator
Scott Pacheco, AICP, Planning Department

Subject: Waters Edge Village Open Space Community PUD – Site Plan Review #4

Dear Planning Commission members:

We have reviewed the revised site plan for the proposed Waters Edge Village Open Space Community Planned Unit Development (PUD) residential project, which is dated November 19, 2018.

OPEN SPACE COMMUNITY PUD

Hamburg Township's Open Space Community PUD is an optional development method which:

> *"Offers an alternative to traditional subdivisions for the purpose of:*
> - *Assuring the permanent preservation of open space, agricultural lands, and other natural resources;*
> - *Providing recreational facilities within a reasonable distance of all residents of the development;*
> - *Allowing innovation and greater flexibility in the design of residential developments;*
> - *Ensuring compatibility of design and use between neighboring properties; and*
> - *Encouraging a less sprawling form of development, thus preserving open space as undeveloped land".*
>
> \- Section 14.1 Intent: Open Space Community PUD, Hamburg Township Zoning Ordinance

Throughout this review, references to the above intent language will be noted as this is the framework that guides Open Space Communities. Provided for your consideration, this planning review contains seven main sections:

1. Brief Summary of the Waters Edge Proposal
2. Eligibility Review
3. Project Design Standards
4. Provisions for Exemplary Projects
5. Site Plan Review
6. Recommendations
7. Appendices – A: Huron River and the Natural River District
   B: Neighborhood Design Best Practices

1. Brief Summary of the Waters Edge Proposal

Per the November 19, 2018 site plan, a total of 154 residential lots are proposed, consisting of Cottage, Village and Estate lots with four different lot widths: 41-, 51-, 61-, and 90-feet. As the overall site is approximately 92.50 acres, the applicant's proposal results in a total gross density of 1.89 units per acre. This represents a 95% density bonus over what would be permitted under conventional zoning.

The parallel plan provided on sheet 3 of the site plan has a maximum unit count of 79[1]. The Township's Open Space Ordinance permits regulatory flexibility for ***exceptional projects.*** Three main open spaces are also provided on the site plan with access to the site limited to Winans Lake Road.

	Underlying WRF / NR Zoning District Maximums	Proposed Open Space Community PUD
Number of Residential Units	79 units (may be less, see footnote #1)	154 units
Residential Lot Areas (Min.)	30,000 SF per lot	--
Gross Density	0.85 units / acre (may be less, see footnote #1)	1.66 units / acre
Density Bonus	n/a	95% increase (may be greater, see footnote #1)

---

[1] *The parallel plan calculation is based on 30,000 SF lots. However, per section 14.4.3.A, "the parallel plan shall meet all standards for lot size…lot width and setbacks as normally required under section 7.6".*

As previously requested, lot dimensions are now provided on the parallel plan; the plan illustrates 125-foot lot widths. However, in the NR, Natural River district, lot widths are a minimum of 150-feet. The parallel plan must be adjusted to accurately depict what is allowable under conventional zoning; this may impact the number of residential units, gross density and the requested density bonus.

2. Eligibility Review

Section 14.3 of the Township's Zoning Ordinance identifies specific criteria that proposed development must meet to be eligible to qualify as an Open Space Community, as listed below. Please note, outstanding deficiencies that are called out with a "(P)" are required to be addressed before Preliminary Open Space Community consideration.

A. **Recognizable Benefit**

To be eligible, the proposed development must provide a **recognizable and substantial benefit** to the residents of the community and overall quality of life in the Township **through site design in excess of the requirements of this Ordinance**, such as extensive landscaping, unique site features, preservation a of woodlands, creation of recreation facilities, and buffering development from rivers.

The proposed development pattern will protect and preserve a portion of the existing woodlands (3.68 acres) on the site and the Huron River shoreline is shown as common shoreline. However, the plan layout has 34 residential units that back up to the Huron River and with minimal delineation of public / private space, the shoreline becomes privatized. The site plan must clearly provide an intentional tree line (or other method), building upon an accurate representation of the existing woodlands to ensure private lot delineation. While the revised site plans now note "intentional tree line to define lots" on sheet 4, the landscape plan indicates not infill. There is concern that as the tree line is not uniform, the use of the tree line as a private / public delineation method is not effective.

Along Gill Lake, approximately 1900-feet of common shoreline is proposed. A total of 25 residential lots back up to Gill Lake, creating a sense of privatization / private spaces, as opposed to public enjoyment.

The snapshot right (Google Street view, 2018) illustrates a 45-foot lot in West Bloomfield that offers neighborhood access to a common shoreline, as a scaled comparison. It is important to consider the pathways / treatment of adjacent homes (ex: will there be fencing, landscaping, etc.) to delineate the public / private space? We recommend further treatment of these areas (only fencing is noted at one location along a portion of the land.

Further, a total of four parks are identified on the plan, two of which contain the required stormwater detention ponds and one in the far southwest corner of the site with recreation facilities. The common park areas are connected by paved and woodchip paths. Additionally, one optional floating dock is proposed for Gill Lake (see below for additional comments). Overall, additional thought is needed for the *design, treatment and location of the amenities and preservation of natural features before a recognizable benefit is provided.*

Deficiency (P):	1.	The proposed Open Space Community is permissible only upon demonstration that the above mentioned recognizable benefit will be provided, not only for the neighborhood but also for the Township. While final details are not necessary for preliminary site plan approval, further consideration is necessary for these areas before a true, recognizable benefit can be assured.

B. Open Space.

The development must provide **at least one of the following open space benefits**, as shown in a prepared **Site Analysis Plan**:

1. Significant Natural Assets (ex: applicant must demonstrate quality woodlands exist – individuals trees over 12 inch diameter, wetlands, water bodies, natural corridors, etc.);
2. Recreation Facilities (which includes reasonable access); and/or
3. Creation of Natural Features.

As requested, a Site Analysis Plan has been provided. It is recommended that the tree survey be overlaid with lot boundaries to review the proposed limits of disturbance. Additionally, while the project narrative details that approximately a third of all trees surveyed will be preserved, little quantified data has been provided on the number and quality of trees to be removed as part of this project.

Deficiency (P):	1.	Additional information should be supplied on the site plan to fulfill the Site Analysis Plan. While final details are not necessary for preliminary site plan approval, it is difficult to assess the true impact of the project on natural features without additional information.

C. Guarantee of Open Space.

The applicant shall guarantee to the satisfaction of the Township Planning Commission that all open space portions of the development will be maintained in the manner approved.

Deficiency:	1.	Documents must be provided that bind all successors and future owners in fee title to commitments made as part of the proposal. This may be included within the approved Master Deed and by-laws, but meet the standards of section 14.4.8.

D. **Cohesive Neighborhood.**

The development shall be designed to create a cohesive community neighborhood through **common open space areas for passive or active recreation and for resident interaction**. All open space areas shall be equally available to all residents of the Open Space Community.

The open space amenities are dispersed between five main sites including four parks and the Huron River shoreline trail but the overall pedestrian system is lacking. Many lots (for instance, 89-97, 126-138, 148-154, etc.) do not have access to the path system. Further consideration is necessary for the amenity and pedestrian connections (for instance, grass areas along are not considered active recreation per MDNR standards, benches, picnic tables and the large gazebo do not have paths leading to them, crushed stone pathways should be treated the same as five-foot sidewalks, the 3.6 woodland with is labeled to contain "extensive paths" but only shows a single path, etc.) before the neighborhood reflects best practices and can be considered cohesive.

Deficiency (P):	1.	Without a thoughtful and well-connected pedestrian system and neighborhood elements (such as benches, signs, recreation amenities, or other features) the cohesive neighborhood standard remains unmet.

E. Unified Control.
The development shall be under single ownership / control.

Single control of the property shall be provided by Winans Lake Development, LLC.

F. Density Impact.
The Planning Commission may require an Impact Statement documenting the significant of any environmental, traffic or any adverse impacts resulting from the development, including a quantitative comparison of the impacts. Should impacts be identified, a mitigation plan is required.

The site plan states (sheet 3) that the proposed density is 1.69 units / acre.

Deficiency:	1.	It is recommended that the Planning Commission require an Impact Statement for the proposed density (and what would be permitted under conventional zoning regulations).

G. Township Master Plan.
The development must be consistent with and further implement the Township Master Plan.

Relevant Sections of Hamburg's current 2011 Master Plan include:

- *The subject site is primarily designated as Medium Density Residential on the Future Land Use Map, which equates to a density of one dwelling per acre, including any waterfront property, with the intent being that waterfront residential should maintain setbacks from the lake and existing character. Developments in the Medium Density Residential district are encouraged to take advantage of the Township's open space provisions (page 70).*
- *The southern portion of the subject site (along the Huron River) is identified as "least capable of supporting development" in Map 8: Land Capability and are to "require close scrutiny and*

sensitive site design" (page 52). The 34 residential units which back up to the Huron River and are located in this area do not support the above policy.

- *"Hamburg is blessed with an abundance of natural resources…the Huron River is unique and one of the most valuable resources to the Township. Development densities should be limited in areas that contain fragile natural features and pristine natural conditions" (page 4).*

Deficiency (P):	1. Without justification of an exemplary project, the requested density bonus of 95% is well beyond the one dwelling unit per acre density prescribed in the Master Plan. 2. Any development in the land area adjacent to the Huron River requires "close scrutiny and sensitive site design". The applicant must demonstrate such context sensitive design to the Township.

3. Project Design Standards

Section 14.4 of the Township's Zoning Ordinance requires that any open space community comply with the following project design standards:

Section 14.4.1: Location.
An open space community is limited to the RAA, RA, RB, NR, WFR, or VR zoning districts.

> *The subject site contains both the Waterfront Residential (WFR) and the Natural River (NR) districts. See additional comments below in section 14.4.2.*

Section 14.4.2: Permitted Uses.
An open space community is generally restricted to single family homes.

> *The proposed development includes detached, single family units within located in both the WFR and NR districts. While the proposed residential in the WFR district is more aligned with the Master Plan, there are significant concerns regarding the ±38 homes, approximately quarter of all units, that are located within the Natural River district as this district is intended to offer single family uses that protect and enhance natural features, that allow for recreational values and uses of the river and that enhance fish, wildlife and their habitats, etc. (see Appendix A for additional details).*

Deficiency (P):	1.	With approximately a quarter of all units located within the Huron River district, the district should also include appropriate provisions for the natural study, hiking and pedestrian paths, boardwalks and conservation and environmental interpretive areas so as to meet the intent of section 7.5.1(b).

Section 14.4.3: Dwelling Density.
The number of dwelling units allowable within an open space community project shall be determined through preparation of a parallel plan. For parcels with an underlining zoning districts of WFR / NR, the parallel plan shall consist of lots of at least 30,000 square feet as a minimum size.

> *<u>The applicant has submitted a revised parallel plan with dimensions. However, it appears the lot widths in the NR, Natural River district do not comply with the schedule of regulations in section 7.6</u>.*

Deficiency (P):	1.	The parallel plan shall be done in accordance with the guidelines of Section 14.4.3 to determine the maximum number of units that will be allowed on the site. This will clarify if the proposed plan complies, requires a density bonus to comply, or does not comply.

Section 14.4.4: Plans Not Requiring Public Hearing.
Not applicable.

Section 14.4.5: Water and Sewer Service.
The Planning Commission may require water or sewer service connections if available. We defer to the Township and Township Engineer on this matter.

Section 14.4.6: Base Zoning Regulations.
All underlying zoning requirements for the WFR and NR districts must apply unless waived / modified by the Planning Commission.

Section 14.4.7: Regulatory Flexibility.
To encourage flexibility and creativity consistent with the open space community concept, departures from compliance with the standards provided for in the Zoning Ordinance may be granted at the discretion of the Planning Commission.

To demonstrate how the project will achieve its desired outcomes using the regulatory flexibility allowed by the Ordinance, the applicant has provided a draft table on the site plan showing details on how the project deviates from the established zoning area regulations such as height, setbacks, or general provisions, and reasons for why the proposed deviations are sought. However, there are inconsistencies with the table and other sheets of the submission (ex: sheet 4, project narrative, and the traffic impact study).

Deficiency (P):	1.	An updated, consistent Regulatory Flexibility chart must be so provided on the site plan for Township review.

Section 14.4.8: Open Space Requirements.
In an open space community, any land not devoted to residential development or accessory uses shall be set aside as common land for recreation, conservation, agricultural uses, or preserved in an undeveloped state.

An open space community shall maintain a minimum of 40% of the gross area of the site as a dedicated upland open space area. Areas not considered open space include street right-of-way; submerged land area; and required setbacks surrounding a residential structure that is not located on an individual lot.

An updated open space calculation must be provided on the site plan, with the assumptions used. Additionally, a minimum of 25% of the open space area is required to be uplands exclusive of wetlands. It is unclear which areas are included in the applicant's open space calculation (ex: private lots, right-of-way, etc.).

Deficiency (P):	1.	A revised Open Space chart which details the calculations and any accessory structures to recreation / open space must be provided on the site plan for Township review.

Section 14.4.9: Compatibility with Adjacent Uses.
Any accessory uses / structures that are a significant different scale or character than the surrounding residential districts (such as pickle ball courts, parking areas, etc.) shall not be located near the boundary of the development so as to negatively impact the residential use of adjacent lands.

It is strongly recommended that greater consideration should be given to the recreation amenities in the southwest corner of the site, as these are located near ±5/6 residential homes in neighboring communities but also, are not proposed in a more central location for all residents of the neighborhood to enjoy.

Deficiency (P):	1.	While the pickle ball courts have been moved approximately 25 feet northeast, their overall proximity to adjacent residences and their lack of a central location to the neighborhood remains the same and it is recommended that additional consideration be given.

Section 14.4.10: Transition Area.
A transition area is required between an open space community and any adjacent single-family residential district. The transition area may consist of existing woodlands preserved around the boundary, significant changes in topography or single family units similar in lot area, lot width and setback placed adjacent to the existing residential homes. The Planning Commission may require a transition area to consist of one or more of the following: residential units that are similar in density, lot size, setbacks, etc.; woodlands / landscaped greenbelt; open / recreation space; and/or significant changes in topography.

As mentioned above, there are adjacent single-family residential lots to the east and west, which would benefit from additional landscaped screening but also the relocation of recreation areas away from the southwest corner of the site. Greater consideration should be given to the residential homes in neighboring communities and the treatment of these transitional, shared boundaries.

Deficiency:	1.	The landscape plan illustrates some additional canopy and evergreens trees within the 150-foot setback but no species or details have been provided. The quality of the landscaping proposed will need to be evaluated during final review in order to ensure the transition areas are effective.

Section 14.4.11: Architectural and Site Element Design.
At a minimum, residential façades may not be dominated by garages (at least 40% of all unit shall have side or recessed garages, at least five-feet behind the front line of the living portion of the principal dwelling unit). Further, elevations are required for buildings / accessory structures, including lookouts.

The renderings provided feature a majority of garage-dominated facades, which this standard does not support and dimensions for the required for a five-foot recessed garage behind the front line of the living portion of the principal dwelling unit are not detailed on the site plan.

While some of the proposed units will have vehicular access from alleys, the majority of the units proposed should have recessed or side entry garages from the private roads with dimensions.

Deficiency:	1.	Lot details which include standards / information for the amount, type, and location of garages must be provided.

Section 14.4.12: Access.
Direct access onto a County Road or State Highway is required for open space communities.

Access to the proposed development is from Winans Lake Road which is public road and maintained by the Livingston County Road Commission.

A preliminary traffic study that assesses the traffic impact of the project with and without the access to Huron Rapids Drive has been provided. The object of this traffic study is to determine the directional distribution of traffic from the proposed development and the impact on the closest intersections; however the traffic study is missing key components, such as a findings report and recommendations. Based on the review, we have the following traffic / access findings:

1. *The existing neighborhood to the south was designed and approved with the expectation that future development would have access to M-36 and residents from the existing neighborhood would have access to Winans Lake road. This represents good planning and development by dispersing the traffic.*
2. *Best, safest and definitely EXEMPLARY development practices would provide at least two access points for the distribution of traffic.*
3. *The traffic study uses the most conservative estimates for peak hour traffic generation which does not take in to account several of the proposed units may be occupied by retirees that will not impact peak hour trips.*
4. *There would be approximately 35 am peak trips and 45 pm peak trips which represents a minimal impact.*

Deficiency:	1.	A finalized traffic study, with a summary of findings and recommendations that assesses the traffic impact of the project with and without the access to Huron Rapids Drive must be provided for review.
	2.	The open space community shall meet (or exceed) the access standards of section 10.8, unless waived or modified by the Planning Commission.
	3.	Approvals from the Livingston County Road Commission for access of Winans Lake Road are required.

Section 14.4.13: Internal Roads.
Internal roads within an open space community may be public or private.

> *The site plan indicates internal roads will be private, of which connectivity for access and circulation is encouraged. Private roadways within the Township must comply with Hamburg's Private Road Ordinance and a maintenance plan, including a means of guaranteeing maintenance assessments form the affected property owners, must be reviewed and approved by the Township Planning Commission.*

Deficiency:	1. The site plan must provide private roads, with internal connections, that comply with Hamburg's Private Road Ordinance. 2. A cross-access easement for public enjoyment of roadways, pedestrian paths and amenities must be established and provided to the Township for review.

Section 14.4.14: Pedestrian Circulation.
The development shall provide pedestrian access to all open space areas from all residential areas, between open spaces and connections between on- and off-site uses. Trails may be constructed of gravel, woodchip or other similar material but the Planning Commission may require an 8-foot asphalt bike through the development. Locations for school bus stops must be identified.

Deficiency (P):	1. We recommend the trail along the Huron River be an 8-foot asphalt path to maximize user ship, especially among the targeted aging in place demographic. Due to the location of the path along the bluff, we believe this can be carefully executed without significant impacts to the existing tree canopy. An asphalt path is a more inclusive amenity to the neighborhood. 2. Pedestrian connections, as stated above, must be provided to residential units and site amenities.

Section 14.4.15: Natural Features.
The development shall be designed to promote the preservation of natural features.

> *The project preserves a portion of the wooded area in the center of the site as well as the natural shorelines of both Gill Lake and the Huron River.*

Deficiency:	1. The site plan must clearly note on the site plan which existing trees are to be preserved or removed as part of this project by noted each tree as "to be saved" or "to be removed" and to quantify trees for removal. 2. Further information on the floating dock usage and design must be provided to the Township for review.

4. Provisions for Exemplary Projects

Section 14.5 of the Township's Zoning Ordinance permits the Planning Commission to allow an exemplary open space community to qualify for a density bonus, multi-family component, or commercial component. To qualify for one or more optional provisions, the applicant must demonstrate that the **proposed project exceeds minimum standards for open space community eligibility under Section 14.3**. Also, all structures in the project, including single family dwellings, shall be subject to architectural review by the Planning Commission.

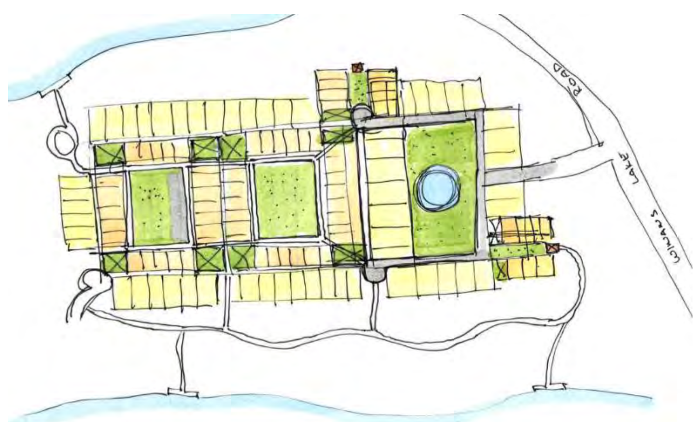
Deficiency (P):	1.	The proposed project does not qualify for a density bonus at this time since the project does not currently meet the standards in section 14.3. Only once the project meets, and exceeds, the eligibility criteria of section 14.3, does the Planning Commission have the authority to grant such a density bonus.

EXEMPLARY PROJECT SUGGESTIONS:

Waters Edge has the potential to be a model exemplary project that provides Hamburg Township with a long-term and sustainable residential development. The development currently includes a mix of lot sizes that will cater to a variety of residents from empty-nesters looking for lower maintenance housing options in Hamburg Township to young families looking for a first-time home in Hamburg. The developer has committed to quality architectural design which will add to the long-term value of the project.

We believe that the following suggestions will help make Waters Edge an exemplary project for the Township:

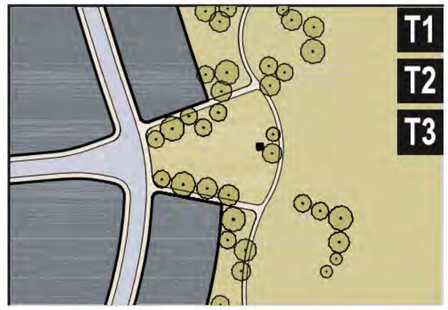
1. **Lot Orientation.**
   Each lot should have a recognizable front yard and rear yard. Front yards are semi-public spaces that front on public spaces such as streets or parks/greens. Rear yards are private spaces that front on lanes (alleys) or natural open spaces. The plan currently has a number of open spaces where some homes front on the open space and other home back to the open space creating a conflict between public and private spaces. This can be addressed by some minor modifications to the proposed road configuration.



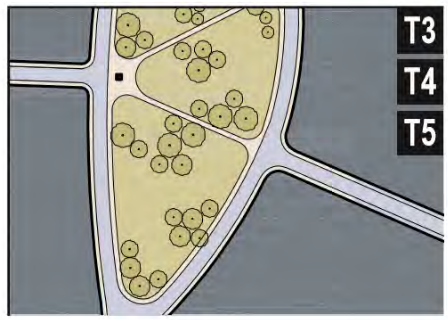
   The concept sketch above shows the transition from roads to "lanes" that will allow all units to front on the Greens and front or back to the Parks around the edges of the property where the natural assets are located.

2. **Open Space**.
There are two type of open space in the proposed design – **<u>Parks</u>** which are informal, passive open spaces, and **<u>Greens</u>** which are more formal well-defined open spaces. Units must front on **<u>Greens</u>** and may front or back to a **<u>Park</u>**.

a. Park: A natural preserve available for unstructured recreation. A park may be independent of surrounding building Frontages. Its landscape shall consist of Paths and trails, meadows, waterbodies, woodland and open shelters, all naturalistically disposed. Parks may be lineal, following the trajectories of natural corridors. The minimum size shall be 8 acres. Larger parks may be approved by Warrant as Special Districts in all zones.



b. Green: An Open Space, available for unstructured recreation. A Green may be spatially defined by landscaping rather than building Frontages. Its landscape shall consist of lawn and trees, naturalistically disposed. The minimum size shall be 1/2 acre and the maximum shall be 8 acres.



3. **Pocket Greens.**
The proposal includes two appendages – one to the north and one to the east. In order to be consistent with the intend of creating tight knit neighborhood units focused on open spaces we suggest the applicant consider creating true pocket neighborhoods by converting these appendage lanes to open spaces surrounded by the smallest cottage units the developer is offering. Small parking areas would be available at the base of these units and access would be through the central green area.

4. **Access to Huron River/Gill Lake.**
Access to these natural amenities should be emphasized through more frequent and larger access points strategically located to be highly visible. These access points could then provide access to a more appropriate viewing platforms to take advantage of the bluffs and also to provide the most appropriate access to the water given the natural topography.

5. Site Plan Requirements

The preliminary site plan review stage establishes the lot, road and open space layout of the proposed development. In addition to issues regarding lot layout and open space requirements indicated above, the following outstanding items (shown with underline) remain to be addressed once PUD Eligibility in sections 2 and 3 above, is determined.

1. **Natural Features Impact Statement**.
   The applicant shall provide an updated Natural Features Impact Statement in accordance with Section 4.4.2.D of the Hamburg Township Zoning Ordinance.

2. **Zoning Setbacks and Requirements.**
   The underlying zoning for this lot is Waterfront Residential (WFR) and the Natural River (NR) district. Lots within the parallel plan shall meet the following requirements:

Table B: WFR and NR District Regulations

District	WFR	NR
Minimum Lot Area	43,560 square feet	43,560 square feet
Minimum Lot Width (at street)	125 feet	150 feet
Maximum Lot Coverage	35% (40% including parking)	35% (40% including parking)
Minimum Front Yard Setback	25 feet	25 feet
Minimum Side Yard Setback	10 feet	10 feet
Minimum Rear Yard Setback	30 feet	30 feet
Maximum Building Height	35 feet (2.5 stories)	35 feet (2.5 stories)

The purpose of the parallel plan is to demonstrate how the site could be developed under the existing regulations, and to show how the proposed concept will deviate from these standards. An updated parallel plan is necessary and must consistently show how the proposed concept will deviate from these standards. This will make clear the reasons why the proposed concept represents a recognizable and substantial benefit to the community.

3. **Design Elements.**
   Our preliminary comments regarding specific design elements are as follows:

   a. **Architectural Styles.** The site plan must illustrate the different types of architectural products that will be available and demonstrate the design and layout of the lots. To ensure a mix of housing, the site plan will need to document the various typical lot layouts with dimensions, setbacks, outdoor space (porch, patio, walkway, etc.), and common areas for each lot type.

   b. **Materials.** Information on building and siding materials used shall be submitted. The buildings shall use high-quality materials such as modern vinyl and stone, brick, or any other decorative base material, especially on visible / public sides of buildings. The applicant indicates materials will be provided at time of final site plan review.

c. **Garages.** Garages should not dominate the facades of the units so as to achieve an attractive and cohesive community design that supports walkability and connectivity. Unit designs with recessed or side entry garages must be included on the site plan and recessed areas dimensioned on the plan.

d. **Mailboxes.** The designs of mailboxes and structures shall be provided with final plan review.

4. **Site Circulation.**
The proposed development contains a combination of private roads and alleys that connect to Winans Lake Road to the north. Additional thought to the location of parking spaces should be given and disbursed throughout the site near the open space areas. While road cross sections have been provided for, the private roads should not have mountable curbs as this is a treatment specific to alley design.

5. **Pedestrian Circulation.**
See comments above for connectivity recommendations.

6. **Site Frontage.**
A conceptual landscape plan illustrates some additional canopy and evergreens trees within the perimeter site setbacks but no species or details are provided. The quality of the landscaping proposed will need to be evaluated during final review in order to ensure the transition / buffer areas are effective. We recommend that the final landscape plan include extensive landscaping along Winans Lake Road north of the pathways to separate the residences from traffic and also increase the aesthesis of the site from roadway.

7. **Emergency Access**.
The Fire and Police Departments shall also provide their comments on the proposed project, especially regarding access for emergency vehicles. The applicant shall then consider and comply with comments from these departments.

8. **Storm Water Management.**
The applicant has included areas for proposed storm water management on sheet 7. Storm water management areas shall also be included on a parallel plan. We defer to the Township Engineer for comments regarding details of the storm water management system. Further, we recommend that the applicant utilize appropriate best management practices to ensure that the storm water management feature is an environmental and sustainable asset to the site.

9. **Landscaping.**
The conceptual landscape plan illustrates a mix of canopy and evergreens trees within the site; the quality of the landscaping proposed will need to be evaluated during final review. A complete landscaping plan for the entire site is required for final site plan consideration, as well as typical lot landscape plans for each unit type (if applicable).

10. **Lighting.**
No details regarding lighting have been included. The locations, details, and designs of all lighting fixtures to be used shall be submitted, including shielding methods, for final site review.

11. **Master Deed and Bylaws.**
A copy of the Master Deed and Bylaws must be submitted for review prior to final open space PUD approval. The document must contain language for protection of open space and for landscape maintenance. The master deed must contain language for private road maintenance, storm water management, and any significant agency concerns. It's strongly recommended that the master deed also include a provision for accessory dwelling units.

12. **Agency Approvals.** At a minimum, the following agency approvals will be necessary prior to final approval:
    a. Livingston County Road Commission
    b. Livingston County Health Department
    c. Livingston County Drain Commissioner
    d. Michigan Department of Environmental Quality

6. Recommendations

Overall, the modifications presented in the November 19, 2018 site plan represent an improvement to the proposed Waters Edge Open Space Community. However, it is our professional opinion that the proposal has not justified the requested 95% density bonus and does not represent an exemplary Open Space Community for the Township.

The recommendations in this review letter are intended to reflect adjustments to the current concept plan, not to redesign it, for the benefit of the Township and the future residents of Waters Edge. At this time, we recommend the developer incorporate these recommendations and submit a revised Open Space Community Plan to the Township for full review.

We are confident that together, we can not only meet, but exceed, Hamburg Township's Open Space Community Ordinance for the betterment of the Township and the future residents of this site.

If you have any questions, please do not hesitate to contact us.

Respectfully submitted,
McKENNA

John R. Jackson, AICP
President

7. Appendix A

Huron River, Hamburg Township (Google 2018)

ZONING AND THE HURON RIVER, HAMBURG'S COUNTY, SCENIC RIVER

The 92.5 acres subject site is zoned as two different districts: the majority of the site is zoned the WFR, Waterfront Residential district, while the southern area surrounding the Huron River is zoned the NR, Natural River district. The Natural River district is a critical component of community enjoyment for any Open Space Community moving forward.

Designated as a "County Scenic, Natural River", the sustainability, preservation and public enjoyment of the Huron River is addressed in Section 7.5.1 (Natural River district) of Hamburg's Zoning Ordinance, which is granted by the provisions of the Environmental Protection Act and was created based on the public objectives of the Huron River Natural River Management Plan. The Natural River district ordinance was enacted to accomplish the following:

- *To protect and enhance the values of the natural river in the interest of present and future generations;*
- *To protect the economic value of this scenic resource from unwise and disorderly development which may adversely pollute, destroy or otherwise impair its beneficial use and preservation;*
- *To prevent ecological and aesthetic damage which may result from overcrowding and overuse or unwise and disorderly development;*
- *To permit reasonable and compatible uses of land which complement the natural characteristics of the river and further the purposes of this Ordinance;*
- *To limit the intensity of use, density of population and type and amount of development in order to protect and enhance the natural river values, and thereby carefully guide the expenditure of funds for public improvements and services in an orderly fashion, in keeping with the character of the natural river area, the purposes for its designation, and the community as a whole;*

- *To conserve the river water, and prevent further degradation of its quality, purity, clarity and free-flowing condition;*
- *To provide for the conservation of soil, of riverbed and banks of adjoining uplands;*
- *To protect the natural flood water storage capacity of the river flood plain and to prevent flood damages and associated public relief expenditures created by improper construction of structures in the flood plain;*
- *To protect and enhance fish, wildlife and their habitat; and*
- *To protect boating and recreational values and uses of the river.*

In order to respect the purposes and intent of this section (as described above), enjoyment of the Huron River, by all residents of the development and also the larger Township community, needs to be secured. Presently, the proposed development illustrates (per sheet 4), ±34 lots will have private views along the Huron River. A woodchip path is proposed along the river bluff. We have encouraged the developer to make this asset of the development more open to residents of the community and beyond. We recommend that the developer continue to examine ways of making this portion of the site more accessible.

7. Appendix B

Excerpt of the 1999 Plan: Cherry Hill Village, Canton Township, MI

NEIGHBORHOOD DESIGN BEST PRACTICES

Cohesive neighborhood development is an important aspect of any open space community that is reflected in the unit and lot sizes as well as their orientation and connection to the open spaces. Many of the units proposed on the site do not have any access to sidewalks, and some directly face open space with no pedestrian access to it. All units adjacent to open spaces should be distinctly oriented to be front-facing such amenities. Additionally, all open spaces should have pedestrian access from all units and all the way around or through the space. Another way to contribute to neighborhood appeal and cohesion is to use a variety of lot sizes and unit sizes laid out so that the smaller units are on smaller lots in dense clusters, while larger units (and possibly smaller units) are on larger lots where appropriate.

To achieve this desired neighborhood feel, the Open Space project must include a wider range of unit sizes, including a minimum of 10% of all units with 1,200SF or less and opportunities for accessory dwelling units. A variation of lot sizes must also be provided, and the side-yard setbacks between units should be greater than the currently proposed 5'5-feet (15-foot aggregate side-yard setback recommended). Hamburg Township is committed to providing a wide range of residential options and has adopted Ordinances to facilitate their development, namely provisions for the Elderly Cottage Housing Opportunity (ECHO) ordinance and Accessory Dwelling Units to allow for multi-generational housing arrangements. As shown above, the 1999 Cherry Hill Village plan in Canton Township included a wealth of different residential dwelling units, including larger estate lots for growing families to village and cottage lots that are designed primarily for young professionals and empty nesters. Cherry Hill Village also features a wealth of green, public open spaces for enjoyment by the entire development. See our additional comments on page 10 of this review for detailed recommendations.

EXHIBIT B

Process Results®
THE ART OF ENGINEERING

October 10, 2018

Ms. Amy Steffens
Hamburg Township
10549 Merrill Road
P.O. Box 157
Hamburg, MI 48139

Re: Waters Edge Village
Preliminary Site Plan Review

Dear Ms. Steffens

We received plans dated August 28, 2018 for the above referenced projected as prepared by Midwestern Consulting, Inc. The petitioner is proposing a 156 unit planned unit development. The PUD is proposed to connect to the Hamburg Township sewer system, and be served by a private water system.

The Preliminary site plan submitted do not include enough engineering detail for to provide meaningful comment. We assume future submittals will include storm water drainage, grading plans, water utility plans, sanitary sewer plans, etc.

We note the that proposed water system will be a private Type I Community water supply. The petitioner shall follow all relevant Livingston County and Michigan Department of Environmental Quality requirements.

The petitioner shall also apply for a connection to the public sewer system in accordance with Township policies.

If you have any questions, please contact me at (734) 657.4925.

Sincerely
Process Results, Inc.

Ted L. Erickson, P.E.
Principal

EXHIBIT C

Hamburg Township
a great place to grow

FAX 810-231-4295
PHONE 810-231-1000

P.O. Box 157
10405 Merrill Road
Hamburg, Michigan 48139

SITE PLAN APPROVAL APPLICATION

Please note: All required information, copies, fees, and other materials as appropriate must be submitted and complete before the Township Planning Commission will set a public hearing date on the Site Plan Approval Application.

Application fees and review fees are required at the time of application.
In the case of separate applications for Preliminary and Final reviews, separate application and review fees shall be collected. Review fees shall be placed into a non-interest bearing escrow account. Upon final review, review fee balances shall be returned upon receipt of final billing. The applicant shall be responsible for all costs incurred.

Note: Acreage calculations based upon the acreage being developed or utilized for the project (parking, buildings, walks, storm water retention etc.)

The undersigned hereby makes application for a Site Plan Approval for: (Check all that apply)

1. **TYPE OF PROJECT:** [X] Open Space [ ] Echo [ ] Residential [ ] Condominium [ ] Apartments [ ] Commercial [ ] Industrial [X] PUD [ ] Hardship PUD

2. **TYPE OF APPLICATION:** [X] Preliminary Site Plan [ ] Optional Conceptual Site Plan Review by Planning Commission [ ] Final Site Plan [ ] Combined – Preliminary/Final Site Plan [ ] Minor Site Plan [ ] Site Plan Amendment (less than 25% area of site being changed) [ ] Site Plan Amendment (26% or more or site being changed)

3. **PROJECT NAME:** Waters Edge Village Submittal Date: ______

4. **PROJECT ADDRES:** 6716 Winans Lake Road, Pinckney Michigan 48169

Tax Code Numbers: 15 - 23-100-002 15 - 14-400-008 15 ______
15 - ______ 15 - ______ 15 - ______

○ Metes & Bounds Parcel ⊗ Subdivision ______ Lot Numbers: ______

Zoning District Classification: WFR & NR Floodplain Classification: None

Number of Lots Proposed: 156 Acreage of Project: 92.55

5. **PROJECT DESCRIPTION:** Waters Edge Village is a proposed 156 unit open space planned unit development. Award winning quaint cottage homes will be constructed to enhance the character of the Township.

6. **OWNER/PROPRIETOR INFORMATION:**

Name: ~~Waters Edge Village, LLC~~ WINANS LAKE DEVELOPMENT Phone Number(s): ~~(248)882-2543~~ 248-220-6860

Email: haytham@pinccovebuilding.com Address: 3596 West Maple Road

City: Bloomfield Hills State: Michigan Zip: 48301

7. **APPLICANT:**

Name: Midwestern Consulting Phone Number(s): (734)995-0200 Ext. 274

Email: rcw@midwesternconsulting.com Address: 3815 Plaza Drive

City: Ann Arbor State: Michigan Zip: 48108

8. **DESIGNER INFORMATION:**

Name: Midwestern Consulting Phone Number(s): (734)995-0200 Ext. 274

Email: rcw@midwesternconsulting.com Address: 3815 Plaza Drive

City: Ann Arbor State: Michigan Zip: 48108

9. **SPECIAL USE PERMIT:**

Is a Special Use Permit required for this project? ○ No ○ Yes

IF YES, Attach Special Use Permit Application Form with this site plan review application form

---

APPLICANT CERTIFICATION:

I hereby certify that all structures and uses for which this application is made shall conform to the Ordinances of Hamburg Township, Livingston County and the State of Michigan. All information submitted as a part of the site plan application is to my knowledge accurate. If the information is determined either now or in the future to be inaccurate any permits granted for the incorrect information shall be void and any structures built or uses approved may be in violation of the required ordinances and must otherwise be brought into compliance with all regulations.

I further agree that any deviation from the plans submitted or the breach of any additional safeguards, conditions or requirements the Hamburg Township may impose in granting this application shall constitute a violation of the Ordinance and invalidate the permit granted.

PROPERTY OWNERS SIGNATURE: ____________ DATE: 8-9-18

*If an agent submits the project to the Township for the property owner a letter authorizing must be submitted.

MIDWESTERN
CONSULTING

3815 Plaza Drive
Ann Arbor, Michigan 48108
734.995.0200

Land Development • Land Surveying • Municipal • Wireless Communications • Institutional • Transportation • Landfill Services

August 29, 2018

Hamburg Township
10405 Merrill Road
Hamburg, MI 48139
Attn: Amy Steffens, AICP
Planning/Zoning Administrator

Re: Waters Edge Village

Dear Ms. Steffens:

Attached please find the Preliminary Site Plan/Open Space PUD for Waters Edge Village, located at 6716 Winans Lake Road. We have made revisions per our meeting with Hamburg Township on March 21, 2018. Some of the enhancements to the plan include the following:

- The connection to Lake Crest has been eliminated. Emergency access to Huron Rapids Drive has been indicated. This emergency access plan has been approved by the Fire Marshal.
- Woodchip path has been added along river.
- Community access to optional floating dock for kayaks, row boats and/or canoes has been added to west end at Gill Lake.
- Amenities have been added including a large gazebo gathering\meeting space, picnic tables, two pickle ball courts, central mailbox area, dog waste dispensers
- The faux gatehouse has been eliminated
- Diversity/mix of housing types has been added to the plans.
- 40 percent of the homes along the roadways are now side yard entry or recessed garages
- Three additional conifers have been added to screen homes located on street corners.
- The bus stop location at the entrance has been coordinated with Sue Miller, Transportation Director for Pinckney Community Schools
- Sight distance approval has been granted by the Livingston County Road Commission.
- A left turn lane has been added and the geometrics have been approved by the Livingston County Road Commission.
- Note No. 1 of the Preliminary Site Plan Sheet 4 states that landscaping will be maintained by the Homeowner's Association.
- Note No. 2 of the Preliminary Site Plan Sheet 4 has been added indicating one refuse collection company will be utilized.
- A note has been added to the Preliminary Site Plan Sheet 4 stating that parking will only be allowed on one side of the street.

Todd Hallett, President of TK Design and Associates, Inc., currently developing the Preliminary Architectural Drawings for the project. In addition, the Natural Features Impact Statement will be provided under separate cover.

We look forward to working with you on this development.

Sincerely,

Robert C. Wagner, P.E.
Project Manager

OWNER AUTHORIZATION

In accordance herewith, the undersigned, owner of the property known as 6716 Winans Lake Road in Livingston County, Michigan (Tax Parcel Numbers 4715-14-400-008 & 4715-23-100-002) (the "Property"), hereby authorizes Winans Lake Development, LLC ("Developer"), to apply to Hamburg Township for Site Plan approval for the Property.

Developer shall be solely responsible for all costs, obligations and liabilities associated with such application, and all approvals and associated requirements that may be imposed upon the Property (or owner thereof) as a result thereof shall be conditioned upon Developer acquiring fee title to the Property.

M. Eleanor Forlenza

M. Eleanor Forlenza, individually and as Trustee of the Marie Eleanor Forlenza Trust, as applicable (to the extent of their respective interest in the Property)

Dated: August 21, 2018

WATERS EDGE

LOCATED IN THE N 1/2, SEC 23 & S 1/2, SEC 14, T1N, R5E, HAMBURG TOWNSHIP, LIVINGSTON COUNTY, MICHIGAN

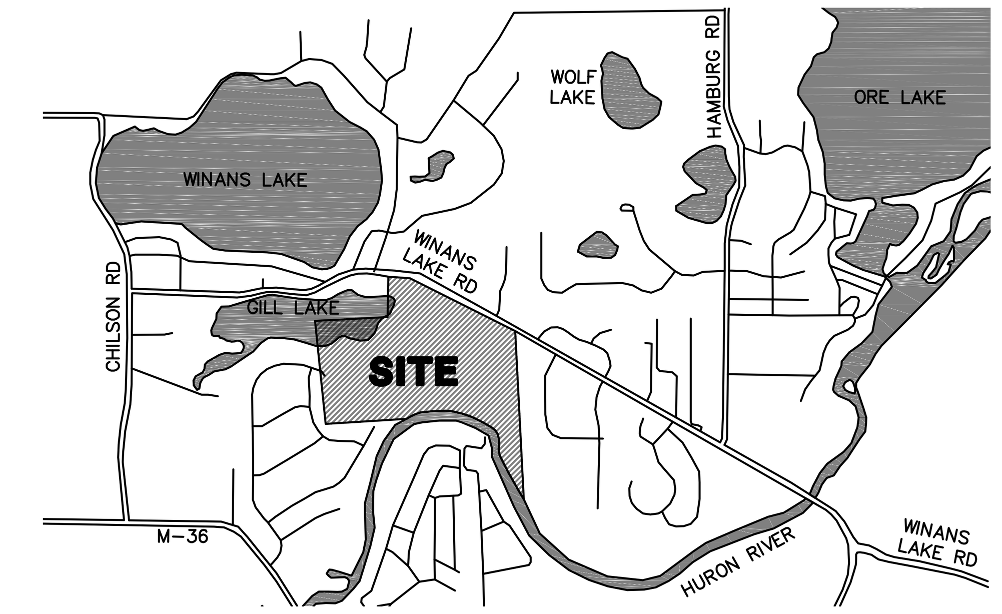
PRELIMINARY SITE PLAN/PLANNED OPEN SPACE COMMUNITY

DEVELOPER
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301
ATTN: HAYTHAM OBEID
PH: (248) 220-6860

ARCHITECT
TK DESIGN & ASSOCIATES
26030 PONTIAC TRAIL
SOUTH LYON, MI 48178
ATTN: TODD HALLETT
PH: (248) 446-1960

ENGINEER/SURVEYOR
MIDWESTERN CONSULTING, L.L.C.
3815 PLAZA DR.
ANN ARBOR, MI. 48108
ATTN: ROBERT WAGNER, PE
PH: (734) 995-0200

LANDSCAPE ARCHITECT
MIDWESTERN CONSULTING, L.L.C.
3815 PLAZA DR.
ANN ARBOR, MI. 48108
ATTN: ROBERT WAGNER, PE
PH: (734) 995-0200

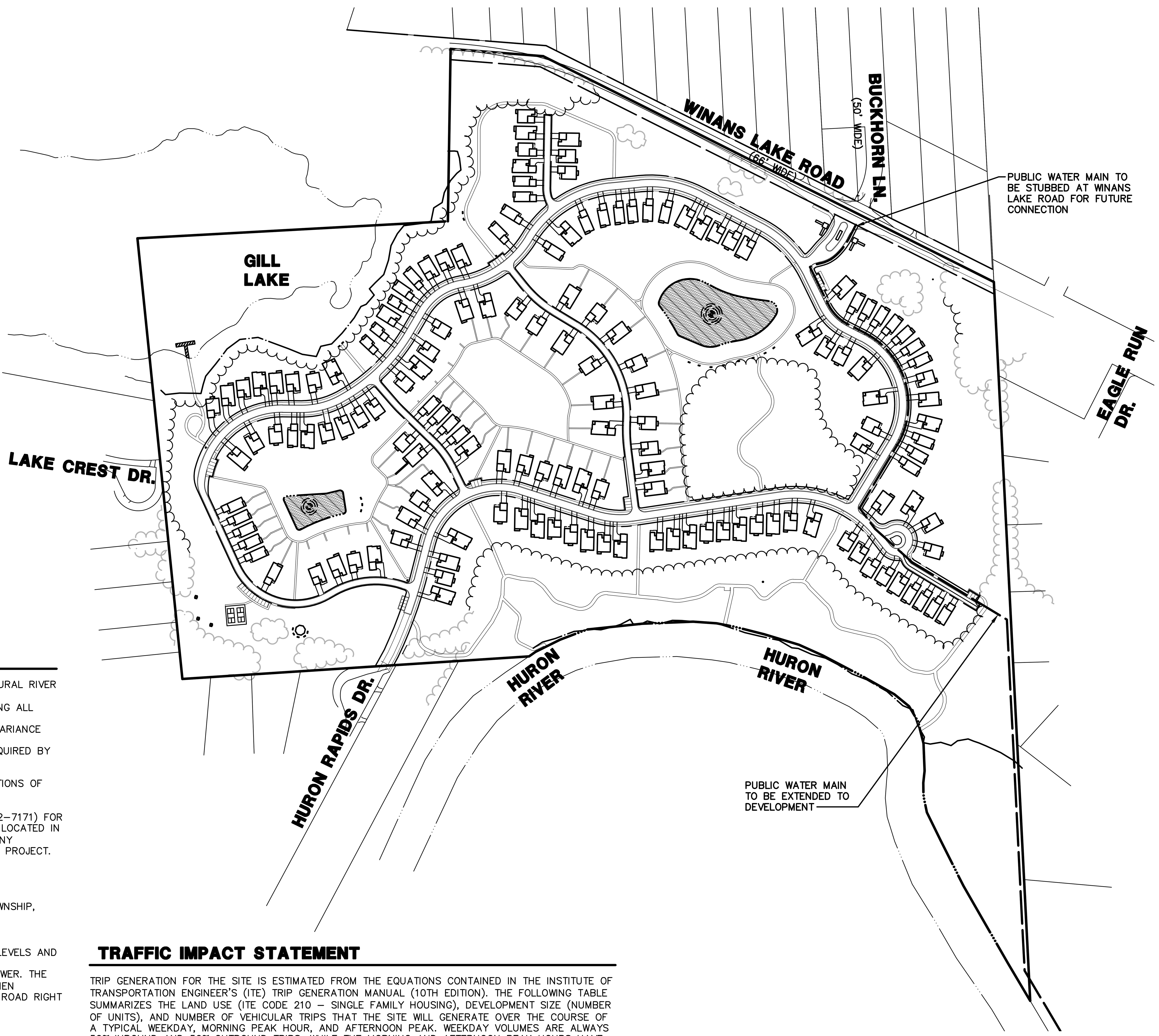


VICINITY MAP
SCALE: 1"=2000'

Sheet Index

REQUIRED PERMITS & APPROVALS

Approval/Permit	Agency	Submitted	Plans Approved	Approval Issued	Comment
Preliminary Site Plan/ Open Space PUD (Site Walk)	Hamburg Township Board of Trustees Pat Hohl, Township Supervisor 810-222-1116 pathohl@hamburg.mi.us 10405 Merrill Rd. Hamburg, MI 48139				Site Walk to be held on Novermber 7th, 2018
Final Site Plan	Hamburg Township Board of Trustees Pat Hohl, Township Supervisor 810-222-1116 pathohl@hamburg.mi.us 10405 Merrill Rd. Hamburg, MI 48139				
Fire Access	Hamburg Township Fire Department Jordan Zernick, Fire Marshal 810-222-1105 jzernick@hamburg.mi.us 10100 Veterans Memorial Dr. Hamburg, MI 48139				
Storm Water Management	Hamburg Township Engineer (Process Results) Ted Erickson 734-429-8900 ext. 151 terickson@processresults.com 201 S. Ann Arbor St. Saline, MI 48176				
Public Road Approach	Livingston County Road Commission Kim Hiller (517) 546-4250 khiller@livingstonroads.org 3535 Grand Oaks Drive Howell, MI 48843				Sight Distance Approval 1807-005 was granted on 7/21/2018
Engineering Plans	Hamburg Township Engineer (Process Results) Ted Erickson 734-429-8900 ext. 151 terickson@processresults.com 201 S. Ann Arbor St. Saline, MI 48176				
Soil Erosion	Livingston County Drain Commissioner (517) 546-0040 2300 E. Grand River Ave., Suite 105 Howell, MI 48843				
NPDES Notice of Coverage	Michigan DEQ				
Wetland, Lake, & River Impacts (Joint Permit - Parts 301 & 303)	Michigan DEQ				
Public Water Main	Michigan DEQ				
Traffic Study	Michigan DOT Wendy Ramirez 810-225-2626 ramirezw@michigan.gov 10321 E. Grand River Ave., Suite 500 Brighton, MI 48116				



GENERAL NOTES

- A MAJORITY OF THE PROPERTY IS ZONED WATERFRONT RESIDENTIAL, WITH A SMALLER PORTION ZONED NATURAL RIVER (BOTH SINGLE FAMILY MEDIUM DENSITY).
- CONTRACTOR IS RESPONSIBLE FOR PROTECTING ALL EXISTING AND PROPOSED UTILITIES FROM DAMAGE DURING ALL STAGES OF CONSTRUCTION.
- THE ENGINEER AND APPLICABLE AGENCY MUST APPROVE, PRIOR TO CONSTRUCTION, ANY ALTERATION, OR VARIANCE FROM THESE PLANS.
- UNDERGROUND DRY UTILITIES SHALL BE EXTENDED FROM EXISTING LOCATIONS TO SERVICE THIS SITE AS REQUIRED BY UTILITY COMPANIES.
- SEE EXISTING CONDITIONS PLAN FOR DESCRIPTION OF EXISTING SOIL TYPES.
- ALL CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH THE CURRENT STANDARDS AND SPECIFICATIONS OF HAMBURG TOWNSHIP AND LIVINGSTON COUNTY.
- THE CONTRACTOR SHALL TELEPHONE HAMBURG TOWNSHIP 72 HOURS PRIOR TO ANY CONSTRUCTION.
- THREE WORKING DAYS PRIOR TO ANY EXCAVATION, THE CONTRACTOR SHALL TELEPHONE MISS DIG (800-482-7171) FOR THE LOCATION OF UNDERGROUND UTILITIES AND SHALL ALSO NOTIFY REPRESENTATIVES OF OTHER UTILITIES LOCATED IN THE VICINITY OF THE WORK. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY AND/OR OBTAIN ANY INFORMATION NECESSARY REGARDING THE PRESENCE OF UNDERGROUND UTILITIES WHICH MIGHT AFFECT THIS PROJECT.
- SITE WETLANDS:
  - NEAR HURON RIVER: 149,543 SF
  - NEAR GILL LAKE: 97,733 SF
  - TOTAL: 247,276 SF = 5.68 ACRES
- FLOODPLAIN: THE SITE LIES WITHIN FLOOD ZONE "X" PER FLOOD INSURANCE RATE MAPS FOR HAMBURG TOWNSHIP, MICHIGAN. FLOOD ZONE "X" IS AN AREA DETERMINED TO BE OUTSIDE THE 500-YEAR FLOODPLAIN.
  - MAP NUMBERS: 26093C0452D
    26093C0454D
- THE SITE'S STORMWATER WILL BE MANAGED BY UTILIZING TWO DETENTION PONDS WITH PERMANENT WATER LEVELS AND ONE DRY DETENTION BASIN. OUTLETS WILL BE TO THE HURON RIVER AND GILL LAKE.
- THE WASTEWATER GENERATED ON SITE WILL BE COLLECTED AND CONVEYED THROUGH GRAVITY SANITARY SEWER. THE GRAVITY SANITARY SEWER WILL DISCHARGE TO A PUMP STATION(S) ON SITE. THE PUMP STATION(S) WILL THEN DISCHARGE THE WASTE WATER TO THE EXISTING SANITARY FORCE MAIN LOCATED WITHIN THE WINANS LAKE ROAD RIGHT OF WAY.
- PUBLIC WATER MAIN WILL BE EXTENDED TO THE SITE TO SERVE ALL LOTS FOR DOMESTIC WATER.
- NO HAZARDOUS MATERIAL WILL BE STORED ON SITE.

The underground utilities shown have been located from field survey information and existing records. The surveyor makes no guarantees that the underground utilities shown comprise all such utilities in the area, either in-service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated. Although the surveyor does certify that they are located as accurately as possible from the information available.

TRAFFIC IMPACT STATEMENT

TRIP GENERATION FOR THE SITE IS ESTIMATED FROM THE EQUATIONS CONTAINED IN THE INSTITUTE OF TRANSPORTATION ENGINEER'S (ITE) TRIP GENERATION MANUAL (10TH EDITION). THE FOLLOWING TABLE SUMMARIZES THE LAND USE (ITE CODE 210 - SINGLE FAMILY HOUSING), DEVELOPMENT SIZE (NUMBER OF UNITS), AND NUMBER OF VEHICULAR TRIPS THAT THE SITE WILL GENERATE OVER THE COURSE OF A TYPICAL WEEKDAY, MORNING PEAK HOUR, AND AFTERNOON PEAK. WEEKDAY VOLUMES ARE ALWAYS 50% INBOUND AND 50% OUTBOUND TRIPS, WHILE THE MORNING AND AFTERNOON PEAK HOURS HAVE THEIR OWN INBOUND AND OUTBOUND PERCENTAGES.

	ITE		24 Hour	AM Peak Hour			PM Peak Hour		
Land Use	Site Code	Units	Volume	Enter	Exit	Total	Enter	Exit	Total
Single Family Homes	210	156	1565	29	87	116	98	58	156

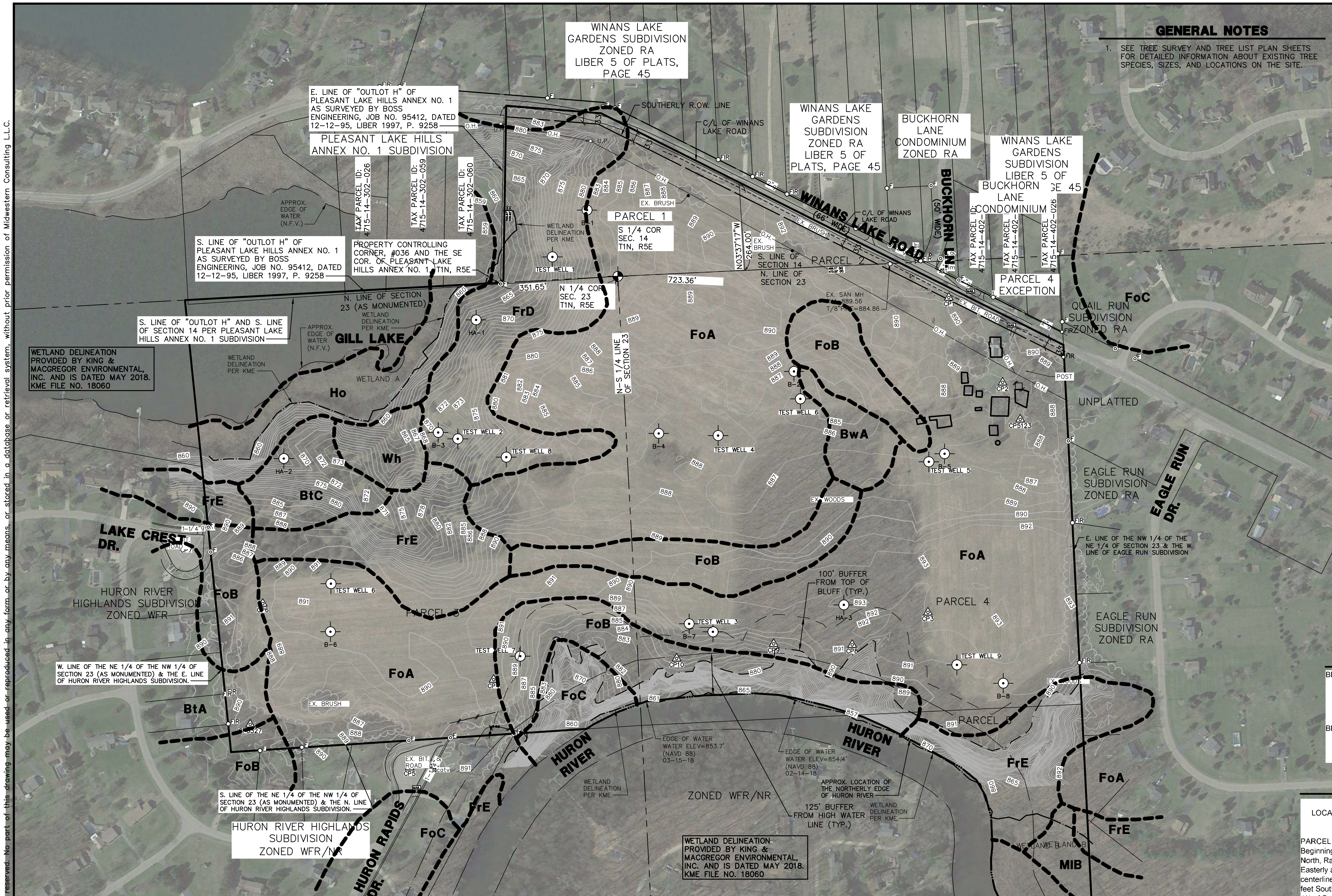
WATERS EDGE

JOB No.	18037
DATE:	8/28/18
SHEET	1 OF 19
REVISIONS: PER TOWNSHIP COMMENTS	REV. DATE 11/19/18
CADD:	
ENG:	JCA, TPH
PM:	RCW
TECH:	RDW
	18037CV1.DWG

1

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

RELEASED FOR:	DATE



GENERAL NOTES

1. SEE TREE SURVEY AND TREE LIST PLAN SHEETS FOR DETAILED INFORMATION ABOUT EXISTING TREE SPECIES, SIZES, AND LOCATIONS ON THE SITE.

811 Know what's below. Call before you dig.

SCALE: 1" = 150'

0 150 300 450

LEGEND

838	EXIST. CONTOUR
836.2	EXIST. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
U.P.	EXIST. UTILITY POLE W/ TRANS.
	GUY WIRE
	ELEC. TRANSFORMER
OH	EXIST. OVERHEAD UTILITY LINE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
	EXIST. GAS VALVE
f.o.	EXIST. FIBER OPTIC LINE
r	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	END SECTION
	CULVERT
s	EXIST. SANITARY SEWER
	C/L OF DITCH OR EDGE OF WATER
	SIGN
t	TELEPHONE RISER
catv	CABLE TELEVISION RISER
e	ELECTRIC METER
g	GAS METER
glm	GAS LINE MARKER
fiber	FIBER OPTIC MARKER
	POST
	WELL
	FENCE
	SINGLE TREE
	TREE OR BRUSH LIMIT
	SECTION CORNER
F	FOUND IRON PIPE
F	FOUND MONUMENT
FIR	FOUND IRON ROD
	CONTROL PT.

BENCHMARKS

BM#1: SPIKE IN NORTH FACE OF UTILITY POLE 130' SOUTHWEST OF THE INTERSECTION OF WINANS LAKE RD. AND BUCKHORN LN.

ELEV=892.31 (NAVD 88)

BM#2: SPIKE IN SOUTH SIDE OF 20" COTTONWOOD LOCATED 20' EAST OF LAKE CREST DR.

ELEV=891.71 (NAVD 88)

LEGAL DESCRIPTION

LEGAL DESCRIPTION OF A PARCEL OF LAND
LOCATED IN THE N 1/2 OF SECTION 23 AND SOUTH 1/2 OF SECTION 14, T1N, R5E
HAMBURG TOWNSHIP, LIVINGSTON COUNTY, MICHIGAN

PARCEL 1:
Beginning at a point 343.2 feet West of the 1/4 stake between Sections 14 and 23, in Town 1 North, Range 5 East, Hamburg Township, Livingston County, Michigan: running thence Easterly along the Section line 723.36 feet; thence North 2 degrees West 264 feet to the centerline of the highway; thence Northwest along said highway 747.12 feet; thence 535.92 feet Southwesterly to the place of beginning, being of the Southwest 1/4 of thence Southeast 1/4 of Section 14, Town 1 North, Range 5 East, Hamburg Township, Livingston County, Michigan.

PARCEL 2:
Commencing at the crossing on the Section line of Sections 14 and 23 with a road running Northwest and Southeast: thence running West on the Section line 473.22 feet: thence North 264 feet to the center of said road: thence Southeasterly along the center of said road to the place of beginning, being a part of the Southwest 1/4 of the Southeast 1/4 of Section 14, Town 1 North, Range S East, Hamburg Township, Livingston County, Michigan.

PARCEL 3:
The Northeast 1/4 of the Northwest 1/4 of Section 23, Town 1 North, Range 5 East, Hamburg Township, Livingston County, Michigan.

PARCEL 4:
The Northwest 1/4 of the Northeast 1/4 of Section 23, Town 1 North, Range 5 East, Hamburg Township, Livingston County, Michigan, excepting therefrom all that property lying North of the road running Northwest and Southeast.

PARCEL 5:
Commencing at a point 1,320 feet West of the 1/4 post on the Southeast 1/4 of the Northeast 1/4 of Section 23, Town 1 North, Range 5 East, Hamburg Township, Livingston County, Michigan; thence North 1320 feet: thence West to the corner post on the Huron River; thence on a Southeasterly course following the line of the River to the place of beginning.

SOIL TYPE LEGEND

BtA	BOYER-OSHTEMO LOAMY SANDS, 0-2% SLOPES
BtC	BOYER-OSHTEMO LOAMY SANDS, 6-12% SLOPES
BwA	BRONSON LOAMY SAND, 0-2% SLOPES
FoA	FOX SANDY LOAM, 0-2% SLOPES
FoB	FOX SANDY LOAM, 2-6% SLOPES
FoC	FOX SANDY LOAM, 6-12% SLOPES
FrD	FOX-BOYER COMPLEX, 12-18% SLOPES
FrE	FOX-BOYER COMPLEX, 18-25% SLOPES
Ho	HOUGHTON MUCK, 0-1% SLOPES
Lm	LINWOOD MUCK
MIB	METAMORA SANDY LOAM, 0-4% SLOPES
Wh	WASHTENAW SILT LOAM

The underground utilities shown have been located from field survey information and existing records. The surveyor makes no guarantees that the underground utilities shown comprise all such utilities in the area, either in-service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated. Although the surveyor does certify that they are located as accurately as possible from the information available.

WATERS EDGE VILLAGE NATURAL FEATURES DESCRIPTION (Prepared by King and MacGregor)

The following descriptions are of the approximate areas identified in Figure 1.

Area 1- Gut Lake Wetland Fringe
Emergent and scrub-shrub wetland on the east and south sides of Gut Lake. This area contains highly organic soils which are saturated year-round. It is dominated by a variety of wetland plants such as hybrid cattail *(Typha x glauca)*, marsh fern *(Thelypteris palustis)*, blue vervain *(Verbena hastata)*, tussock sedge *(Carex stricta)* and purple loosestrife *(Lythrum salicaria)*. The edge close to the wood line has some woody species such as glossy buckthorn (*Frangula alnus*), swamp rose *(Rosa palustris)*, buttonbush *(Cephalathus occidentalis)*, and white willow *(Salix alba)*.

Area 2 – Oak Hickory Woods along Gut Lake
This sloping forested area near Gut Lake is characteristic of an Oak-Hickory forest type. It is occurring on a moist, well-drained, loamy soils, located between row crops (soybeans) to the east and the Gut Lake wetland fringe. The canopy is dominated by red oak *(Quercus rubra)*, black locust *(Robinia pseudoacacia)*, white oak *(Quercus alba)*, pignut hickory *(Carya glabra)*, and shagbark hickory *(Carya ovata)*. The understory is comprised of invasive honeysuckle *(Lonicera morrowii)*, blackberry *(Rubus allegheniensis)*, poison ivy *(Toxicodendron radicans)* and smooth bromegrass *(Bromus inermis)*.

Area 3- Old Field Scrub
Located east of the hickory woods along Gut Lake, this area may have been an apple grove. It now has a mix of open spaces dominated by smooth bromegrass, Queen Ann's lace *(Daucus carota)*, gray goldenrod *(Solidago nemoralis)*, and a variety of thistles and clovers as well as areas dominated by shrubs and trees such as honeysuckle, glossy buckthorn, autumn olive *(Elaeagnus umbellata)*, red cedar *(Juniperus virginiana)* and apple trees *(Malus pumila)*.

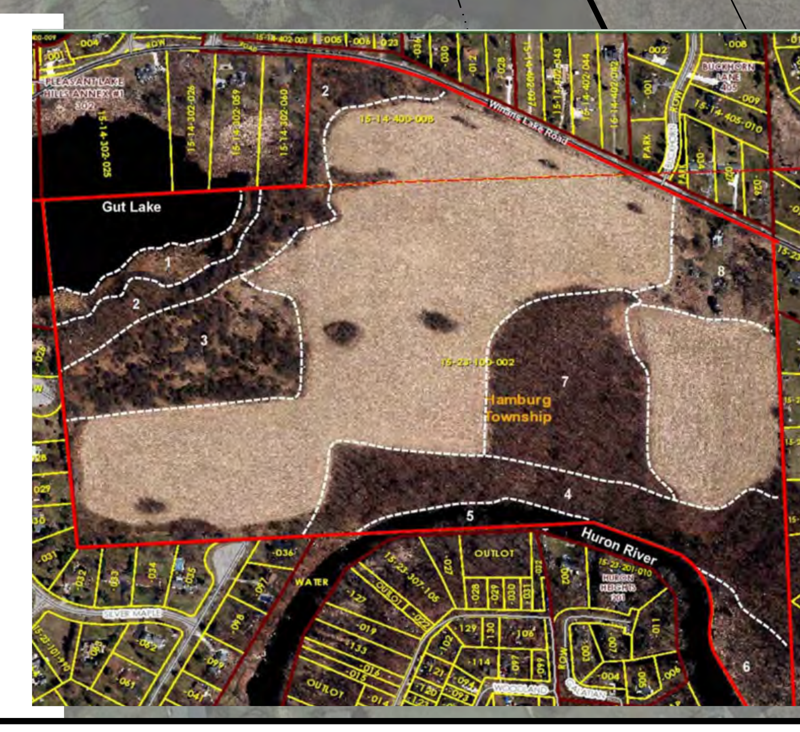
Area 4- Huron River Valley Hillside Woods
This woods on the south side of the property on the slope above the bank of the Huron River is comprised of black locust, American elm *(Ulmus americana)*, boxelder *(Acer negundo)* and black cherry *(Prunus serotine)*. The understory is dominated by invasive honeysuckles and multiflora rose *(Rosa multiflora)*. In the slightly more open areas of the forest there is motherwort *(Leonurus cardiaca)*, black raspberry (*Rubus occidentalis*), poison ivy (*Toxicodenron radicans*), and smooth bromegrass.

Area 5- Huron River
The stretch of the Huron River bordering the property has a sandy river bed, with very little gravel. The grade of the river here is low and the current is slow moving. There are some aquatic plants visible in the river but not dominating the river bed. Bluegill *(Lepomis macrochirus)* and some mussel shells were observed in the river bed.

Area 6- Huron River Floodplain Wetland
In the southern most portion of the property along the Huron River lies a floodplain wetland. The soils here are highly organic and saturated with ground water year-round. Trees growing in this area consist of swamp white oak (*Quercus bicolor)*, American elm, and red ash *(Fraxinus pennsylvanica)*. Water hemlock *(Cicuta maculata)*, skunk cabbage *(Symplocarpus foetidus)*, jewelweed *(Impatiens capensis)*, and sensitive fern *(Onoclea sensibillis)* were observed in the open areas.

Area 7- Central Woodlot
Surrounded by row crop on three sides, this stand's canopy contains sugar maple *(Acer saccharum)*, red oak, pignut hickory, northern pin oak *(Quercus ellispsoidalis)*, sycamore *(Plantanus occidentalis)* and boxelder. The understory is largely dominated by invasive honey suckle growing very dense in some areas. The understory also contains poison ivy, Virginia creeper *(Parthenocissus quinquefolia)*, burning bush *(Euonymus alatus)*, and riverbank grape *(Vitis riparia)*.

Area 8- Old Farmstead
In the far northeast portion of the property there is an abandon farmstead consisting of a house, a few out buildings, and a barn. This area is mostly open with a few trees. The open areas are dominated by smooth bromegrass, tall goldenrod *(Solidago altissima)*, field thistle *(Cirsium dicolor)*, red fescue *(Festuca rubra)*, and stickseed *(Hackelia virginiana)*. The trees include native and landscape species such as boxelder, black locust, black walnut (*Juglans nigra*), black cherry, eastern red bud *(Cercis canadensis)*, Douglas fir *(Pseudotsuga menziesii)*, common pear *(Pyrus communis)*, Chinese magnolia *(Magnolia x soulangenana)* and Scotch pine *(Pinus sylvestris)*.



MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

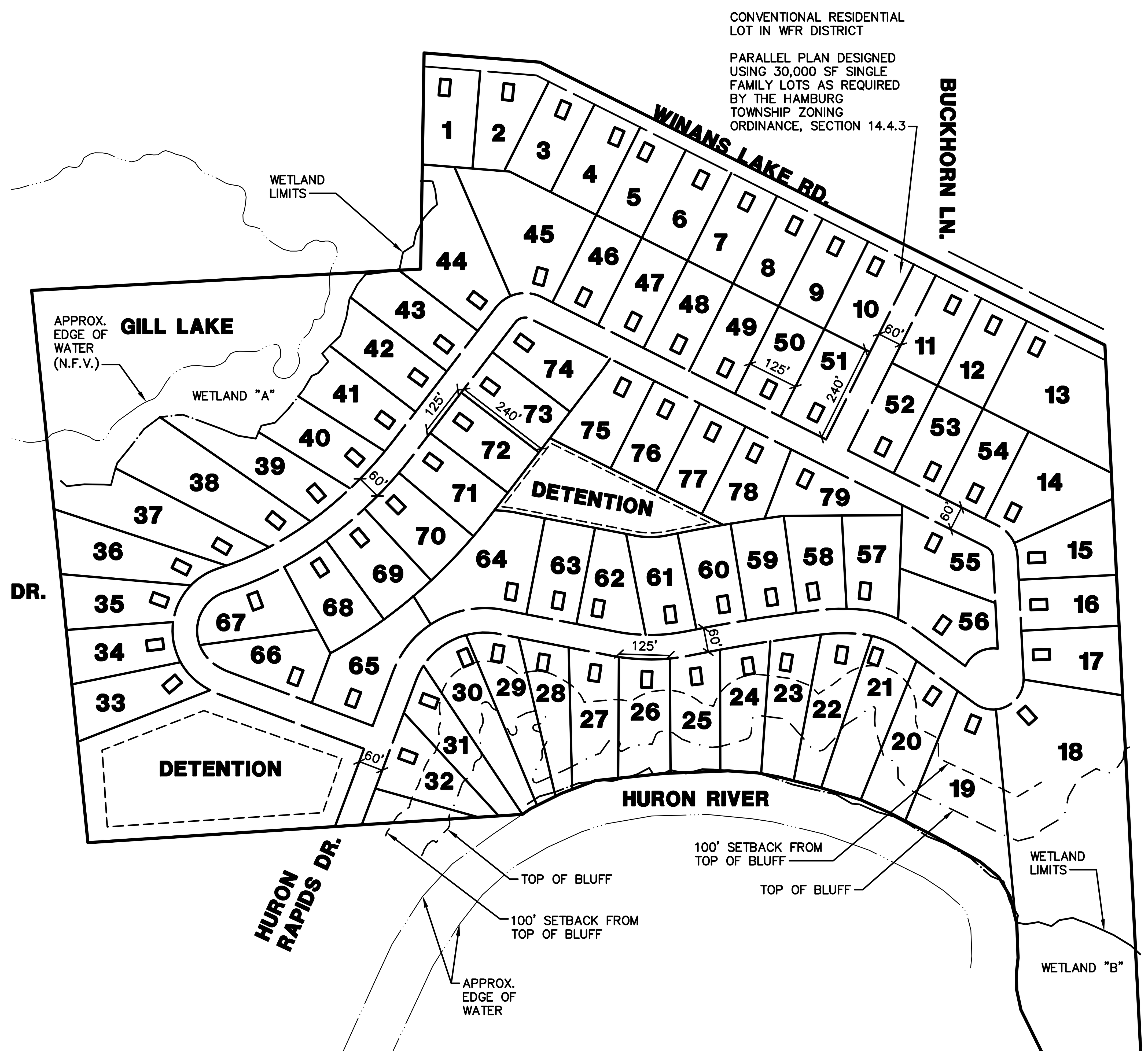
WATERS EDGE
OPEN SPACE PUD DEVELOPMENT
EXISTING CONDITIONS

2

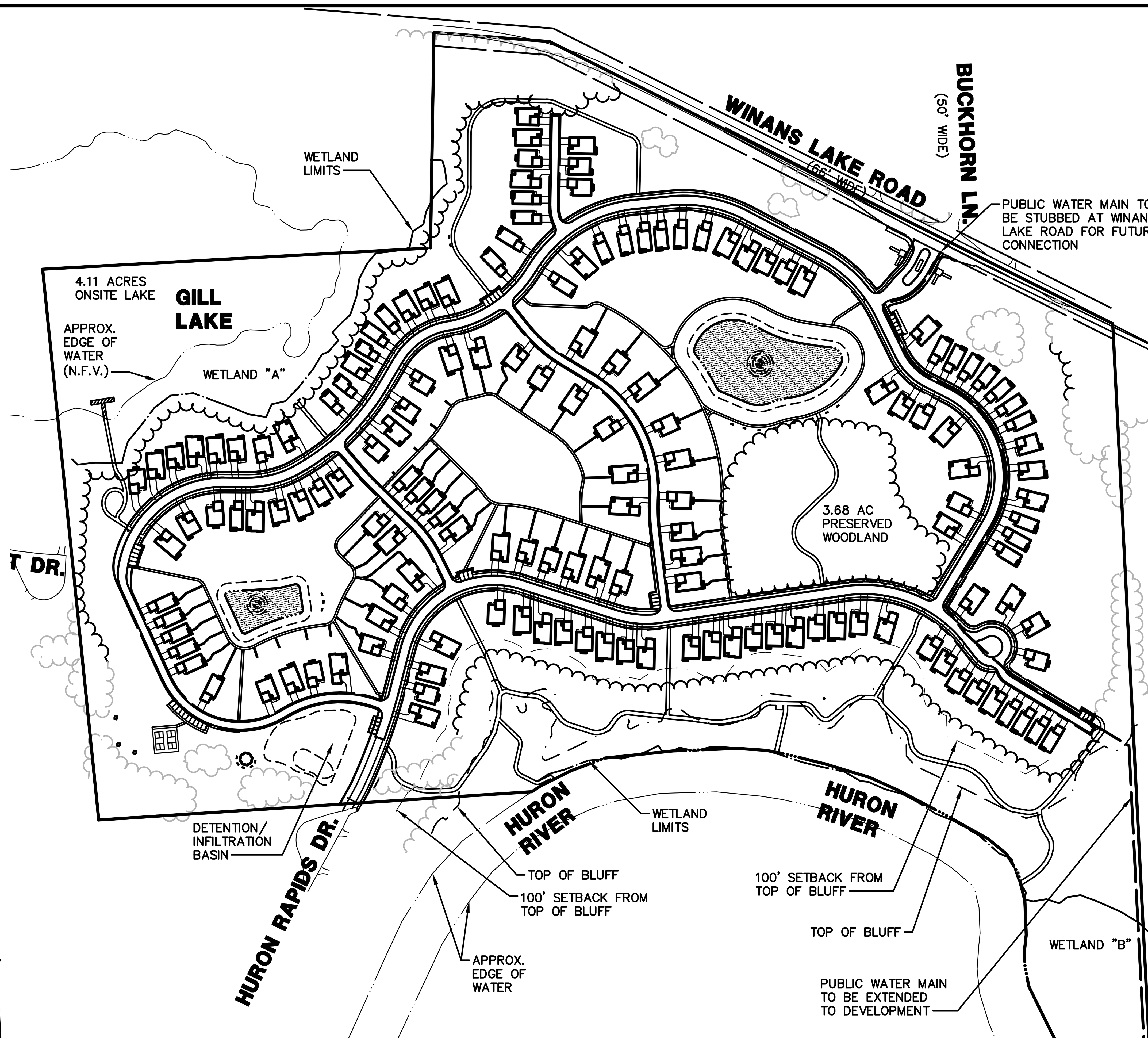
DATE: 8/29/18	SHEET 2 OF 19
CADD:	ENG: JCA, TPH
	PM: RCW
	TECH: RDW
	18037EX1.dwg

JOB No. 18037

REVISIONS:	REV. DATE
PER TOWNSHIP COMMENTS	11/19/18



PARALLEL SITE PLAN - EXISTING WFR/NR ZONING



PROPOSED OPEN SPACE COMMUNITY PLANNED UNIT DEVELOPMENT SITE PLAN

SCALE: 1" = 200'

0 200 400 600

811 Know what's below. Call before you dig.

EXEMPLARY PROJECT ITEMS

1. PRESERVATION OF NATURAL FEATURES WITH AN EMPHASIS ON PROVIDING UNINHIBITED ACCESS AND ENJOYMENT OF THESE FEATURES, INCLUDING:
   - RIVER BLUFF WALKING PATH
   - RIVER BLUFF OBSERVATION/GATHERING POINT
   - RIVERSIDE ACCESS FOR KAYAKS, CANOES, AND A PADDLEBOAT
   - COMMON SHORELINE ACCESS TO GILL LAKE
   - GILL LAKE LOOKOUT AREA
   - OPTIONAL DOCK PROVIDING LAKE ACCESS FOR KAYAKS, CANOES, AND PADDLEBOATS
   - 3.68 ACRES PRESERVED WOODLAND WITH WALKING PATH THROUGH MIDDLE
2. EXTENSION OF WATER MAIN TO SITE PROVIDING PUBLIC SERVICE OPPORTUNITIES TO MORE OF HAMBURG TOWNSHIP
3. STORMWATER BMPS INCLUDING INFILTRATION/DETENTION BASIN AND PERMEABLE PAVEMENT PARKING AREAS (IF FEASIBLE)
4. STORMWATER DETENTION PONDS/BASIN PROVIDING VOLUMES FAR EXCEEDING REQUIRED VOLUMES AND CONTROLLING RELEASE TO NATURAL WATER FEATURES
5. ELIMINATING NEED FOR GRINDER PUMPS – SITE TO BE SERVED BY A COMBINATION OF GRAVITY SEWER AND PUMP STATION(S) TO CONNECT VIA ON–SITE FORCE MAIN TO EXISTING PUBLIC SANITARY FORCE MAIN
6. BRINGING APPROXIMATELY $380,000 TO $390,000 TO THE TOWNSHIP BY WAY OF SANITARY SEWER TAP FEES.
7. EXTENSIVE WALKING PATHS THROUGHOUT DEVELOPMENT ENCOURAGING COHESIVE NEIGHBORHOOD
8. INTEGRATED MIXTURE OF HOUSING OPTIONS AND LOT SIZES
9. MEETING THE INTENT OF THE 150–FOOT DEPTH PERIMETER TRANSITION AREAS AROUND THE SITE WITH SEPARATION AS WELL AS ADDED LANDSCAPE SCREENING
10. COMMUNITY AMENITIES INCLUDING:
    - OPEN WATER FEATURES AND FOUNTAINS WITH SURROUNDING BENCHES
    - LARGE GAZEBO
    - PICKLEBALL COURTS
    - PICNIC AREA
    - BENCHES IS STRATEGIC LOCATIONS
    - ACTIVE OPEN SPACE AREAS
    - DOG WASTE STATIONS
    - EXTENSIVE WALKING PATHS THROUGHOUT DEVELOPMENT AND ALONG SCENIC FEATURES
11. EXTENSIVE LANDSCAPING SUPPLEMENTAL TO REQUIRED LANDSCAPING ALONG WINANS LAKE ROAD CORRIDOR

Open Space Community PUD Development

Total Site: 92.55 Ac

Development Zone: 62.98 Ac (68% of total site)

Total Units: 154

Total Gross Density: 1.66 units per gross acre

Site Access: Boulevard entrance at Winans Lake Road

The neighborhood development of Waters Edge will be constructed on approximately 63 acres across the overall 92.5-acre site. 56% of the site will be dedicated to providing a combination of common recreational amenities and preserved natural features. A series of walking paths will be established through the community, providing residents the chance to explore and connect in a low-impact way.

With 154 new homes to be constructed, a total gross density of only 1.66 units per acre across the site will be realized. The final site plan submission documents will provide internal property lines between each home in order to establish individual home sites and building envelopes consistent with the setback dimensions established in the Development Comparison Table.

Open Space Community PUD Eligibility Requirements – Section 14.3:
Waters Edge meets criteria to qualify as an Open Space Community Planned Unit Development.

A. Recognizable Benefit: One major benefit the Waters Edge development will provide is the extension of public water main from M-36, through the development, and to Winans Lake Road. The development will also provide a benefit to the community by creating a walkable neighborhood with community gathering spaces and preserved natural features including wooded areas, wetland adjacent to Gill Lake, and the natural bluff to the Huron River. 56% of the site is maintained as open space, benefitting the ecosystems of Gill Lake and the Huron River.

B. Open Space: 56% of the site will be preserved as open space, including the preservation of the existing bluffs along the Huron River and wetland ecosystems to the south. Approximately 3 acres of woods will be preserved within the central portion of the property and trees will be preserved adjacent to Gill Lake and the associated wetland as well as along the Winans Lake Road corridor. Stormwater management areas will be landscaped in a manner to create focal points within the proposed open space. Proposed recreation facilities include pedestrian walking paths throughout the community with benches in strategic locations, a walkable path along the Huron River bluff, several access points from the bluff path down to the riverside which include areas for kayak/canoe/non-motorized paddleboat access, an optional floating dock for recreational boats on Gill Lake, a lookout location near Gill Lake, a gazebo, pickleball courts, and a picnic area.

C. Guarantee of Open Space: The approved PUD Site Plan as well as the Master Deed and By-laws will dictate the preservation of the natural features and open space.

D. Cohesive Neighborhood: The proposed neighborhood utilizes narrow streets, sidewalks and trails, varied home styles, and shared open space to foster a compact and cohesive community. The centrally located houses have front porches that face 3 of the 4 community open space parks. There are several amenities proposed within these 3 parks, such as benches overlooking ponds and fountains, walking paths, and 3.68 acres of preserved forest area with a pathway through the center. The fourth open space park has several additional amenities including a gazebo, pickleball courts, and a picnic area. The development proposes to provide even more features to promote public enjoyment of the parcel's open space which includes a walkable path along the Huron River bluff with several access points, a platform on the path to provide a gathering and observation point, access to the riverside with areas for kayaks/canoes/non-motorized paddleboats, several wide areas of Gill Lake shoreline that are accessible to the community, a Gill Lake lookout area, and an optional floating dock on the lake for recreational boats. The collection of all of these amenities and natural features encourage active and passive recreation as well as interaction throughout the neighborhood.

E. Unified Control: The property is under single control of Winans Lake Development, LLC.

F. Density Impact: The proposed density of 1.66 units/acre (154 units) is considered a low to medium density and will not result in an unreasonable impact on public services or infrastructure. The neighborhood is primarily intended to be an "empty nest" community, and therefore will have a minimal impact on the local school system. The property is located within the future sanitary sewer service districts as identified in the Township Master Plan and will tap into the existing sanitary sewer at Winans Lake Road. Furthermore, an extension of water main to the site will provide public water service opportunities, present and future, to many other properties in Hamburg Township.

G. Twp. Master Plan: The proposed residential neighborhood development at this location is consistent with the Township Master Plan. The property is located in an area designated for Medium Density Residential (one dwelling unit per acre) and along the Natural River District along the edge of the Huron River to the south. Developments in the Medium Density Residential district are encouraged to take advantage of the Township's open space provisions. The preservation of the bluff along the Huron River and its walkable path, as well as the proposed lookout area to the Gill Lake ecosystem and the several common shoreline areas reflect the Master Plan's emphasis on scenic features within the Township.

Optional Provisions for Exemplary Projects – Section 14.5:
Waters Edge Village exceeds the requirements set forth for the Open Space Community PUD development and a density bonus is requested based on exemplary design elements noted below.

14.5.1 Density Bonus. The community will be served by public water main and sanitary sewer and meets the intent of the following elements:

A. *A high level of clustered development where a minimum of sixty percent (60%) of the Open Space Community is common open space.*
While the proposed development does not meet the requirement of 60% open space when excluding submerged land areas (i.e. Gill Lake), 56% of the upland areas and wetlands on the site will be preserved as open space. If the open water area along Gill Lake and the open water features with fountains in our stormwater management basins are included in the open space amenities on the site, we would achieve 62% common/shared use areas on the site.

B. *Inclusion of an integrated mixture of housing types.*
A variety of lot sizes are provided within the development to encourage a mixture of home types. These include two sizes of smaller Cottage lots, medium-sized Village lots, and a few large Estate lots.
Six types of single family homes are proposed with the development creating variation in housing types throughout the development that respond to the open space and natural features on the site. The traditional front entry garage extensions in front of the homes are complemented by courtyard entry homes that have side entry to the garage. Additionally, recessed garages are proposed for a portion of the homes to emphasize front home facades that are closer to the road than the garage. Lastly, there are homes that have garages along the roads but the front entry of the house is along the central open space parks encouraging pedestrian connectivity throughout the neighborhood.

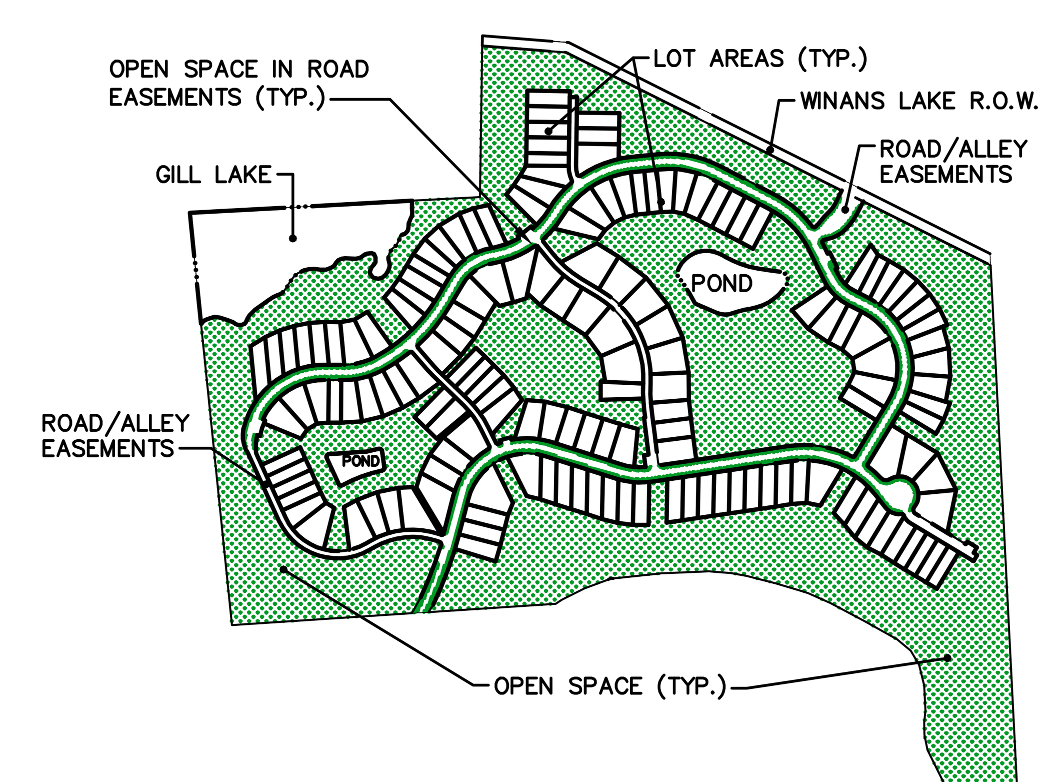
C. *Providing perimeter transition areas around all sides of the development that are at least one hundred fifty (150) feet in depth.*
The one hundred fifty foot depth perimeter is proposed along the Winans Lake Road corridor, along the adjacent residential neighborhoods to the south, west, and east and along the Huron River bluff. The only exception to the one hundred fifty foot perimeter setback is along a small portion of the frontage along Gill Lake in the northwest corner of the site. The perimeter is maintained adjacent to the single family residence immediately to the west.

D. *Cleanup of site contamination.* – Not applicable.

E. *Other similar elements as determined by the Planning Commission.*
The overall development places an emphasis on active recreation opportunities by including pedestrian linkages from residences to open space elements such as the open water features and fountains in the stormwater management ponds, park areas internal to the road network, and pickleball courts. The paths also include an overlook area adjacent to Gill Lake and a path along the bluff to the Huron River, which responds to the Hamburg Township Master Plan emphasis on the preservation of natural features and scenic views. An optional floating dock for recreational boats can be placed in Gill Lake with a trail down from the scenic overlook area. There are also trail amenities proposed including benches in key locations, dog waste stations, and a picnic area. The development provides not only the required open space adjacent to existing residential areas but also extensive landscape screening to further reduce the impact of the proposed development on the adjacent neighborhoods. Additionally, supplemental landscaping is proposed along the Winans Lake Road corridor to define the entry to the neighborhood, provide screening, and to complement the aesthetic along Winans Lake Road in adjacent established residential areas.

REGULATORY FLEXIBILITY DATA

	Underlying WFR Zoning Disctrict Maximums	Proposed Open Space PUD development
Zoning	WFR/NR	Open Space PUD
Lot Area	30,000 sf min	-
Setbacks:		
Front	25	23 from EOP
Rear	30	10
Side	10	5.5
Min. Frontage	125' min	41' min
ROW	60'	24' alleys & 50' roads
Road Width	-	20' alleys & 24' roads
Open Space	13%	56%
Proposed Homes	79	154
Proposed Density	0.85 units/acre	1.66 units/acre
Density Bonus	-	95%



OPEN SPACE CALCULATION

GROSS:	4,031,597 sf	92.55 ac
Gill Lake	178,961 sf	4.11 ac
Gill Lake Wetland	97,690 sf	2.24 ac
Road/Alley Easements	352,782 sf	8.10 ac
Pathways and green space in Road Easements	135,491 sf	3.11 ac
Lots	1,268,550 sf	29.12 ac
Huron River Wetland	149,543 sf	3.43 ac
Winans ROW	60,546 sf	1.39 ac
Permanent Ponds	64,264 sf	1.48 ac

Total Open Space Provided	2,241,985 sf	51.47 ac	% of Gross Area	56%	(40% required for Open Space Community; 60% desired for density bonus)
Open Space Provided, excluding wetland area	1,859,261 sf	42.68 ac	% of Gross Area	46%	(calculation which does not count wetlands as open space)
			% of Provided Open Space that is exclusve of wetlands	83%	(Open Space excl. wetlands / Total Open Space; minimum 25%)

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

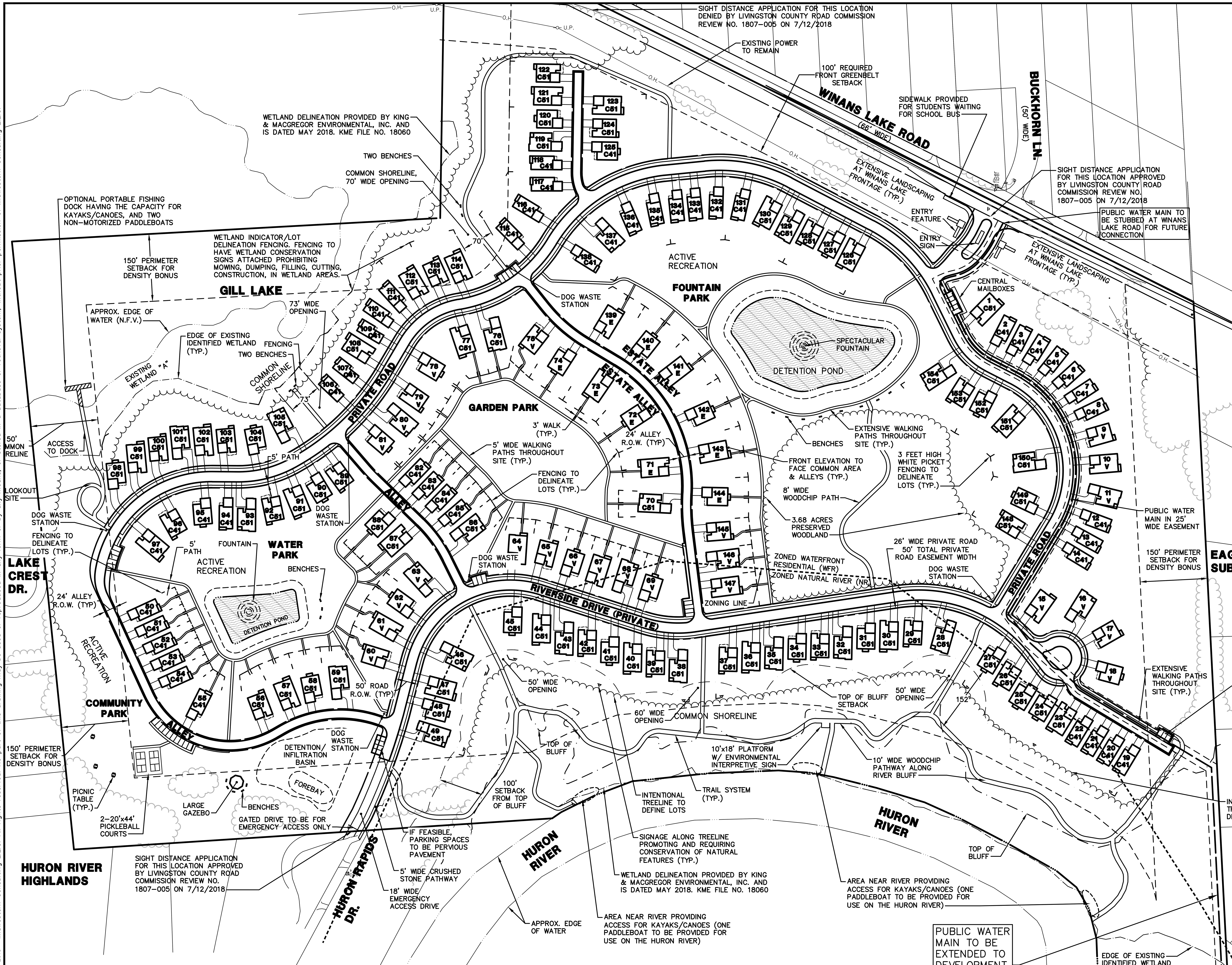
CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE
OPEN SPACE PUD DEVELOPMENT
OPEN SPACE DEVELOPMENT PLAN

3

JOB No. 18037

REVISIONS:	REV. DATE	DATE: 8/29/18
PER TOWNSHIP COMMENTS	11/19/18	SHEET 3 OF 19
		CADD:
		ENG: JCA, TPH
		PM: RCW
		TECH: RDW
		18037OS1.dwg



The underground utilities shown have been located from field survey information and existing records. The surveyor makes no guarantees that the underground utilities shown comprise all such utilities in the area, either in-service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated. Although the surveyor does certify that they are located as accurately as possible from the information available.

811 Know what's below. Call before you dig.

SCALE: 1" = 100'

0 100 200 300

GENERAL NOTES

1. HOME MODELS SHOWN FOR EACH UNIT ARE PRELIMINARY AND ARE SUBJECT TO CHANGE DURING FINAL SITE PLAN APPROVALS.
2. LANDSCAPING, ROOFS, SIDING, EXTERIOR TRIM, GARAGE DOORS, FENCING, PATHWAYS, FOUNTAINS, PONDS, RECREATION FACILITIES, ROADS AND ALLEYS WILL BE MAINTAINED IN PERPETUITY BY THE HOMEOWNERS ASSOCIATION.
3. DEVELOPMENT ENTRANCE AND WINANS LAKE ROAD FRONTAGE ARE TO UTILIZE UPLIGHTING. THROUGHOUT THE DEVELOPMENT, LIGHTING SHALL BE PROVIDED BY PHOTOCELL LIGHTS ON EITHER SIDE OF THE GARAGE ON ALL UNITS.
4. ONE SINGLE REFUSE COMPANY WILL BE REQUIRED BY MASTER DEED.
5. SIDE YARD ENTRY OR RECESSED GARAGE PRODUCTS ARE PROPOSED FOR AT LEAST 20% OF THE ENTIRE DEVELOPMENT. AT LEAST 40% OF THE HOMES PROPOSED ALONG PRIVATE ROADS ARE TO BE SIDE YARD ENTRY OR RECESSED GARAGES. AS SHOWN, 108 HOMES ARE PROPOSED ALONG PRIVATE ROADS WHILE 46 HOMES FRONT ALLEYS. 62 OF THE 108 HOMES PROPOSED ALONG PRIVATE ROADS ARE PROPOSED TO BE SIDE YARD ENTRY OR HAVE RECESSED GARAGES.
6. PINCKNEY COMMUNITY SCHOOLS TRANSPORTATION SUPERVISOR, SUE MILLER, HAS INDICATED THAT SCHOOL BUSSES WILL PICK STUDENTS UP AT THE ENTRANCE TO THE DEVELOPMENT. A SIDEWALK HAS BEEN PROVIDED NEAR THE DECELERATION LANE FOR STUDENTS TO BE ABLE TO STAND AND WAIT FOR THE BUS.
7. DETAILS OF ENTRY SIGN TO BE PROVIDED AT A LATER DATE OR ON SIGN PERMIT APPLICATION.
8. TREE REMOVALS IN THE NATURAL RIVER (NR) DISTRICT WILL REQUIRE A PERMIT.
9. NO MITIGATION OF THE WETLANDS IS REQUIRED OR PROPOSED.
10. THE WOODCHIP PATH ALONG THE HURON RIVER IS TO BE MAINTAINED ANNUALLY.
11. CENTRAL MAILBOXES TO BE APPROVED BY THE PINCKNEY POST OFFICE.

Water's Edge
Key and Program

Lot/Home Type	Lot Width (ft)	Total # of Lots	River	Lake
Cottage 41	41	46	4	9
Cottage 51	51	73	27	16
Village Residential	61	25		
Estate Residential	90	10		
TOTAL		154		

ROAD & ALLEY DESIGN DATA

RIVERSIDE DRIVE & PRIVATE ROADS

RIVERSIDE DRIVE IS THE MAIN ROAD THROUGH THE DEVELOPMENT. THE PRIVATE ROADS CONSIST OF A 26' WIDE ROAD IN A 50' EASEMENT WITH UTILITIES AND A SIDEWALK ALONG EACH SIDE OF THE ROAD.

THE PRIVATE ROADS ALSO SERVE THE CONNECTIONS TO WINANS LAKE ROAD AND THE EMERGENCY CONNECTION TO HURON RAPIDS DRIVE. PARKING WILL BE ALLOWED ON ONE SIDE OF THESE ROADS.

ALLEYWAYS

THE ONSITE ALLEYS ARE QUIETER ROADS INTENDED PRIMARILY TO ACCESS GARAGES. THESE ALLEYS CONSIST OF A 20' WIDE ROAD IN A 24' EASEMENT AND WILL HAVE UTILITIES, BUT NOT SIDEWALKS.

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE VILLAGE

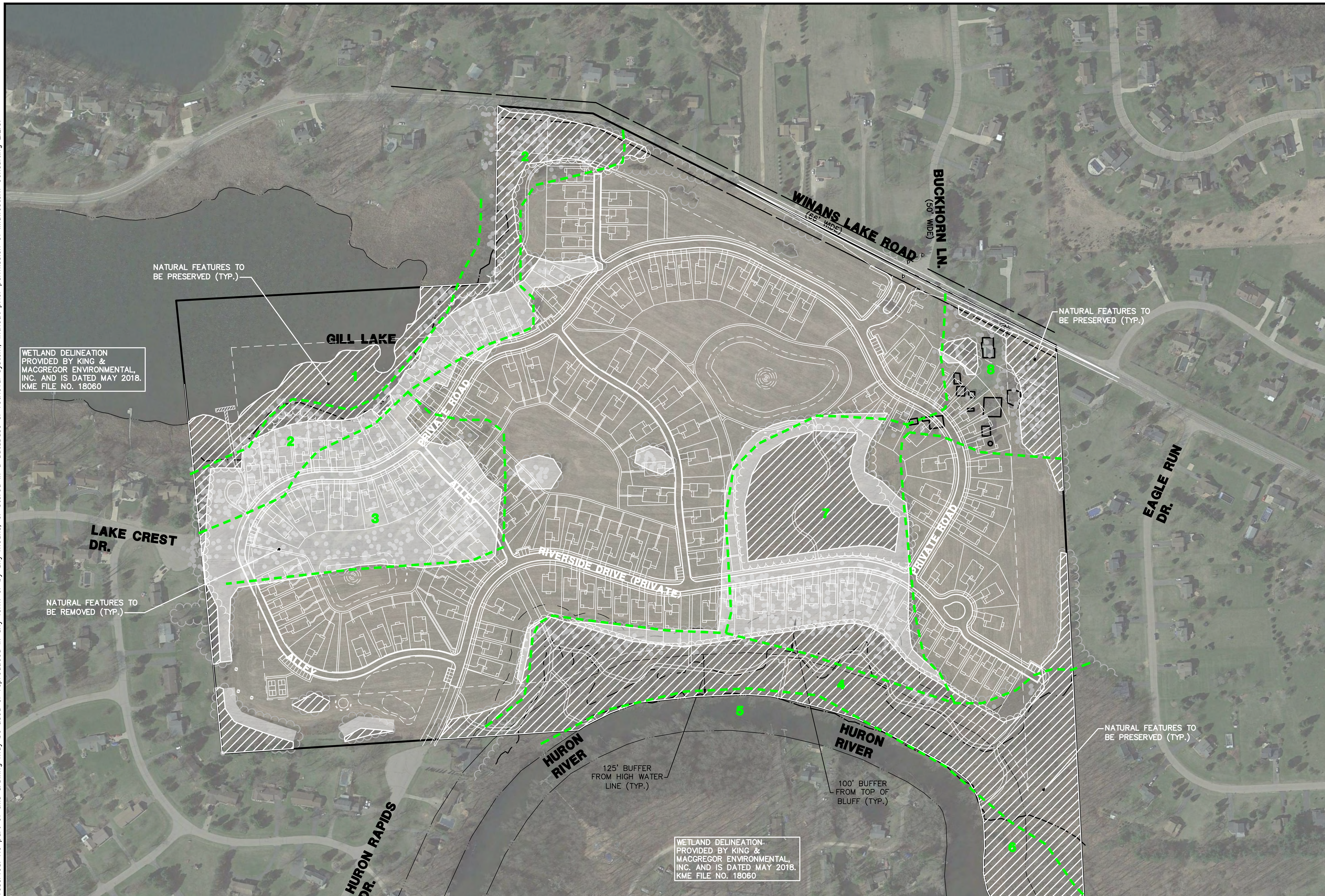
OPEN SPACE PUD DEVELOPMENT
PRELIMINARY SITE PLAN

4

DATE: 8/29/18
SHEET 4 OF 19
ENG: JCA, TPH
PM: RCW
TECH: RDW
18037SP1.dwg

REVISIONS: REV. DATE
PER TOWNSHIP COMMENTS 11/19/18

JOB No. 18037



WATERS EDGE VILLAGE NATURAL FEATURES DESCRIPTION (Prepared by King and MacGregor)

The following descriptions are of the approximate areas identified in Figure 1.

Area 1- Gut Lake Wetland Fringe
Emergent and scrub-shrub wetland on the east and south sides of Gut Lake. This area contains highly organic soils which are saturated year-round. It is dominated by a variety of wetland plants such as hybrid cattail *(Typha x glauca)*, marsh fern *(Thelypteris palustis)*, blue vervain *(Verbena hastata)*, tussock sedge *(Carex stricta)* and purple loosestrife *(Lythrum salicaria)*. The edge close to the wood line has some woody species such as glossy buckthorn (*Frangula alnus*), swamp rose *(Rosa palustris)*, buttonbush *(Cephalathus occidentalis)*, and white willow *(Salix alba)*.

Area 2 – Oak Hickory Woods along Gut Lake
This sloping forested area near Gut Lake is characteristic of an Oak-Hickory forest type. It is occurring on a moist, well-drained, loamy soils, located between row crops (soybeans) to the east and the Gut Lake wetland fringe. The canopy is dominated by red oak *(Quercus rubra)*, black locust *(Robinia pseudoacacia)*, white oak *(Quercus alba)*, pignut hickory *(Carya glabra)*, and shagbark hickory *(Carya ovata)*. The understory is comprised of invasive honeysuckle *(Lonicera morrowii)*, blackberry *(Rubus allegheniensis)*, poison ivy *(Toxicodendron radicans)* and smooth bromegrass *(Bromus inermis)*.

Area 3- Old Field Scrub
Located east of the hickory woods along Gut Lake, this area may have been an apple grove. It now has a mix of open spaces dominated by smooth bromegrass, Queen Ann's lace *(Daucus carota)*, gray goldenrod *(Solidago nemoralis)*, and a variety of thistles and clovers as well as areas dominated by shrubs and trees such as honeysuckle, glossy buckthorn, autumn olive *(Elaeagnus umbellata)*, red cedar *(Juniperus virginiana)* and apple trees *(Malus pumila)*.

Area 4- Huron River Valley Hillside Woods
This woods on the south side of the property on the slope above the bank of the Huron River is comprised of black locust, American elm *(Ulmus americana)*, boxelder *(Acer negundo)* and black cherry *(Prunus serotine)*. The understory is dominated by invasive honeysuckles and multiflora rose *(Rosa multiflora)*. In the slightly more open areas of the forest there is motherwort *(Leonurus cardiaca)*, black raspberry (*Rubus occidentalis*), poison ivy (*Toxicodenron radicans*), and smooth bromegrass.

Area 5- Huron River
The stretch of the Huron River bordering the property has a sandy river bed, with very little gravel. The grade of the river here is low and the current is slow moving. There are some aquatic plants visible in the river but not dominating the river bed. Bluegill *(Lepomis macrochirus)* and some mussel shells were observed in the river bed.

Area 6- Huron River Floodplain Wetland
In the southern most portion of the property along the Huron River lies a floodplain wetland. The soils here are highly organic and saturated with ground water year-round. Trees growing in this area consist of swamp white oak (*Quercus bicolor*), American elm, and red ash *(Fraxinus pennsylvanica)*. Water hemlock *(Cicuta maculata)*, skunk cabbage *(Symplocarpus foetidus)*, jewelweed *(Impatiens capensis)*, and sensitive fern *(Onoclea sensibillis)* were observed in the open areas.

Area 7- Central Woodlot
Surrounded by row crop on three sides, this stand's canopy contains sugar maple *(Acer saccharum)*, red oak, pignut hickory, northern pin oak *(Quercus ellispsoidalis)*, sycamore *(Plantanus occidentalis)* and boxelder. The understory is largely dominated by invasive honey suckle growing very dense in some areas. The understory also contains poison ivy, Virginia creeper *(Parthenocissus quinquefolia)*, burning bush *(Euonymus alatus)*, and riverbank grape *(Vitis riparia)*.

Area 8- Old Farmstead
In the far northeast portion of the property there is an abandon farmstead consisting of a house, a few out buildings, and a barn. This area is mostly open with a few trees. The open areas are dominated by smooth bromegrass, tall goldenrod *(Solidago altissima)*, field thistle *(Cirsium dicolor)*, red fescue *(Festuca rubra)*, and stickseed *(Hackelia virginiana)*. The trees include native and landscape species such as boxelder, black locust, black walnut (*Juglans nigra*), black cherry, eastern red bud *(Cercis canadensis)*, Douglas fir *(Pseudotsuga menziesii)*, common pear *(Pyrus communis)*, Chinese magnolia *(Magnolia x soulangenana)* and Scotch pine *(Pinus sylvestris)*.

REGULATORY FLEXIBILITY CHART

LEGEND

838	EXIST. CONTOUR
836.2	EXIST. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
U.P.	EXIST. UTILITY POLE W/ TRANS.
	GUY WIRE
	ELEC. TRANSFORMER
OH	EXIST. OVERHEAD UTILITY LINE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
	EXIST. GAS VALVE
f.o.	EXIST. FIBER OPTIC LINE
r	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	END SECTION
	CULVERT
s	EXIST. SANITARY SEWER
	C/L OF DITCH OR EDGE OF WATER
	SIGN
t	TELEPHONE RISER
catv	CABLE TELEVISION RISER
e	ELECTRIC METER
g	GAS METER
glm	GAS LINE MARKER
fiber	FIBER OPTIC MARKER
	POST
	WELL
	FENCE
	SINGLE TREE
	TREE OR BRUSH LIMIT
	SECTION CORNER
O F	FOUND IRON PIPE
F	FOUND MONUMENT
FIR	FOUND IRON ROD
	CONTROL PT.
	NATURAL FEATURES PRESERVATION
	NATURAL FEATURES REMOVALS

SITE ANALYSIS

1. THERE ARE APPROXIMATELY 23 ACRES OF PRESERVED UPLAND AREA, MOST OF WHICH HAS NOT BEEN EVALUATED FOR THE TREE SURVEY. APPROXIMATELY 16 ACRES OF THE SITE IS TO BE CLEARED.
2. FOR A COMPLETE LIST OF TREE REMOVALS, SEE THE TREE SURVEY PLAN ON SHEETS 9 – 13 AND THE TREE LIST PLAN ON SHEETS 14 – 16.
3. THE SIGNIFICANT NATURAL FEATURES ON THE SITE ARE AS FOLLOWS:
   - QUALITY WOODLANDS: SEE NATURAL FEATURES DESCRIPTIONS PROVIDED BY KING AND MacGREGOR ENVIRONMENTAL, THIS SHEET. THE AREAS IDENTIFIED AS WOODS ARE THE OAK HICKORY WOODS (AREA 2), THE HURON RIVER VALLEY HILLSIDE WOODS (AREA 4), AND THE CENTRAL WOODLOT (AREA 7). THESE AREAS CONTAIN THE MAJORITY OF THE TREES TO REMAIN ON–SITE.
   - TWO WETLAND AREAS HAVE BEEN DELINEATED ON–SITE BY KING AND MacGREGOR ENVIRONMENTAL. THE GUT LAKE WETLAND FRINGE (AREA 1) AND THE HURON RIVER FLOODPLAIN WETLAND (AREA 6) ARE TO BE PRESERVED IN THEIR ENTIRETY.
   - GILL LAKE AND THE HURON RIVER ARE TO BE PRESERVED.
4. RECREATION ACCESS IS TO BE PROVIDED TO ALL SIGNIFICANT NATURAL FEATURES FOR THE BENEFIT OF THE COMMUNITY.
   - PEDESTRIAN PATHS ARE PROPOSED NEAR OR THROUGH ALL WOODED AREAS TO BE PRESERVED.
   - MINOR DISTURBANCES TO THE WETLANDS AND WATER BODIES ARE PROPOSED AS A PART OF PROVIDING RECREATIONAL ACCESS TO THE WATER BODIES.
5. THE WOODED BUFFERS ALONGSIDE NEIGHBORING PROPERTIES ARE TO BE EXPANDED BY PLANTING TREES TO FILL IN GAPS IN THE EXISTING BUFFER. SEE THE LANDSCAPE PLAN (SHEET 6) FOR THE PRELIMINARY PLANTING LOCATIONS.

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Surveying • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

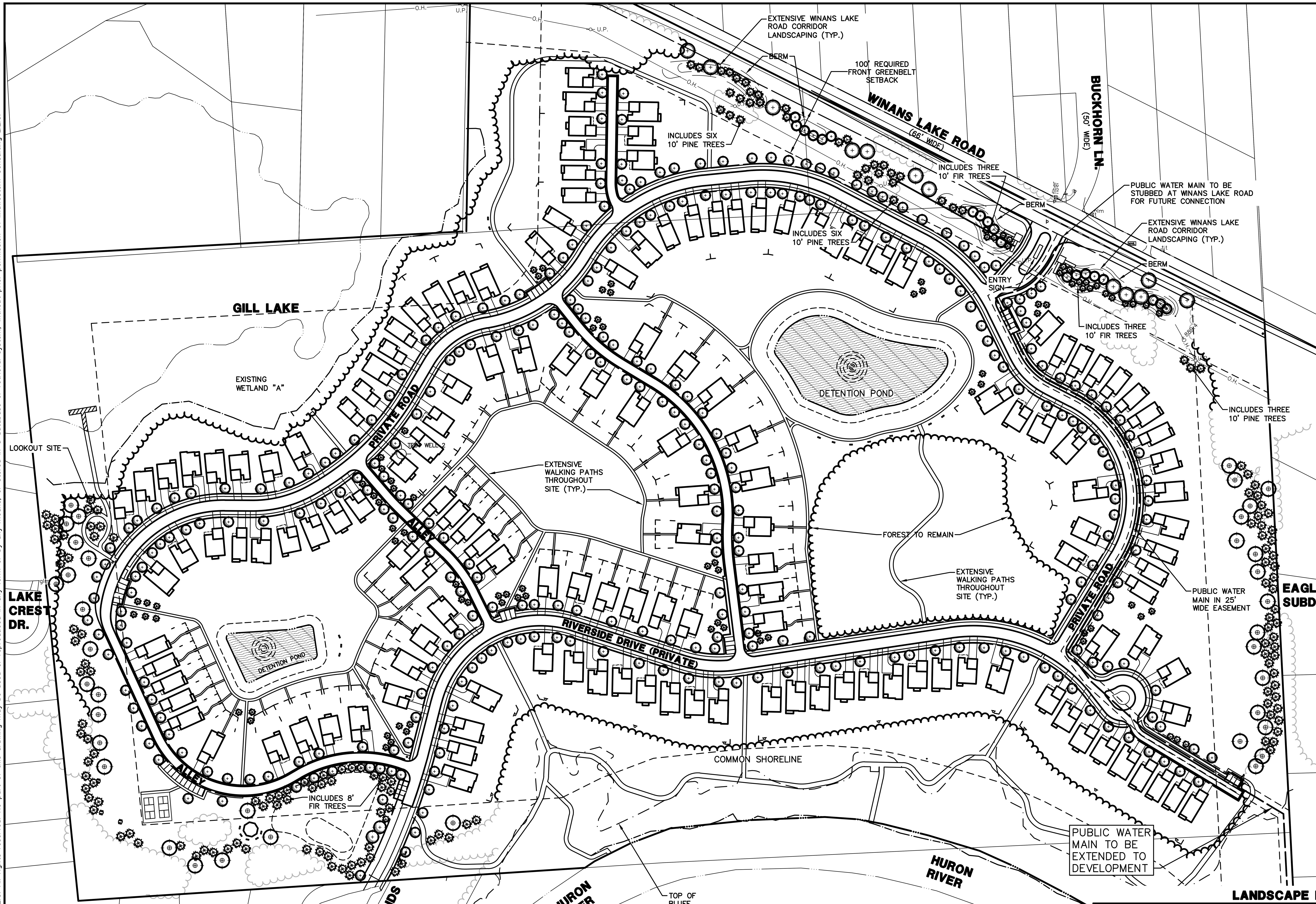
CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE
OPEN SPACE PUD DEVELOPMENT
SITE ANALYSIS PLAN

5

DATE: 11/19/18
SHEET OF 19
CADD:
ENG: JCA, TPH
PM: RCW
TECH:
18037SA1.dwg
REV. DATE
REVISIONS:
JOB No. 18037

M:\Civil3d_Proj\18037\Preliminary Site Plan\18037SA1.dwg, 11/19/2018 3:46 PM, Rachel D. Wandmacher, SITE ANALYSIS PLAN, MCLLC PDF.pc3



Know what's below. Call before you dig.

SCALE: 1" = 100'

0 100 200 300

LEGEND

- PROPOSED CANOPY TREE (INTERIOR STREET TREES)
- PROPOSED EVERGREEN TREE (INTERIOR STREET TREES)
- PROPOSED CANOPY TREE (FRONT GREENBELT)
- PROPOSED EVERGREEN TREE (FRONT GREENBELT)
- PROPOSED CANOPY TREE (TRANSITION STRIP)
- PROPOSED EVERGREEN TREE (TRANSITION STRIP)
- PROPOSED EVERGREEN TREE (SITE LANDSCAPING)

LANDSCAPING NOTES

1. GREENBELT PLANTINGS TO INCLUDE PERENNIALS AND ORNAMENTAL GRASSES.

LANDSCAPE REQUIREMENTS

	Allowed/ Required - zoning	Proposed	
Front Greenbelt (along exterior public road) per Article 14: Open Space Community	1 evergreen or canopy tree per 20 feet of road frontage 1,833LF frontage / 20 lf = 92 trees required	72 103	proposed trees existing trees preserved
Transition Strip to adjacent residential per Article 14: Open Space Community	woodland/natural features/ landscaped greenbelt sufficient to provide an obscuring effect OR open recreation space	min. 150 ft open space proposed adjacent to residential 17 deciduous, 42 evergreen proposed trees on east property line	
Internal Street trees - per Article 14: Open Space Community	2 canopy trees per dwelling for areas with lot frontage; 1 canopy tree per 50 ft road each side where not lot frontage; preserved trees w/in 5 ft of road can be credited (156 x 2 = 312) + (5,275/50 = 106) = 418 trees required	319 84 ~15	proposed street trees proposed transition strip trees on southwest property lines existing trees preserved along perimeter of woodland preservation area

The underground utilities shown have been located from field survey information and existing records. The surveyor makes no guarantees that the underground utilities shown comprise all such utilities in the area, either in-service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated. Although the surveyor does certify that they are located as accurately as possible from the information available.

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE VILLAGE

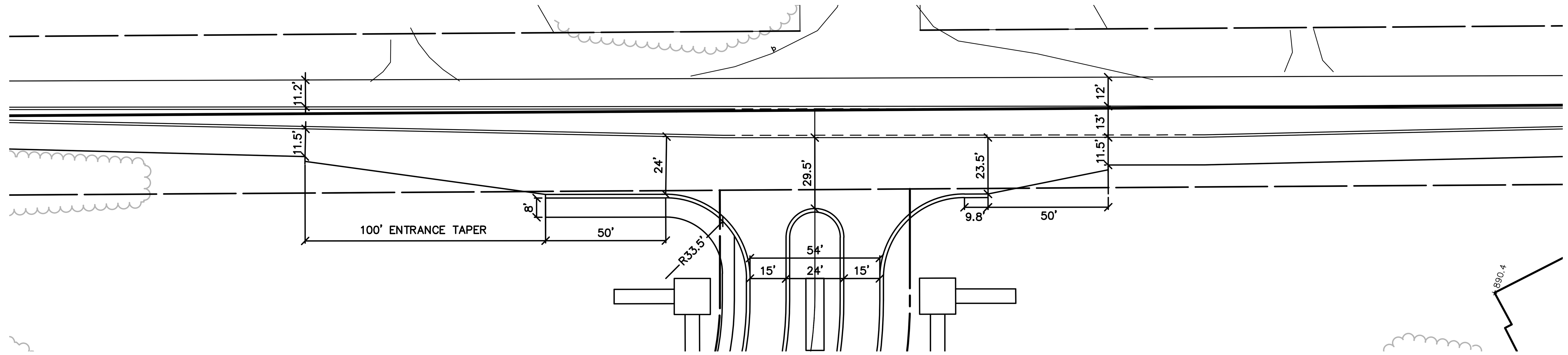
OPEN SPACE PUD DEVELOPMENT
LANDSCAPE PLAN

6

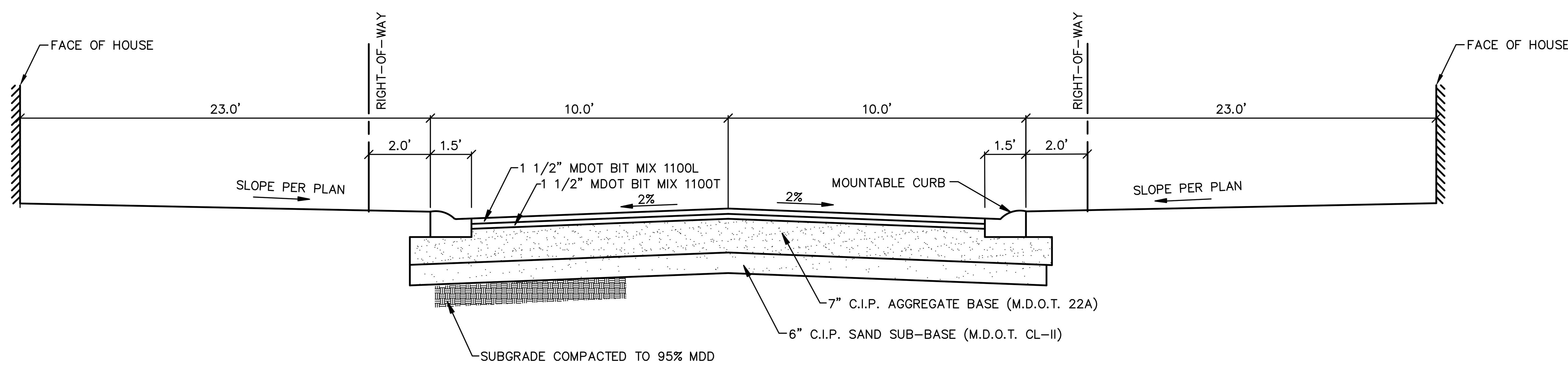
DATE: 8/29/18
SHEET 6 OF 19
CADD:
ENG: JCA, TPH
PM: RCW
TECH: TRF
18037LP1.dwg

JOB No. 18037
REVISIONS: REV. DATE
PER TOWNSHIP COMMENTS 11/19/18

M:\Civil3d_Proj\18037\Preliminary Site Plan\18037LP1.dwg, 11/19/2018 3:46 PM, Rachel D. Wandmacher, LANDSCAPE PLAN, MCLLC PDF.pc3

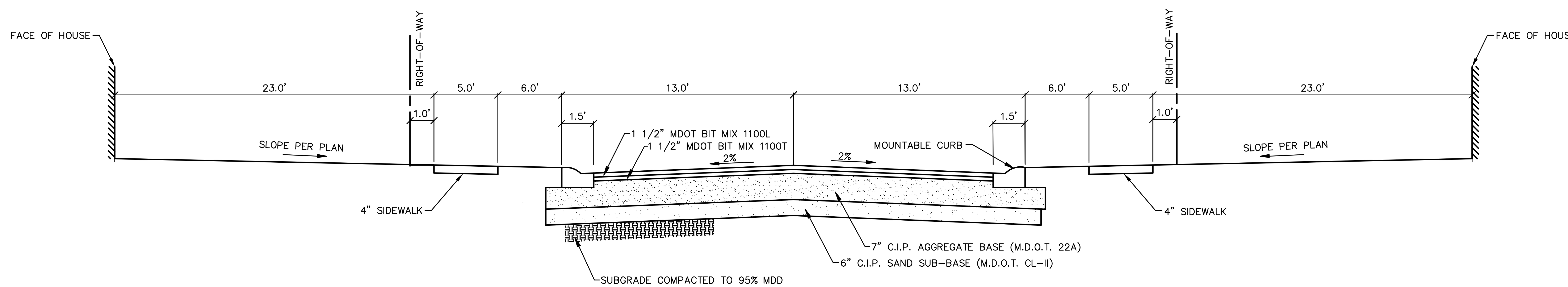


APPROACH DETAIL



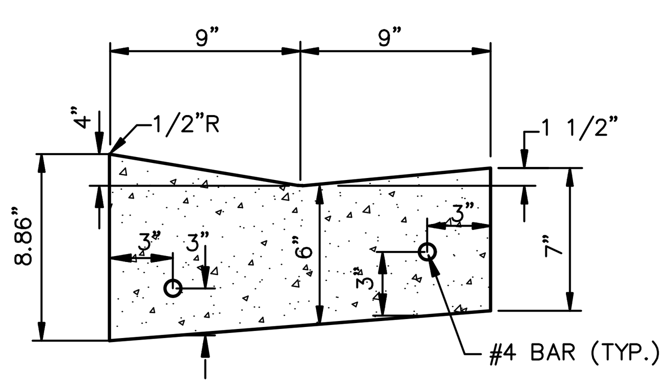
TYPICAL ALLEY CROSS SECTION

NOT TO SCALE



TYPICAL PRIVATE ROAD CROSS SECTION

NOT TO SCALE



MOUNTABLE CONCRETE CURB & GUTTER

NOT TO SCALE

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE
OPEN SPACE PUD DEVELOPMENT
SITE DETAILS

7

DATE: 8/29/18
SHEET 7 OF 19
CADD:
ENG: JCA, TPH
PM: RCW
TECH:
18037DT1

JOB No. 18037

REVISIONS:	REV. DATE
PER TOWNSHIP COMMENTS	11/19/18

M:\Civil3d_Proj\18037\Preliminary Site Plan\18037DT1.dwg, 11/19/2018 3:46 PM, Rachel D. Wandmacher, MISC, MCLLC PDF.pc3

1000 Plan Elevations

1400 Plan Elevations

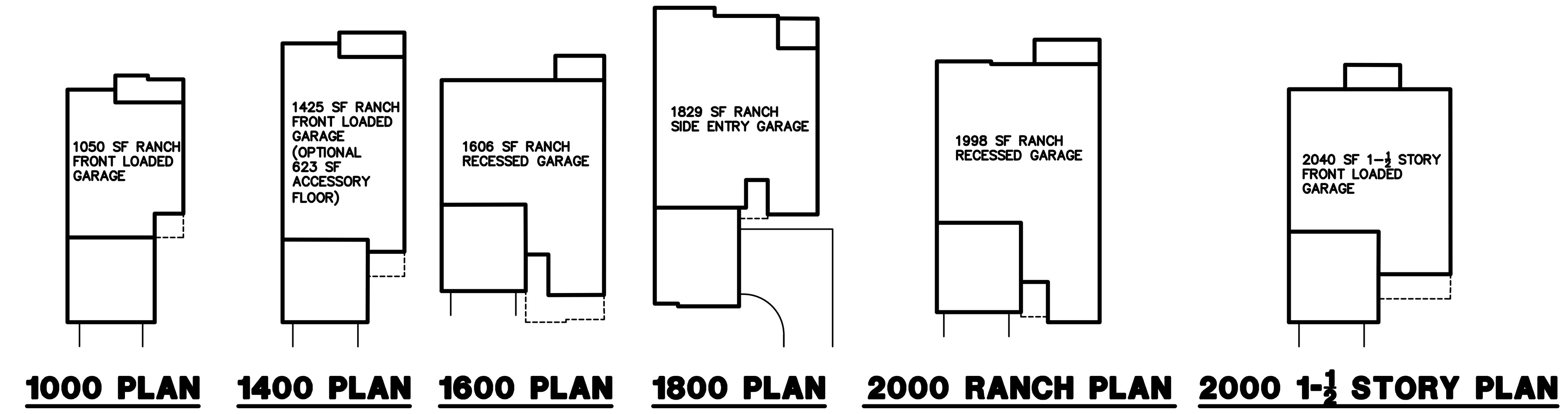
1600 Elevations

1800 Elevations

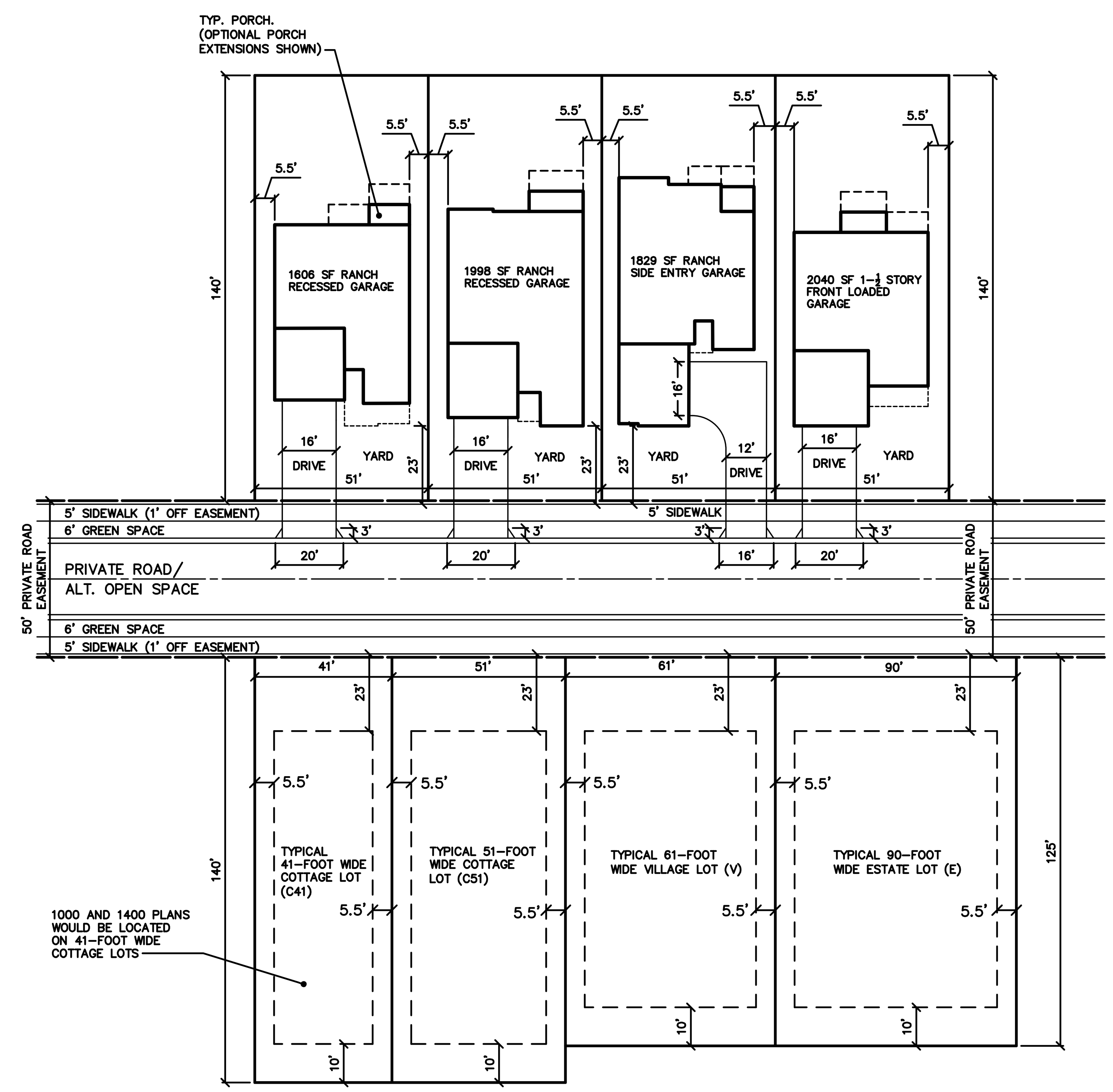
2000 Ranch Elevations

2000 1-1/2 StoryElevations

ARCHITECTURAL ELEVATIONS



*NOTE: BUILDING LAYOUTS AND DIMENSIONS ARE PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL SITE PLAN.



TYPICAL LOT CONFIGURATIONS

LOT DETAILS SHOWN FOR COTTAGE 51 LOTS

NOTES

1. THE CONFIGURATIONS SHOWN ABOVE INDICATE TYPICAL MINIMUM LOT WIDTHS, DEPTHS, AND SETBACKS.
2. ACTUAL LOT DIMENSIONS AND SETBACKS ARE GREATER THAN MINIMUM IN VARIOUS LOCATIONS.
3. WHERE SIDEWALKS EXIST, HOMES ARE SET A MINIMUM 23' FROM EDGE OF SIDEWALK. WHERE NO SIDEWALK EXISTS, HOMES ARE SET A MINIMUM 23' FROM BACK OF CURB.
4. HOMES ALONG ALLEYS ARE ALL SET A MINIMUM 23' FROM BACK OF CURB (NO SIDEWALKS EXIST ALONG ALLEYS).
5. BUILDING DIMENSIONS ARE PRELIMINARY AND SUBJECT TO CHANGE DURING FINAL SITE PLAN.

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE

OPEN SPACE PUD DEVELOPMENT
CONCEPTUAL ARCHITECTURAL DETAILS

8

JOB No. 18037

REVISIONS:	REV. DATE	DATE: 8/29/18
PER TOWNSHIP COMMENTS	11/19/18	SHEET 8 OF 19
		CADD:
		ENG: JCA, TPH
		PM: RCW
		TECH:
		18037DT1

SCALE: 1" = 50'

Know what's below. Call before you dig.

LEGEND

838	EXIST. CONTOUR
836.2	EXIST. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
U.P.	EXIST. UTILITY POLE W/ TRANS.
	GUY WIRE
	ELEC. TRANSFORMER
OH	EXIST. OVERHEAD UTILITY LINE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
	EXIST. GAS VALVE
f.o.	EXIST. FIBER OPTIC LINE
r	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	END SECTION
	CULVERT
s	EXIST. SANITARY SEWER
	C/L OF DITCH OR EDGE OF WATER
	SIGN
t	TELEPHONE RISER
catv	CABLE TELEVISION RISER
e	ELECTRIC METER
g	GAS METER
glm	GAS LINE MARKER
fiber	FIBER OPTIC MARKER
	POST
	WELL
	FENCE
	SINGLE TREE
	TREE OR BRUSH LIMIT
	SECTION CORNER
F	FOUND IRON PIPE
F	FOUND MONUMENT
FIR	FOUND IRON ROD
	CONTROL PT.

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE

OPEN SPACE PUD DEVELOPMENT
TREE SURVEY PLAN 1

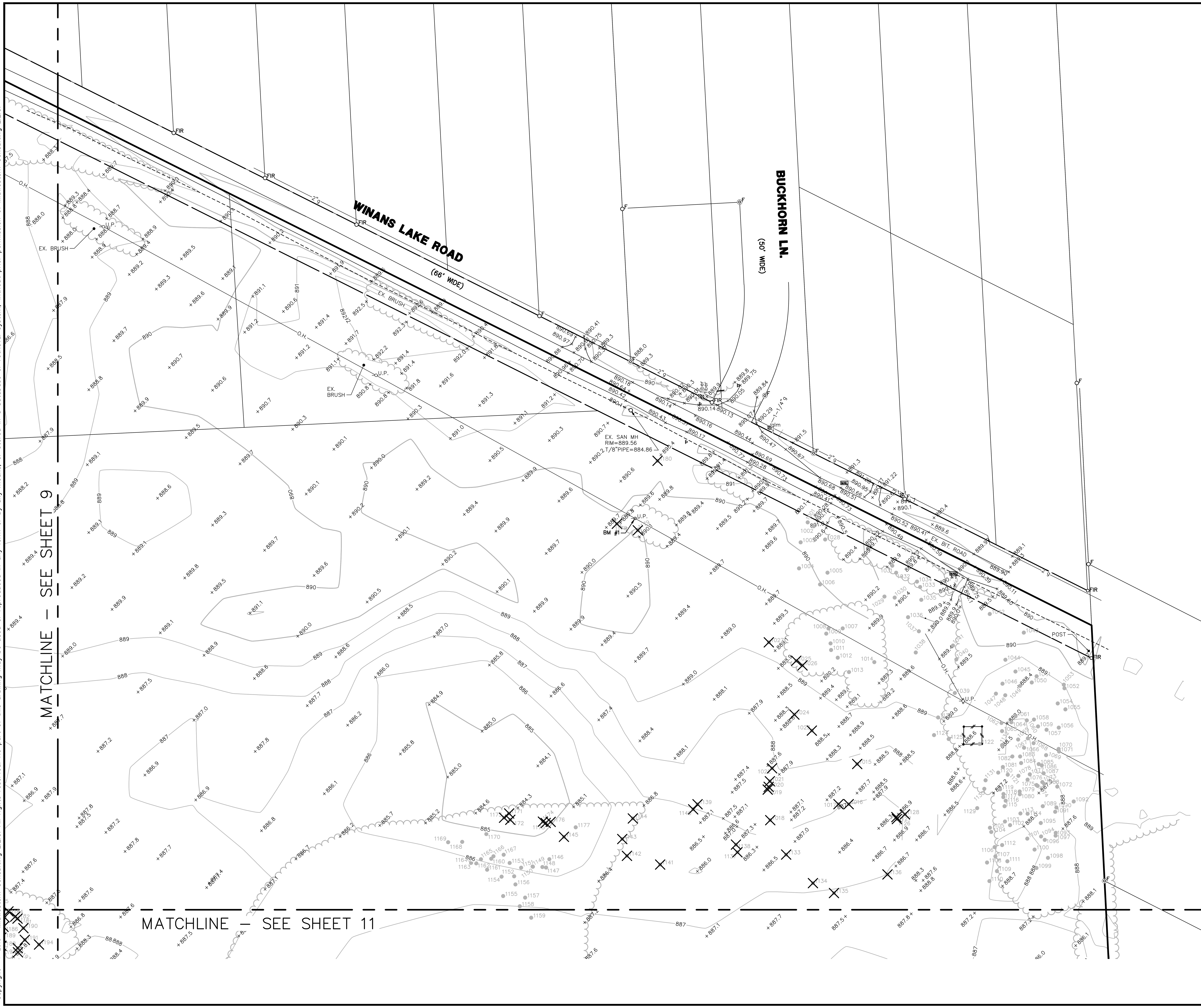
9

JOB No. 18037

REVISIONS:	REV. DATE
PER TOWNSHIP COMMENTS	11/19/18

DATE: 8/29/18
SHEET 9 OF 19
CADD:
ENG: JCA, TPH
PM: RCW
TECH:
18037EX2.dwg

M:\Civil3d_Proj\18037\Preliminary Site Plan\18037EX2.dwg, 11/19/2018 3:47 PM, Rachel D. Wandmacher, TREE SURVEY1, MCLLC PDF.pc3



SCALE: 1" = 50'

0 50 100 150

811 Know what's below. Call before you dig.

LEGEND

838	EXIST. CONTOUR
836.2	EXIST. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
U.P.	EXIST. UTILITY POLE W/ TRANS.
	GUY WIRE
	ELEC. TRANSFORMER
OH	EXIST. OVERHEAD UTILITY LINE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
	EXIST. GAS VALVE
f.o.	EXIST. FIBER OPTIC LINE
r	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	END SECTION
	CULVERT
s	EXIST. SANITARY SEWER
	C/L OF DITCH OR EDGE OF WATER
	SIGN
t	TELEPHONE RISER
catv	CABLE TELEVISION RISER
e	ELECTRIC METER
g	GAS METER
glm	GAS LINE MARKER
fiber	FIBER OPTIC MARKER
	POST
	WELL
	FENCE
	SINGLE TREE
	TREE OR BRUSH LIMIT
	SECTION CORNER
F	FOUND IRON PIPE
F	FOUND MONUMENT
FIR	FOUND IRON ROD
	CONTROL PT.

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE

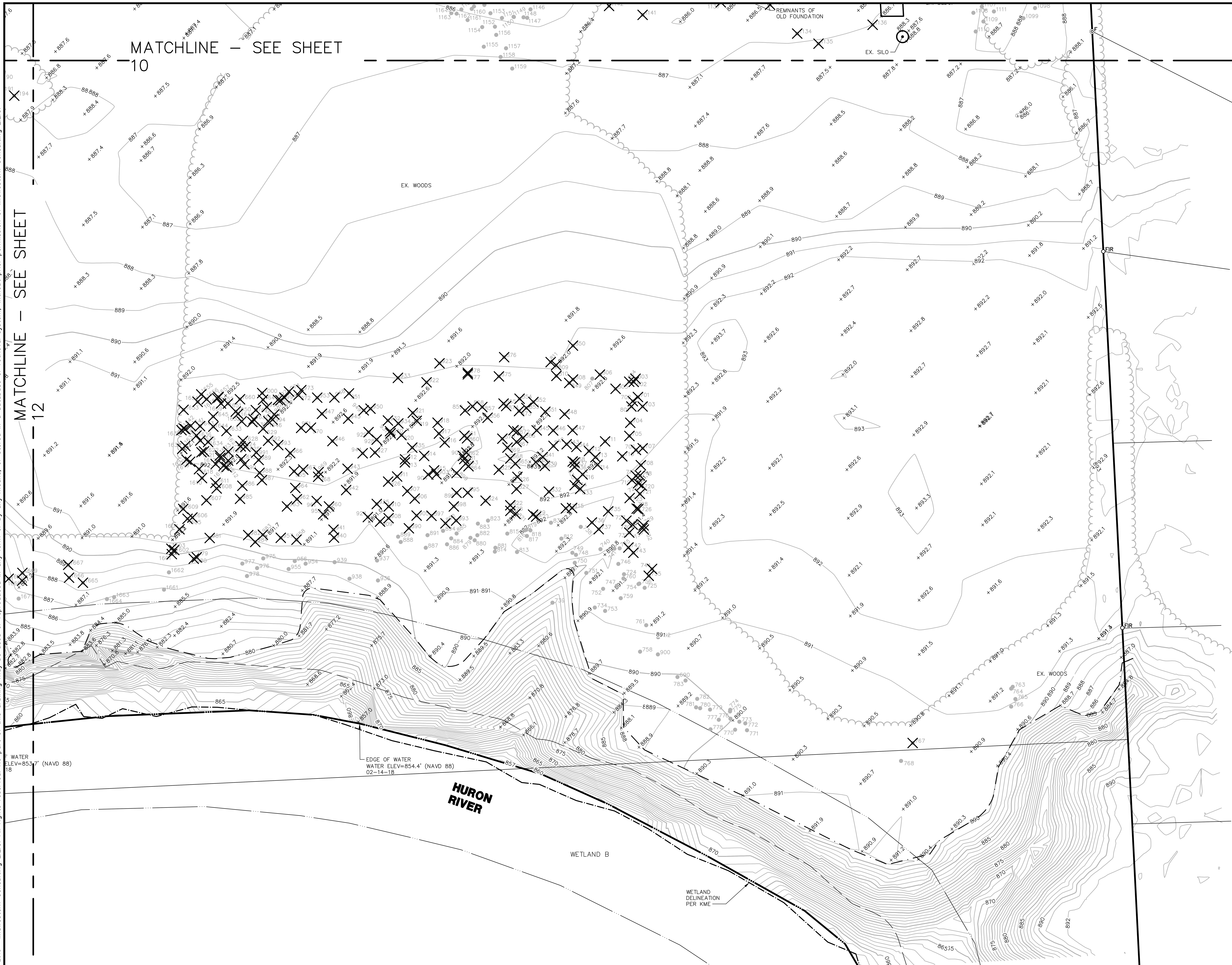
OPEN SPACE PUD DEVELOPMENT
TREE SURVEY PLAN 2

10

DATE: 8/29/18
SHEET 10 OF 19
CADD:
ENG: JCA, TPH
PM: RCW
TECH:
18037EX2.dwg

JOB No. 18037

REVISIONS:	REV. DATE
PER TOWNSHIP COMMENTS	11/19/18



SCALE: 1" = 50'

0 50 100 150

811 Know what's below. Call before you dig.

LEGEND

838	EXIST. CONTOUR
836.2	EXIST. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
U.P.	EXIST. UTILITY POLE W/ TRANS.
	GUY WIRE
	ELEC. TRANSFORMER
OH	EXIST. OVERHEAD UTILITY LINE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
	EXIST. GAS VALVE
f.o.	EXIST. FIBER OPTIC LINE
r	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	END SECTION
	CULVERT
s	EXIST. SANITARY SEWER
	C/L OF DITCH OR EDGE OF WATER
	SIGN
t	TELEPHONE RISER
catv	CABLE TELEVISION RISER
e	ELECTRIC METER
g	GAS METER
glm	GAS LINE MARKER
fiber	FIBER OPTIC MARKER
	POST
	WELL
	FENCE
	SINGLE TREE
	TREE OR BRUSH LIMIT
	SECTION CORNER
F	FOUND IRON PIPE
F	FOUND MONUMENT
FIR	FOUND IRON ROD
	CONTROL PT.

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Surveys • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE
OPEN SPACE PUD DEVELOPMENT
TREE SURVEY PLAN 3

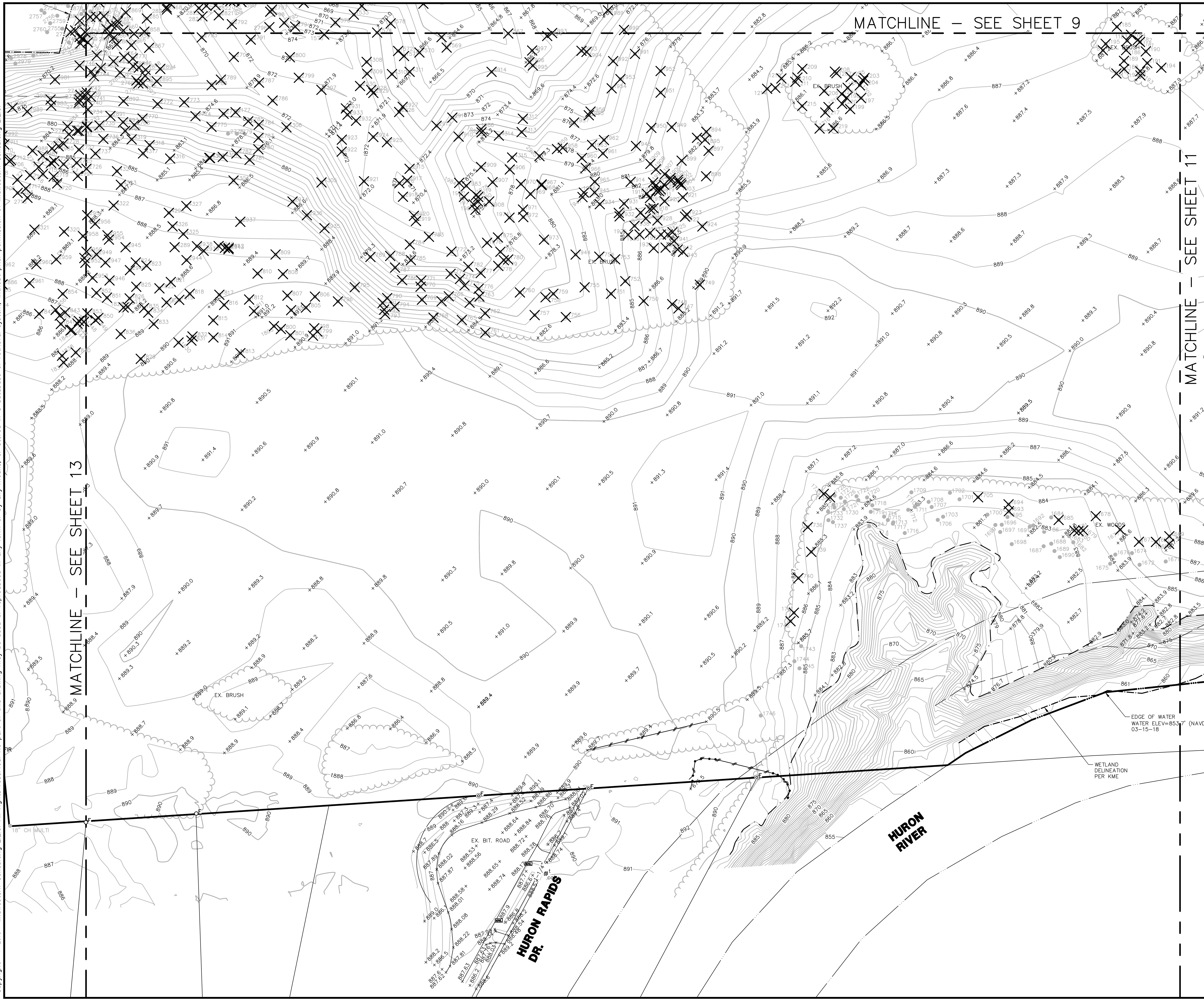
11

DATE: 8/29/18
SHEET 11 OF 19

REVISIONS:	REV. DATE	
PER TOWNSHIP COMMENTS	11/19/18	CADD:
		ENG: JCA, TPH
		PM: RCW
		TECH:
		18037EX2.dwg

JOB No. 18037

M:\Civil3d_Proj\18037\Preliminary Site Plan\18037EX2.dwg, 11/19/2018 3:47 PM, Rachel D. Wandmacher, TREE SURVEYS, MCLLC PDF.pc3



SCALE: 1" = 50'

0 50 100 150

Know what's below. Call before you dig.

LEGEND

838	EXIST. CONTOUR
836.2	EXIST. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
U.P.	EXIST. UTILITY POLE W/ TRANS.
	GUY WIRE
	ELEC. TRANSFORMER
OH	EXIST. OVERHEAD UTILITY LINE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
	EXIST. GAS VALVE
f.o.	EXIST. FIBER OPTIC LINE
r	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	END SECTION
	CULVERT
s	EXIST. SANITARY SEWER
	C/L OF DITCH OR EDGE OF WATER
	SIGN
t	TELEPHONE RISER
catv	CABLE TELEVISION RISER
e	ELECTRIC METER
g	GAS METER
glm	GAS LINE MARKER
fiber	FIBER OPTIC MARKER
	POST
	WELL
	FENCE
	SINGLE TREE
	TREE OR BRUSH LIMIT
	SECTION CORNER
F	FOUND IRON PIPE
F	FOUND MONUMENT
FIR	FOUND IRON ROD
	CONTROL PT.

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE
OPEN SPACE PUD DEVELOPMENT
TREE SURVEY PLAN 4

12

JOB No. 18037		DATE: 8/29/18
REVISIONS:	REV. DATE	SHEET 12 OF 19
PER TOWNSHIP COMMENTS	11/19/18	CADD:
		ENG: JCA, TPH
		PM: RCW
		TECH:
		18037EX2.dwg

M:\Civil3d_Proj\18037\Preliminary Site Plan\18037EX2.dwg, 11/19/2018 3:47 PM, Rachel D. Wandmacher, TREE SURVEY4, MCLLC PDF.pc3

SCALE: 1" = 50'

0 50 100 150

811 Know what's below. Call before you dig.

LEGEND

838	EXIST. CONTOUR
836.2	EXIST. SPOT ELEVATION
U.P.	EXIST. UTILITY POLE
U.P.	EXIST. UTILITY POLE W/ TRANS.
	GUY WIRE
	ELEC. TRANSFORMER
OH	EXIST. OVERHEAD UTILITY LINE
t	EXIST. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
g	EXIST. GAS LINE
	EXIST. GAS VALVE
f.o.	EXIST. FIBER OPTIC LINE
r	EXIST. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	END SECTION
	CULVERT
s	EXIST. SANITARY SEWER
	C/L OF DITCH OR EDGE OF WATER
	SIGN
t	TELEPHONE RISER
catv	CABLE TELEVISION RISER
e	ELECTRIC METER
g	GAS METER
glm	GAS LINE MARKER
fiber	FIBER OPTIC MARKER
	POST
	WELL
	FENCE
	SINGLE TREE
	TREE OR BRUSH LIMIT
	SECTION CORNER
F	FOUND IRON PIPE
F	FOUND MONUMENT
FIR	FOUND IRON ROD
	CONTROL PT.

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE

OPEN SPACE PUD DEVELOPMENT
TREE SURVEY PLAN 5

13

DATE: 8/29/18	
SHEET 13 OF 19	
CADD:	
ENG: JCA, TPH	
PM: RCW	
TECH:	
18037EX2.dwg	

REVISIONS:	REV. DATE
PER TOWNSHIP COMMENTS	11/19/18

JOB No. 18037

M:\Civil3d_Proj\18037\Preliminary Site Plan\18037EX2.dwg, 11/19/2018 3:47 PM, Rachel D. Wandmacher, TREE SURVEYS, MCLLC PDF.pc3

690	*Juglans nigra*	Black Walnut	6			Fair	no bud, leaf	
701	*Quercus rubra*	Red Oak	20			Good		X
702	*Ulmus americana*	American Elm	8			Good		X
703	*Quercus rubra*	Red Oak	9			Good		X
704	*Acer saccharum*	Sugar Maple	22			Good		X
705	*Carya glabra*	Pignut Hickory	7			Good		X
706	*Carya glabra*	Pignut Hickory	9			Good		X
707	*Prunus serotina*	Black Cherry	9			Good		X
708	*Acer saccharinum*	Silver Maple	14			Good		X
710	*Quercus velutina*	Black Oak	6			Good		X
711	*Carya ovata*	Shagbark Hickory	7			Good		X
712	*Acer* spp.	Maple	13			Good		X
713	*Prunus serotina*	Black Cherry	6			Good		X
714	*Acer negundo*	Boxelder	8			Fair		X
715	*Carya* spp.	Hickory	15			Good		X
716	*Ulmus americana*	American Elm	7			Good		X
717	*Quercus velutina*	Black Oak	7			Good		X
718	*Ulmus americana*	American Elm	9			Good		X
719	*Carya* spp.	Hickory	7			Good		X
720	*Carya* spp.	Hickory	10			Good		X
721	*Carya* spp.	Hickory	14			Good		X
722	*Quercus velutina*	Black Oak	21			Good		X
723	*Quercus rubra*	Red Oak	6			Good		X
724	*Prunus serotina*	Black Cherry	6			Fair		X
725	*Acer saccharinum*	Silver Maple	20			Fair		X
726	*Acer* spp.	Maple	10			Good		X
727	*Ulmus americana*	American Elm	19			Fair		X
728	*Ulmus americana*	American Elm	8			Fair		X
729	*Carya* spp.	Hickory	16			Good		X
730	*Ulmus americana*	American Elm	9			Good		X
731	*Acer* spp.	Maple	7			Good		X
732	*Acer* spp.	Maple	11			Good		X
733	*Carya* spp.	Hickory	9			Good		X
734	*Acer saccharinum*	Silver Maple	24			Good		X
735	*Carya* spp.	Hickory	8			Good		X
736	*Carya* spp.	Hickory	12			Good		X
737	*Carya* spp.	Hickory	8			Good		X
738	*Quercus velutina*	Black Oak	10			Good		X
739	*Prunus serotina*	Black Cherry	8			Good		
740	*Carya* spp.	Hickory	9			Good		
741	*Carya* spp.	Hickory	7			Good		
742	*Carya* spp.	Hickory	6			Good		X
743	*Acer* spp.	Maple	17			Good		X
744	*Ulmus americana*	American Elm	9			Good		X
745	*Carya* spp.	Hickory	10			Good		
746	*Carya* spp.	Hickory	10			Good		
747	*Carya* spp.	Hickory	8			Good		
748	*Prunus serotina*	Black Cherry	13			Very Poor		
749	*Ulmus americana*	American Elm	7			Good		
750	*Prunus serotina*	Black Cherry	8			Very Poor		
751	*Prunus serotina*	Black Cherry	13			Good		
752	*Carya* spp.	Hickory	10			Good		
753	*Carya* spp.	Hickory	10			Good		
754	*Acer saccharinum*	Silver Maple	34			Good		
755	*Ulmus americana*	American Elm	8			Fair		X
756	*Acer saccharinum*	Silver Maple	17			Good		
758	*Carya* spp.	Hickory	10			Good		
759	*Quercus velutina*	Black Oak	17			Good		
760	*Acer saccharum*	Sugar Maple	14			Good		
761	*Quercus rubra*	Red Oak	9			Good		
762	*Quercus velutina*	Black Oak	8			Good		
763	*Robinia pseudoacacia*	Black Locust	10			Fair		
764	*Robinia pseudoacacia*	Black Locust	10			Fair		
765	*Ulmus americana*	American Elm	9			Fair		
766	*Robinia pseudoacacia*	Black Locust	9			Fair		
767	*Robinia pseudoacacia*	Black Locust	6			Good		X
768	*Platanus occidentalis*	Sycamore	13			Good		
770	*Ulmus americana*	American Elm	7			Fair		
771	*Juglans nigra*	Black Walnut	9			Good		
772	*Quercus velutina*	Black Oak	9			Good		
773	*Quercus rubra*	Red Oak	10			Good		
774	*Prunus serotina*	Black Cherry	10			Fair		
775	*Ulmus americana*	American Elm	8			Fair		
776	*Ulmus americana*	American Elm	8			Fair		
777	*Juglans nigra*	Black Walnut	29			Fair		
778	*Prunus serotina*	Black Cherry	9			Fair		
779	*Ulmus americana*	American Elm	7			Fair		
780	*Carya* spp.	Hickory	7			Fair		
781	*Quercus velutina*	Black Oak	15			Fair		
782	*Carya* spp.	Hickory	7			Fair		
783	*Juglans nigra*	Black Walnut	9			Fair		
801	*Ulmus americana*	American Elm	11			Good		X
802	*Acer* spp.	Maple	28			Good		X
803	*Ulmus americana*	American Elm	8			Fair		X
804	*Ulmus americana*	American Elm	8			Fair		X
805	*Carya glabra*	Pignut Hickory	7			Good		X
806	*Prunus serotina*	Black Cherry	11			Good		X
807	*Ulmus americana*	American Elm	7			Poor		X
808	*Quercus alba*	White Oak	27			Good		X
809	*Carya ovata*	Shagbark Hickory	23			Good		X
810	*Quercus alba*	White Oak	20			Good		X
811	*Ulmus americana*	American Elm	9			Good		X
812	*Prunus serotina*	Black Cherry	8			Poor		
813	*Prunus serotina*	Black Cherry	8			Poor		
814	*Acer rubrum*	Red Maple	8			Good		
815	*Prunus serotina*	Black Cherry	16			Fair		
816	*Prunus serotina*	Black Cherry	6			Fair		
817	*Prunus serotina*	Black Cherry	8			Good		
818	*Prunus serotina*	Black Cherry	12			Fair		
819	*Prunus serotina*	Black Cherry	7			Good		
820	*Prunus serotina*	Black Cherry	10			Fair		X
821	*Quercus alba*	White Oak	28			Good		X
822	*Quercus alba*	White Oak	26			Good		X
823	*Prunus serotina*	Black Cherry	8			Fair		
824	*Ulmus americana*	American Elm	11			Good		X
825	*Juglans nigra*	Black Walnut	24			Good		X
826	*Quercus velutina*	Black Oak	28			Good		X
827	*Ulmus americana*	American Elm	13			Good		X
828	*Carya* spp.	Hickory	24			Good		X
829	*Prunus serotina*	Black Cherry	8			Fair		X
830	*Prunus serotina*	Black Cherry	14			Fair		X
831	*Prunus serotina*	Black Cherry	13			Fair		X
832	*Quercus* spp.	Oak	36			Poor		X
833	*Prunus serotina*	Black Cherry	10			Good		X
834	*Prunus serotina*	Black Cherry	14			Good		X
835	*Prunus serotina*	Black Cherry	8			Poor		X
836	*Ulmus americana*	American Elm	12			Fair		X
837	*Quercus velutina*	Black Oak	32			Good		X
838	*Prunus serotina*	Black Cherry	8			Good		X
839	*Prunus serotina*	Black Cherry	11			Good		X
840	*Prunus serotina*	Black Cherry	8			Poor		X
841	*Prunus serotina*	Black Cherry	12			Poor		X
842	*Ulmus americana*	American Elm	9			Good		X
843	*Prunus serotina*	Black Cherry	7			Fair		X
844	*Quercus alba*	White Oak	19			Good		X
845	*Ulmus americana*	American Elm	10			Good		X
846	*Quercus alba*	White Oak	28			Good		X
847	*Prunus serotina*	Black Cherry	8			Poor		X
848	*Quercus alba*	White Oak	4			Good		X
849	*Juglans nigra*	Black Walnut	21			Good		X
850	*Carya* spp.	Hickory	8			Good		X
851	*Ulmus americana*	American Elm	8			Poor		X
852	*Juglans nigra*	Black Walnut	23			Good		X
853	*Carya* spp.	Hickory	25			Good		X
854	*Juglans nigra*	Black Walnut	8			Good		X
855	*Quercus alba*	White Oak	20			Poor		X
856	*Prunus serotina*	Black Cherry	11			Fair		X
857	*Ulmus americana*	American Elm	7			Fair		X
858	*Juglans nigra*	Black Walnut	18			Good		X
859	*Juglans nigra*	Black Walnut	20			Good		X
860	*Ulmus americana*	American Elm	6			Fair		X
861	*Prunus serotina*	Black Cherry	10			Fair		X
862	*Prunus serotina*	Black Cherry	6			Fair		X
863	*Prunus serotina*	Black Cherry	9			Fair		X
864	*Prunus serotina*	Black Cherry	9			Fair		X
865	*Prunus serotina*	Black Cherry	8			Good		X
866	*Quercus velutina*	Black Oak	27			Fair		X
867	*Prunus serotina*	Black Cherry	10			Fair		X
868	*Quercus velutina*	Black Oak	21			Good		X
869	*Ulmus americana*	American Elm	7			Fair		X
870	*Prunus serotina*	Black Cherry	12			Fair		X
871	*Ulmus americana*	American Elm	7			Fair		X
872	*Quercus alba*	White Oak	13			Very Poor		X
873	*Ulmus americana*	American Elm	7			Fair		X
874	*Quercus alba*	White Oak	24			Good		X
875	*Ulmus americana*	American Elm	10			Fair		X
876	*Prunus serotina*	Black Cherry	9			Poor		X
877	*Quercus alba*	White Oak	28			Fair		X
878	*Carya* spp.	Hickory	13			Fair		X
879	*Quercus velutina*	Black Oak	28			Fair		X
880	*Prunus serotina*	Black Cherry	8			Fair		
881	*Prunus serotina*	Black Cherry	8			Fair		
882	*Prunus serotina*	Black Cherry	9			Fair		
883	*Ulmus americana*	American Elm	18			Fair		
884	*Prunus serotina*	Black Cherry	7			Fair		
885	*Quercus velutina*	Black Oak	28			Fair		
886	*Quercus alba*	White Oak	13			Poor		
887	*Quercus velutina*	Black Oak	20			Poor		
888	*Prunus serotina*	Black Cherry	7			Fair		
889	*Quercus alba*	White Oak	21			Fair		
890	*Quercus alba*	White Oak	14			Fair		X
891	*Quercus velutina*	Black Oak	28			Fair		
892	*Prunus serotina*	Black Cherry	9			Poor		X
893	*Ulmus americana*	American Elm	15			Fair		X
894	*Acer rubrum*	Red Maple	7			Good		
895	*Ulmus americana*	American Elm	8			Good		X
896	*Quercus alba*	White Oak	22			Good		X
897	*Prunus serotina*	Black Cherry	8			Fair		X
898	*Acer rubrum*	Red Maple	7			Good		X
899	*Prunus serotina*	Black Cherry	7			Fair		X
900	*Juglans nigra*	Black Walnut	8			Fair	no bud, leaf	
901	*Quercus* spp.	Oak	28			Good		X
902	*Euonymus alata*	Winged Wahoo	6			Good		X
903	*Quercus alba*	White Oak	23			Fair		X
904	*Carya glabra*	Pignut Hickory	11			Good		X
905	*Prunus serotina*	Black Cherry	8			Fair		X
906	*Prunus serotina*	Black Cherry	6			Fair		X
907	*Quercus alba*	White Oak	14			Poor		X
908	*Carya ovata*	Shagbark Hickory	22			Good		X
909	*Carya ovata*	Shagbark Hickory	20			Good		X
910	*Quercus alba*	White Oak	16			Poor		X
911	*Ulmus americana*	American Elm	7			Good		X
912	*Carya glabra*	Pignut Hickory	21			Fair		X
913	*Carya glabra*	Pignut Hickory	18			Good		X
914	*Ulmus americana*	American Elm	9			Good		X
915	*Acer saccharum*	Sugar Maple	9			Fair		X
916	*Quercus alba*	White Oak	20			Good		X
917	*Ulmus americana*	American Elm	6			Good		X
918	*Quercus alba*	White Oak	20			Fair		X
919	*Carya* spp.	Hickory	21			Good		X
920	*Carya ovata*	Shagbark Hickory	20			Good		X
921	*Quercus alba*	White Oak	18			Good		X
922	*Quercus alba*	White Oak	22			Good		X
923	*Quercus rubra*	Red Oak	38			Good		X
924	*Ulmus americana*	American Elm	6			Poor		X
925	*Quercus velutina*	Black Oak	33			Good		X
926	*Quercus velutina*	Black Oak	30			Poor		X
927	*Carya glabra*	Pignut Hickory	14			Good		X
928	*Carya glabra*	Pignut Hickory	24			Good		X
929	*Carya glabra*	Pignut Hickory	14			Fair		X
930	*Carya glabra*	Pignut Hickory	19			Good		X
931	*Carya glabra*	Pignut Hickory	11			Fair		X
932	*Quercus alba*	White Oak	25			Fair		X
933	*Quercus alba*	White Oak	24			Poor		X
934	*Carya glabra*	Pignut Hickory	22			Good		X
935	*Ulmus americana*	American Elm	6			Good		X
936	*Quercus alba*	White Oak	26			Fair		
937	*Carya glabra*	Pignut Hickory	18			Good		
938	*Carya ovata*	Shagbark Hickory	16			Fair		
939	*Quercus rubra*	Red Oak	36			Poor		
940	*Carya glabra*	Pignut Hickory	24			Very Poor		X
941	*Quercus* spp.	Oak	25			Poor		X
942	*Carya* spp.	Hickory	43			Poor		X
943	*Carya glabra*	Pignut Hickory	20			Good		X
944	*Carya* spp.	Hickory	14			Good		X
945	*Carya glabra*	Pignut Hickory	18			Poor		X
946	*Quercus* spp.	Oak	28			Poor		X
947	*Carya* spp.	Hickory	12			Good		X
948	*Carya glabra*	Pignut Hickory	31			Good		X
949	*Carya glabra*	Pignut Hickory	24			Fair		X
950	*Carya glabra*	Pignut Hickory	18			Fair		X
951	*Quercus rubra*	Red Oak	7			Good		X
953	*Quercus rubra*	Red Oak	8			Poor		X
954	*Carya glabra*	Pignut Hickory	19			Fair		
955	*Carya glabra*	Pignut Hickory	25			Fair		
956	*Acer saccharum*	Sugar Maple	8			Good		
957	*Quercus alba*	White Oak	20			Good		X
958	*Carya glabra*	Pignut Hickory	24			Good		X
959	*Quercus rubra*	Red Oak	22			Poor		X
960	*Quercus* spp.	Oak	28			Fair		X
961	*Quercus rubra*	Red Oak	27			Poor		X
962	*Quercus alba*	White Oak	13			Fair		X
963	*Quercus alba*	White Oak	33			Fair		X
964	*Carya glabra*	Pignut Hickory	21			Fair		X
965	*Quercus rubra*	Red Oak	22			Poor		X
966	*Quercus rubra*	Red Oak	26			Fair		X
967	*Quercus rubra*	Red Oak	25			Poor		X
968	*Acer saccharum*	Sugar Maple	9			Good		X
969	*Quercus rubra*	Red Oak	28			Poor		X
970	*Carya glabra*	Pignut Hickory	14			Fair		X
971	*Carya glabra*	Pignut Hickory	26			Good		X
972	*Quercus* spp.	Oak	7			Poor		X
973	*Quercus* spp.	Oak	7			Poor		X
974	*Quercus rubra*	Red Oak	7			Fair		X
975	*Acer rubrum*	Red Maple	8			Good		
976	*Acer rubrum*	Red Maple	8			Poor		
977	*Carya glabra*	Pignut Hickory	10			Poor		
978	*Quercus rubra*	Red Oak	32			Fair		
979	*Quercus* spp.	Oak	8			Fair		X
980	*Quercus rubra*	Red Oak	9			Fair		X
981	*Quercus rubra*	Red Oak	34			Fair		X
982	*Quercus rubra*	Red Oak	13			Fair		X
983	*Quercus rubra*	Red Oak	9			Poor		X
984	*Quercus rubra*	Red Oak	8			Poor		X
985	*Quercus alba*	White Oak	39			Fair		X
986	*Quercus alba*	White Oak	23			Poor		X
987	*Prunus serotina*	Black Cherry	7			Fair		X
988	*Carya glabra*	Pignut Hickory	7			Good		X
989	*Prunus serotina*	Black Cherry	7			Poor		X
990	*Quercus rubra*	Red Oak	8			Very Poor		X
991	*Prunus serotina*	Black Cherry	10			Good		X
992	*Prunus serotina*	Black Cherry	8			Fair		X
993	*Acer rubrum*	Red Maple	13			Good		X
994	*Quercus rubra*	Red Oak	8			Fair		X
995	*Quercus* spp.	Oak	8			Poor		X
996	*Quercus rubra*	Red Oak	9			Poor		X
997	*Thuja occidentalis*	White Cedar	11			Fair		X
998	*Quercus rubra*	Red Oak	7			Poor		X
999	*Quercus rubra*	Red Oak	8			Fair		X
1000	*Quercus rubra*	Red Oak	11			Fair		X
1001	*Ulmus americana*	American Elm	26			Good		
1002	*Ulmus americana*	American Elm	14			Fair		
1003	*Pyrus communis*	Common Pear	11			Fair		
1004	*Pyrus communis*	Common Pear	17			Good		
1005	*Aesculus glabra*	Ohio Buckeye	13			Fair		
1006	*Pyrus communis*	Common Pear	8			Fair		
1007	*Pyrus communis*	Common Pear	26			Fair		
1008	*Catalpa speciosa*	Northern Catalpa	10			Poor		
1009	*Juniperus virginiana*	Red Cedar	12			Fair		
1010	*Juniperus virginiana*	Red Cedar	12			Fair		
1011	*Juniperus virginiana*	Red Cedar	17			Fair		
1012	*Acer negundo*	Boxelder	17			Fair		
1013	*Salix alba*	White Willow	23			Very Poor		
1014	*Cercis canadensis*	Redbud	11			Good		
1015	*Juglans nigra*	Black Walnut	22			Good		X
1016	*Juglans nigra*	Black Walnut	22			Good		X
1017	*Juglans nigra*	Black Walnut	9			Fair		X
1018	*Prunus serotina*	Black Cherry	15			Good		X
1019	*Quercus alba*	White Oak	8			Good		X
1020	*Populus tremuloides*	Quaking Aspen	10			Good		X
1021	*Quercus alba*	White Oak	8			Good		X
1022	*Quercus alba*	White Oak	8			Good		X
1023	*Acer negundo*	Boxelder	6			Good		X
1024	*Prunus serotina*	Black Cherry	18			Good		X
1025	*Quercus rubra*	Red Oak	7			Good		X
1026	*Catalpa speciosa*	Northern Catalpa	13			Poor		X
1027	*Morus alba*	White Mulberry	45			Fair		X
1028	*Juniperus virginiana*	Red Cedar	15			Good		
1029	*Cercis canadensis*	Redbud	9			Fair		
1030	*Pseudotsuga menziesii*	Douglas Fir	20			Fair		
1031	*Juniperus virginiana*	Red Cedar	16			Good		
1032	*Juniperus virginiana*	Red Cedar	18			Good		
1033	*Juniperus virginiana*	Red Cedar	15			Good		
1034	*Juniperus virginiana*	Red Cedar	14			Good		
1035	*Catalpa speciosa*	Northern Catalpa	42			Poor		
1036	*Magnolia x soulangeana*	Chinese Magnolia	8			Good		
1037	*Catalpa speciosa*	Northern Catalpa	22			Poor		
1038	*Catalpa speciosa*	Northern Catalpa	21			Fair		
1039	*Juglans nigra*	Black Walnut	10			Fair		
1040	*Acer negundo*	Boxelder	13	7.5		Poor		
1041	*Acer negundo*	Boxelder	16			Poor		
1042	*Quercus velutina*	Black Oak	30			Good		
1043	*Juglans nigra*	Black Walnut	13			Good		
1044	*Pinus sylvestris*	Scotch Pine	8			Good		
1045	*Juniperus virginiana*	Red Cedar	6			Good		
1046	*Juglans nigra*	Black Walnut	8			Poor		
1047	*Acer negundo*	Boxelder	7			Poor		
1048	*Acer negundo*	Boxelder	9			Poor		
1049	*Juniperus virginiana*	Red Cedar	6			Good		
1050	*Acer negundo*	Boxelder	10			Fair		
1051	*Juniperus virginiana*	Red Cedar	6			Good		
1052	*Populus grandidentata*	Big-tooth Aspen	10			Fair		
1053	*Populus grandidentata*	Big-tooth Aspen	7			Fair		
1054	*Populus grandidentata*	Big-tooth Aspen	7			Fair		
1055	*Populus grandidentata*	Big-tooth Aspen	7			Fair		
1056	*Acer negundo*	Boxelder	16			Fair		
1057	*Juglans nigra*	Black Walnut	7			Very Poor		
1058	*Acer negundo*	Boxelder	7			Poor		
1059	*Acer negundo*	Boxelder	7			Poor		
1060	*Acer negundo*	Boxelder	7			Poor		
1061	*Acer negundo*	Boxelder	9	6.8		Fair		
1062	*Acer negundo*	Boxelder	6			Very Poor		
1063	*Juglans nigra*	Black Walnut	9			Fair		
1064	*Acer negundo*	Boxelder	15			Poor		
1065	*Prunus serotina*	Black Cherry	9			Poor		
1066	*Acer negundo*	Boxelder	8			Poor		
1067	*Acer negundo*	Boxelder	12			Poor		
1068	*Acer negundo*	Boxelder	7			Poor		
1069	*Juglans nigra*	Black Walnut	7			Poor		
1070	*Acer negundo*	Boxelder	8			Fair		
1071	*Acer negundo*	Boxelder	19			Fair		
1072	*Acer negundo*	Boxelder	8			Fair		
1073	*Acer negundo*	Boxelder	8			Very Poor		
1074	*Acer negundo*	Boxelder	6			Poor		
1075	*Acer negundo*	Boxelder	12	11.7		Poor		
1076	*Prunus serotina*	Black Cherry	7			Fair		
1077	*Quercus velutina*	Black Oak	11			Fair		
1078	*Acer negundo*	Boxelder	8			Dead		
1079	*Prunus serotina*	Black Cherry	6			Fair		
1080	*Juglans nigra*	Black Walnut	11			Good		
1081	*Acer negundo*	Boxelder	7			Poor		
1082	*Acer negundo*	Boxelder	10	6.1		Fair		
1083	*Acer negundo*	Boxelder	8			Poor		
1084	*Acer negundo*	Boxelder	6			Fair		
1085	*Acer negundo*	Boxelder	9			Poor		
1086	*Juglans nigra*	Black Walnut	6			Fair		
1087	*Acer negundo*	Boxelder	6			Very Poor		
1088	*Prunus serotina*	Black Cherry	9			Fair		
1089	*Acer negundo*	Boxelder	11			Fair		
1090	*Acer negundo*	Boxelder	12			Fair		
1091	*Acer negundo*	Boxelder	10	8.5		Fair		
1092	*Acer negundo*	Boxelder	16			Fair		
1093	*Acer negundo*	Boxelder	14	10.7		Good		
1094	*Acer negundo*	Boxelder	7			Poor		
1095	*Acer negundo*	Boxelder	10	7.4		Very Poor		
1096	*Acer negundo*	Boxelder	16			Fair		
1097	*Acer negundo*	Boxelder	19			Fair		
1098	*Acer negundo*	Boxelder	8			Fair		
1099	*Prunus serotina*	Black Cherry	8			Good		
1100	*Acer negundo*	Boxelder	7			Fair		
1101	*Acer negundo*	Boxelder	7			Poor		
1102	*Acer negundo*	Boxelder	10	6.2	6.2	Poor		
1103	*Acer negundo*	Boxelder	9			Poor		
1104	*Acer negundo*	Boxelder	8			Poor		
1105	*Acer negundo*	Boxelder	9			Fair		
1106	*Acer negundo*	Boxelder	10			Good		
1107	*Acer negundo*	Boxelder	9	8.1		Fair		
1108	*Acer negundo*	Boxelder	11	10.4		Fair		
1109	*Acer negundo*	Boxelder	8			Good		
1110	*Acer negundo*	Boxelder	25			Good		
1111	*Acer negundo*	Boxelder	11	7.6		Fair		
1112	*Acer negundo*	Boxelder	8			Fair		
1113	*Acer negundo*	Boxelder	10			Poor		
1114	*Acer negundo*	Boxelder	7			Poor		
1115	*Acer negundo*	Boxelder	8	7.0		Poor		
1116	*Acer negundo*	Boxelder	7			Very Poor		
1117	*Acer negundo*	Boxelder	10			Very Poor		
1118	*Acer negundo*	Boxelder	7			Poor		
1119	*Acer negundo*	Boxelder	8			Poor		
1120	*Acer negundo*	Boxelder	6			Very Poor		
1121	*Acer negundo*	Boxelder	10			Poor		
1122	*Morus alba*	White Mulberry	40			Fair		
1123	*Juglans nigra*	Black Walnut	12			Fair		
1124	*Juglans nigra*	Black Walnut	25			Fair		
1125	*Acer negundo*	Boxelder	18			Fair		
1126	*Acer negundo*	Boxelder	12	8.8		Fair		X
1127	*Acer negundo*	Boxelder	18	9.0		Fair		X
1128	*Acer negundo*	Boxelder	12			Good		X
1129	*Acer negundo*	Boxelder	22	14.9	13.0	Fair		
1130	*Acer negundo*	Boxelder	9			Fair		
1131	*Acer negundo*	Boxelder	25			Fair		
1132	*Acer negundo*	Boxelder	9			Poor		
1133	*Quercus alba*	White Oak	9			Good		X
1134	*Robinia pseudoacacia*	Black Locust	16			Good		X
1135	*Acer negundo*	Boxelder	24			Good		X
1136	*Acer negundo*	Boxelder	12			Good		X
1137	*Robinia pseudoacacia*	Black Locust	14			Fair		X
1138	*Acer negundo*	Boxelder	32			Good		X
1139	*Ulmus pumilia*	Siberian Elm	15			Fair		X
1140	*Juniperus virginiana*	Red Cedar	7			Good		X
1141	*Quercus velutina*	Black Oak	11			Good		X
1142	*Quercus velutina*	Black Oak	54			Fair		X
1143	*Prunus serotina*	Black Cherry	26			Fair		X
1144	*Quercus velutina*	Black Oak	9			Good		X
1145	*Quercus velutina*	Black Oak	17			Fair		X
1146	*Quercus alba*	White Oak	24			Fair		
1147	*Quercus alba*	White Oak	25			Fair		
1148	*Quercus alba*	White Oak	26			Fair		
1149	*Prunus serotina*	Black Cherry	8			Poor		
1150	*Quercus alba*	White Oak	33			Fair		
1151	*Quercus alba*	White Oak	25			Fair		
1152	*Quercus alba*	White Oak	24			Fair		
1153	*Quercus alba*	White Oak	27			Fair		
1154	*Prunus serotina*	Black Cherry	7			Fair		
1155	*Prunus serotina*	Black Cherry	9			Fair		
1156	*Prunus serotina*	Black Cherry	12			Fair		
1157	*Malus pumila*	Apple	9			Good		
1158	*Quercus alba*	White Oak	25			Fair		
1159	*Quercus alba*	White Oak	20			Fair		
1160	*Prunus serotina*	Black Cherry	11			Good		
1161	*Quercus alba*	White Oak	32			Fair		
1162	*Quercus alba*	White Oak	13			Fair		
1163	*Prunus serotina*	Black Cherry	7			Fair		
1164	*Prunus serotina*	Black Cherry	7			Very Poor		
1165	*Malus pumila*	Apple	6			Good		
1166	*Prunus serotina*	Black Cherry	6			Poor		
1167	*Ulmus americana*	American Elm	13			Good		
1168	*Quercus velutina*	Black Oak	33			Fair		
1169	*Carya ovata*	Shagbark Hickory	11			Good		
1170	*Quercus velutina*	Black Oak	30			Fair		
1171	*Quercus velutina*	Black Oak	8			Fair		X
1172	*Quercus velutina*	Black Oak	8			Good		X
1173	*Prunus serotina*	Black Cherry	6			Fair		X
1174	*Quercus velutina*	Black Oak	10			Good		X
1175	*Quercus velutina*	Black Oak	9			Fair		X
1176	*Quercus velutina*	Black Oak	7			Poor		X
1177	*Prunus serotina*	Black Cherry	6			Good		X
1178	*Prunus serotina*	Black Cherry	13			Poor		X
1179	*Ulmus americana*	American Elm	7			Fair		X
1180	*Robinia pseudoacacia*	Black Locust	13			Good		X
1181	*Prunus serotina*	Black Cherry	9			Fair		X
1182	*Morus alba*	White Mulberry	7			Poor		X
1183	*Prunus serotina*	Black Cherry	6			Fair		X
1184	*Acer negundo*	Boxelder	13			Poor		X
1185	*Acer negundo*	Boxelder	9			Fair		X
1186	*Acer negundo*	Boxelder	8			Good		X
1187	*Prunus serotina*	Black Cherry	7			Good		X
1188	*Acer negundo*	Boxelder	11			Fair		X
1189	*Robinia pseudoacacia*	Black Locust	13			Fair		X
1190	*Acer negundo*	Boxelder	7			Fair		X
1191	*Acer negundo*	Boxelder	7			Fair		X
1192	*Acer negundo*	Boxelder	7			Fair		X
1193	*Acer negundo*	Boxelder	8			Fair		X
1194	*Carya glabra*	Pignut Hickory	40			Poor	has heartrot	X
1195	*Carya glabra*	Pignut Hickory	69			Good		X
1196	*Prunus serotina*	Black Cherry	7			Good		X
1197	*Quercus velutina*	Black Oak	9			Fair		X
1198	*Prunus serotina*	Black Cherry	13			Fair		X
1199	*Prunus serotina*	Black Cherry	11			Fair		X
1200	*Acer negundo*	Boxelder	9			Fair		X
1201	*Prunus serotina*	Black Cherry	9			Fair		X
1202	*Prunus serotina*	Black Cherry	12			Fair		X
1203	*Acer negundo*	Boxelder	6			Fair		X
1204	*Quercus velutina*	Black Oak	8			Fair		X
1205	*Prunus serotina*	Black Cherry	11			Fair		X
1206	*Acer negundo*	Boxelder	21			Poor		X
1207	*Prunus serotina*	Black Cherry	9			Fair		X
1208	*Acer negundo*	Boxelder	13			Fair		X
1209	*Acer negundo*	Boxelder	9			Fair		X
1210	*Quercus velutina*	Black Oak	13			Fair		X
1211	*Ailanthus altissima*	Tree-of-Heaven	12			Fair		X
1212	*Robinia pseudoacacia*	Black Locust	10	6.7		Fair		X
1213	*Platanus occidentalis*	Sycamore	11	9.9		Good		X
1214	*Robinia pseudoacacia*	Black Locust	6			Fair		X
1215	*Prunus serotina*	Black Cherry	12			Fair		X
1216	*Robinia pseudoacacia*	Black Locust	7			Fair		X
1217	*Prunus serotina*	Black Cherry	12			Fair		X
1218	*Prunus serotina*	Black Cherry	8			Fair		X
1219	*Robinia pseudoacacia*	Black Locust	18			Good		X
1220	*Prunus serotina*	Black Cherry	15			Fair		X
1221	*Acer negundo*	Boxelder	7			Fair		X
1222	*Carya ovata*	Shagbark Hickory	13			Good		X
1223	*Quercus ellipsoidalis*	Northern Pin Oak	39			Good		X
1224	*Quercus velutina*	Black Oak	7			Good		X
1225	*Quercus alba*	White Oak	26			Good		
1226	*Ulmus americana*	American Elm	16			Fair		
1227	*Carya glabra*	Pignut Hickory	58			Fair		
1228	*Juniperus virginiana*	Red Cedar	13			Good		
1229	*Morus alba*	White Mulberry	14			Good		
1230	*Prunus serotina*	Black Cherry	12			Fair		
1231	*Morus alba*	White Mulberry	13			Poor		
1232	*Ulmus americana*	American Elm	32			Good		
1233	*Quercus ellipsoidalis*	Northern Pin Oak	8			Fair		
1234	*Populus deltoides*	Cottonwood	9			Fair		
1236	*Quercus ellipsoidalis*	Northern Pin Oak	22			Fair		
1238	*Malus pumila*	Apple	11	10.3		Fair		
1239	*Acer negundo*	Boxelder	14			Fair		
1240	*Prunus serotina*	Black Cherry	11			Good		
1241	*Acer negundo*	Boxelder	25			Fair		
1242	*Morus alba*	White Mulberry	10			Fair		
1243	*Acer negundo*	Boxelder	16			Poor		
1244	*Juniperus virginiana*	Red Cedar	16			Good		
1245	*Quercus ellipsoidalis*	Northern Pin Oak	24			Fair		
1246	*Carya glabra*	Pignut Hickory	12			Good		
1247	*Carya glabra*	Pignut Hickory	16			Good		
1248	*Carya glabra*	Pignut Hickory	11			Fair		
1249	*Carya glabra*	Pignut Hickory	7			Good		
1250	*Morus alba*	White Mulberry	7			Fair		
1251	*Juniperus virginiana*	Red Cedar	9			Good		
1252	*Juniperus virginiana*	Red Cedar	10			Good		
1253	*Carya glabra*	Pignut Hickory	8			Fair		
1254	*Quercus alba*	White Oak	11			Fair		
1255	*Quercus ellipsoidalis*	Northern Pin Oak	20			Fair		
1256	*Quercus ellipsoidalis*	Northern Pin Oak	8			Poor		

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Surveying • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE

OPEN SPACE PUD DEVELOPMENT
TREE LIST 1

14

JOB No. 18037
DATE: 8/29/18
SHEET 14 OF 19
CADD:
ENG: JCA, TPH
PM: RCW
TECH:
18037EX2.dwg

REVISIONS: PER TOWNSHIP COMMENTS — DATE: 11/19/18

M:\Civil3d_Proj\18037\Preliminary Site Plan\18037EX2.dwg, 11/19/2018 3:47 PM, Rachel D. Wardmacher, TREE LIST1, MCLLC PDF.pc3

1257	*Quercus ellipsoidalis*	Northern Pin Oak	29			Good		
1258	*Quercus ellipsoidalis*	Northern Pin Oak	23			Good		
1259	*Quercus ellipsoidalis*	Northern Pin Oak	19			Fair		
1260	*Carya glabra*	Pignut Hickory	8			Fair		
1261	*Carya glabra*	Pignut Hickory	13			Fair		
1262	*Carya glabra*	Pignut Hickory	6			Fair		
1263	*Carya glabra*	Pignut Hickory	8			Good		
1264	*Malus pumila*	Apple	11			Good		
1265	*Carya glabra*	Pignut Hickory	6			Fair		
1266	*Carya glabra*	Pignut Hickory	12			Good		
1267	*Carya glabra*	Pignut Hickory	8			Fair		
1268	*Carya glabra*	Pignut Hickory	8	7.6		Fair		
1269	*Carya glabra*	Pignut Hickory	11			Fair		
1270	*Carya glabra*	Pignut Hickory	9			Fair		
1271	*Carya glabra*	Pignut Hickory	10			Fair		
1272	*Carya glabra*	Pignut Hickory	10			Fair		
1273	*Carya glabra*	Pignut Hickory	6			Fair		
1274	*Carya ovata*	Shagbark Hickory	13			Good		
1275	*Carya glabra*	Pignut Hickory	14			Good		
1276	*Carya glabra*	Pignut Hickory	9			Good		
1277	*Carya ovata*	Shagbark Hickory	9			Good		
1278	*Malus pumila*	Apple	15			Good		
1279	*Carya glabra*	Pignut Hickory	14			Good		
1280	*Carya glabra*	Pignut Hickory	23			Good		
1281	*Acer ginnala*	Amur Maple	12	8.1		Good		
1282	*Carya glabra*	Pignut Hickory	32			Good		
1283	*Quercus ellipsoidalis*	Northern Pin Oak	22			Fair		
1284	*Carya glabra*	Pignut Hickory	16			Fair		
1285	*Carya glabra*	Pignut Hickory	9			Fair		
1286	*Carya glabra*	Pignut Hickory	9			Fair		
1287	*Carya glabra*	Pignut Hickory	20			Fair		
1288	*Carya glabra*	Pignut Hickory	11			Fair		
1289	*Juniperus virginiana*	Red Cedar	7			Good		
1290	*Juniperus virginiana*	Red Cedar	8			Good		
1291	*Juglans nigra*	Black Walnut	14			Good		
1292	*Juglans nigra*	Black Walnut	17			Good		
1293	*Juglans nigra*	Black Walnut	7			Good		
1294	*Carya glabra*	Pignut Hickory	32			Good		
1295	*Quercus ellipsoidalis*	Northern Pin Oak	13			Fair		
1296	*Quercus alba*	White Oak	9			Poor		
1297	*Carya glabra*	Pignut Hickory	7			Fair		
1298	*Juniperus virginiana*	Red Cedar	8			Good		
1299	*Quercus alba*	White Oak	7			Poor		
1300	*Quercus alba*	White Oak	8			Poor		
1301	*Quercus alba*	White Oak	7			Fair		
1302	*Prunus serotina*	Black Cherry	7			Fair		
1303	*Quercus ellipsoidalis*	Northern Pin Oak	26			Fair		
1304	*Prunus serotina*	Black Cherry	7			Fair		
1305	*Quercus alba*	White Oak	45			Good		
1306	*Carya glabra*	Pignut Hickory	27			Good		
1307	*Malus pumila*	Apple	9			Good		
1307	*Prunus serotina*	Black Cherry	20			Good		
1308	*Rhamnus cathartica*	Common buckthorn	11			Good		
1309	*Quercus ellipsoidalis*	Northern Pin Oak	16			Fair		
1310	*Quercus ellipsoidalis*	Northern Pin Oak	7			Very Poor		
1311	*Carya glabra*	Pignut Hickory	16			Fair		
1312	*Carya glabra*	Pignut Hickory	24			Fair		
1313	*Carya glabra*	Pignut Hickory	7			Fair		
1314	*Carya glabra*	Pignut Hickory	15			Fair		
1315	*Prunus serotina*	Black Cherry	26			Good		
1316	*Carya glabra*	Pignut Hickory	13	11.9	11.3	Fair		
1317	*Quercus ellipsoidalis*	Northern Pin Oak	20			Good		
1318	*Prunus serotina*	Black Cherry	19			Good		
1319	*Juniperus virginiana*	Red Cedar	13			Good		
1320	*Juglans nigra*	Black Walnut	7			Fair		
1321	*Prunus serotina*	Black Cherry	8			Fair		
1322	*Quercus alba*	White Oak	12			Fair		
1323	*Prunus serotina*	Black Cherry	6			Fair		
1324	*Juniperus virginiana*	Red Cedar	7			Good		
1325	*Prunus serotina*	Black Cherry	17			Fair		
1326	*Juniperus virginiana*	Red Cedar	11			Good		
1327	*Malus pumila*	Apple	26			Good		
1328	*Acer ginnala*	Amur Maple	18			Good		
1329	*Juniperus virginiana*	Red Cedar	6			Fair		
1330	*Acer platanoides*	Norway Maple	13			Good		
1331	*Prunus serotina*	Black Cherry	13			Fair		
1332	*Prunus serotina*	Black Cherry	10			Fair		
1333	*Acer negundo*	Boxelder	7			Poor		
1334	*Quercus ellipsoidalis*	Northern Pin Oak	8			Poor		
1335	*Quercus ellipsoidalis*	Northern Pin Oak	24			Fair		
1336	*Carya glabra*	Pignut Hickory	7			Fair		
1337	*Carya ovata*	Shagbark Hickory	14			Fair		
1338	*Carya glabra*	Pignut Hickory	6			Fair		
1339	*Carya glabra*	Pignut Hickory	9			Good		
1340	*Carya glabra*	Pignut Hickory	7			Fair		
1341	*Carya glabra*	Pignut Hickory	16			Fair		
1342	*Carya glabra*	Pignut Hickory	8			Good		
1343	*Quercus ellipsoidalis*	Northern Pin Oak	25			Fair		
1344	*Carya glabra*	Pignut Hickory	10			Good		
1345	*Carya glabra*	Pignut Hickory	9			Good		
1346	*Malus pumila*	Apple	10			Fair		
1347	*Carya glabra*	Pignut Hickory	14			Good		
1348	*Carya glabra*	Pignut Hickory	6			Fair		
1349	*Quercus ellipsoidalis*	Northern Pin Oak	16			Fair		
1350	*Carya glabra*	Pignut Hickory	9			Fair		
1351	*Carya glabra*	Pignut Hickory	7			Fair		
1352	*Carya glabra*	Pignut Hickory	12			Fair		
1353	*Carya glabra*	Pignut Hickory	11			Fair		
1354	*Malus pumila*	Apple	7			Good		
1355	*Malus pumila*	Apple	7			Good		
1356	*Malus pumila*	Apple	9	8.7		Good		
1357	*Juniperus virginiana*	Red Cedar	13			Good		
1358	*Malus pumila*	Apple	7			Good		
1359	*Acer negundo*	Boxelder	10			Fair		
1360	*Acer negundo*	Boxelder	9			Fair		
1361	*Acer negundo*	Boxelder	9			Fair		
1362	*Robinia pseudoacacia*	Black Locust	11	11.0	9.0	Fair		
1363	*Robinia pseudoacacia*	Black Locust	14			Fair		
1364	*Juglans nigra*	Black Walnut	6			Fair		
1365	*Robinia pseudoacacia*	Black Locust	9			Fair		
1366	*Acer negundo*	Boxelder	7			Fair		
1367	*Juglans nigra*	Black Walnut	6			Poor		
1368	*Quercus ellipsoidalis*	Northern Pin Oak	36			Good		
1369	*Acer negundo*	Boxelder	15			Good		
1370	*Acer negundo*	Boxelder	24			Fair		
1371	*Acer negundo*	Boxelder	15			Fair		
1372	*Juglans nigra*	Black Walnut	11			Fair		
1373	*Acer negundo*	Boxelder	10	9.4	7.0	Poor		
1374	*Acer negundo*	Boxelder	8			Poor		
1375	*Juglans nigra*	Black Walnut	7			Good		
1376	*Acer negundo*	Boxelder	11	7.7		Fair		
1377	*Prunus serotina*	Black Cherry	12			Good		
1378	*Acer negundo*	Boxelder	10			Good		
1379	*Juglans nigra*	Black Willow	37			Poor		
1380	*Acer negundo*	Boxelder	10			Fair		
1381	*Prunus serotina*	Black Cherry	24			Fair		
1382	*Ulmus americana*	American Elm	6			Good		
1383	*Acer negundo*	Boxelder	32			Fair		
1384	*Acer negundo*	Boxelder	8	7.4		Fair		
1385	*Acer negundo*	Boxelder	6			Fair		
1386	*Acer negundo*	Boxelder	7			Fair		
1387	*Robinia pseudoacacia*	Black Locust	15			Fair		
1388	*Robinia pseudoacacia*	Black Locust	8			Fair		
1389	*Acer negundo*	Boxelder	9			Fair		
1390	*Acer negundo*	Boxelder	7			Fair		
1391	*Acer negundo*	Boxelder	9	7.5		Fair		X
1392	*Acer negundo*	Boxelder	7			Fair		X
1393	*Acer negundo*	Boxelder	7			Fair		X
1394	*Acer negundo*	Boxelder	7			Fair		X
1395	*Robinia pseudoacacia*	Black Locust	10			Fair		X
1396	*Robinia pseudoacacia*	Black Locust	8	7.5		Fair		X
1397	*Acer negundo*	Boxelder	7	6.8		Poor		X
1398	*Acer negundo*	Boxelder	10	8.0		Fair		X
1399	*Robinia pseudoacacia*	Black Locust	18			Fair		
1400	*Acer negundo*	Boxelder	9			Fair		
1401	*Acer negundo*	Boxelder	9			Fair		
1402	*Acer negundo*	Boxelder	12			Fair		
1403	*Ulmus americana*	American Elm	7			Poor		
1404	*Acer negundo*	Boxelder	29			Fair		
1405	*Acer negundo*	Boxelder	11			Fair		
1406	*Acer negundo*	Boxelder	11	10.1		Fair		
1407	*Acer negundo*	Boxelder	30			Fair		
1408	*Acer negundo*	Boxelder	8			Fair		
1409	*Quercus ellipsoidalis*	Northern Pin Oak	14			Poor		X
1410	*Quercus ellipsoidalis*	Northern Pin Oak	8			Fair		X
1411	*Acer negundo*	Boxelder	9			Fair		X
1412	*Acer negundo*	Boxelder	8			Fair		X
1413	*Acer negundo*	Boxelder	8			Fair		X
1414	*Acer negundo*	Boxelder	11			Fair		X
1415	*Acer negundo*	Boxelder	6			Fair		X
1416	*Acer negundo*	Boxelder	7			Poor		X
1417	*Malus pumila*	Apple	7			Good		X
1418	*Prunus serotina*	Black Cherry	26			Good		X
1419	*Quercus ellipsoidalis*	Northern Pin Oak	7			Fair		X
1420	*Quercus velutina*	Black Oak	13			Good		X
1421	*Prunus serotina*	Black Cherry	9			Good		X
1422	*Juniperus virginiana*	Red Cedar	8			Fair		X
1423	*Malus pumila*	Apple	8			Fair		X
1424	*Quercus ellipsoidalis*	Northern Pin Oak	11			Good		X
1425	*Prunus serotina*	Black Cherry	14			Good		X
1426	*Prunus serotina*	Black Cherry	12			Fair		
1427	*Juniperus virginiana*	Red Cedar	7			Fair		
1428	*Juniperus virginiana*	Red Cedar	14			Good		
1429	*Quercus ellipsoidalis*	Northern Pin Oak	10			Fair		
1430	*Quercus ellipsoidalis*	Northern Pin Oak	18			Fair		
1431	*Prunus serotina*	Black Cherry	10			Fair		
1432	*Quercus ellipsoidalis*	Northern Pin Oak	8			Good		
1433	*Prunus serotina*	Black Cherry	13			Fair		
1434	*Quercus ellipsoidalis*	Northern Pin Oak	19			Good		
1435	*Quercus ellipsoidalis*	Northern Pin Oak	18			Good		
1436	*Quercus ellipsoidalis*	Northern Pin Oak	10			Fair		
1437	*Prunus serotina*	Black Cherry	12			Poor		
1438	*Quercus ellipsoidalis*	Northern Pin Oak	20			Fair		
1439	*Quercus ellipsoidalis*	Northern Pin Oak	36			Fair		
1440	*Prunus serotina*	Black Cherry	16			Fair		
1441	*Prunus serotina*	Black Cherry	7			Fair		
1442	*Prunus serotina*	Black Cherry	25			Fair		
1443	*Carya glabra*	Pignut Hickory	9			Good		
1444	*Carya glabra*	Pignut Hickory	12			Good		
1445	*Prunus serotina*	Black Cherry	21			Fair		
1446	*Prunus serotina*	Black Cherry	11			Good		X
1447	*Juniperus virginiana*	Red Cedar	10			Good		X
1448	*Acer negundo*	Boxelder	9			Fair		X
1449	*Robinia pseudoacacia*	Black Locust	7			Fair		X
1450	*Carya glabra*	Pignut Hickory	35			Good		X
1451	*Acer negundo*	Boxelder	11			Fair		X
1452	*Acer negundo*	Boxelder	8			Fair		X
1453	*Acer negundo*	Boxelder	7			Fair		X
1454	*Quercus ellipsoidalis*	Northern Pin Oak	11			Fair		X
1455	*Acer negundo*	Boxelder	10			Fair		X
1456	*Morus alba*	White Mulberry	9			Fair		X
1457	*Acer negundo*	Boxelder	7			Fair		X
1458	*Acer negundo*	Boxelder	7			Fair		X
1459	*Acer negundo*	Boxelder	10			Fair		X
1460	*Acer negundo*	Boxelder	10			Fair		X
1461	*Acer negundo*	Boxelder	9			Fair		X
1462	*Prunus serotina*	Black Cherry	11			Good		X
1463	*Malus pumila*	Apple	8			Good		X
1464	*Malus pumila*	Apple	20	12.5		Good		X
1465	*Prunus serotina*	Black Cherry	18			Good		X
1466	*Juniperus virginiana*	Red Cedar	13			Good		X
1467	*Prunus serotina*	Black Cherry	14	13.0		Good		X
1468	*Malus pumila*	Apple	11			Good		X
1469	*Juniperus virginiana*	Red Cedar	12			Good		X
1470	*Juniperus virginiana*	Red Cedar	13			Good		X
1471	*Quercus ellipsoidalis*	Northern Pin Oak	13			Good		X
1472	*Malus pumila*	Apple	11			Good		X
1473	*Juniperus virginiana*	Red Cedar	9			Good		X
1474	*Juniperus virginiana*	Red Cedar	14			Good		X
1475	*Juniperus virginiana*	Red Cedar	10			Fair		X
1476	*Quercus ellipsoidalis*	Northern Pin Oak	12			Fair		X
1477	*Prunus serotina*	Black Cherry	18			Good		X
1478	*Malus pumila*	Apple	11			Good		X
1479	*Prunus serotina*	Black Cherry	9			Good		X
1480	*Prunus serotina*	Black Cherry	16			Good		X
1481	*Juniperus virginiana*	Red Cedar	14			Good		X
1482	*Quercus ellipsoidalis*	Northern Pin Oak	24			Good		
1483	*Malus pumila*	Apple	6			Fair		X
1484	*Quercus ellipsoidalis*	Northern Pin Oak	21			Good		X
1485	*Prunus serotina*	Black Cherry	16			Good		X
1486	*Salix alba*	White Willow	15			Good		
1487	*Prunus serotina*	Black Cherry	17			Good		
1488	*Malus pumila*	Apple	11			Fair		
1489	*Salix alba*	White Willow	13			Good		
1490	*Juniperus virginiana*	Red Cedar	11			Good		
1491	*Prunus serotina*	Black Cherry	12			Good		X
1492	*Prunus serotina*	Black Cherry	10			Good		X
1493	*Juniperus virginiana*	Red Cedar	14			Good		X
1494	*Carya glabra*	Pignut Hickory	10			Good		X
1495	*Juniperus virginiana*	Red Cedar	11			Good		
1496	*Quercus ellipsoidalis*	Northern Pin Oak	19			Good		
1497	*Quercus ellipsoidalis*	Northern Pin Oak	10			Good		
1498	*Quercus ellipsoidalis*	Northern Pin Oak	16			Good		
1499	*Juniperus virginiana*	Red Cedar	13			Good		
1500	*Salix alba*	White Willow	11			Good		
1501	*Amelanchier arborea*	Juneberry	10	9.0		Good		
1502	*Juniperus virginiana*	Red Cedar	8			Good		
1503	*Quercus ellipsoidalis*	Northern Pin Oak	8			Good		
1504	*Prunus serotina*	Black Cherry	23			Good		
1505	*Prunus serotina*	Black Cherry	15			Fair		
1506	*Carya glabra*	Pignut Hickory	9			Good		
1507	*Prunus serotina*	Black Cherry	6			Fair		
1508	*Salix alba*	White Willow	10			Good		
1509	*Salix discolor*	Pussy Willow	7			Fair		
1510	*Malus pumila*	Apple	11			Good		X
1511	*Malus pumila*	Apple	10	7.6		Good		X
1512	*Prunus serotina*	Black Cherry	21			Fair		X
1513	*Quercus ellipsoidalis*	Northern Pin Oak	13			Fair		X
1514	*Juniperus virginiana*	Red Cedar	8			Good		X
1515	*Malus pumila*	Apple	11			Good		X
1516	*Prunus serotina*	Black Cherry	14			Good		X
1517	*Juniperus virginiana*	Red Cedar	9			Good		X
1518	*Malus pumila*	Apple	8			Good		X
1519	*Prunus serotina*	Black Cherry	8			Good		X
1520	*Juniperus virginiana*	Red Cedar	13			Good		X
1521	*Prunus serotina*	Black Cherry	10			Good		X
1522	*Malus pumila*	Apple	12			Good		X
1523	*Juniperus virginiana*	Red Cedar	6			Fair		X
1524	*Juniperus virginiana*	Red Cedar	8			Fair		X
1525	*Prunus serotina*	Black Cherry	17			Fair		X
1526	*Malus pumila*	Apple	8			Fair		X
1527	*Prunus serotina*	Black Cherry	18			Fair		X
1528	*Malus pumila*	Apple	8			Good		X
1529	*Prunus serotina*	Black Cherry	15			Good		X
1530	*Prunus serotina*	Black Cherry	7			Good		X
1531	*Quercus ellipsoidalis*	Northern Pin Oak	16			Good		X
1532	*Juniperus virginiana*	Red Cedar	9			Fair		X
1533	*Juniperus virginiana*	Red Cedar	10			Good		X
1534	*Prunus serotina*	Black Cherry	11			Fair		X
1535	*Acer rubrum*	Red Maple	29			Fair		X
1536	*Quercus ellipsoidalis*	Northern Pin Oak	22			Good		X
1537	*Quercus ellipsoidalis*	Northern Pin Oak	16			Fair		X
1538	*Quercus ellipsoidalis*	Northern Pin Oak	14			Fair		X
1539	*Juniperus virginiana*	Red Cedar	8			Fair		X
1540	*Juniperus virginiana*	Red Cedar	10			Fair		X
1541	*Quercus ellipsoidalis*	Northern Pin Oak	11			Poor		X
1542	*Quercus ellipsoidalis*	Northern Pin Oak	7			Fair		X
1543	*Quercus ellipsoidalis*	Northern Pin Oak	18			Fair		X
1544	*Prunus serotina*	Black Cherry	9			Fair		X
1545	*Quercus ellipsoidalis*	Northern Pin Oak	15			Fair		X
1546	*Quercus ellipsoidalis*	Northern Pin Oak	16			Fair		X
1547	*Quercus ellipsoidalis*	Northern Pin Oak	25			Fair		X
1548	*Juniperus virginiana*	Red Cedar	15			Good		X
1549	*Quercus ellipsoidalis*	Northern Pin Oak	16			Fair		X
1550	*Prunus serotina*	Black Cherry	14			Good		X
1551	*Juniperus virginiana*	Red Cedar	8			Good		X
1552	*Prunus serotina*	Black Cherry	10			Good		X
1553	*Juniperus virginiana*	Red Cedar	9			Good		X
1554	*Juniperus virginiana*	Red Cedar	9			Good		X
1555	*Juniperus virginiana*	Red Cedar	6			Good		X
1556	*Juniperus virginiana*	Red Cedar	7			Good		X
1557	*Prunus serotina*	Black Cherry	8			Good		
1558	*Prunus serotina*	Black Cherry	11			Good		
1559	*Acer rubrum*	Red Maple	28			Good		
1560	*Prunus serotina*	Black Cherry	15			Fair		
1561	*Prunus serotina*	Black Cherry	8			Fair		
1562	*Quercus ellipsoidalis*	Northern Pin Oak	22			Good		X
1563	*Quercus ellipsoidalis*	Northern Pin Oak	7			Good		
1564	*Prunus serotina*	Black Cherry	7			Poor		
1565	*Prunus serotina*	Black Cherry	10			Good		
1566	*Prunus serotina*	Black Cherry	7			Good		
1567	*Juniperus virginiana*	Red Cedar	15			Fair		X
1568	*Ulmus americana*	American Elm	6			Fair		X
1569	*Juniperus virginiana*	Red Cedar	10			Fair		X
1570	*Ulmus americana*	American Elm	6			Fair		X
1571	*Prunus serotina*	Black Cherry	14			Fair		X
1572	*Juniperus virginiana*	Red Cedar	13			Fair		X
1573	*Prunus serotina*	Black Cherry	24			Good		X
1574	*Pinus sylvestris*	Scotch Pine	18			Fair		X
1575	*Prunus serotina*	Black Cherry	19			Good		X
1576	*Prunus serotina*	Black Cherry	15			Good		X
1577	*Quercus ellipsoidalis*	Northern Pin Oak	10			Fair		X
1578	*Juniperus virginiana*	Red Cedar	10			Fair		X
1579	*Quercus ellipsoidalis*	Northern Pin Oak	9			Fair		X
1580	*Quercus ellipsoidalis*	Northern Pin Oak	16			Fair		X
1581	*Malus pumila*	Apple	7			Poor		
1582	*Prunus serotina*	Black Cherry	7			Fair		X
1583	*Carya glabra*	Pignut Hickory	8			Good		X
1584	*Prunus serotina*	Black Cherry	10			Good		X
1585	*Juniperus virginiana*	Red Cedar	11			Good		X
1586	*Juniperus virginiana*	Red Cedar	7			Good		X
1587	*Carya glabra*	Pignut Hickory	12			Fair		X
1588	*Carya glabra*	Pignut Hickory	14			Fair		X
1589	*Quercus ellipsoidalis*	Northern Pin Oak	7			Fair		X
1590	*Malus pumila*	Apple	13			Fair		X
1591	*Carya glabra*	Pignut Hickory	16			Good		X
1592	*Carya glabra*	Pignut Hickory	7			Fair		X
1593	*Prunus serotina*	Black Cherry	7			Good		X
1594	*Quercus rubra*	Red Oak	13			Fair		X
1595	*Prunus serotina*	Black Cherry	7			Good		X
1596	*Prunus serotina*	Black Cherry	12			Fair		
1597	*Quercus rubra*	Red Oak	9			Poor		
1598	*Quercus ellipsoidalis*	Northern Pin Oak	18			Fair		
1599	*Quercus ellipsoidalis*	Northern Pin Oak	18			Fair		
1600	*Quercus ellipsoidalis*	Northern Pin Oak	14			Fair		
1601	*Quercus rubra*	Red Oak	11			Fair		X
1602	*Quercus rubra*	Red Oak	10			Poor		X
1603	*Quercus rubra*	Red Oak	8			Fair		X
1604	*Quercus rubra*	Red Oak	6			Poor		X
1605	*Quercus rubra*	Red Oak	9			Fair		X
1606	*Quercus rubra*	Red Oak	6			Poor		X
1607	*Quercus rubra*	Red Oak	9			Fair		X
1608	*Quercus rubra*	Red Oak	8			Poor		X
1609	*Carya ovata*	Shagbark Hickory	23			Good		X
1610	*Quercus rubra*	Red Oak	7			Poor		X
1611	*Quercus rubra*	Red Oak	11			Fair		X
1612	*Quercus rubra*	Red Oak	8			Poor		X
1613	*Quercus rubra*	Red Oak	7			Poor		X
1614	*Quercus rubra*	Red Oak	8			Poor		X
1615	*Quercus rubra*	Red Oak	8			Very Poor		X
1616	*Quercus rubra*	Red Oak	12			Poor		X
1617	*Quercus rubra*	Red Oak	11			Poor		X
1618	*Quercus rubra*	Red Oak	8			Poor		X
1619	*Quercus rubra*	Red Oak	7			Poor		X
1620	*Quercus rubra*	Red Oak	12			Poor		X
1621	*Quercus rubra*	Red Oak	12			Poor		X
1622	*Quercus rubra*	Red Oak	6			Poor		X
1623	*Quercus spp.*	Oak	7			Poor		X
1624	*Quercus rubra*	Red Oak	8			Very Poor		X
1625	*Quercus rubra*	Red Oak	6			Poor		X
1626	*Quercus rubra*	Red Oak	7			Poor		X
1627	*Quercus rubra*	Red Oak	7			Poor		X
1628	*Quercus rubra*	Red Oak	8			Poor		X
1629	*Quercus rubra*	Red Oak	9			Good		X
1630	*Quercus rubra*	Red Oak	8			Fair		X
1631	*Quercus rubra*	Red Oak	9			Fair		X
1632	*Prunus serotina*	Black Cherry	7			Good		X
1633	*Quercus alba*	White Oak	25			Very Poor		X
1634	*Carya spp.*	Hickory	19			Very Poor		X
1635	*Quercus spp.*	Oak	6			Very Poor		X
1636	*Quercus rubra*	Red Oak	8			Fair		X
1637	*Quercus rubra*	Red Oak	8			Poor		X
1638	*Quercus spp.*	Oak	17			Fair		X
1639	*Quercus rubra*	Red Oak	8			Fair		X
1640	*Quercus velutina*	Black Oak	7			Fair		X
1641	*Quercus spp.*	Oak	10			Poor		X
1642	*Quercus spp.*	Oak	11			Poor		X
1643	*Quercus spp.*	Oak	7			Poor		X
1644	*Quercus rubra*	Red Oak	9			Poor		X
1645	*Quercus rubra*	Red Oak	8			Poor		X
1646	*Quercus rubra*	Red Oak	7			Fair		X
1647	*Quercus rubra*	Red Oak	8			Poor		X
1648	*Quercus spp.*	Oak	9			Fair		X
1649	*Quercus rubra*	Red Oak	7			Poor		X
1650	*Quercus rubra*	Red Oak	8			Fair		X
1651	*Quercus rubra*	Red Oak	6			Fair		X
1652	*Quercus rubra*	Red Oak	9			Poor		X
1653	*Quercus rubra*	Red Oak	11			Fair		X
1654	*Quercus rubra*	Red Oak	11			Fair		X
1655	*Quercus spp.*	Oak	8			Fair		X
1656	*Quercus rubra*	Red Oak	7			Fair		X
1657	*Quercus rubra*	Red Oak	8			Fair		X
1658	*Quercus rubra*	Red Oak	6			Poor		X
1659	*Quercus rubra*	Red Oak	6			Poor		X
1660	*Quercus rubra*	Red Oak	11			Fair		X
1661	*Quercus alba*	White Oak	27			Fair		
1662	*Quercus alba*	White Oak	29			Fair		
1663	*Robinia pseudoacacia*	Black Locust	7			Very Poor		
1664	*Robinia pseudoacacia*	Black Locust	10			Poor		
1665	*Robinia pseudoacacia*	Black Locust	8			Poor		X
1666	*Robinia pseudoacacia*	Black Locust	9	8.4		Fair		X
1667	*Robinia pseudoacacia*	Black Locust	7			Poor		X
1668	*Robinia pseudoacacia*	Black Locust	12			Poor		X
1669	*Robinia pseudoacacia*	Black Locust	8			Fair		X
1670	*Robinia pseudoacacia*	Black Locust	10			Poor		X
1671	*Robinia pseudoacacia*	Black Locust	11			Very Poor		
1672	*Robinia pseudoacacia*	Black Locust	8			Poor		
1673	*Robinia pseudoacacia*	Black Locust	10			Very Poor		X
1674	*Robinia pseudoacacia*	Black Locust	8	6.7		Very Poor		
1675	*Robinia pseudoacacia*	Black Locust	8			Very Poor		
1676	*Robinia pseudoacacia*	Black Locust	7			Very Poor		
1677	*Robinia pseudoacacia*	Black Locust	10			Very Poor		X
1678	*Robinia pseudoacacia*	Black Locust	11			Poor		X
1679	*Robinia pseudoacacia*	Black Locust	8			Poor		X
1680	*Robinia pseudoacacia*	Black Locust	8			Very Poor		X
1681	*Robinia pseudoacacia*	Black Locust	9			Poor		X
1682	*Robinia pseudoacacia*	Black Locust	7			Very Poor		
1683	*Robinia pseudoacacia*	Black Locust	8			Poor		
1684	*Robinia pseudoacacia*	Black Locust	8	8.2		Fair		
1685	*Robinia pseudoacacia*	Black Locust	8			Poor		X
1686	*Robinia pseudoacacia*	Black Locust	8			Poor		
1687	*Robinia pseudoacacia*	Black Locust	8			Very Poor		
1688	*Robinia pseudoacacia*	Black Locust	6			Very Poor		
1689	*Robinia pseudoacacia*	Black Locust	9			Very Poor		
1690	*Robinia pseudoacacia*	Black Locust	7			Very Poor		
1691	*Robinia pseudoacacia*	Black Locust	10			Poor		
1692	*Robinia pseudoacacia*	Black Locust	6			Poor		
1693	*Robinia pseudoacacia*	Black Locust	9			Poor		X
1694	*Robinia pseudoacacia*	Black Locust	11			Poor		X
1695	*Robinia pseudoacacia*	Black Locust	11			Poor		
1696	*Robinia pseudoacacia*	Black Locust	7			Poor		
1697	*Robinia pseudoacacia*	Black Locust	7			Very Poor		
1698	*Robinia pseudoacacia*	Black Locust	10			Very Poor		
1699	*Robinia pseudoacacia*	Black Locust	7			Very Poor		
1700	*Robinia pseudoacacia*	Black Locust	7			Very Poor		
1701	*Robinia pseudoacacia*	Black Locust	11			Fair		
1702	*Robinia pseudoacacia*	Black Locust	7			Fair		
1703	*Robinia pseudoacacia*	Black Locust	8			Poor		
1704	*Robinia pseudoacacia*	Black Locust	6			Poor		X
1705	*Robinia pseudoacacia*	Black Locust	7			Poor		
1706	*Robinia pseudoacacia*	Black Locust	7			Poor		
1707	*Robinia pseudoacacia*	Black Locust	9			Poor		
1708	*Robinia pseudoacacia*	Black Locust	9			Poor		
1709	*Robinia pseudoacacia*	Black Locust	7			Fair		
1710	*Robinia pseudoacacia*	Black Locust	7			Very Poor		
1711	*Robinia pseudoacacia*	Black Locust	9			Very Poor		
1712	*Acer negundo*	Boxelder	8			Fair		
1713	*Robinia pseudoacacia*	Black Locust	7			Very Poor		
1714	*Robinia pseudoacacia*	Black Locust	6			Poor		
1715	*Robinia pseudoacacia*	Black Locust	7			Poor		
1716	*Robinia pseudoacacia*	Black Locust	11			Poor		
1717	*Robinia pseudoacacia*	Black Locust	13			Poor		
1718	*Robinia pseudoacacia*	Black Locust	10			Good		
1719	*Robinia pseudoacacia*	Black Locust	14			Poor		
1720	*Robinia pseudoacacia*	Black Locust	7			Fair		
1721	*Robinia pseudoacacia*	Black Locust	12			Poor		
1722	*Robinia pseudoacacia*	Black Locust	11			Fair		
1723	*Robinia pseudoacacia*	Black Locust	11			Fair		
1724	*Robinia pseudoacacia*	Black Locust	9			Very Poor		
1725	*Robinia pseudoacacia*	Black Locust	11			Fair		
1726	*Robinia pseudoacacia*	Black Locust	11			Fair		
1727	*Robinia pseudoacacia*	Black Locust	11			Fair		
1728	*Robinia pseudoacacia*	Black Locust	7			Fair		
1729	*Robinia pseudoacacia*	Black Locust	6			Fair		
1730	*Robinia pseudoacacia*	Black Locust	7			Fair		
1731	*Robinia pseudoacacia*	Black Locust	11			Fair		
1732	*Robinia pseudoacacia*	Black Locust	9			Fair		
1733	*Robinia pseudoacacia*	Black Locust	12			Poor		
1734	*Robinia pseudoacacia*	Black Locust	7			Poor		X
1735	*Robinia pseudoacacia*	Black Locust	11			Poor		X
1736	*Robinia pseudoacacia*	Black Locust	7			Poor		X
1737	*Robinia pseudoacacia*	Black Locust	19			Fair		
1738	*Robinia pseudoacacia*	Black Locust	6			Poor		X
1739	*Robinia pseudoacacia*	Black Locust	6			Poor		X
1740	*Robinia pseudoacacia*	Black Locust	7			Poor		X
1741	*Robinia pseudoacacia*	Black Locust	7			Very Poor		X
1742	*Robinia pseudoacacia*	Black Locust	6			Very Poor		X
1743	*Prunus spp.*	Cherry	8			Good		
1744	*Robinia pseudoacacia*	Black Locust	9			Very Poor		
1745	*Robinia pseudoacacia*	Black Locust	6			Very Poor		
1746	*Robinia pseudoacacia*	Black Locust	12			Fair		
1747	*Carya ovata*	Shagbark Hickory	15			Fair		X
1748	*Carya ovata*	Shagbark Hickory	17			Fair		X
1749	*Robinia pseudoacacia*	Black Locust	12			Fair		X
1750	*Carya ovata*	Shagbark Hickory	9			Fair		X
1751	*Malus pumila*	Apple	19			Fair		X
1752	*Juniperus virginiana*	Red Cedar	7			Fair		X
1753	*Carya ovata*	Shagbark Hickory	10			Fair		X
1754	*Malus pumila*	Apple	11			Fair		X
1755	*Prunus serotina*	Black Cherry	14			Fair		X
1756	*Prunus serotina*	Black Cherry	28			Fair		X
1757	*Carya ovata*	Shagbark Hickory	19			Good		X
1758	*Malus pumila*	Apple	11			Fair		X
1759	*Prunus serotina*	Black Cherry	10			Fair		X
1760	*Prunus serotina*	Black Cherry	27			Poor		X
1761	*Quercus rubra*	Red Oak	7			Fair		X
1762	*Prunus serotina*	Black Cherry	21			Fair		X
1763	*Prunus serotina*	Black Cherry	27			Fair		X
1764	*Prunus serotina*	Black Cherry	10			Fair		X
1765	*Prunus serotina*	Black Cherry	7			Fair		X
1766	*Malus pumila*	Apple	17			Fair		X
1767	*Malus pumila*	Apple	11			Fair		X
1768	*Prunus serotina*	Black Cherry	14	6.2		Fair		X
1769	*Quercus ellipsoidalis*	Northern Pin Oak	7			Fair		X
1770	*Prunus serotina*	Black Cherry	10			Fair		X
1771	*Prunus serotina*	Black Cherry	13			Fair		X
1772	*Quercus ellipsoidalis*	Northern Pin Oak	7			Fair		X
1773	*Malus pumila*	Apple	19			Fair		X
1774	*Quercus ellipsoidalis*	Northern Pin Oak	14			Fair		X
1775	*Malus pumila*	Apple	7			Dead		X
1776	*Malus pumila*	Apple	8			Fair		X
1777	*Prunus serotina*	Black Cherry	10			Fair		X
1778	*Prunus serotina*	Black Cherry	7			Poor		X
1779	*Prunus serotina*	Black Cherry	13			Fair		X
1780	*Malus pumila*	Apple	8			Fair		X
1781	*Juniperus virginiana*	Red Cedar	7			Fair		X
1782	*Prunus serotina*	Black Cherry	7			Fair		X
1783	*Malus pumila*	Apple	14			Fair		X
1784	*Malus pumila*	Apple	12			Fair		X
1785	*Juniperus virginiana*	Red Cedar	12			Fair		X
1786	*Quercus ellipsoidalis*	Northern Pin Oak	6			Fair		X
1787	*Prunus serotina*	Black Cherry	14			Fair		X
1788	*Prunus serotina*	Black Cherry	16			Fair		X
1789	*Prunus serotina*	Black Cherry	12			Fair		X
1790	*Prunus serotina*	Black Cherry	11			Fair		X
1791	*Juniperus virginiana*	Red Cedar	8			Fair		X
1792	*Juniperus virginiana*	Red Cedar	7			Fair		X

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Surveying • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE
OPEN SPACE PUD DEVELOPMENT
TREE LIST 2

15

DATE: 8/29/18
SHEET 15 OF 19
CADD:
ENG: JCA, TPH
PM: RCW
TECH:
18037EX2.dwg

REVISIONS: REV. DATE
PER TOWNSHIP COMMENTS 11/19/18

JOB No. 18037

1793	Juniperus virginiana	Red Cedar	9			Fair		X
1794	Juniperus virginiana	Red Cedar	9			Fair		X
1795	Prunus serotina	Black Cherry	10			Fair		X
1796	Juniperus virginiana	Red Cedar	10			Fair		X
1797	Juniperus virginiana	Red Cedar	12			Fair		X
1798	Juniperus virginiana	Red Cedar	8			Fair		X
1799	Juniperus virginiana	Red Cedar	11			Fair		X
1800	Quercus ellipsoidalis	Northern Pin Oak	17			Fair		X
1801	Juniperus virginiana	Red Cedar	12			Fair		X
1802	Malus pumila	Apple	21			Fair		X
1803	Juniperus virginiana	Red Cedar	7			Fair		X
1805	Juniperus virginiana	Red Cedar	13			Fair		X
1806	Juniperus virginiana	Red Cedar	11			Fair		X
1807	Prunus serotina	Black Cherry	9			Fair		X
1808	Prunus serotina	Black Cherry	9			Fair		X
1809	Juniperus virginiana	Red Cedar	16			Fair		X
1810	Malus pumila	Apple	11			Fair		X
1811	Malus pumila	Apple	12			Fair		X
1812	Malus pumila	Apple	12			Fair		X
1813	Robinia pseudoacacia	Black Locust	13			Fair		X
1814	Malus pumila	Apple	16			Dead		X
1815	Malus pumila	Apple	12			Fair		X
1816	Malus pumila	Apple	9	6.6		Fair		X
1817	Malus pumila	Apple	7			Fair		X
1818	Prunus serotina	Black Cherry	14			Fair		X
1819	Prunus serotina	Black Cherry	8			Fair		X
1820	Prunus serotina	Black Cherry	7			Fair		X
1821	Juniperus virginiana	Red Cedar	12			Fair		X
1822	Quercus ellipsoidalis	Northern Pin Oak	9			Fair		X
1823	Juniperus virginiana	Red Cedar	9			Fair		X
1824	Quercus ellipsoidalis	Northern Pin Oak	10			Fair		X
1825	Malus pumila	Apple	16			Fair		X
1826	Juniperus virginiana	Red Cedar	8			Fair		X
1827	Prunus serotina	Black Cherry	26			Fair		X
1828	Quercus ellipsoidalis	Northern Pin Oak	23			Fair		X
1829	Acer negundo	Boxelder	17	9.9		Fair		X
1830	Malus pumila	Apple	14			Fair		X
1831	Malus pumila	Apple	12			Fair		X
1832	Malus pumila	Apple	13			Fair		X
1833	Prunus serotina	Black Cherry	9			Fair		X
1834	Juniperus virginiana	Red Cedar	9			Fair		X
1835	Malus pumila	Apple	11			Fair		X
1836	Juniperus virginiana	Red Cedar	7			Fair		X
1838	Malus pumila	Apple	13			Good		X
1839	Malus pumila	Apple	11			Good		X
1840	Malus pumila	Apple	24			Good		X
1841	Malus pumila	Apple	6			Poor		X
1842	Malus pumila	Apple	6			Good		X
1843	Prunus serotina	Black Cherry	11			Good		X
1844	Prunus serotina	Black Cherry	7			Good		X
1845	Prunus serotina	Black Cherry	13			Good		X
1846	Prunus serotina	Black Cherry	7			Good		X
1847	Prunus serotina	Black Cherry	8			Good		X
1848	Prunus serotina	Black Cherry	8			Good		X
1849	Malus pumila	Apple	7			Fair		X
1850	Prunus serotina	Black Cherry	7			Fair		X
1851	Juniperus virginiana	Red Cedar	8			Fair		X
1852	Prunus serotina	Black Cherry	16			Fair		X
1853	Juniperus virginiana	Red Cedar	6			Fair		X
1854	Juniperus virginiana	Red Cedar	13			Good		X
1855	Malus pumila	Apple	13			Good		X
1856	Juniperus virginiana	Red Cedar	6			Poor		X
1857	Malus pumila	Apple	19	13.3		Fair		X
1858	Prunus serotina	Black Cherry	14			Fair		X
1859	Prunus serotina	Black Cherry	47			Poor		
1860	Robinia pseudoacacia	Black Locust	9			Fair		
1861	Robinia pseudoacacia	Black Locust	8			Fair		
1862	Robinia pseudoacacia	Black Locust	6			Fair		
1863	Robinia pseudoacacia	Black Locust	7			Fair		
1864	Robinia pseudoacacia	Black Locust	15			Good		
1865	Robinia pseudoacacia	Black Locust	15			Fair		
1866	Robinia pseudoacacia	Black Locust	6			Fair		
1867	Robinia pseudoacacia	Black Locust	17			Fair		
1868	Robinia pseudoacacia	Black Locust	22			Good		
1869	Populus deltoides	Cottonwood	17			Fair		
1870	Robinia pseudoacacia	Black Locust	9			Fair		
1871	Robinia pseudoacacia	Black Locust	12			Fair		
1872	Prunus serotina	Black Cherry	15			Good		
1873	Carya glabra	Pignut Hickory	13			Good		
1874	Robinia pseudoacacia	Black Locust	8			Fair		
1875	Robinia pseudoacacia	Black Locust	14			Fair		
1876	Robinia pseudoacacia	Black Locust	13			Fair		
1877	Robinia pseudoacacia	Black Locust	12			Fair		
1878	Robinia pseudoacacia	Black Locust	14			Poor		
1879	Robinia pseudoacacia	Black Locust	13			Fair		
1880	Quercus velutina	Black Oak	16			Poor		
1881	Robinia pseudoacacia	Black Locust	9			Fair		X
1882	Robinia pseudoacacia	Black Locust	7			Fair		X
1883	Robinia pseudoacacia	Black Locust	7			Fair		X
1884	Robinia pseudoacacia	Black Locust	7			Fair		X
1885	Prunus serotina	Black Cherry	16			Fair		X
1886	Carya glabra	Pignut Hickory	9			Good		X
1888	Robinia pseudoacacia	Black Locust	8			Fair		X
1888	Prunus serotina	Black Cherry	15			Good		
1889	Prunus serotina	Black Cherry	20			Fair		
1890	Quercus rubra	Red Oak	23			Fair		
1891	Quercus velutina	Black Oak	14			Poor		
1892	Quercus velutina	Black Oak	12			Fair		
1893	Quercus velutina	Black Oak	14			Fair		
1894	Prunus serotina	Black Cherry	11			Fair		X
1895	Acer negundo	Boxelder	9			Fair		X
1896	Acer negundo	Boxelder	13			Fair		X
1897	Prunus serotina	Black Cherry	17			Fair		X
1898	Quercus ellipsoidalis	Northern Pin Oak	11			Fair		X
1899	Carya ovata	Shagbark Hickory	10			Fair		X
1900	Prunus serotina	Black Cherry	20			Fair		X
1901	Carya ovata	Shagbark Hickory	6			Fair		X
1902	Carya ovata	Shagbark Hickory	6			Fair		X
1903	Quercus ellipsoidalis	Northern Pin Oak	7			Fair		X
1904	Malus pumila	Apple	11			Fair		X
1905	Carya ovata	Shagbark Hickory	9			Fair		X
1906	Carya ovata	Shagbark Hickory	9			Fair		X
1907	Carya ovata	Shagbark Hickory	8			Fair		X
1908	Carya ovata	Shagbark Hickory	14			Fair		X
1909	Prunus serotina	Black Cherry	10			Fair		X
1910	Prunus serotina	Black Cherry	12			Fair		X
1910	Juniperus virginiana	Red Cedar	15			Fair		X
1911	Carya ovata	Shagbark Hickory	6			Fair		X
1912	Carya ovata	Shagbark Hickory	9			Fair		X
1913	Carya ovata	Shagbark Hickory	8			Fair		X
1914	Quercus ellipsoidalis	Northern Pin Oak	10			Fair		X
1915	Carya ovata	Shagbark Hickory	8			Fair		X
1916	Carya ovata	Shagbark Hickory	8			Fair		X
1917	Carya ovata	Shagbark Hickory	6			Fair		X
1918	Carya ovata	Shagbark Hickory	10			Fair		X
1919	Carya ovata	Shagbark Hickory	9			Fair		X
1920	Carya ovata	Shagbark Hickory	7			Fair		X
1921	Prunus serotina	Black Cherry	7			Fair		X
1922	Prunus serotina	Black Cherry	11			Fair		X
1923	Carya ovata	Shagbark Hickory	32			Good		X
1924	Morus alba	White Mulberry	7			Fair		X
1925	Carya ovata	Shagbark Hickory	7			Fair		X
1926	Carya ovata	Shagbark Hickory	9			Fair		X
1927	Carya ovata	Shagbark Hickory	11			Fair		X
1928	Carya ovata	Shagbark Hickory	8			Fair		X
1929	Carya ovata	Shagbark Hickory	7			Fair		X
1930	Carya ovata	Shagbark Hickory	6			Fair		X
1931	Malus pumila	Apple	12			Fair		X
1932	Malus pumila	Apple	12			Fair		X
1933	Juniperus virginiana	Red Cedar	7			Fair		X
1934	Carya ovata	Shagbark Hickory	8			Fair		X
1935	Carya ovata	Shagbark Hickory	9			Fair		X
1936	Carya ovata	Shagbark Hickory	10	9.1		Fair		X
1937	Carya ovata	Shagbark Hickory	11			Fair		X
1938	Prunus serotina	Black Cherry	11			Fair		X
1939	Carya ovata	Shagbark Hickory	10			Fair		X
1940	Carya ovata	Shagbark Hickory	10			Fair		X
1941	Carya ovata	Shagbark Hickory	8			Fair		X
1942	Carya ovata	Shagbark Hickory	8			Fair		X
1943	Malus pumila	Apple	9			Fair		X
1944	Prunus serotina	Black Cherry	19			Fair		X
1945	Juniperus virginiana	Red Cedar	12			Fair		X
1946	Juniperus virginiana	Red Cedar	7			Fair		X
1947	Juniperus virginiana	Red Cedar	8			Fair		X
1948	Malus pumila	Apple	12			Fair		X
1949	Prunus serotina	Black Cherry	25			Fair		X
1950	Prunus serotina	Black Cherry	14			Fair		X
1951	Malus pumila	Apple	12	11.0		Fair		X
1952	Prunus serotina	Black Cherry	14			Fair		X
1953	Juniperus virginiana	Red Cedar	8			Fair		X
1954	Juniperus virginiana	Red Cedar	12			Fair		X
1955	Prunus serotina	Black Cherry	20	17.9		Fair		X
1956	Malus pumila	Apple	10			Fair		X
1957	Juniperus virginiana	Red Cedar	6			Fair		X
1958	Prunus serotina	Black Cherry	19			Fair		X
1959	Malus pumila	Apple	7			Fair		X
1960	Malus pumila	Apple	14			Fair		X
1961	Prunus serotina	Black Cherry	24			Fair		X
1962	Prunus serotina	Black Cherry	14			Fair		X
1963	Prunus serotina	Black Cherry	21			Fair		X
1965	Juniperus virginiana	Red Cedar	16			Fair		X
1966	Malus pumila	Apple	6			Fair		X
1967	Juniperus virginiana	Red Cedar	8			Fair		X
1968	Juniperus virginiana	Red Cedar	7			Fair		X
1969	Juniperus virginiana	Red Cedar	7			Fair		X
1970	Juniperus virginiana	Red Cedar	15			Fair		X
1971	Malus pumila	Apple	15			Fair		X
1972	Juniperus virginiana	Red Cedar	12			Fair		X
1973	Juniperus virginiana	Red Cedar	14			Fair		X
1974	Juniperus virginiana	Red Cedar	7			Fair		X
1975	Prunus serotina	Black Cherry	7			Fair		X
1976	Prunus serotina	Black Cherry	6			Fair		X
1977	Prunus serotina	Black Cherry	13			Fair		X
1978	Malus pumila	Apple	9			Fair		X
1979	Malus pumila	Apple	14			Fair		X
1980	Malus pumila	Apple	7			Fair		X
1980	Prunus serotina	Black Cherry	11			Fair		X
1982	Prunus serotina	Black Cherry	10			Fair		X
1983	Prunus serotina	Black Cherry	12			Fair		X
1984	Juniperus virginiana	Red Cedar	6			Fair		X
1985	Prunus serotina	Black Cherry	17			Fair		X
1986	Prunus serotina	Black Cherry	8			Fair		X
1987	Ulmus pumilia	Siberian Elm	15			Good		X
1988	Malus pumila	Apple	7			Good		X
1989	Malus pumila	Apple	11			Fair		X
1990	Malus pumila	Apple	12			Fair		X
1991	Malus pumila	Apple	9			Fair		X
1992	Juniperus virginiana	Red Cedar	6			Fair		X
1993	Malus pumila	Apple	14			Fair		X
1994	Prunus serotina	Black Cherry	18			Fair		X
1995	Quercus ellipsoidalis	Northern Pin Oak	6			Fair		X
1996	Prunus serotina	Black Cherry	13			Fair		X
1997	Malus pumila	Apple	17			Fair		X
1998	Malus pumila	Apple	12			Fair		X
1999	Malus pumila	Apple	12			Fair		X
2000	Malus pumila	Apple	11			Fair		X
2177	Juniperus virginiana	Red Cedar	13			Fair		X
2701	Quercus rubra	Red Oak	15			Fair		X
2702	Quercus rubra	Red Oak	18			Fair		X
2703	Quercus rubra	Red Oak	9			Good		X
2704	Prunus serotina	Black Cherry	11			Good		X
2705	Prunus serotina	Black Cherry	16			Good		X
2706	Quercus alba	White Oak	10			Poor		X
2707	Quercus rubra	Red Oak	9			Good		X
2708	Prunus serotina	Black Cherry	9			Fair		X
2709	Quercus velutina	Black Oak	10			Fair		X
2710	Carya glabra	Pignut Hickory	6			Good		X
2711	Quercus rubra	Red Oak	7			Good		X
2712	Populus tremuloides	Quaking Aspen	9			Good		X
2713	Populus tremuloides	Quaking Aspen	11			Good		X
2714	Quercus alba	White Oak	13			Fair		X
2715	Carya glabra	Pignut Hickory	6			Good		X
2716	Quercus velutina	Black Oak	9			Good		X
2717	Populus tremuloides	Quaking Aspen	6			Good		X
2718	Juniperus virginiana	Red Cedar	10			Good		X
2719	Quercus ellipsoidalis	Northern Pin Oak	10			Fair		X
2720	Quercus ellipsoidalis	Northern Pin Oak	13			Fair		X
2721	Quercus rubra	Red Oak	19			Fair		X
2722	Carya glabra	Pignut Hickory	7			Good		X
2723	Quercus ellipsoidalis	Northern Pin Oak	8			Poor		X
2724	Carya glabra	Pignut Hickory	8			Fair		X
2725	Quercus alba	White Oak	20	8.6		Fair		X
2726	Prunus serotina	Black Cherry	9			Fair		X
2727	Prunus serotina	Black Cherry	10			Fair		X
2728	Quercus rubra	Red Oak	17			Fair		X
2729	Quercus alba	White Oak	8			Fair		X
2730	Quercus alba	White Oak	6			Fair		X
2731	Quercus rubra	Red Oak	12			Fair		X
2732	Quercus rubra	Red Oak	10			Fair		X
2733	Quercus alba	White Oak	7			Fair		X
2734	Quercus alba	White Oak	15			Fair		X
2735	Prunus serotina	Black Cherry	19			Good		X
2736	Juniperus virginiana	Red Cedar	8			Good		X
2737	Malus pumila	Apple	15			Good		X
2738	Quercus rubra	Red Oak	15			Fair		X
2738	Quercus rubra	Red Oak	15			Good		X
2739	Quercus rubra	Red Oak	14			Fair		X
2740	Quercus rubra	Red Oak	9			Fair		X
2741	Quercus rubra	Red Oak	14			Fair		X
2742	Quercus rubra	Red Oak	13			Fair		X
2743	Quercus rubra	Red Oak	7			Fair		X
2744	Quercus rubra	Red Oak	14			Fair		X
2745	Quercus rubra	Red Oak	8			Fair		X
2746	Prunus serotina	Black Cherry	7			Fair		X
2747	Prunus serotina	Black Cherry	8			Fair		X
2748	Quercus rubra	Red Oak	9			Fair		X
2749	Quercus rubra	Red Oak	9			Fair		X
2749	Quercus rubra	Red Oak	9			Fair		
2750	Carya glabra	Pignut Hickory	6			Good		X
2751	Quercus rubra	Red Oak	8			Fair		X
2752	Prunus serotina	Black Cherry	7			Fair		X
2753	Quercus rubra	Red Oak	8			Fair		X
2754	Quercus rubra	Red Oak	12			Poor		X
2755	Quercus rubra	Red Oak	18			Good		
2756	Quercus rubra	Red Oak	14			Good		
2757	Quercus rubra	Red Oak	9			Good		
2758	Quercus rubra	Red Oak	9			Good		
2759	Quercus rubra	Red Oak	8			Good		
2760	Quercus rubra	Red Oak	9			Good		
2761	Quercus rubra	Red Oak	7			Fair		X
2762	Quercus rubra	Red Oak	12			Fair		X
2763	Quercus rubra	Red Oak	12			Fair		X
2764	Quercus rubra	Red Oak	11			Fair		X
2765	Quercus rubra	Red Oak	10			Fair		X
2766	Quercus alba	White Oak	13			Fair		X
2767	Quercus rubra	Red Oak	16			Good		X
2768	Prunus serotina	Black Cherry	9			Good		X
2769	Juglans nigra	Black Walnut	7			Good		X
2770	Prunus serotina	Black Cherry	10			Good		X
2771	Quercus rubra	Red Oak	8			Poor		X
2772	Juniperus virginiana	Red Cedar	8			Good		X
2773	Prunus serotina	Black Cherry	10			Fair		X
2774	Amelanchier arborea	Juneberry	17			Good		X
2775	Prunus serotina	Black Cherry	27			Fair		X
2776	Ulmus americana	American Elm	8			Fair		X
2778	Prunus serotina	Black Cherry	7			Fair		X
2779	Prunus serotina	Black Cherry	12			Fair		X
2780	Prunus serotina	Black Cherry	17			Good		X
2781	Juniperus virginiana	Red Cedar	10			Fair		X
2782	Juniperus virginiana	Red Cedar	7			Fair		X
2783	Prunus serotina	Black Cherry	10			Very Poor		X
2784	Prunus serotina	Black Cherry	18			Good		X
2785	Malus pumila	Apple	10			Fair		X
2786	Juniperus virginiana	Red Cedar	9			Good		X
2787	Prunus serotina	Black Cherry	20			Good		X
2788	Prunus serotina	Black Cherry	16			Good		X
2789	Prunus serotina	Black Cherry	15			Good		X
2790	Juniperus virginiana	Red Cedar	8			Good		X
2791	Juniperus virginiana	Red Cedar	8			Good		X
2792	Juniperus virginiana	Red Cedar	8			Good		X
2793	Prunus serotina	Black Cherry	20			Fair		X
2794	Juniperus virginiana	Red Cedar	8			Good		X
2795	Prunus serotina	Black Cherry	7			Fair		X
2796	Juniperus virginiana	Red Cedar	8			Good		X
2797	Juniperus virginiana	Red Cedar	14			Good		X
2798	Juniperus virginiana	Red Cedar	11			Good		X
2799	Prunus serotina	Black Cherry	7			Fair		X
2800	Prunus serotina	Black Cherry	8			Good		X
2801	Quercus ellipsoidalis	Northern Pin Oak	18			Poor		
2802	Quercus ellipsoidalis	Northern Pin Oak	18			Poor		
2803	Quercus rubra	Red Oak	12			Fair		
2804	Quercus rubra	Red Oak	10			Good		
2805	Quercus rubra	Red Oak	8			Fair		
2806	Quercus rubra	Red Oak	8			Fair		
2807	Quercus rubra	Red Oak	11			Fair		
2808	Carya glabra	Pignut Hickory	7			Fair		
2809	Quercus rubra	Red Oak	13			Fair		
2810	Quercus rubra	Red Oak	10			Fair		
2811	Quercus ellipsoidalis	Northern Pin Oak	16	9.5		Fair		
2812	Quercus ellipsoidalis	Northern Pin Oak	11			Poor		X
2813	Quercus rubra	Red Oak	9			Fair		X
2814	Quercus rubra	Red Oak	18			Fair		X
2815	Carya glabra	Pignut Hickory	9			Poor		X
2816	Carya glabra	Pignut Hickory	8			Fair		X
2817	Quercus rubra	Red Oak	16			Fair		X
2818	Carya glabra	Pignut Hickory	9			Fair		
2819	Carya glabra	Pignut Hickory	41			Fair		X
2820	Carya glabra	Pignut Hickory	11			Fair		X
2821	Quercus rubra	Red Oak	11			Good		X
2822	Carya glabra	Pignut Hickory	11			Fair		X
2823	Carya glabra	Pignut Hickory	9			Poor		X
2824	Carya glabra	Pignut Hickory	10			Fair		X
2825	Carya glabra	Pignut Hickory	8	7.3		Fair		X
2826	Quercus rubra	Red Oak	18			Fair		X
2827	Quercus rubra	Red Oak	21			Good		X
2828	Quercus rubra	Red Oak	21			Fair		X
2829	Quercus rubra	Red Oak	18			Fair		X
2830	Quercus rubra	Red Oak	22			Fair		X
2831	Juniperus virginiana	Red Cedar	11			Good		
2832	Juniperus virginiana	Red Cedar	10			Good		
2833	Juniperus virginiana	Red Cedar	8			Fair		
2834	Quercus rubra	Red Oak	13			Poor		
2835	Quercus ellipsoidalis	Northern Pin Oak	23			Poor		
2836	Quercus ellipsoidalis	Northern Pin Oak	13			Good		
2837	Quercus rubra	Red Oak	11			Fair		
2838	Quercus ellipsoidalis	Northern Pin Oak	14			Fair		
2839	Carya glabra	Pignut Hickory	8			Poor		
2840	Prunus serotina	Black Cherry	11			Good		
2841	Quercus rubra	Red Oak	19			Good		
2842	Quercus rubra	Red Oak	11			Good		
2843	Quercus rubra	Red Oak	16			Fair		
2844	Ulmus americana	American Elm	13			Fair		
2845	Carya glabra	Pignut Hickory	7			Fair		
2846	Acer rubrum	Red Maple	10			Fair		
2847	Carya glabra	Pignut Hickory	6			Poor		
2848	Prunus serotina	Black Cherry	7			Fair		
2849	Prunus serotina	Black Cherry	7			Fair		
2850	Quercus rubra	Red Oak	18			Fair		
2851	Juniperus virginiana	Red Cedar	13			Good		
2852	Prunus serotina	Black Cherry	17			Poor		
2853	Quercus rubra	Red Oak	8			Fair		
2854	Carya glabra	Pignut Hickory	7			Poor		
2855	Quercus rubra	Red Oak	10			Fair		X
2856	Quercus rubra	Red Oak	7			Fair		X
2857	Quercus rubra	Red Oak	13	9.4		Good		X
2858	Quercus rubra	Red Oak	17			Fair		X
2859	Quercus rubra	Red Oak	13			Fair		X
2860	Quercus rubra	Red Oak	16			Poor		X
2861	Quercus rubra	Red Oak	8			Fair		X
2862	Quercus rubra	Red Oak	9			Fair		X
2863	Carya glabra	Pignut Hickory	7			Fair		X
2864	Quercus rubra	Red Oak	7			Poor		X
2865	Quercus rubra	Red Oak	8			Poor		X
2866	Quercus rubra	Red Oak	16			Poor		X
2867	Quercus rubra	Red Oak	14			Fair		X
2868	Juniperus virginiana	Red Cedar	11			Fair		X
2869	Quercus rubra	Red Oak	17			Fair		X
2870	Quercus rubra	Red Oak	13			Poor		X
2871	Quercus rubra	Red Oak	9			Fair		X
2872	Quercus rubra	Red Oak	10			Fair		X
2873	Quercus rubra	Red Oak	18			Fair		X
2874	Quercus rubra	Red Oak	10			Fair		X
2875	Prunus serotina	Black Cherry	13			Fair		X
2876	Quercus rubra	Red Oak	8			Poor		X
2877	Quercus rubra	Red Oak	12			Fair		
2878	Quercus rubra	Red Oak	7			Fair		
2879	Quercus rubra	Red Oak	18			Poor		X
2880	Quercus rubra	Red Oak	10			Fair		
2881	Quercus rubra	Red Oak	13			Fair		
2882	Carya glabra	Pignut Hickory	14			Fair		
2883	Carya glabra	Pignut Hickory	15			Fair		
2884	Quercus rubra	Red Oak	14			Fair		
2885	Quercus rubra	Red Oak	13			Fair		
2886	Quercus rubra	Red Oak	12			Fair		
2887	Prunus serotina	Black Cherry	12			Fair		
2888	Quercus rubra	Red Oak	13			Good		
2889	Juniperus virginiana	Red Cedar	14			Good		
2890	Juniperus virginiana	Red Cedar	7			Good		
2891	Prunus serotina	Black Cherry	8			Fair		X
2892	Malus pumila	Apple	11			Poor		X
2893	Juniperus virginiana	Red Cedar	11			Good		X
2894	Quercus rubra	Red Oak	22			Good		X
2895	Prunus serotina	Black Cherry	9			Good		X
2896	Quercus rubra	Red Oak	10			Fair		X
2896	Quercus rubra	Red Oak	24			Good		X
2897	Carya glabra	Pignut Hickory	8			Good		X
2898	Quercus rubra	Red Oak	14			Good		X
2900	Quercus rubra	Red Oak	9			Fair		X
2901	Crataegus spp.	Hawthorn	7			Good		X
2903	Malus pumila	Apple	8	7.6	7.2	Fair		X
2904	Malus pumila	Apple	12			Fair		X
2905	Juniperus virginiana	Red Cedar	8			Good		X
2906	Juniperus virginiana	Red Cedar	8			Fair		X
2907	Juniperus virginiana	Red Cedar	6			Fair		X
2908	Juniperus virginiana	Red Cedar	10			Fair		X
2909	Malus pumila	Apple	11			Fair		X
2911	Prunus serotina	Black Cherry	11			Fair		X
2912	Malus pumila	Apple	13			Fair		X
2914	Prunus serotina	Black Cherry	7			Fair		X
2915	Acer negundo	Boxelder	7			Fair		X
2916	Prunus serotina	Black Cherry	12			Fair		X
2917	Prunus serotina	Black Cherry	11			Fair		X
2918	Quercus ellipsoidalis	Northern Pin Oak	10			Fair		X
2919	Malus pumila	Apple	8			Fair		X
2920	Malus pumila	Apple	9			Good		X
2921	Acer negundo	Boxelder	23			Fair		X
2922	Malus pumila	Apple	13			Good		X
2923	Juniperus virginiana	Red Cedar	7			Good		X
2924	Prunus serotina	Black Cherry	22			Good		X
2925	Juniperus virginiana	Red Cedar	6			Good		X
2926	Prunus serotina	Black Cherry	14			Good		X
2927	Juniperus virginiana	Red Cedar	16			Good		X
2928	Malus pumila	Apple	12			Fair		X
2929	Malus pumila	Apple	6			Fair		X
2930	Malus pumila	Apple	16			Good		X
2931	Quercus ellipsoidalis	Northern Pin Oak	8			Fair		X
2932	Juniperus virginiana	Red Cedar	7			Fair		X
2933	Malus pumila	Apple	11			Good		X
2934	Prunus serotina	Black Cherry	14			Fair		X
2935	Prunus serotina	Black Cherry	8			Fair		X
2936	Prunus serotina	Black Cherry	9			Fair		X
2937	Prunus serotina	Black Cherry	9			Fair		X
2938	Prunus serotina	Black Cherry	18			Fair		X
2939	Juniperus virginiana	Red Cedar	8			Fair		X
2940	Malus pumila	Apple	11			Fair		X
2941	Malus pumila	Apple	6			Fair		X
2942	Juniperus virginiana	Red Cedar	8			Fair		X
2943	Juniperus virginiana	Red Cedar	8			Fair		X
2944	Malus pumila	Apple	16			Fair		X
2945	Juniperus virginiana	Red Cedar	7			Fair		X
2946	Juniperus virginiana	Red Cedar	9			Fair		X
2947	Malus pumila	Apple	9			Fair		X
2948	Juniperus virginiana	Red Cedar	7			Fair		X
2949	Prunus serotina	Black Cherry	13			Fair		X
2950	Prunus serotina	Black Cherry	13			Fair		X
2951	Prunus serotina	Black Cherry	8			Fair		X
2952	Malus pumila	Apple	11			Fair		X
2953	Malus pumila	Apple	8			Fair		X
2954	Juniperus virginiana	Red Cedar	6			Fair		X
2955	Prunus serotina	Black Cherry	8			Fair		X
2956	Prunus serotina	Black Cherry	7			Fair		X
2957	Acer negundo	Boxelder	7			Fair		X
2958	Malus pumila	Apple	7			Fair		X
2959	Malus pumila	Apple	8			Good		X
2960	Juniperus virginiana	Red Cedar	13			Good		X
2961	Juniperus virginiana	Red Cedar	8			Fair		X
2962	Malus pumila	Apple	6			Fair		X
2964	Quercus velutina	Black Oak	17			Fair		
2965	Quercus alba	White Oak	9			Poor		
2966	Carya glabra	Pignut Hickory	8			Fair		
2967	Carya glabra	Pignut Hickory	9			Fair		
2968	Carya glabra	Pignut Hickory	11	7.8		Fair		
2969	Prunus serotina	Black Cherry	18			Good		
2970	Quercus alba	White Oak	26			Fair		
2971	Quercus alba	White Oak	25			Fair		
2972	Carya glabra	Pignut Hickory	9			Fair		
2973	Quercus rubra	Red Oak	6			Fair		
2974	Quercus rubra	Red Oak	31			Fair		
2976	Carya glabra	Pignut Hickory	13			Poor		
2977	Quercus rubra	Red Oak	34			Good		
2978	Carya glabra	Pignut Hickory	12			Good		
2979	Carya glabra	Pignut Hickory	22			Good		
2980	Quercus rubra	Red Oak	29			Fair		
2981	Quercus rubra	Red Oak	45			Fair		X
2982	Carya glabra	Pignut Hickory	19			Fair		X
2983	Quercus alba	White Oak	31			Fair		X
2984	Prunus serotina	Black Cherry	9			Poor		X
2985	Carya glabra	Pignut Hickory	6			Good		X
2986	Quercus ellipsoidalis	Northern Pin Oak	12			Good		X
2987	Quercus alba	White Oak	7			Very Poor		X
2988	Quercus rubra	Red Oak	19			Fair		X
2989	Quercus alba	White Oak	26			Fair		X
2990	Quercus alba	White Oak	25			Fair		X
2991	Quercus alba	White Oak	30			Fair		X
2992	Quercus rubra	Red Oak	15			Fair		X
2993	Quercus rubra	Red Oak	16			Poor		X
2994	Quercus rubra	Red Oak	6			Fair		X
2995	Quercus rubra	Red Oak	6			Good		
2996	Quercus rubra	Red Oak	10			Fair		
2997	Quercus rubra	Red Oak	10			Good		
2998	Quercus rubra	Red Oak	15			Good		X
2999	Quercus rubra	Red Oak	12			Good		X
3000	Quercus rubra	Red Oak	21			Good		X
4289	Malus pumila	Apple	8			Fair		X
4293	Juniperus virginiana	Red Cedar	12			Fair		X
4301	Malus pumila	Apple	9	6.7		Good		X
4302	Prunus serotina	Black Cherry	10			Good		X
4303	Malus pumila	Apple	7			Fair		X
4304	Juniperus virginiana	Red Cedar	10			Good		X
4305	Malus pumila	Apple	22			Fair		X
4306	Malus pumila	Apple	11			Fair		X
4308	Juniperus virginiana	Red Cedar	9			Good		X
4309	Prunus serotina	Black Cherry	8			Good		X
4310	Prunus serotina	Black Cherry	18			Good		X
4311	Prunus serotina	Black Cherry	21			Fair		X
4312	Pyrus communis	Common Pear	10			Fair		X
4313	Malus pumila	Apple	17			Fair		X
4314	Malus pumila	Apple	7			Fair		X
4315	Prunus serotina	Black Cherry	7			Fair		X
4316	Juniperus virginiana	Red Cedar	9			Good		X
4317	Prunus serotina	Black Cherry	10			Good		X
4318	Juniperus virginiana	Red Cedar	8			Good		X
4319	Prunus serotina	Black Cherry	12			Good		X
4320	Juniperus virginiana	Red Cedar	18			Good		X
4321	Prunus serotina	Black Cherry	17			Good		X
4322	Malus pumila	Apple	10			Good		X
4323	Juniperus virginiana	Red Cedar	14			Good		X
4324	Juniperus virginiana	Red Cedar	7			Good		X
4325	Juniperus virginiana	Red Cedar	9			Fair		X
4326	Prunus serotina	Black Cherry	18			Fair		X
4327	Juniperus virginiana	Red Cedar	6			Fair		X

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Surveying • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE

OPEN SPACE PUD DEVELOPMENT
TREE LIST 3

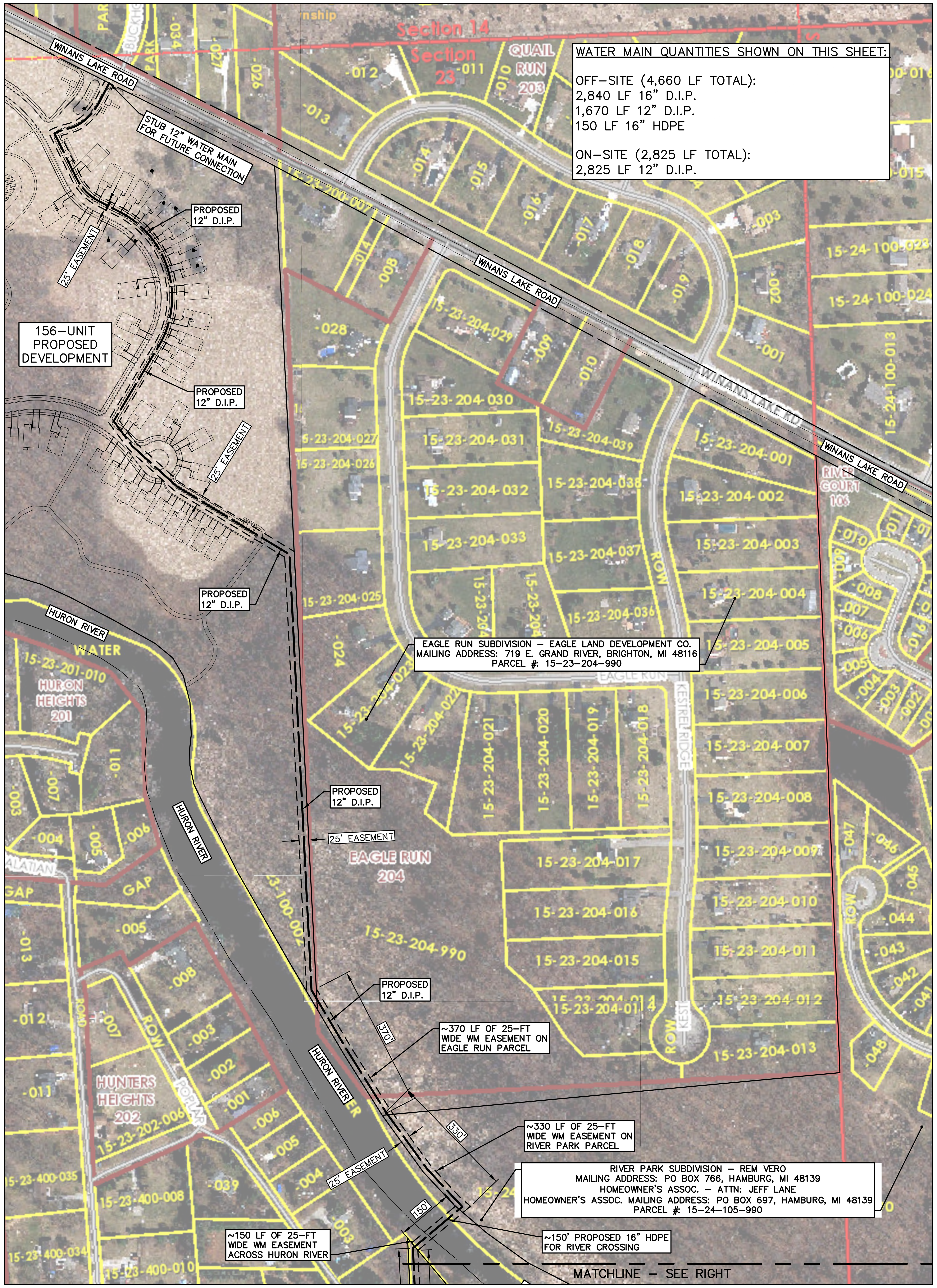
16

DATE: 8/29/18
SHEET 16 OF 19
CADD:
ENG: JCA, TPH
PM: RCW
TECH:
18037EX2.dwg

JOB No. 18037

REVISIONS:	REV. DATE
PER TOWNSHIP COMMENTS	11/19/18

M:\Civil3d_Proj\18037\Preliminary Site Plan\18037EX2.dwg, 11/19/2018 3:47 PM, Rachel D. Wardmacher, TREE LIST3, MCLLC PDF.pc3



M I D W E S T E R N
C O N S U L T I N G

3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

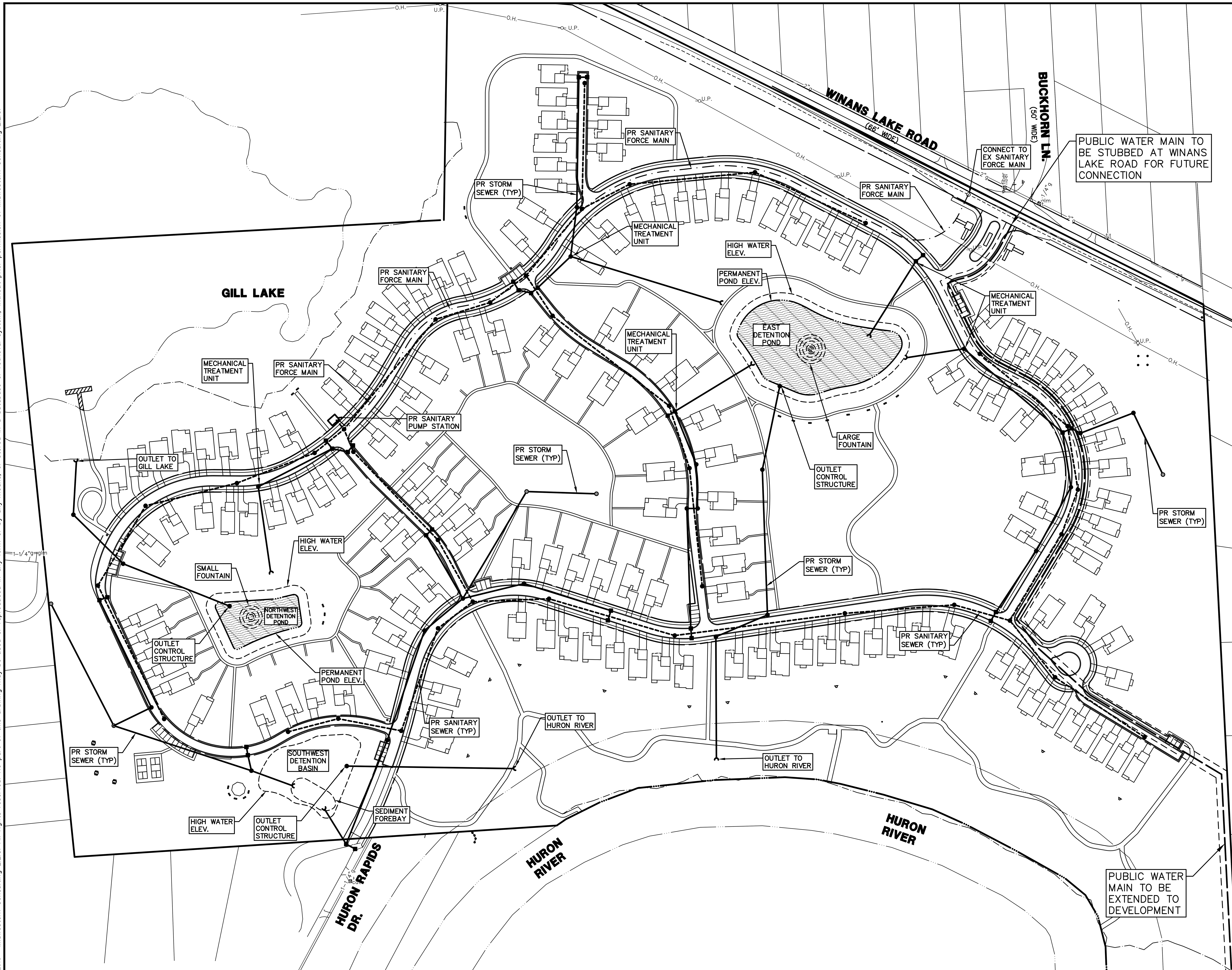
WATERS EDGE
OPEN SPACE PUD DEVELOPMENT
PUBLIC WATER MAIN EXTENSION

17

DATE: 11/19/18
SHEET 17 OF 19
CADD:
ENG: JCA, TPH
PM: RCW
TECH:
18037WM_EXT1

JOB No. **18037**

REVISIONS: REV. DATE



The underground utilities shown have been located from field survey information and existing records. The surveyor makes no guarantees that the underground utilities shown comprise all such utilities in the area, either in-service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated. Although the surveyor does certify that they are located as accurately as possible from the information available.

SCALE: 1" = 100'

0 100 200 300

811 Know what's below. Call before you dig.

LEGEND

U.P.	EXIST. UTILITY POLE
U.P.	EXIST. UTILITY POLE W/ TRANS.
GP	EXIST. GUY POLE
	GUY WIRE
	ELEC. TRANSFORMER
OH	EXIST. OVERHEAD UTILITY LINE
	EXIST. LIGHT POLE
	PROP. LIGHT POLE
	PROP. BUILDING LIGHT
t	EXIST. TELEPHONE LINE
T	PROP. TELEPHONE LINE
e	EXIST. ELECTRIC LINE
E	PROP. ELECTRIC LINE
g	EXIST. GAS LINE
G	PROP. GAS LINE
g	EXIST. GAS VALVE
f.o.	EXIST. FIBER OPTIC LINE
F.O.	PROP. FIBER OPTIC LINE
w	EXIST. WATER MAIN
W	PROP. WATER MAIN
	EXIST. HYDRANT
	PROP. HYDRANT
	EXIST. GATE VALVE IN BOX
	PROP. GATE VALVE IN BOX
	EXIST. GATE VALVE IN WELL
	PROP. GATE VALVE IN WELL
	EXIST. CURB STOP & BOX
	PROP. CURB STOP & BOX
	REDUCER
	EXIST. BLOW-OFF
	PROP. BLOW-OFF
P.I.V.	POST INDICATOR VALVE
	THRUST BLOCK
KB	PROP. KNOXBOX
r	EXIST. STORM SEWER
R	PROP. STORM SEWER
	EXIST. CATCH BASIN OR INLET
	PROP. CATCH BASIN OR INLET
	EXIST. BEEHIVE INLET
	PROP. BEEHIVE INLET
RD	PROP. ROOF DRAIN
	END SECTION
	HEAD WALL
	CULVERT
ds	EXIST. DOWNSPOUT
ps	PROP. DOWNSPOUT
s	EXIST. SANITARY SEWER
S	PROP. SANITARY SEWER
	EXIST. CLEANOUT
	PROP. CLEANOUT
t	TELEPHONE RISER
catv	CABLE TELEVISION RISER
e	ELECTRIC METER
w	WATER METER
scb	SPRINKLER CONTROL BOX
g	GAS METER
glm	GAS LINE MARKER
fiber	FIBER OPTIC MARKER
W	WELL
GFC	EXIST. GAS FILLER CAP
PED	PEDESTRIAN CROSSING SIGNAL
tscb	TRAFFIC SIGNAL CONTROL BOX
VCS	PROP. VEHICLE CHARGING STATION

WATER MAIN NOTE

WATER MAIN ALIGNMENT CURRENTLY SHOWN TO IDENTIFY LIKELY ROUTE OF PUBLIC WATER MAIN EXTENSION. ADDITIONAL WATER MAIN AND APPURTENANCES NECESSARY TO BE ROUTED THROUGHOUT DEVELOPMENT SHALL BE SHOWN ON FINAL SITE PLANS.

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE
OPEN SPACE PUD DEVELOPMENT
UTILITY PLAN

18

DATE: 11/19/18
SHEET 18 OF 19
CADD:
ENG: JCA, TPH
PM: RCW
TECH:
18037UP1.dwg

JOB No. 18037
REVISIONS:
REV. DATE

EAST DETENTION BASIN CALCULATIONS

Acreage= 34.37 acres
C = 0.46
Permissible Discharge Rate=Q= 0.15
Design Constant (K_1) = 15.98
Q_a = (Q* A)= 5.16 cfs

1	2	3	4	5	6	7
Duration	Duration	Intensity 100-yr Storm	Col.#2x Col.#3	Inflow Volume Col.4xK_1	Outflow volume Col.2xQo	Storage Volume Col.5-Col.6 (cft)
Minutes	Seconds	(in/hr)	Inches	(cft)	(cft)	
5	300	9.17	2,751	43,956	1,547	42,410
10	600	7.86	4,716	75,354	3,094	72,260
15	900	6.88	6,192	98,938	4,641	94,298
20	1,200	6.11	7,332	117,153	6,187	110,966
30	1,800	5.00	9,000	143,805	9,281	134,524
60	3,600	3.24	11,664	186,372	18,562	167,810
90	5,400	2.39	12,906	206,217	27,843	178,374
120	7,200	1.90	13,680	218,584	37,124	181,460
180	10,800	1.34	14,472	231,239	55,686	175,553

Detention Volume Required for 100 yr Storm= **181,460** cft

100 Year volume
V100= 181460 cft

Permanent Pool Volume
PP= 72502 cft

Bankfull flood volume
Vbf=8160*A*C= 130383 cft

First flush volume
Vff=1815*A*C= 29001 cft

Sedimentation volume
Vsed=5%*Vt 9073 cft

Storage Provided

Elevation	Area (sft)	Depth (ft)	Volume (cft)	Total Volume (cft)
882.00	87,124	1.00	84,027	465,362
881.00	80,930	1.00	77,912	381,335
880.00	74,894	1.00	71,956	303,423
879.00	69,018	1.00	66,160	231,467
878.00	63,302	1.00	60,524	165,307
877.00	57,746	1.00	55,049	104,783
876.00	52,351	1.00	49,734	49,734
875.00	47,117	0.00	0	0

Permanent Pool Volume

Elevation	Area (sft)	Depth (ft)	Volume (cft)	Total Volume (cft)
875.00	47,117	1.00	44,580	184,290
874.00	42,043	0.00	0	139,710
874.00	38,103	1.00	35,717	139,710
873.00	33,330	1.00	31,030	103,993
872.00	28,730	1.00	26,509	72,963
871.00	24,287	1.00	22,184	46,455
870.00	20,080	1.00	10,040	24,271
869.00	16,061	1.00	8,031	14,231
868.00	12,401	1.00	6,201	6,201
867.00	9,623	0.00	0	0

Storage Elevations
First Flush
Elev1 = 875.00 Volume1 = 0
Elev2 = 876.00 Volume2 = 49,734
Vtff = 29,001
Zff = First Flush Elev= 875.58

Bank Full
Elev1 = 877.00 Volume1 = 104,783
Elev2 = 878.00 Volume2 = 165,307
Vtbf = 130,383
Zbf = Bank Full Elev= 877.42

100 Year
Elev1 = 878.00 Volume1 = 165,307
Elev2 = 879.00 Volume2 = 231,467
V100= 181,460
Z100 = 100 year Elev= 878.24

NORTHWEST DETENTION BASIN CALCULATIONS

Acreage= 12.38 acres
C = 0.52
Permissible Discharge Rate=Q= 0.15
Design Constant (K_1) = 6.46
Q_a = (Q* A)= 1.86 cfs

1	2	3	4	5	6	7
Duration	Duration	Intensity 100-yr Storm	Col.#2xCol.#3	Inflow Volume Col.4xK_1	Outflow volume Col.2xQo	Storage Volume Col.5-Col.6 (cft)
Minutes	Seconds	(in/hr)	Inches	(cft)	(cft)	
5	300	9.17	2,751	17,865	557	17,308
10	600	7.86	4,716	30,625	1,114	29,511
15	900	6.88	6,192	40,210	1,671	38,539
20	1,200	6.11	7,332	47,614	2,228	45,385
30	1,800	5.00	9,000	58,445	3,343	55,103
60	3,600	3.24	11,664	75,745	6,685	69,060
90	5,400	2.39	12,906	83,811	10,028	73,782
120	7,200	1.90	13,680	88,837	13,371	75,466
180	10,800	1.34	14,472	93,980	20,056	73,924

Detention Volume Required for 100 yr Storm= **75,466** cft

100 Year volume
V100= 75466 cft

Permanent Pool Volume
PP= 29466 cft

Bankfull flood volume
Vbf=8160*A*C= 52990 cft

First flush volume
Vff=1815*A*C= 11786 cft

Sedimentation volume
Vsed=5%*Vt 3773 cft

Storage Provided

Elevation	Area (sft)	Depth (ft)	Volume (cft)	Total Volume (cft)
881.00	40,195	1.00	38,390	231,554
880.00	36,585	1.00	34,858	193,164
879.00	33,131	1.00	31,483	158,306
878.00	29,835	1.00	28,266	126,823
877.00	26,696	1.00	25,205	98,557
876.00	23,714	1.00	22,301	73,352
875.00	20,888	1.00	19,554	51,051
874.00	18,220	1.00	16,965	31,497
873.00	15,709	1.00	14,533	14,533
872.00	13,356	0.00	0	0

Permanent Pool Volume

Elevation	Area (sft)	Depth (ft)	Volume (cft)	Total Volume (cft)
872.00	13,356	1.00	12,158	37,846
871.00	10,960	1.00	10,173	25,688
870.00	9,385	0.00	0	15,516
870.00	7,558	1.00	6,710	15,516
869.00	5,862	1.00	5,102	8,806
868.00	4,342	1.00	3,704	3,704
867.00	3,065	0.00	0	0

Storage Elevations
First Flush
Elev1 = 872.00 Volume1 = 0
Elev2 = 873.00 Volume2 = 14,533
Vtff = 11,786
Zff = First Flush Elev= 872.81

Bank Full
Elev1 = 875.00 Volume1 = 51,051
Elev2 = 876.00 Volume2 = 73,352
Vtbf = 52,990
Zbf = Bank Full Elev= 875.09

100 Year
Elev1 = 876.00 Volume1 = 73,352
Elev2 = 877.00 Volume2 = 98,557
V100= 75,466
Z100 = 100 year Elev= 876.08

SOUTHWEST DETENTION BASIN CALCULATIONS

Acreage= 13.39 acres
C = 0.47
Permissible Discharge Rate=Q= 0.15
Design Constant (K_1) = 6.25
Q_a = (Q* A)= 2.01 cfs

1	2	3	4	5	6	7
Duration	Duration	Intensity 100-yr Storm	Col.#2xCol.#3	Inflow Volume Col.4xK_1	Outflow volume Col.2xQo	Storage Volume Col.5-Col.6 (cft)
Minutes	Seconds	(in/hr)	Inches	(cft)	(cft)	
5	300	9.17	2,751	17,183	602	16,580
10	600	7.86	4,716	29,456	1,205	28,251
15	900	6.88	6,192	38,675	1,807	36,868
20	1,200	6.11	7,332	45,796	2,410	43,386
30	1,800	5.00	9,000	56,214	3,615	52,599
60	3,600	3.24	11,664	72,854	7,230	65,624
90	5,400	2.39	12,906	80,611	10,845	69,766
120	7,200	1.90	13,680	85,445	14,460	70,986
180	10,800	1.34	14,472	90,392	21,689	68,703

Detention Volume Required for 100 yr Storm= **70,986** cft

100 Year volume
V100= 70986 cft

Permanent Pool Volume
PP= 28341 cft

Bankfull flood volume
Vbf=8160*A*C= 50967 cft

First flush volume
Vff=1815*A*C= 11337 cft

Sedimentation volume
Vsed=5%*Vt 3549 cft

Storage Provided

Elevation	Area (sft)	Depth (ft)	Volume (cft)	Total Volume (cft)
886.00	42,348	1.00	39,846	184,567
885.00	37,343	1.00	34,977	144,721
884.00	32,611	1.00	30,358	109,744
883.00	28,104	1.00	25,497	79,387
882.00	22,890	1.00	20,538	53,890
881.00	18,186	1.00	15,815	33,352
880.00	13,444	1.00	11,380	17,537
879.00	9,315	1.00	6,157	6,157
878.00	2,999	0.00	0	0

Sediment Forebay Volume

Elevation	Area (sft)	Depth (ft)	Volume (cft)	Total Volume (cft)
881.00	3,451	1.00	2,884	4,715
880.00	2,316	1.00	1,831	1,831
879.00	1,346	0.00	0	0

Storage Elevations
First Flush
Elev1 = 879.00 Volume1 = 6,157
Elev2 = 880.00 Volume2 = 17,537
Vtff = 11,337
Zff = First Flush Elev= 879.46

Bank Full
Elev1 = 881.00 Volume1 = 33,352
Elev2 = 882.00 Volume2 = 53,890
Vtbf = 50,967
Zbf = Bank Full Elev= 881.86

100 Year
Elev1 = 882.00 Volume1 = 53,890
Elev2 = 883.00 Volume2 = 79,387
V100= 70,986
Z100 = 100 year Elev= 882.67

The underground utilities shown have been located from field survey information and existing records. The surveyor makes no guarantees that the underground utilities shown comprise all such utilities in the area, either in-service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated. Although the surveyor does certify that they are located as accurately as possible from the information available.

M:\Civil3d_Proj\18037\Preliminary Site Plan\18037DA1.dwg, 11/19/2018 3:48 PM, Rachel D. Wandmacher, DETENTION CALCS, MCLLC PDF.pc3

MIDWESTERN CONSULTING
3815 Plaza Drive Ann Arbor, Michigan 48108
(734) 995-0200 • www.midwesternconsulting.com
Land Development • Land Survey • Institutional • Municipal
Wireless Communications • Transportation • Landfill Services

CLIENT
WINANS LAKE DEVELOPMENT LLC
3596 W. MAPLE ROAD #230
BLOOMFIELD HILLS, MI 48301

WATERS EDGE
OPEN SPACE PUD DEVELOPMENT
DETENTION CALCULATIONS

19

DATE:	11/19/18
SHEET	19 OF 19
CADD:	
ENG:	JCA, TPH
PM:	RCW
TECH:	
	18037DA1.dwg

JOB No. **18037**
REVISIONS: REV. DATE

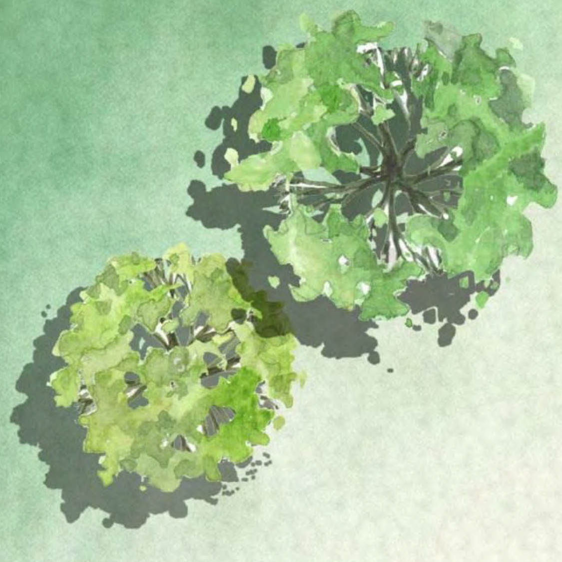
EXHIBIT E

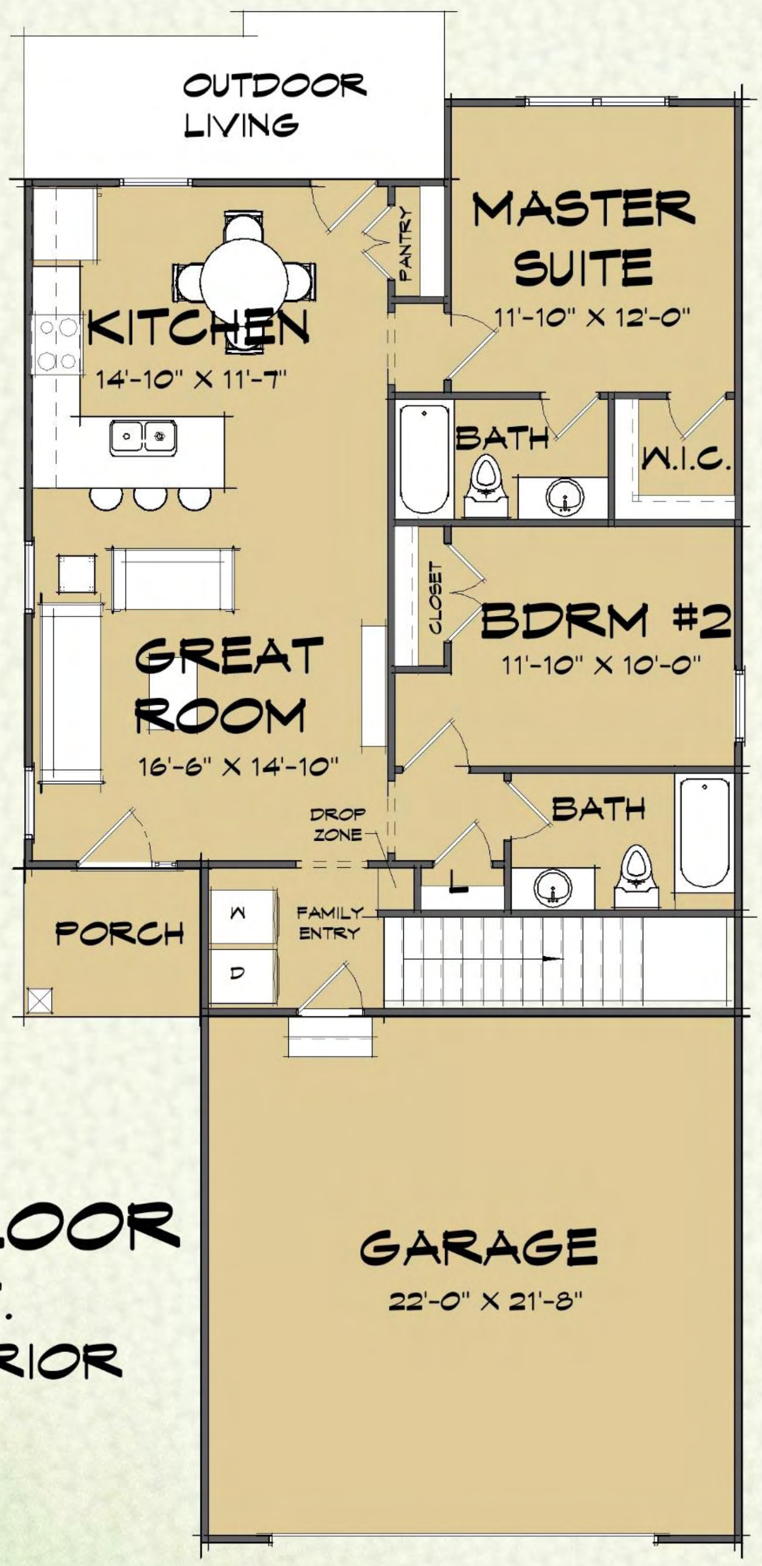
Pine Cove
Waters Edge

11-14-18

PINE COVE
BUILDING COMPANY

T K DESIGN
&
ASSOCIATES





FIRST FLOOR

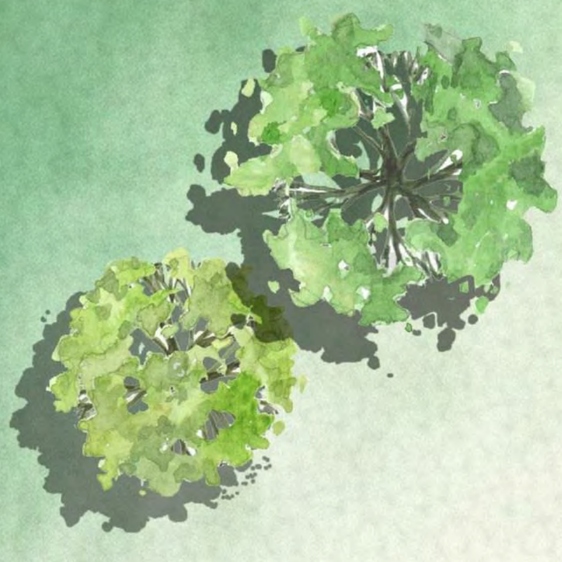
1050 SQ.FT.
2 X 4 EXTERIOR
9' CLG.

1000 Plan

FIRST FLOOR
ALLEY LOAD
1050 SQ.FT.
2 X 4 EXTERIOR
9' CLG.

1000 Alley Plan

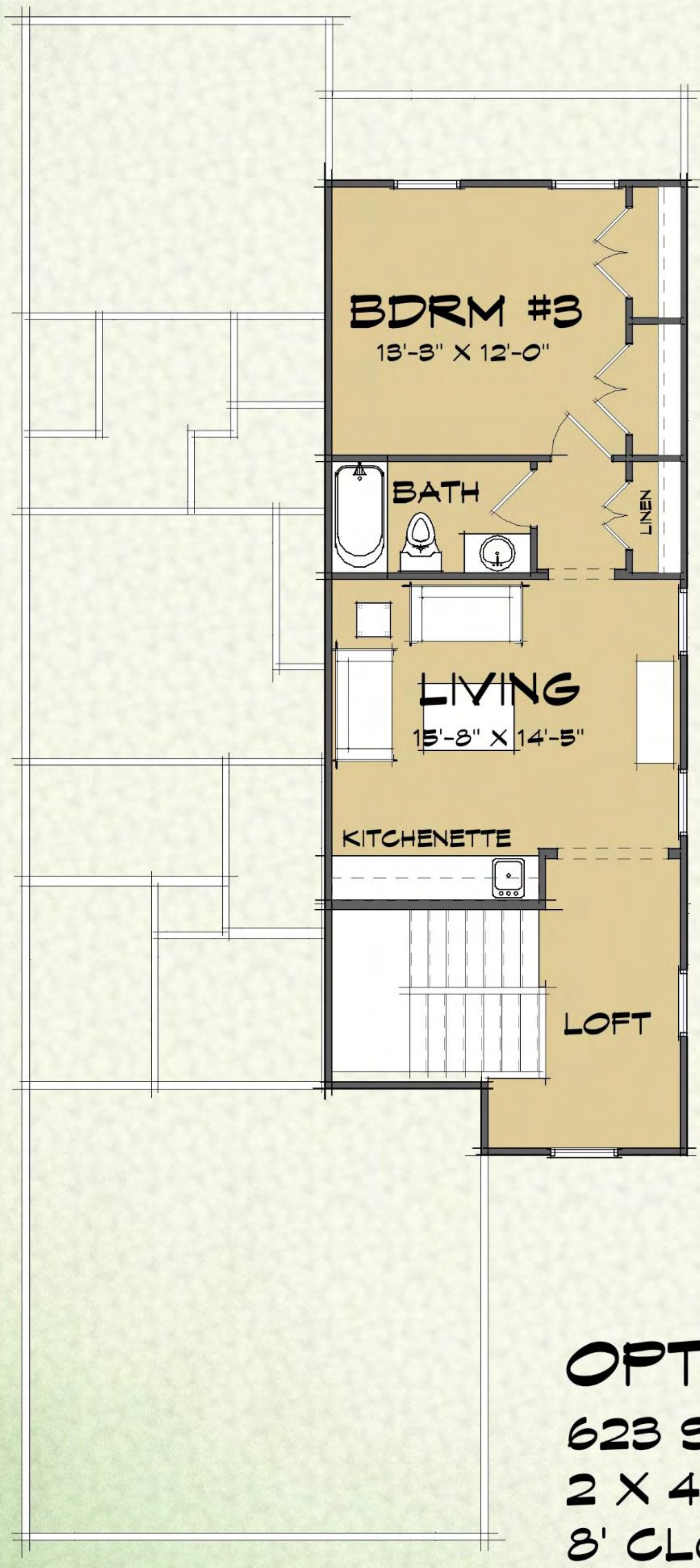
1000 Plan Elevations



FIRST FLOOR

1425 SQ.FT.
2 X 4 EXTERIOR
9' CLG.

1400 Plan



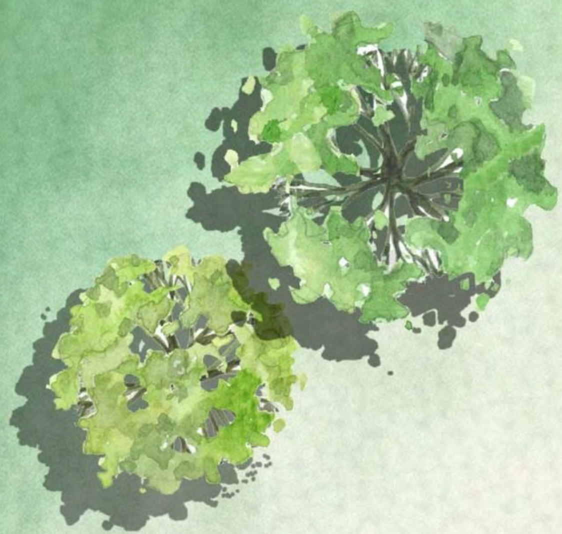
OPT ACCESSORY FLOOR
623 SQ.FT.
2 X 4 EXTERIOR
8' CLG.

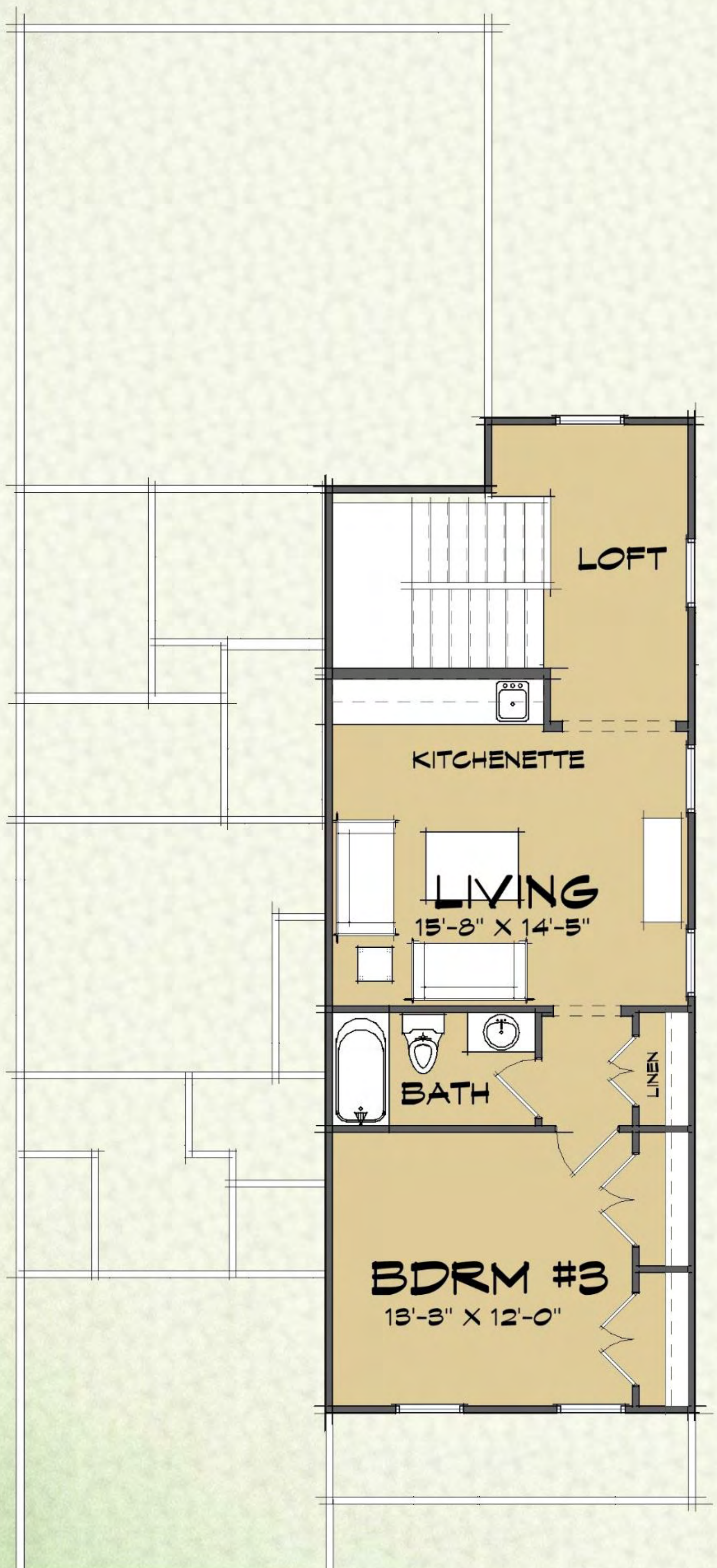
1400 Plan Opt Accessory Plan

FIRST FLOOR
ALLEY LOAD

1425 SQ.FT.
2 X 4 EXTERIOR
9' CLG.

1400 Alley Plan





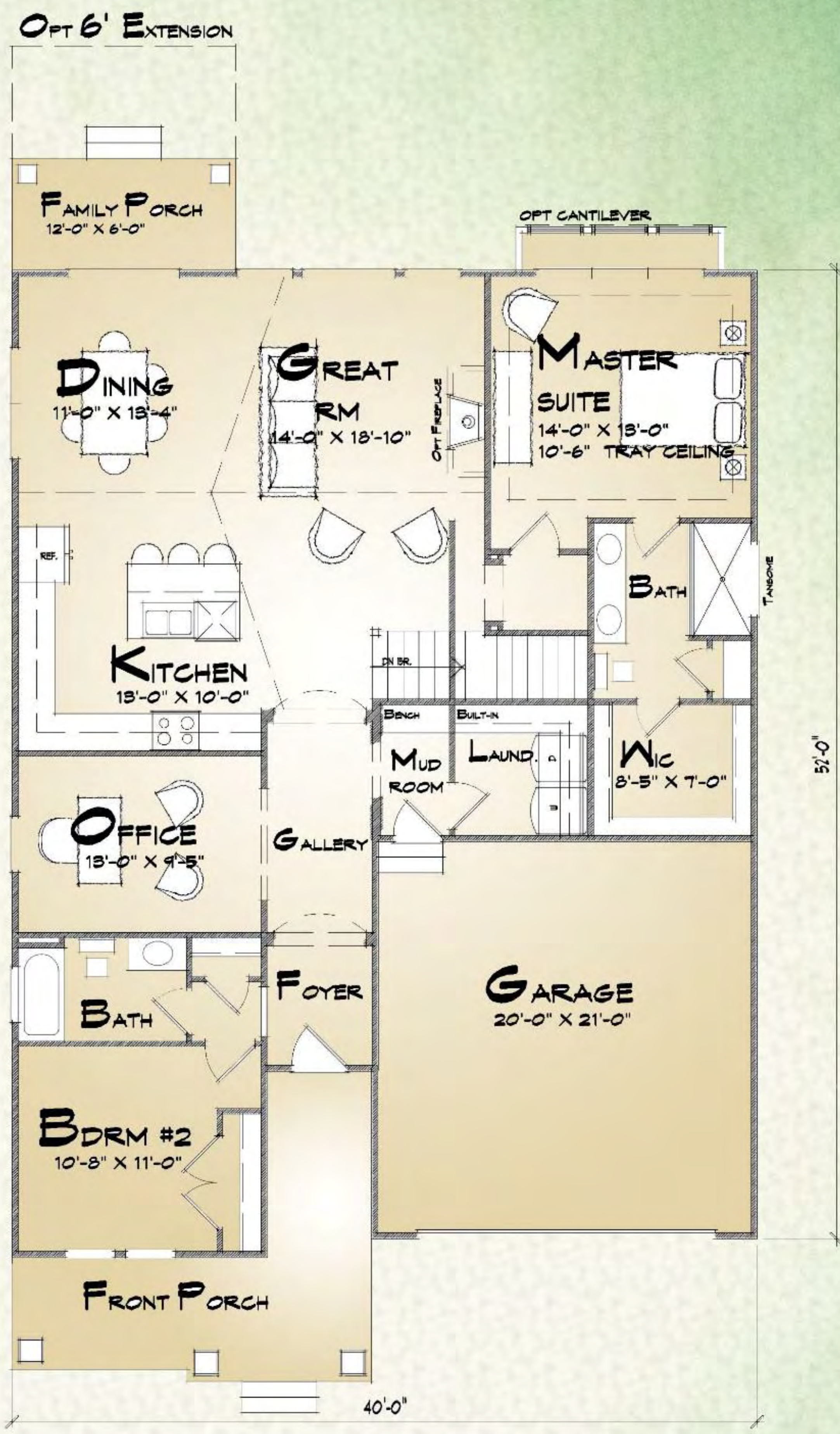
OPT ACCESSORY FLOOR

623 SQ.FT.
2 X 4 EXTERIOR
8' CLG.

1400 Alley Plan Opt Accessory Plan

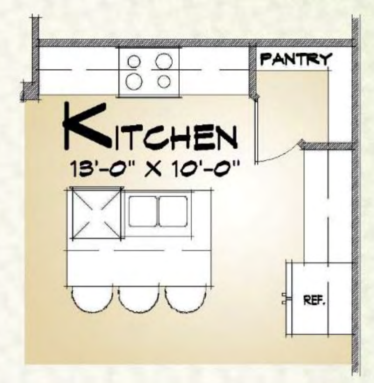
1400 Plan Elevations

Opt Kitchen



1600 Plan
First Floor

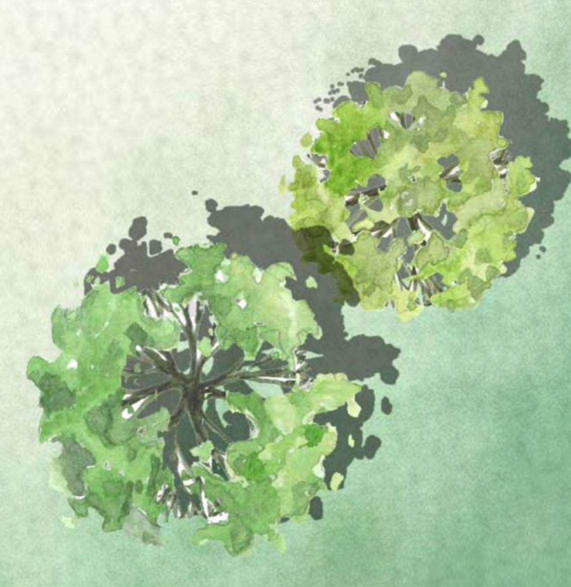
1606 SQ FT
9' CEILING HT.



Opt Kitchen

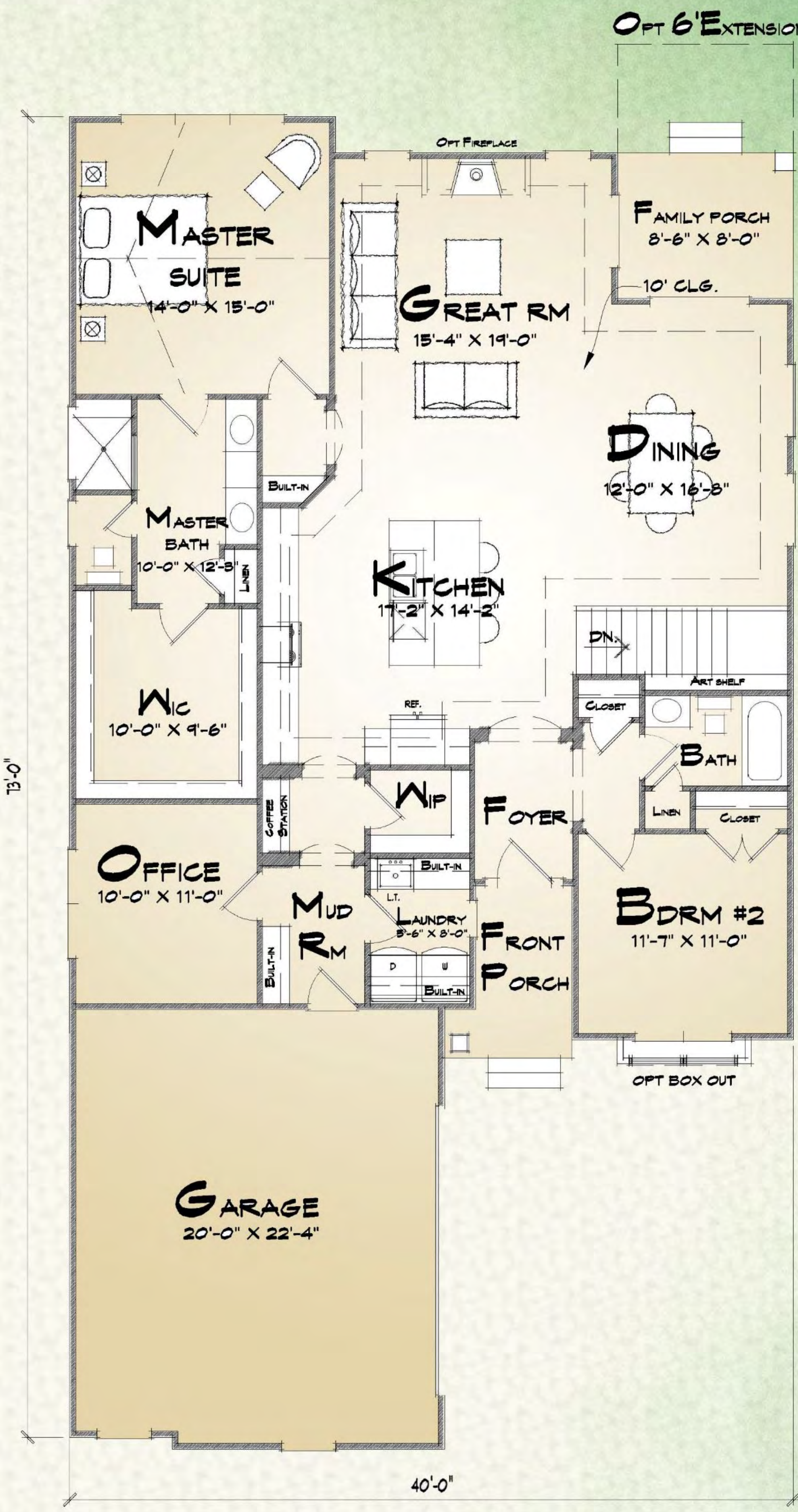
Alley 1600 Plan
First Floor

1606 SQ FT
9' CEILING HT.



1600 Elevations

Opt Master Bath

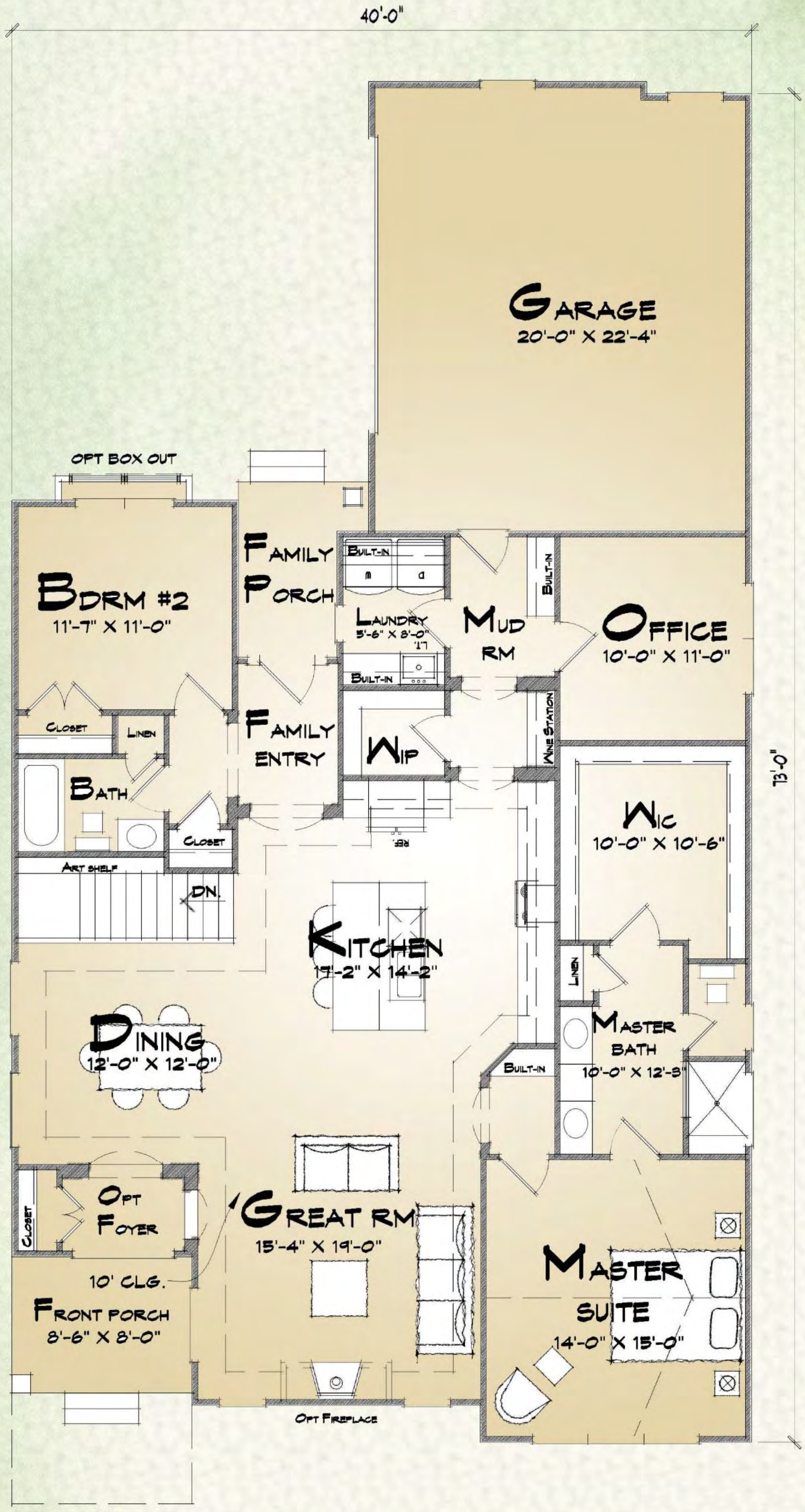


1800 Plan

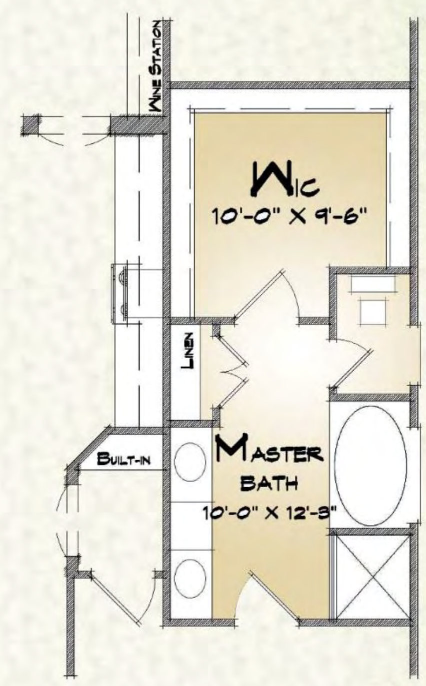
First Floor

1829 SQ FT

9' CLG



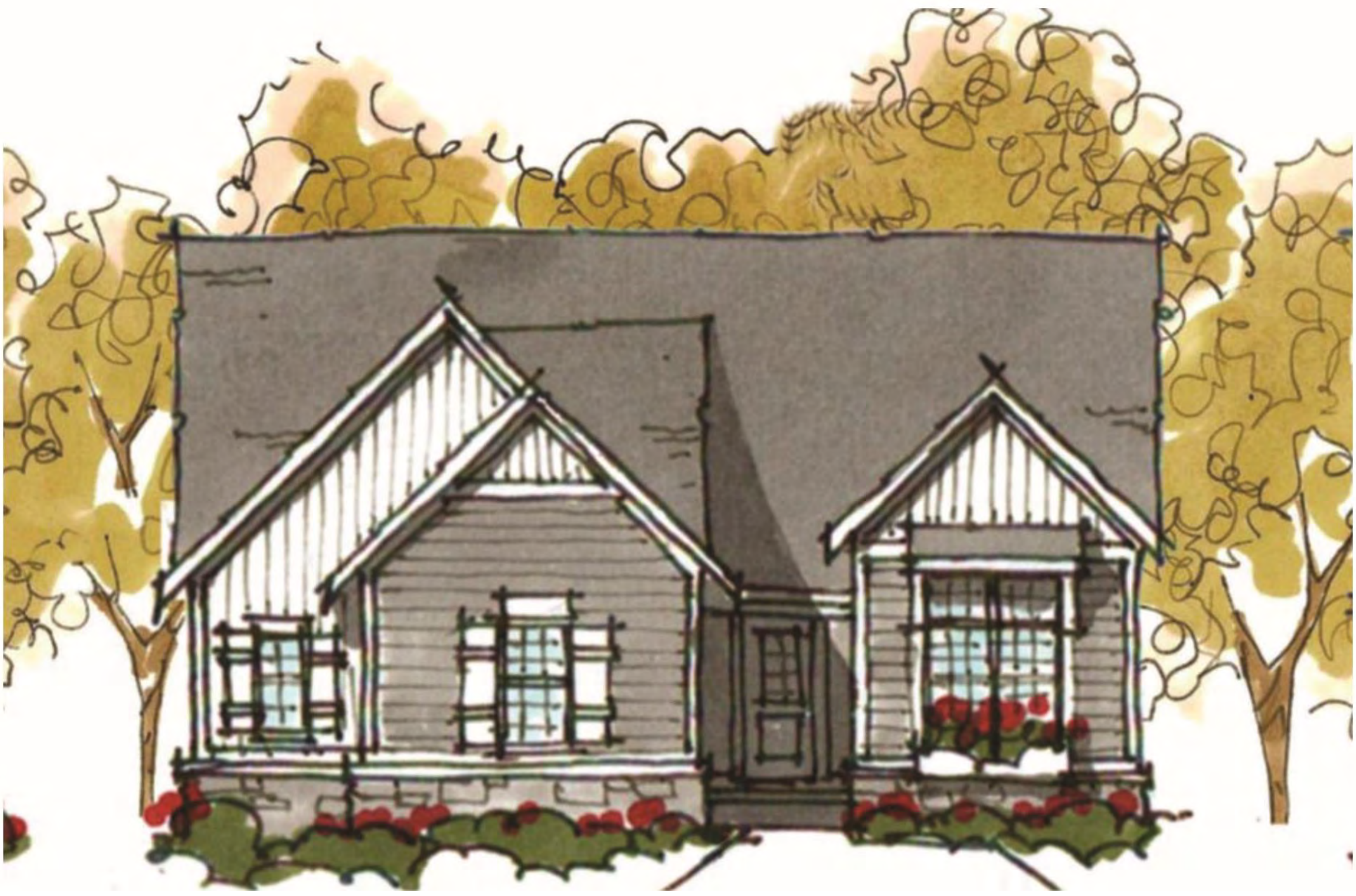
Opt 6'Extension



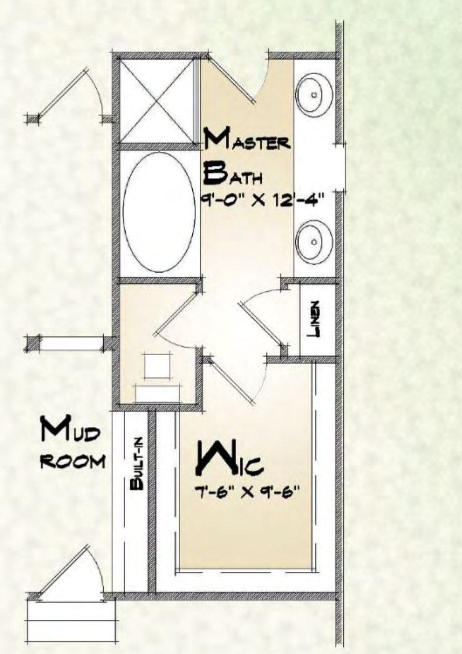
Opt Master Bath

Alley 1800 Plan
First Floor

1829 SQ FT
9' CLG



1800 Elevations



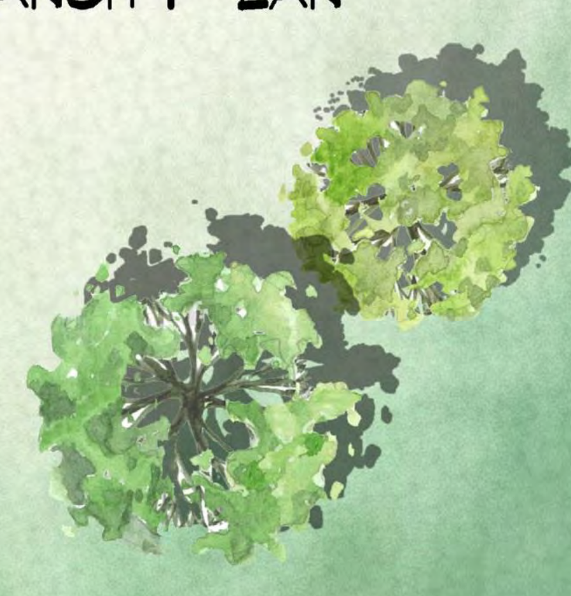
Opt Master Bath

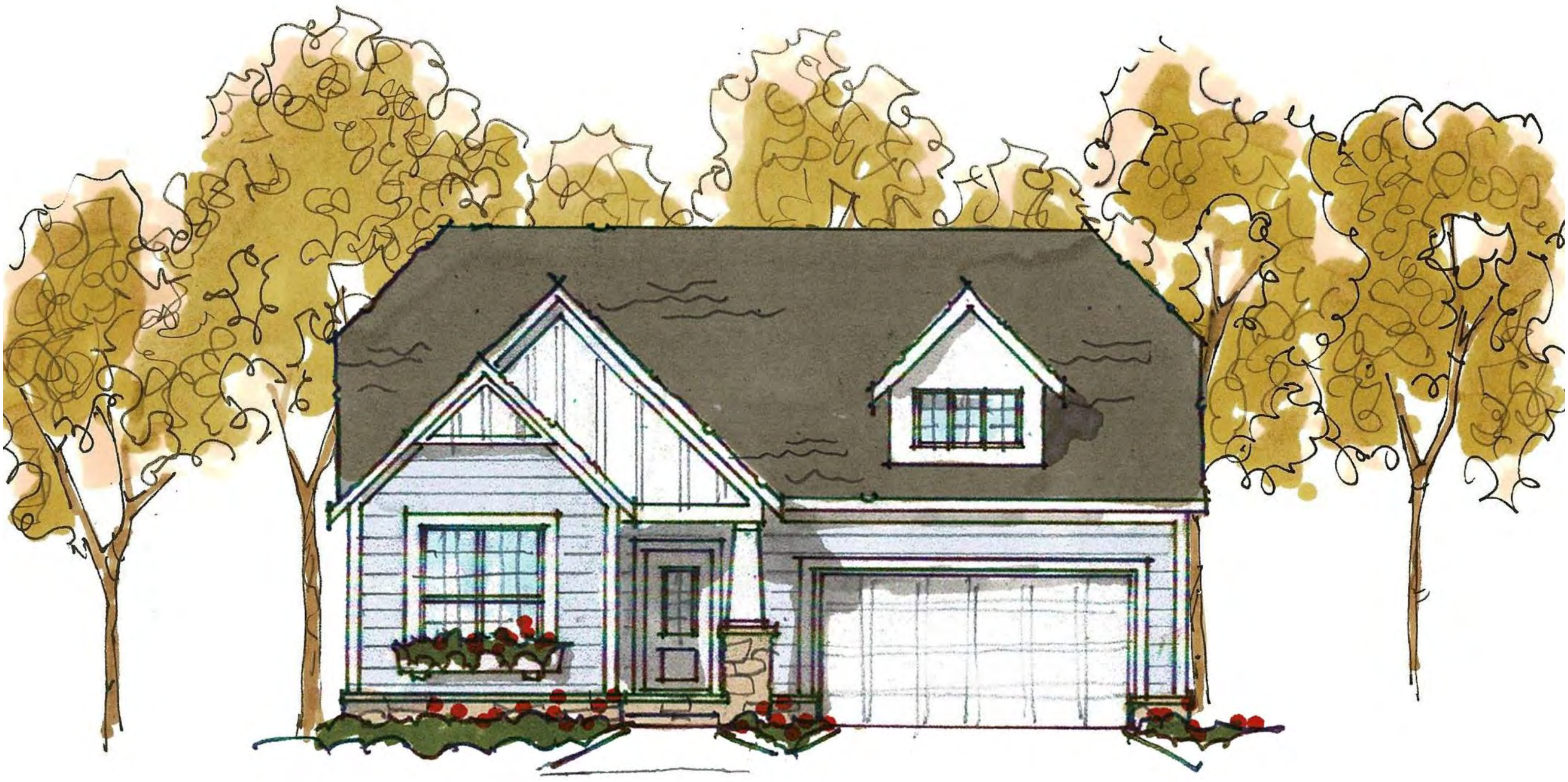
2000 Ranch Plan
First Floor

2007 SQ FT
9' CEILING HT.

Alley 2000 Ranch Plan
First Floor

1998 SQ FT
9' CEILING HT.





2000 Ranch Elevations

2000 1-1/2 Story Plan

First Floor

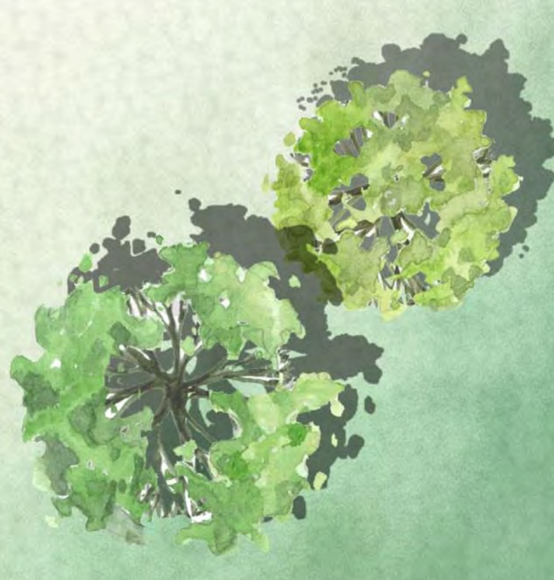
1577 SQ FT

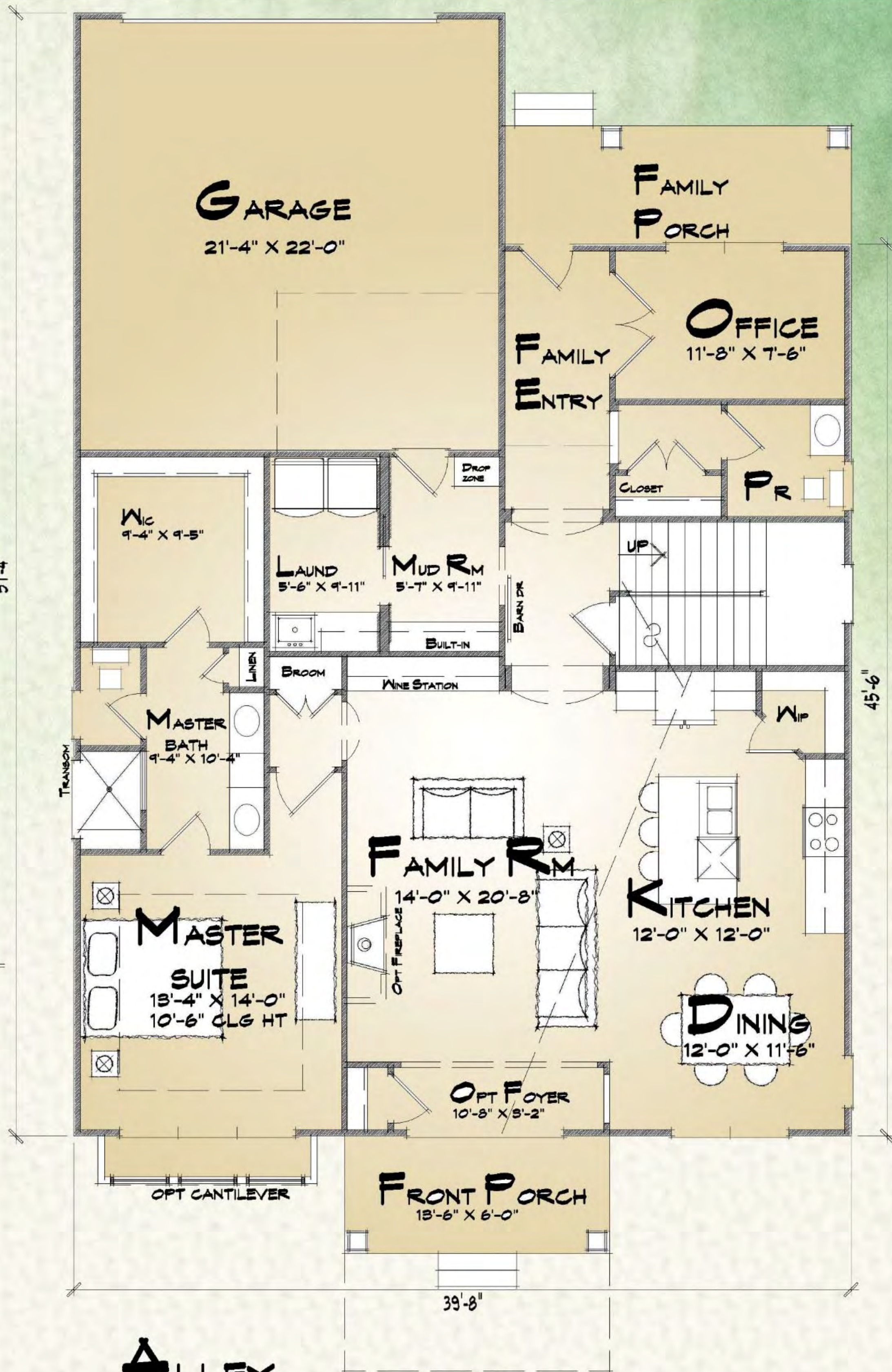
TOTAL 2040 SQ FT

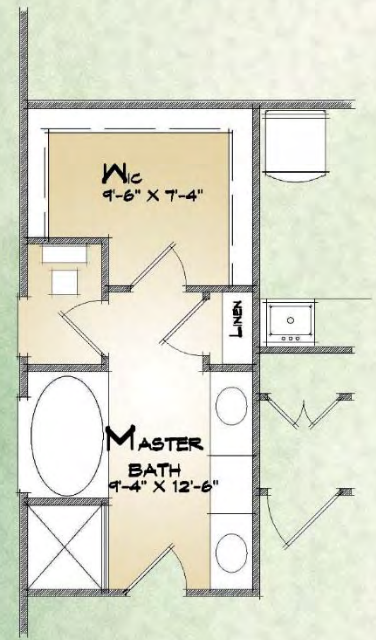
2000 1-1/2 Story Plan

Second Floor

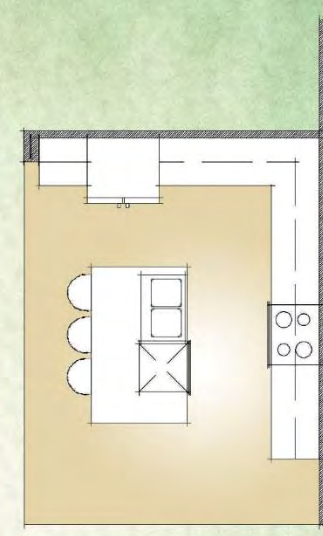
463 SQ FT







Opt Master Bath



Opt Kitchen

Alley

2000 1-1/2 Story Plan
First Floor

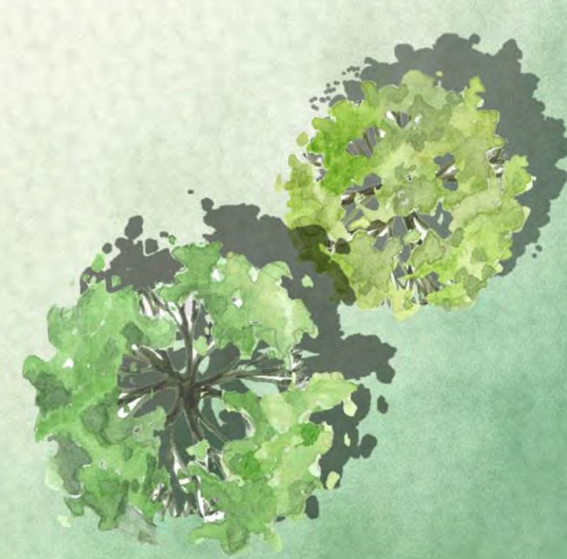
1577 SQ FT

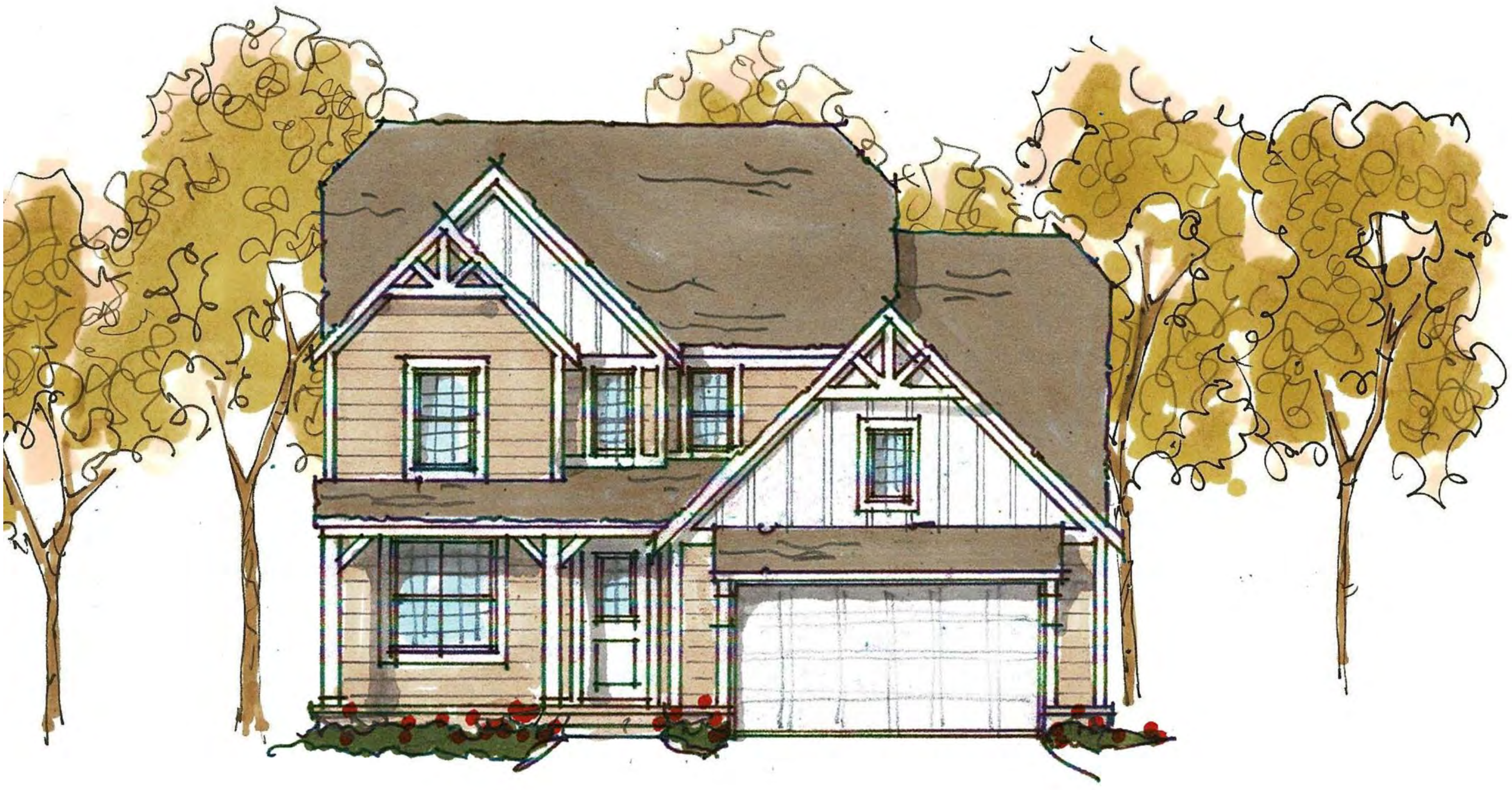
TOTAL 2040 SQ FT

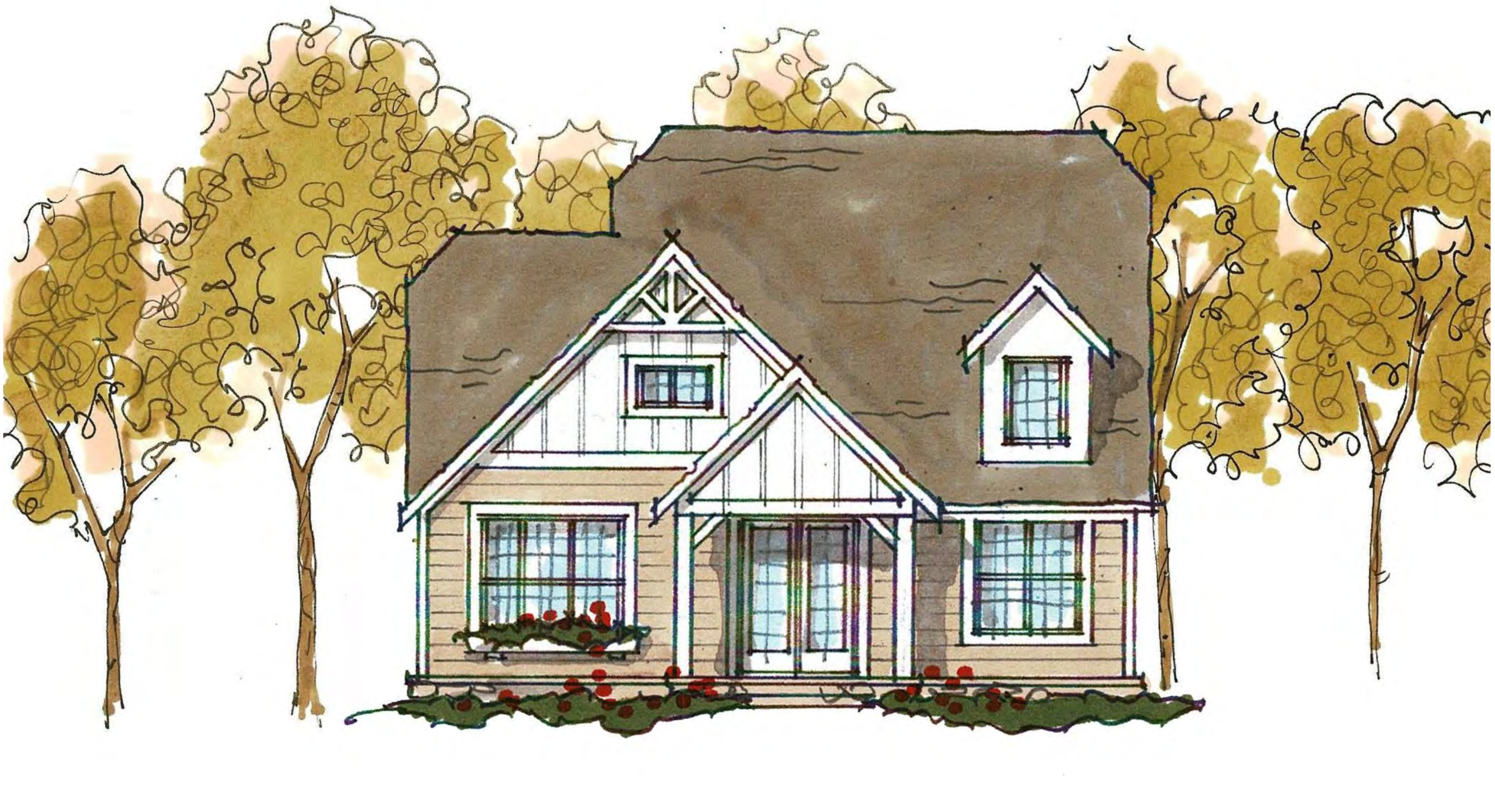
Alley

2000 1-1/2 Story Plan
Second Floor

463 SQ FT

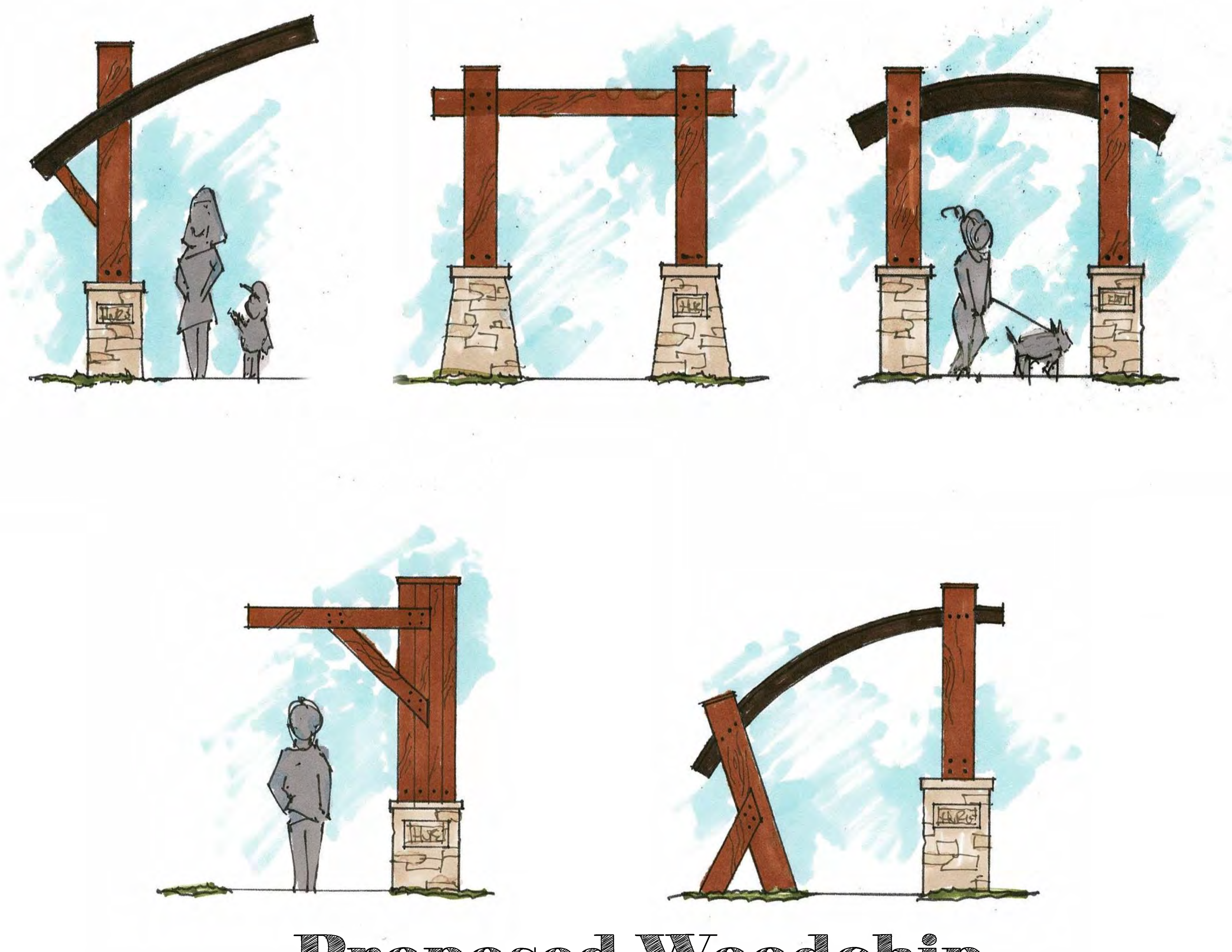




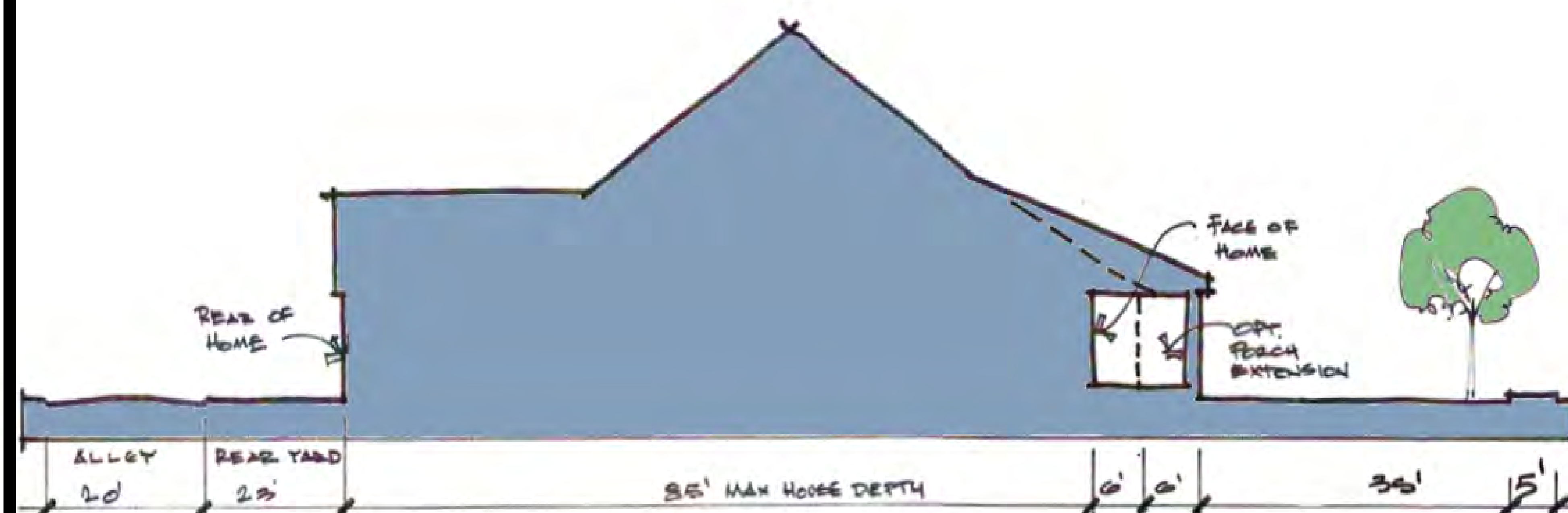


2000 1-1/2 Story Elevations

Proposed Community Entrance Markers



Proposed Woodchip Trail Entrance Markers



TYPICAL ALLEY SECTION

Hamburg Township
Natural Features Impact Statement Outline

PROPOSED DEVELOPMENT NAME: Waters Edge Village

Developer: Winans Lake Development, LLC

Prepared by:
- Midwestern Consulting, 3815 Plaza Drive, Ann Arbor, MI 48108
  Tina Fix, RLA, Ted Hirsch, PE, Rob Wagner, PE
- King and MagGregor Environmental, Inc., 43050 Ford Road, Suite 130, Canton, MI 48187, Woody Held

Additional Information:
Geotechnical investigation report
Hydrogeological investigation report
Protected Species Evaluation

SITE IMPACT ASSESSMENT CHECKLIST:
(Please find attached descriptions, maps, list, plans, or other documentation provided by the developer)

I. Description / Analysis of Site (included are all existing structures, manmade structures):

II. Description / Analysis of surrounding properties within 50 feet of Site (included are all existing structures, manmade structures):

III. Description of existing Natural Features (i.e. topography, soils, slopes, geology, ground water, wetlands, watercourses, plants and animals, habitat, wildlife corridors, and other unique natural features that may exist on the Site).

IV. Recommendations regarding dominant tree species, any rare or unique specimen trees, and all tree species greater than 16 inches in diameter or greater.

V. Potential Impact on Identified Existing Natural Features:

VI. Recommendations regarding any disruption of existing natural features on Site.

VII. Recommendations and concerns regarding storm water drainage and detention/retention systems for the Site:

VIII. Recommendations and concerns regarding sedimentation control during grading and construction of Site:

I. Description / Analysis of Site (included are all existing structures, manmade structures):

Please refer to the Existing Conditions plan for a survey of the property. The project site consists primarily of agricultural fields and wooded areas adjacent to two water features, Gill Lake and the Huron River. There is a house and former outbuilding structures/foundations located in the northeast corner of the site. An overhead electric line transects the site from east to west near Winans Lake Road. The southern leg of the property follows the Huron River and is primarily a wooded wetland.

II. Description / Analysis of surrounding properties within 50 feet of Site (included are all existing structures, manmade structures):

Please refer to the Existing Conditions plan for a survey of the adjacent properties within 50 feet of the site. The property is adjacent to single family residential along Winans Lake Road. The remainder of the perimeter is either single family residential, Gill Lake, or Huron River frontage.

III. Description of existing Natural Features (i.e. topography, soils, slopes, geology, ground water, wetlands, watercourses, plants and animals, habitat, wildlife corridors, and other unique natural features that may exist on the Site).

Please refer to the Existing Conditions plan for a topographic survey, soils limits, and a detailed description of vegetative communities on the site as prepared by King and MacGregor Environmental, Inc. (KME). The following is a general overview of the natural features on the site.

- Vegetation/Trees: Overall brushline limits are shown on the Existing Conditions plan. Trees within in the anticipated limits of impact have been identified and tagged, mapped, and are depicted on the Tree Survey Plans in further detail. The tree list is provided on several Tree list sheets in the plan set.
- Topography: the agricultural fields are generally flat with an elevation change of approximately 5 to 8 feet. The naturalized areas on the northwestern portion of the site drain toward Gill Lake with a significant elevation change of as much as 32 feet with slopes ranging from 10% to 30%. Similarly, the southeastern portion of the site slopes toward the Huron River with an elevation change of as much as 11 feet at slopes ranging from 2% to 6% prior to a steep bluff along the Huron River which has an elevation change of 23-30 feet at slopes ranging from 15% to 60%. There is a drainage swale in the bluff, along the eastern property boundary that has an elevation change of approximately 34 feet.
- Soils – Soils within the agricultural fields consist primarily of Fox sandy loam, a well-drained sandy loam / sandy clay loam soil. Wooded areas are predominantly loam complexes with moderately well to well drained soils. Low lying areas adjacent to Gill Lake and the Huron River are Washtenaw Silt Loam, which is a hydric soil that is poorly drained, and Houghton and Linwood Muck which are hydric soils that are very poorly drained.
- Geology – Soil borings revealed that a majority of the site consists of gravelly sand (some containing trace silt & clay) to depths ranging from 14.5 feet to the maximum

depths explored (20 feet). One hand auger performed near Gill Lake, toward the western property line, revealed loose black peat.

- Groundwater -
    i. A geotechnical investigation was performed for the development and groundwater was observed between 1.5 and 19 feet below the surface (corresponding to approximate elevations ranging between 857.5 and 880 feet) depending on the location on the site.
    ii. A hydrogeological investigation has been performed on the site to determine viability of a community water well for the development. The aquifer underlying the proposed development appears to be capable of sustaining the needs of the development as currently proposed. However, the development proposes to extend public water main to the site to serve domestic water needs.
- Wetlands – There are wetlands along the edge of Gill Lake and wetlands within the Huron River banks that extend along the southeastern finger of the property. Refer to the Existing Conditions plan for additional information regarding location.
- Watercourses – The Huron River defines the southern property boundary and has associated floodplain and wetland areas. The floodplain does not extend beyond the existing bluff on the site.
- Scenery – Both Gill Lake and the Huron River are identified as natural features that provide an opportunity for scenic views with the development of the site.
- Habitat – KME performed a protected species evaluation for the site. See attached.

<u>IV. Recommendations regarding dominant tree species, any rare or unique specimen trees, and all tree species greater than 16 inches in diameter or greater.</u>
Please refer to the Tree Survey Plans and Tree list sheets in the plan set for detailed species information for trees located within the anticipated limits of disturbance. In general, surveyed trees determined to be in good conditioned are located near the edge of Gill Lake and in the woodland that extends into the development area in the southcentral portion of the site.

<u>V. Potential Impact on Identified Existing Natural Features:</u>

- Proposed impacts to natural features:
    i. There are no proposed impacts to the Huron River or Gill Lake or their associated wetlands. The stormwater detention system on site will discharge to Gill Lake and the Huron River from the on-site detention ponds/basin outside of the wetlands. These discharge rates will be controlled per Livingston County Drain Commission standards.
    ii. The woodland corridor along the Huron River extends into the central portion of the site. Efforts have been made to preserve 3.68 acres of the woodland within the internal road network proposed on the site. Impacts to limited portions of the preserved wooded area are proposed to install and construct a walkable pathway through the center of the woodland. Efforts have been made to preserve as much of the woodland along the southern property boundary as is feasible while also providing opportunity for homes that are nestled into the woodlands at the top of the bluff along the Huron River corridor. There are no homes proposed within the 100 foot buffer of the Huron River bluff or within 100 feet of Gill Lake.
    iii. Similar to the homes along the Huron River, the development proposes a number of homes that will be adjacent to and overlooking Gill Lake. With the road alignment serving these homes, there are proposed limited impacts to the trees

within the Oak Hickory Woods adjacent to Gill Lake and the Old Field Scrub area (Areas 2 and 3 on the Existing Conditions Plan) southeast of Gill Lake. Due to the topographic relief in this area, view-out and walk-out basements are proposed to accommodate the existing grade change between field bluff and the existing wetland along the lake. The existing low area in the Old Field Scrub area is an ideal location for installation of one of the stormwater management basins allowing for the treatment of stormwater quality and quantity.

iv. Impacts to existing trees within the 100 foot Winans Lake Road corridor are limited to the minimum grading limits necessary for the proposed entrance roadway, stormwater drainage elements, and required entrance taper lanes and sight distances along Winans Lake Road. Existing trees in the northeast and northwest corners of the property will be preserved to the maximum extent possible in order to maintain mature screening between the proposed development and the adjacent residential uses.

- Natural features protection plan:
  During construction, the grading limits adjacent to trees and woodlands to be preserved will be delineated with tree protection fencing. Additionally, areas that are downslope from the proposed disturbance area will have silt fence installed along the limits of disturbance to minimize sediment washout to the natural features such as the wetlands associated with Gill Lake and the Huron River. In some cases and depending on site conditions during construction additional rows of silt fence, or straw bale dams will be utilized to maximize erosion protection. At low points where runoff will become concentrated flow as opposed to sheet flow, stone filters will be used in between silt fencing to dissipate energy and filter out sediment.
- Alternative analysis:
  The majority of the site is currently zoned Waterfront Residential District (WFR), with a smaller portion zoned Natural River Residential District (NR). One-acre minimum lots are required in these districts with a minimum lot width of 150 feet. The Open space community PUD ordinance requires a parallel plan with standard lots at 30,000sf in area with 125 foot minimum lot width. Additionally, the district requires 60 foot wide private road right-of-ways for roadways. The parallel site plan included with the plan set, shown with the Open Space Development Plan, illustrates development of the site with 79 lots with what would result in significant impact to natural features of the site including the existing trees/woodlands and the bluff along the Huron River.

  The intent of the development is to promote scenic views to both Gill Lake and the Huron River corridor as well as create a walkable community that encourages resident interactions in the green spaces and preserves natural features on the site. The open space community planned unit development proposes deviations from the underlying zoning district in:
  - Lot sizing – various lot sizes including:
    i. (41 ft x 140 ft) and (51 ft x 140 ft) Cottage lots
    ii. (61 ft x 125 ft) Village lots
    iii. (90 ft x 125 ft) Estate lots
  - Home setbacks – Homes to be setback a minimum 23 ft from edge of sidewalk or back of curb
  - Roadway and Road right-of-way widths:
    i. 26 foot private roadways within 50 foot easements
    ii. 20 foot private alleys within 24 foot easements

These deviations allow the development flexibility to preserve natural features on the site beyond that which would be realized through a conventional development. This flexibility translates into 56% open space within the proposed development.

No impacts to wetland, floodplain, Gill Lake, or the Huron River are proposed with the development. Refer to the Site Analysis Plan for the location of anticipated tree impacts, which are primarily located:

- Along the Gill Lake frontage
- Along the Huron River corridor
- Internal wooded area
- Along Winans Lake Road

VI. Recommendations regarding any disruption of existing natural features on site.

The soil erosion and sedimentation control plans in the final site plans will identify measures to be installed prior to, during, and after construction to minimize impacts of the development on the natural features on the site. The following notes will be added to the final site plans to promote preservation and minimal impact to natural features on the site.

- Efforts shall be made to minimize impact to existing trees to the extent practicable when meeting existing grade at the limits of disturbance. If field conditions allow for additional trees to be preserved, they should be preserved.
- Tree protection fence shall be installed around trees to be preserved.
- No mechanical equipment, machinery, or vehicles permitted in critical root zone of existing trees to remain during construction without special considerations (i.e. smaller tracked equipment) or as noted on the existing conditions/removal plan.

VII. Recommendations and concerns regarding storm water drainage and detention/retention systems for the Site:

- Existing drainage patterns:
  - i. Approximately 40 acres (43% of the site) drains to Gill Lake.
  - ii. Approximately 25 acres (27% of the site) drains to the Huron River.
  - iii. There is a large area of woodlands located mostly in the southeast quadrant of the site. There is a low spot just to the north of this woodland area and another low spot due east, near the east property line. The existing topography suggests that an area roughly 19.7 acres in size (21% of the site) drains toward these low spots with no outlet to the Huron River or to Gill Lake. Soil borings in this area indicate sandy/gravelly soils to a depth of 19 feet. Groundwater was also not encountered until 19 feet. It is for these reasons that it can be assumed that runoff from this 19.7 acre area has no problem being infiltrated into the subsurface soils without ponding at the surface.
  - iv. There are also low spots near the southwest corner of the site to which approximately 6.5 acres (7% of the site) drain to, with no outlets to the Huron River or to Gill Lake. Similar soils were encountered in this area (gravelly sands to the maximum depths explored - 20 feet). No groundwater was encountered in this area. It can be assumed that this area also has no problem infiltrating runoff without ponding at the surface.
  - v. The area of the site which is encompassed by the Winans Lake Road R.O.W. (approximately 1.4 acres – 1.5% of the site) does not drain onto the site. Existing drainage ditches carry runoff northwest and southeast along Winans Lake Road.

- Soil infiltration and unsaturated soil capacity
    i. A total of 8 soil borings were performed to a depth of 20 ft. These borings were performed mostly in areas of planned development. The site largely consists of gravelly sand to the extent of the explored depths. One boring encountered a relatively shallow, 5-foot thick seam of hard clayey silt. Groundwater was encountered in only 3 out of 8 soil borings. Each of these 3 borings was dry upon completion. Based on this available information, the site can be characterized as having a high potential for infiltration and saturation capacity.
- Description of changes to site drainage
    i. Approximately 65% of the site's area will have its runoff treated for quality, detained, and released at a controlled rate into either the Huron River or into Gill Lake. The drainage characteristics of the remaining 35% of the site will be largely unaffected and their flow patterns will be maintained (sheet flow/free release to the Huron River or Gill Lake).
    ii. The east detention pond and the southwest detention basin will account for approximately 47.75 acres and will outlet to the Huron River. Approximately 16.8 acres will free release to the Huron River.
    iii. The northwest detention pond will account for approximately 12.5 acres and will outlet to Gill Lake. Approximately 14.75 acres will free release to Gill Lake.
- Description of Facilities to be installed
    i. The east detention pond will have a permanent water level above which will provide detention storage. Runoff from this pond's tributary areas will be treated by several manufactured treatment units upstream of the pond's inlets. An outlet control structure will restrict and control the release rate of stormwater into the Huron River. This outlet control structure will have a riser set at an elevation that will allow for the storage of stormwater volume in excess of two 100-year storm events.
    ii. The northwest detention pond will have a permanent water level above which will provide detention storage. Runoff from this pond's tributary areas will be treated by a manufactured treatment unit upstream of the pond's inlet. An outlet control structure will restrict and control the release rate of stormwater into Gill Lake. This outlet control structure will have a riser set at an elevation that will allow for the storage of stormwater volume in excess of two 100-year storm events.
    iii. The southwest detention/infiltration basin will be a dry basin that provides treatment through a sediment forebay. The basin will intend to utilize the expected high infiltration rate of the in-situ gravelly sands as a stormwater BMP which enhances the quality and quantity treatment of on-site runoff. An outlet control structure will restrict and control the release rate of stormwater into the Huron River. This outlet control structure will have a riser set at an elevation that will allow for the storage of stormwater volume in excess of two 100-year storm events.
    iv. The proposed roads and alleys will have curb and gutter and will utilize curb inlets to capture stormwater runoff. A majority of the upland open space areas will drain toward yard inlets. Networks of enclosed concrete pipes will convey stormwater to each of the detention ponds/basin.

VIII. Recommendations and concerns regarding sedimentation control during grading and construction of Site:

The project will utilize standard conventional soil erosion control methods and materials to limit erosion and control sedimentation during construction operations. These methods and materials include, but are not limited to:

a. Silt fence
b. Inlet filters
c. Riprap and other energy dissipaters
d. Mud tracking mat at construction entrance
e. Regular site inspections to confirm and/or mitigate soil erosion concerns

Special Provisions

- There are no known existing deed restrictions
- There are no known protective covenants associated with the parcel
- There are no known existing master deed or association bylaws associated with the parcel

Previous submittals: No known previous submittals apply to the site.

Submitted by:______________________________ Dated: ___________

Protected Species Evaluation
Waters Edge Village

The assessment of potential Federal and/or State protect species included reviews of the United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation website for the subject property as well as a search of the Michigan Natural Features Inventory (MNFI) database for element occurrence records from the two sections within which the subject property is located.

The USFWS website indicated six federally protected species associated with Livingston County. These six species are: Indiana bat (*Myotis sodalis*; endangered), northern long-eared bat (*Myotis septentrionalis*; threatened), eastern massasauga (*Sistrurus catenatus*; threatened), snuffbox mussel *(Epioblasma triquetra:* endangered), powershiek skipperling *(Oarisma powershiek;* endangered*),* and the eastern prairie fringed orchid *(Plantanthera leucophaea).*

A brief discussion of each of the federally protected species is provided below.

Indiana bats prefer to roost and brood in dead and dying trees with exfoliating/peeling bark, or crevices in dead snags or dying trees located primarily in wetlands, floodplain/riparian forests, bur oak forests, and oak openings. Hibernacula are restricted to caves and mines. Maternity and roost trees are usually found in the open or where exposed to solar radiation. Clearance from small limbs and vines is also a factor for roost site ingress and egress. Potential roost habitat is present on the subject property. To avoid an incidental take that can occur through removing or trimming trees during the summer months, all proposed tree removal will occur during the inactive season (October 1st through March 31st). No caves or mines were observed on the subject property. The search of the MNFI database did not include a record for this species. Given the presence of suitable roosting habitat, it is our opinion that the proposed construction and/or tree removal activities will likely not have an adverse effect on the Indiana bat if all proposed activity takes place during the inactive season.

The northern long-eared bat (NLEB) is less particular than the Indiana bat in its preferred summer habitat, selecting trees, both dead and alive, primarily with regard to the tree's ability to provide bark cover, cavities and crevices. Males and non-breeding females are also known to summer roost in caves and mines. The NLEB typically feed in woodland areas. Like the Indiana bat, the NLEB over-wintering habitat is restricted to hibernacula located in caves and mines. NLEB hibernacula are not known from Livingston County but NLEB roosts are known from Putnam Township (T1N, R4E), Livingston County. The search of the MNFI database did not include a record for this species. To avoid an incidental take that can occur through removing or trimming trees during the summer months, all proposed tree removal will occur during the inactive season (October 1st through March 31st). Given the presence of suitable roosting habitat, it is our opinion that the proposed construction and/or tree removal activities AOI will likely not have an adverse effect on the NLEB bat if all proposed activity takes place during the inactive season.

The eastern massasauga rattlesnake (EMR) is typically associated with open wetlands, such as marshes, prairie fens and wet meadows near streams, rivers and lakes in southern Michigan, and require a water table near the surface for hibernation. The emergent wetlands along the south and east end of Gill Lake as well as the floodplain wetland along the north bank of the Huron River provide potential EMR habitat. The search of the MNFI database did include a record for this species. The Information for Planning and Consultation website of the USFWS indicates that Tier 2 habitat is present, meaning an area with high potential habitat that may be occupied by EMR.

A project which includes Tier 2 habitat is not likely to adversely affect EMR if all of the following apply:

- Project does not impact more than 1 acre of wetland habitat.

- Project will not appreciably affect hydrology.

- Project includes all Tier 2 Best Management Practices as described in the USFWS *General Project Design Guidelines for Eastern Massasauga (=rattlesnake)* available at https://ecos.fws.gov/ipac/location/V3L2COQ6F5AMBDSPTEZKB7CMSY/documents/generated/5280.pdf.

- Use of wildlife-safe materials for erosion control and site restoration by eliminating the use of erosion control products containing plastic mesh netting or other similar material that could ensnare EMR.

- Increase human safety and awareness of EMR by those implementing the project by first watching the MDNR's "60-Second Snakes: The Eastern Massasauga Rattlesnake" video (available at https://youtu.be/-PFnXe_e02w), or review the EMR factsheet (available at www.fws.gov/midwest/endangered/reptiles/eama/pdf/EMRfactsheetSept2016.pdf or by calling 517-351-2555.

- Require reporting of any EMR observations, or observation of any other listed threatened or endangered species, during project implementation to the USFWS within 24 hours.

The snuffbox is a small to medium sized mussel that prefers small to medium-sized streams and some large rivers, in areas of swift current with sand, gravel and cobble substrate. Suitable habitat for the snuffbox mussel was not observed on the subject property given the relatively low gradient of the river and sand/silt substrate. Construction is not proposed within the Huron River. The only proposed action involving the Huron River will be the discharge of pre-treated storm water. The search of the MNFI web database did include a record of this species from the Huron River at a site described as “Rickett Road”. Due to the lack of habitat and lack of construction proposed in the riverbed, it is our opinion that there will be no adverse effects on the mussel from proposed development.

The poweshiek skipperling in Michigan is found exclusively in prairie fens (alkaline peatlands) dominated by grasses and sedges. Prairie fens are a relatively rare natural community type which occur where calcareous groundwater fed springs discharge at the soil surface. Prairie fen habitat was not observed on the subject property. The search of the MNFI Web Database did not include a record for this species. Given the lack of suitable habitat, it is our opinion that the proposed development will have no adverse effects on the powesheik skipperling.

The eastern prairie fringed orchid in southern Michigan is most frequently associated with open bogs characterized by the presence of *Sphagnum* moss or openings within tamarack bogs. Suitable habitat for the eastern prairie fringed orchid was not observed on the subject property. The search of the MNFI Web Database for this section did not include a record for this species. Given the lack of suitable habitat, it is our opinion that the proposed development will have no adverse effects on the eastern prairie fringed orchid.

The review of the Michigan Natural Feature Inventory (MNFI) web database indicates one Federal protected species (snuffbox mussel) and three State protected species. The three State protected species include mat muhly *(Muhlenbergia richardsonis;* threatened*),* orange-or yellow- fringed orchid *(Plantanthera ciliaris;* endangered), and wavyrayed lampmussel *(Lampsilis fasciola).*

Mat muhly in southern Michigan is a grass which is typically found in high quality prairie fens (alkaline peatlands). Prairie fens are a relatively rare natural community type which occur where calcareous groundwater fed springs discharge at the soil surface. Mat muhly is a slender, wiry grass that grows in loose to dense tufts or mats. Prairie fen habitat was not observed on the subject property. Given the lack of suitable habitat it is our opinion that the proposed development will have no adverse effects on mat muhly.

The orange or yellow fringed orchid is a relatively stout, robust orchid, the stem is terminated by a densely flowerhead with strikingly orange to yellow flowers. In southern Michigan, the orange or yellow fringed orchid is most frequently associated with open bogs characterized by the presence of *Sphagnum* moss or openings within tamarack bogs, also occurring in damp sandy meadows. Suitable habitat for the orange or yellow fringed orchid was not observed on the subject property. Given the lack of suitable habitat it is our opinion that the proposed development will have no adverse effects on the orchid.

The wavy-rayed lampmussel occurs in small to medium sized shallow streams, near riffles, with a good current. Their preferred substrate is sand/or gravel. Suitable habitat for the lampmussel mussel was not observed on the subject property given the relatively low gradient of the river and sand/silt substrate. Construction is not proposed within the Huron River. The only proposed action involving the Huron River will be the discharge of pre-treated storm water. Due to lack habitat and lack of construction proposed in the riverbed, it is our opinion that the proposed development will have no adverse effects on the wavy-rayed lampmussel.

EXHIBIT H

Traffic Impact Study (Preliminary)
Waters Edge Residential Development

Hamburg Township, Michigan

November 16, 2018
(Version 01)

Prepared For:

Winans Lake Development LLC
3596 W. Maple Road, Suite 230
Bloomfield Hills, MI 48301

Prepared By:

Midwestern Consulting
3815 Plaza Drive
Ann Arbor, Michigan 48108

MIDWESTERN™
CONSULTING

Table of Contents

Appendix Contents

- **ITE Trip Generation Sheets – Single Family Homes**
- **Turning Movement Count Data**
- **SEMCOG Data**
- **24-Hr Volume Count Data**
- **HCM Output Pages**
- **SimTraffic Output Pages**
- **Signal Timing Plans**

This traffic impact study has been prepared by:

Michael R. Cool

Michael R. Cool, P.E.
Midwestern Consulting
Project Manager
License No: 6201050420

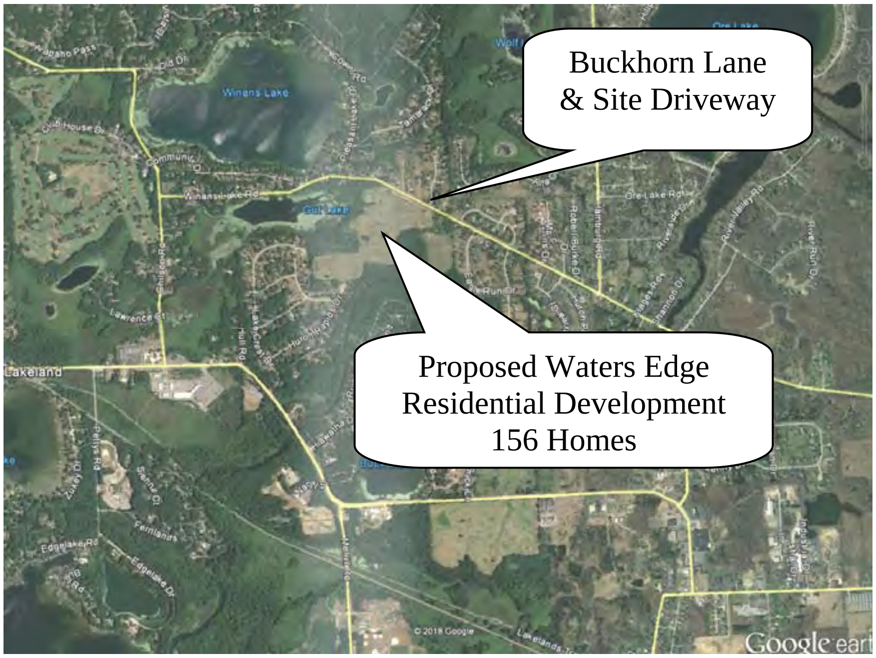
1.0 Executive Summary (TBD)

Summary List of Mitigation
The following is a list of recommended mitigation that is needed to address existing, background, and forecasted traffic issues.

-

2.0 Introduction

A 156-unit single family home development is planned for a site located south of Winans Lake Road between Chilson and Hamburg Roads in Hamburg Township, Michigan. The site's driveway connection to Winans Lake Road will be located across from Buckhorn Lane a private road that serves 10 single family homes.



An emergency-only access connection to Huron Rapids Drive, an existing residential neighborhood to the south of the site, is planned and would provide emergency vehicles with an alternative way to reach the development from M-36 via Lake Crest Drive to Huron Rapids Drive. This study will also analyze a forecast traffic scenario if that emergency access were to be completely open to all traffic.

The scope of this traffic study includes the following intersections:

- 9001 – Winans Lake Road and Chilson Road
- 9002 – Winans Lake Road and Buckhorn Lane / Site Driveway
- 9003 – Winans Lake Road Hamburg Road (T-Intersection)
- 9004 – Winans Lake Road and Hamburg Road (Roundabout)
- 1001 – M-36 and Chilson Road
- 9005 – M-36 and Lake Crest Drive
- 1002 – M-36 and Merrill Road
- 1003 – M-36 and Hamburg Road

This study will identify the existing, background, and forecast level of service at the study intersections in order to determine the impact this development will have on area traffic.

3.0 Area Description & Site Plan

3.1 Proposed Site Location and Surroundings

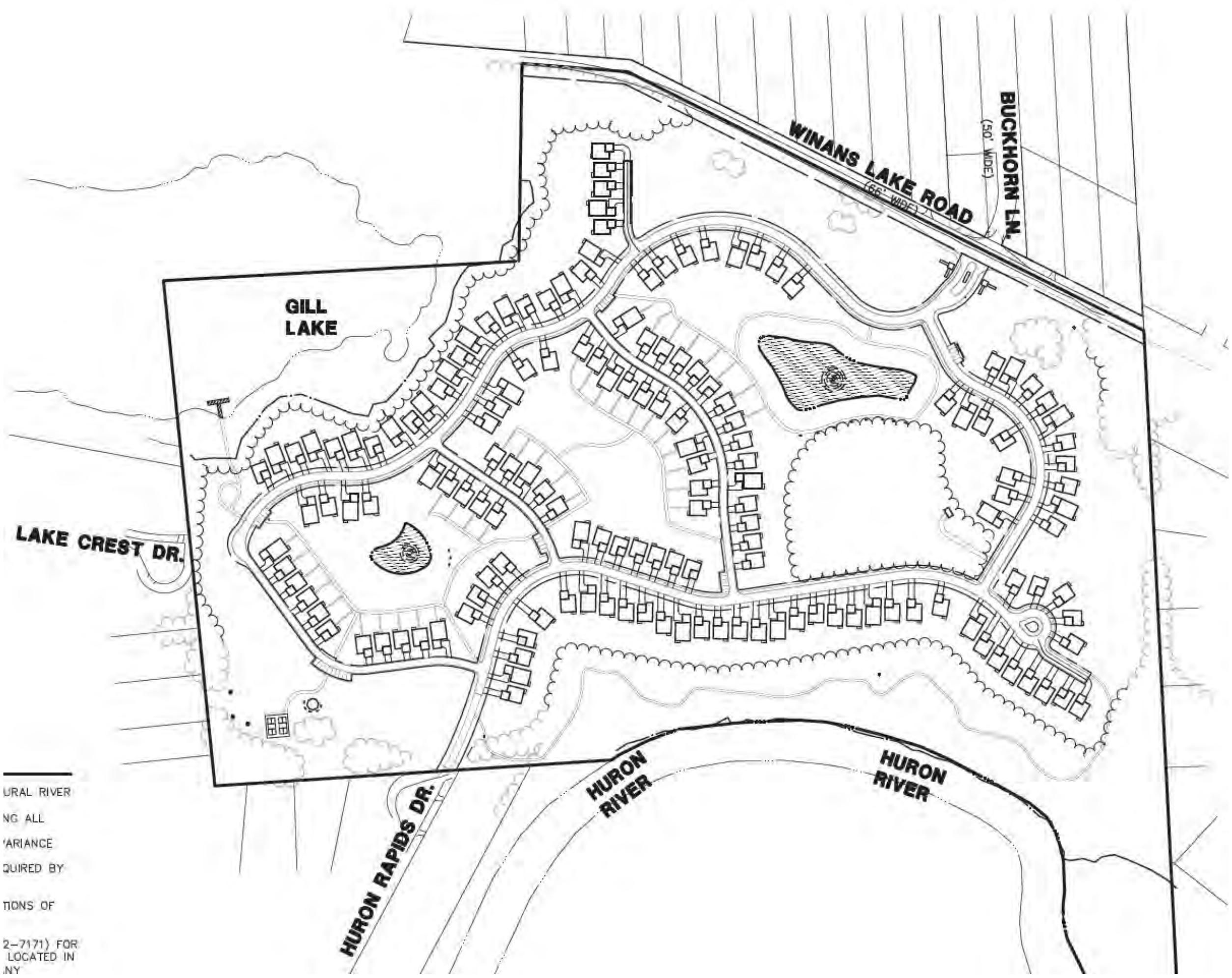
The site is located south of Winans Lake Road between Chilson Road and Hamburg Road. The site's driveway will be located across from Buckhorn Lane, a private road that provides access for 10 homes.

3.2 Existing and Proposed Zoning

The site is currently zoned WFR (Waterfront Residential) and NR (Natural River), and will be rezoned to Open Space Community PUD.

3.3 Site Plan

The proposed site layout is shown below:



3.4 Project Scope and Study Intersections

The intersections that are considered within the traffic influence area of this development and that are analyzed in this traffic study are as follows:

- 9001 – Winans Lake Road and Chilson Road
- 9002 – Winans Lake Road and Buckhorn Lane / Site Driveway
- 9003 – Winans Lake Road Hamburg Road (T-Intersection)
- 9004 – Winans Lake Road and Hamburg Road (Roundabout)
- 1001 – M-36 and Chilson Road
- 9005 – M-36 and Lake Crest Drive
- 1002 – M-36 and Merrill Road
- 1003 – M-36 and Hamburg Road

9001 - Winans Lake Road and Chilson Road

Winans Lake Road and Chilson Road are both under the jurisdiction of the Livingston County Road Commission. The speed limit near the intersection is 35 MPH on both Chilson Road and Winans Lake Road. The T-intersection is stop-controlled for the Winans Lake Road approach, while Chilson Road is free flowing. Each approach consists of a single approach and departure lane and is shown in the picture below.

Chilson Road and Winans Lake Road Intersection (Looking North)

9002 – Winans Lake Road and Buckhorn Lane
Winans Lake Road is two-lanes wide and is under the jurisdiction of the Livingston County Road Commission, and Buckhorn Lane is a private driveway. The Right-Of-Way on Winans Lake Road is 66' wide and the speed limit on this segment is 45 MPH. The intersection is stop-controlled for Buckhorn Lane and the future driveway connection, while Winans Lake Road is free flowing.

The intersection is planned to be widened to include a center-left turn lane and a right-turn deceleration lane for the proposed site driveway. The proposed driveway will be designed with a boulevard style entrance.

A west facing view of the intersection is shown in the picture below.

Winans Lake Road and Buckhorn Lane / Proposed Driveway Intersection (Looking West)

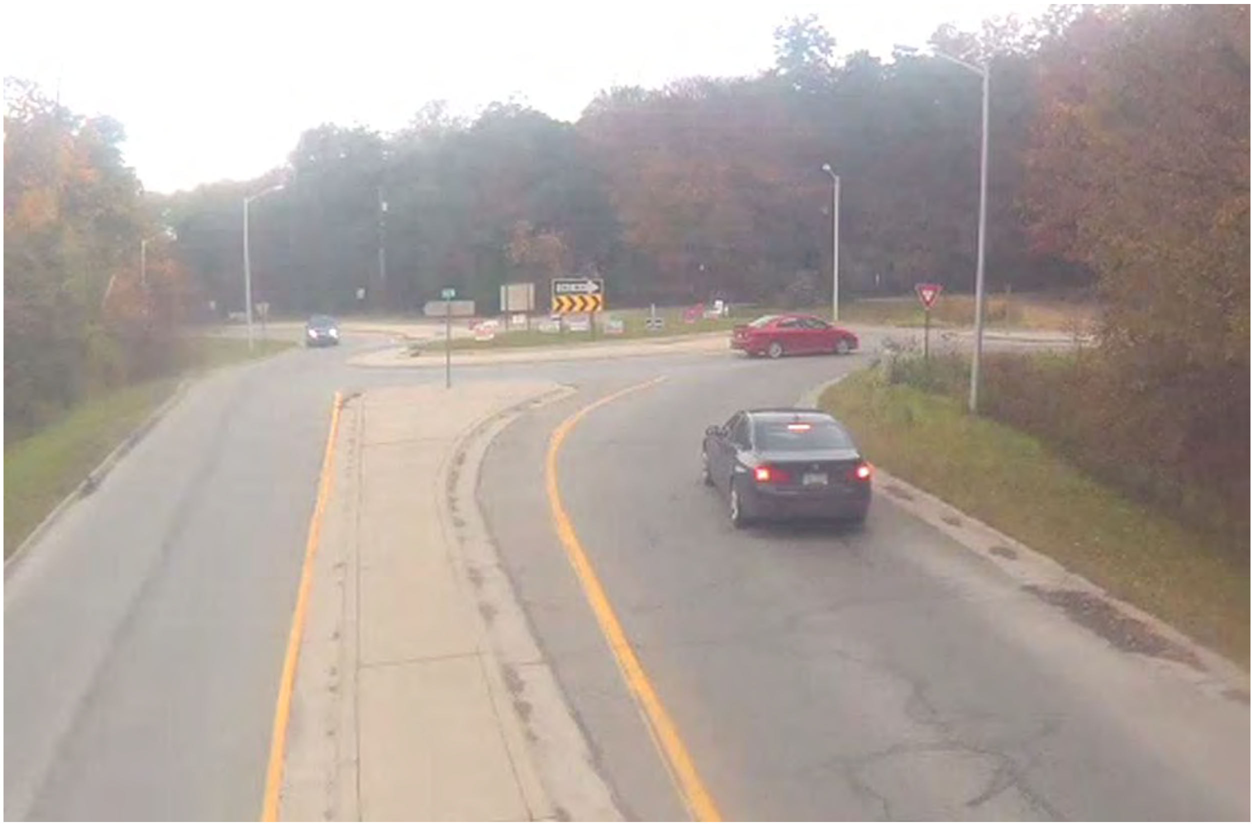
9003 – Winans Lake Road and Hamburg Road (T-Intersection)
Both Winans Lake Road and Hamburg Road are two-lanes wide and under the jurisdiction of the Livingston County Road Commission. The speed limit near the intersection is 45 MPH on Winans Lake Road and 35 MPH on Hamburg Road. Hamburg Road is stop-controlled, while Winans Lake Road is free-flowing. There is a short deceleration taper for the westbound approach to the intersection.

A west facing view of the intersection is shown in the picture below.

Winans Lake Road and Hamburg Road T-Intersection (Looking West)

9004 – Winans Lake Road and Hamburg Road (Roundabout)
Both Winans Lake Road and Hamburg Road are two-lanes wide and under the jurisdiction of the Livingston County Road Commission. The speed limit is 45 MPH on both roadways departing the intersection. All approaches to the single-lane roundabout are yield-controlled, with a circulatory speed of 20 MPH.

A north facing view of the roundabout is shown in the picture below.



Winans Lake Road and Hamburg Road Roundabout (Looking North)

1001 – M-36 and Chilson Road
Chilson Road is under the jurisdiction of the Livingston County Road Commission, while M-36 is under the jurisdiction of the Michigan Department of Transportation (MDOT). This intersection is controlled with a semi-actuated signal (loops sensors on Chilson and the retail driveway) with a 70 second AM cycle length and 80 second PM cycle length. All approaches include a pedestrian crosswalk.

The speed limit on Chilson Road is 35 MPH, and the speed limit on M-36 is 45 MPH.

A south facing view of the roundabout is shown in the picture below.

M-36 and Chilson Road Intersection (Looking South)

9005 – M-36 and Lake Crest Drive

M-36 is under the jurisdiction of MDOT and Lake Crest Drive is under the jurisdiction of the Livingston County Road Commission. M-36 is 45 MPH near the intersection, with a 30 MPH advisory speed limit to the west around the curve near Hull Road. Lake Crest Drive is 25 MPH which connects to Huron Rapids Drive which in turn connects to the proposed site through the proposed emergency access (or full access).

There is a driveway to a club located across from Lake Crest Drive, which had very little traffic during the morning peak hours, but did have some traffic during the afternoon peak hours.

M-36 has a short deceleration lane for Lake Crest Drive, and there is no left-turn passing or center-left-turn lane along M-36 at this intersection. M-36 is free flowing, while the club driveway and Lake Crest Drive is stop-controlled.

An east facing view shows the intersection of M-36 and Lake Crest Drive.

M-36 and Lake Crest Drive (Looking East)

1002 – M-36 and Merrill Road
Merrill Road is under the jurisdiction of the Livingston County Road Commission, while M-36 is under the jurisdiction of the Michigan Department of Transportation (MDOT). The speed limit on M-36 is 45 MPH. This intersection is controlled with a semi-actuated signal (loops sensors on the Merrill Road approach) that runs free with the same Max timing all day long. There is an overlap phase for eastbound M-36 right-turns that allow that traffic to proceed while Merrill Road traffic is receiving a green indication.

The eastbound M-36 approach consists of a through-only lane and a right-turn only lane. The westbound M-36 approach consists of a through only lane and a short left-turn only lane. The northbound Merrill Road approach consists of a separate left-turn and right-turn only lane.

A west facing view of the intersection is shown in the picture below.

M-36 and Merrill Road (Looking West)

1002 – M-36 and Hamburg Road
Hamburg Road is under the jurisdiction of the Livingston County Road Commission, while M-36 is under the jurisdiction of the Michigan Department of Transportation (MDOT). The speed limit on M-36 is 45 MPH, and 40 MPH further to the south. The speed limit on Hamburg Road is 45 Miles per hour. The northbound approach to this intersection is a retail development driveway.

This intersection is controlled with a semi-actuated signal (loops sensors on the Hamburg Road and the retail driveway approaches) that runs free with the same Max timing until the late evening when the intersection is set to flash (yellow flash on M-36, red flash on Hamburg / Retail Driveway) at 11 PM until 4 AM..

The southbound Hamburg Road approach consists of a left-turn only lane and shared through/right-turn lane. The northbound retail driveway approach consists of a left-turn only lane and a shared through right-turn lane. The eastbound and westbound M-36 approaches consist of separate left-turn, through-only, and right-turn lanes.

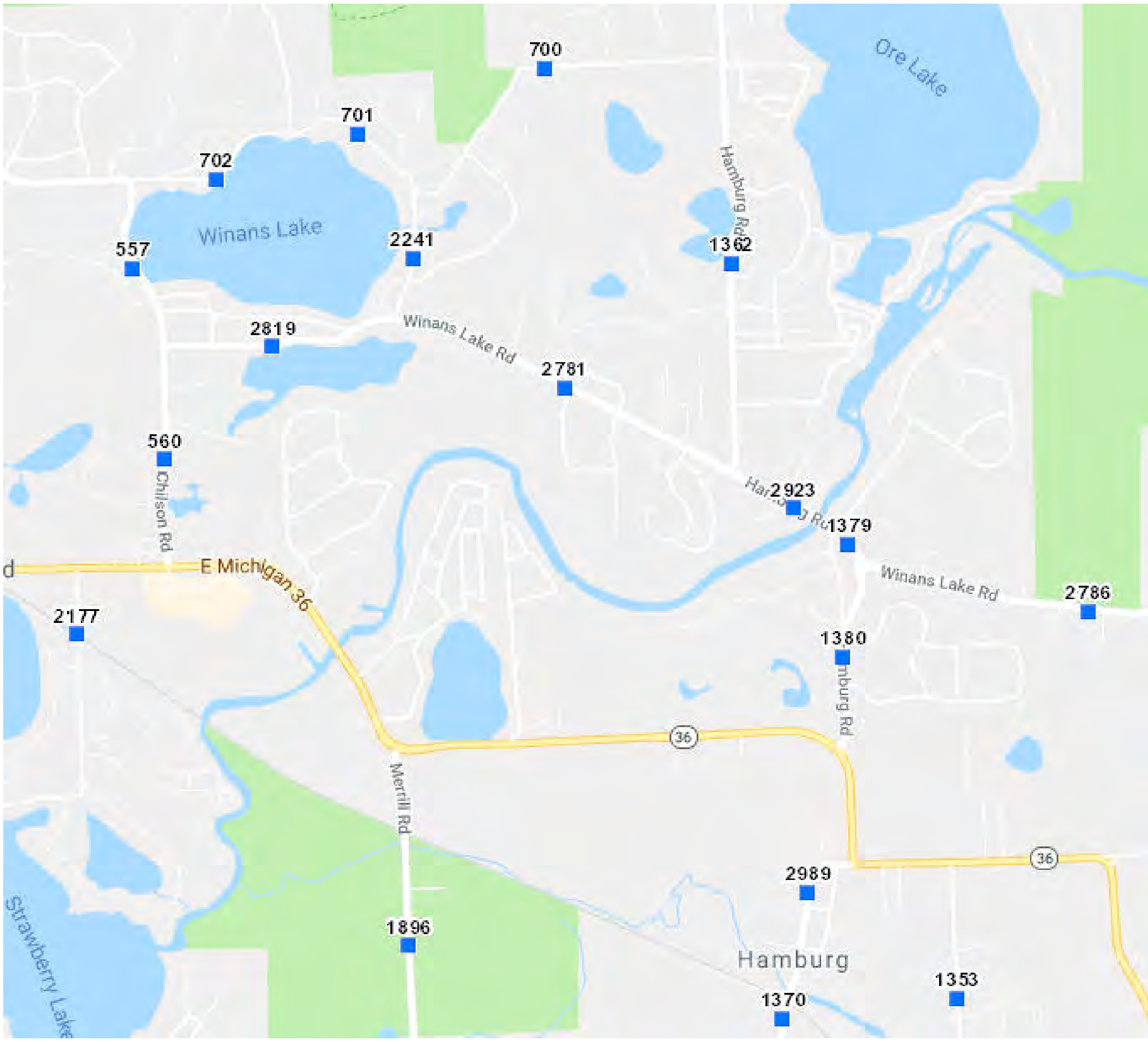
A south facing view of the intersection is shown below.

M-36 and Hamburg Road (Looking South)

4.0 Data Collection & Existing Traffic Volumes

4.1 Twenty-Four Hour Traffic Volumes

Existing and historical 24-hr volume data for this traffic study have been acquired from the Southeast Michigan Council of Government's (SEMCOG) traffic count database. Each location's volume summary printout is included in the appendix, and each of the calculated average annual daily traffic volumes (AADT) from these locations are summarized in Table 4.1.



Map of SEMCOG TCDS Count Locations
(the numbers are local Ids, not traffic volumes volumes)

Table 4.1 – Area 24-Hr Volumes

Local ID	557	560	1362	1379	1380	1896	2781	2786	2819	2923	MDOT-12
Year	AADT										
2018			3,610		11,130		4,380	10,700	4,230	6,170	
2017											
2016	6,630	7,100		6,930		7,400	4,330		4,120		
2015			3,860		9,470			9,930		5,300	9,182
2014	5,650	6,260		5,570		5,720	4,820		3,580		
2013			3,680		8,840	5,630		9,230		4,960	
2012	5,500	5,920		5,480		5,900	4,210		3,920		10,702
2011											
2010	5,810		3,550		7,780	5,640	4,590	8,860		5,300	
2009		5,720		5,350					3,820		8,244
2008	5,380		3,440		7,890					5,650	
Forecasted 2028 Volume											
2028	7,666	9,106	4,003	8,861	14,062	9,883	4,256	12,999	4,561	6,148	11,877
Raw Growth	1.156	1.283	1.109	1.279	1.263	1.336	0.972	1.215	1.078	0.996	1.294
# of Years											
Years	12	12	10	12	10	12	10	10	10	10	13
Growth Rate	1.012	1.021	1.010	1.021	1.024	1.024	0.997	1.020	1.008	1.000	1.020

Average Growth Rate

1.014

The 2028 forecast volumes are calculated using the existing AADT data points and the FORECAST function in Excel. If the historical growth trends continue from the past 10 years into the future, the overall growth rate for the area is about 1% per year.

4.2 Turning Movement Counts

Turning movement counts have been taken between the hours of 7:00-9:00 AM and 4:00-6:00 PM have been taken at the following intersections for use in this traffic study:

- 9001 – Winans Lake Road and Chilson Road
- 9003 – Winans Lake Road and Hamburg Road (T-Intersection)
- 9004 – Winans Lake Road and Hamburg Road (Roundabout)
- 1001 – M-36 and Chilson Road
- 9005 – M-36 and Lake Crest Drive
- 1002 – M-36 and Merrill Road
- 1003 – M-36 and Hamburg Road

These morning and afternoon peak hour counts include all personal vehicles, commercial truck traffic, pedestrians, and bicycle traffic. A summary of these turning movement counts is included in the Appendix.

Figures 4.1 and 4.2 show the existing morning and afternoon peak hour traffic volumes.

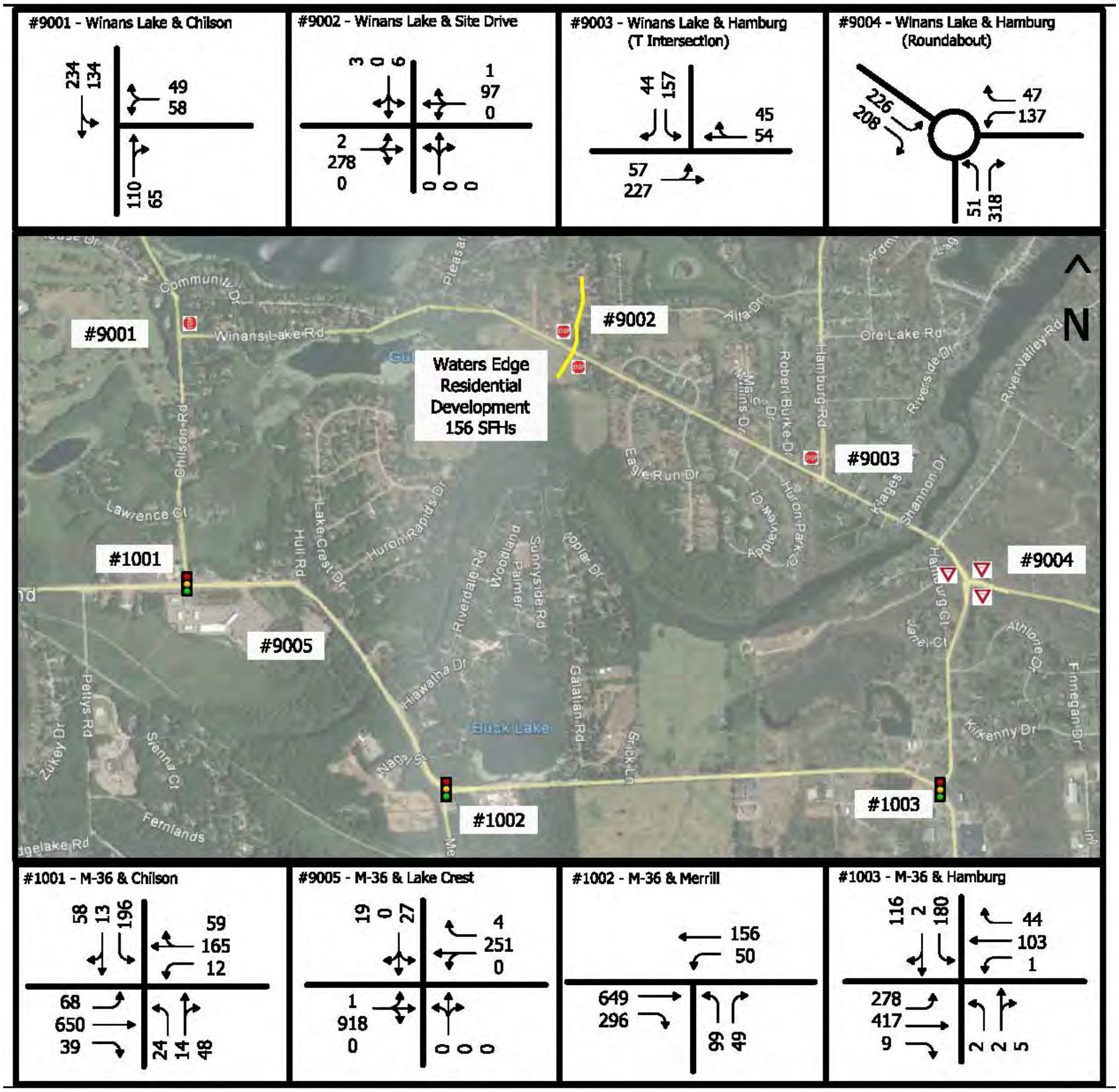


Figure 4.1 – Existing Morning Peak Hour Volumes

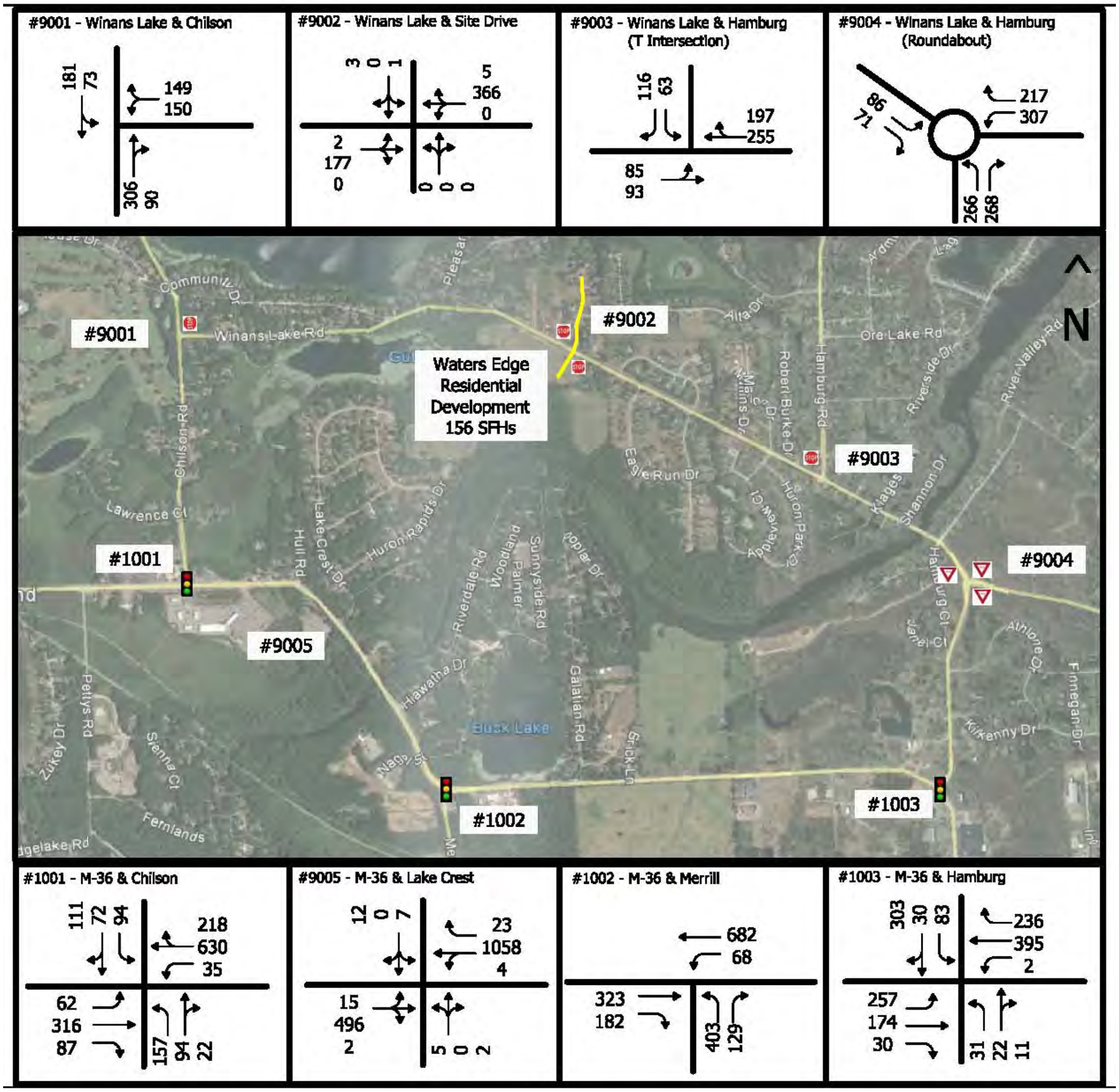


Figure 4.2 – Existing Afternoon Peak Hour Volumes

4.3 Observations on Existing Traffic Conditions

The following general observations were made during the counting process:

- 9001 – Winans Lake Road and Chilson Road
    - AM westbound queues for stopped traffic were typically in the 1-5 vehicle range.
    - PM westbound queues for stopped traffic were occasionally longer than 10 vehicles, but cleared out regularly.
- 9003 – Winans Lake Road and Hamburg Road (T-Intersection)
    - AM southbound queues for stopped traffic were typically in the 1-5 vehicle range.
    - PM southbound queues for stopped traffic were typically in the 1-5 vehicle range.
- 9004 – Winans Lake Road and Hamburg Road (Roundabout)
    - AM traffic moves very well through the roundabout, occasional short lived queues of 1-5 vehicles northbound and westbound.
    - PM traffic also moves well through the roundabout, with occasionally longer westbound queues in the 1-10 vehicle range, and northbound queues in the 1-7 vehicle range.
- 1001 – M-36 and Chilson Road
    - AM southbound left-turns occasionally wait for more than one signal cycle to complete their turn.
    - PM traffic seems to move fairly well through the signal with limited queuing and less waiting through multiple signal cycles.
- 9005 – M-36 and Lake Crest Drive
    - Relatively little traffic on each driveway, so there is very little queuing.
- 1002 – M-36 and Merrill Road
    - Traffic appears to move through this intersection fairly well during both peak hours.
- 1003 – M-36 and Hamburg Road
    - Traffic moves well during the AM peak hour, southbound left-turn queues are in the 1-5 range.
    - Occasionally the eastbound left-turns from M-36 to Hamburg Road wait for multiple signal cycles, during the PM peak hour.

4.4 Crash Data (TBD)

The five most recent years of crash data for each of the study intersections have been gathered from the Michigan Traffic Crash Facts website (www.michigantrafficcrashfacts.org) and are analyzed later in this report.

5.0 Background Growth and Other Developments

Typically traffic volumes may grow over time due to development in the surrounding area. The existing traffic volumes are increased by a background growth rate to estimate the background traffic conditions that will be present when the proposed site has reached its build-out.

SEMCOG's Hamburg township community profile projects a population and job growth rates approximately 0.3% per year for the next 28 years. However the historical traffic volumes from the past 10 years is closer to 1% per year. To be conservative this study will use a 1.0% per year growth rate for a period of 10 years to 2028, the buildout year for this development.

No other developments in the area were considered into this study at this time.

Figures 5.1 and 5.2 show the background volumes for the morning and afternoon peak hours.

Figure 5.1 – Background Morning Peak Hour Volumes

Figure 5.2 – Background Afternoon Peak Hour Volumes

6.0 Trip Generation

6. 1 Methodology

Trip generation for this traffic study is based upon the rates and equations contained in the Institute of Transportation Engineer's (ITE) **Trip Generation Manual**, 10th Edition. The **Trip Generation Manual** is a publication that contains a wealth of traffic data on a wide variety of land uses that fall within the categories of residential, lodging, recreational, institutional, industrial, medical, office, retail, and services. The **Trip Generation Manual** is typically used if no local data for a specific land use is readily available.

Base Vehicular Trips

The methodology in estimating the base vehicular trip generation for the site and any background developments is contained in the ITE **Trip Generation Handbook**, 3rd Edition and is summarized as follows:

- Identify the most appropriate land use category. If more is known about the exact type of land use for a development and there is data on it within the **Trip Generation Manual**, then it is better to select the specific land use. Otherwise there are more general land uses such as General Office or Shopping Center that can be used.
    - This development is a 156-unit single family home development so the ITE category will be Single Family Housing, ITE Code 210.

- Next, select the independent variable used in the analysis. For residential land uses this is typically the number of units, or number of bedrooms. For retail and office space the independent various is often the size of the building, or the number of employees.
    - The independent variable is housing units. (156)

- Determine if the trip generation equations or rates are more appropriate to use in the analysis. The coefficient of determination (R^2) is defined as a number that indicates how well data fit a statistical model – sometimes simply a line or curve. In this case it relates to the line through the data points contained in the **Trip Generation Manual** for proposed development. If the coefficient of determination is less than 0.75, or no equation is provided within the **Trip Generation Manual**, then the trip generation rate is used. If the R^2 value is greater than 0.75, then the equations provided are typically used. Other factors to consider include the number of available studies for each land use, and how the size of the development relates to the average size of the available data set.
    - Equations are used, all coefficients of determination are above 0.75.

- Calculate the base number of vehicular trips for the typical weekday, the morning peak hour, and the afternoon peak hour. The inbound and outbound trips are calculated by the directional distribution provided on the data sheet for a specific category.
- Multi-modal Trip Generation
    - If a development is positioned near convenient public transportation options, or if there are significant destinations within walking or biking distance, the number of vehicle trips may be reduced. In this case, most all trips to and from this development are likely to occur by vehicle, and so there will be no reductions due to alternative modes of transportation.

6.2 Trip Generation Summary – Proposed Development

The trip generation for the proposed development is summarized in Table 6.1. The number of trips that exist on Buckhorn Lane, which is across from the proposed site driveway is also estimated by the Single Family Housing category. The ITE data sheets are included in the Appendix.

- 24-Hour Volumes – This is an estimate of the total weekday daily traffic entering and existing the site (with half entering and half exiting).
- The AM and PM peak hours (of adjacent street traffic) is an estimation of the traffic that enters and exits the site during the peak hours of the day, which is typically period of 1 hour from 7:00-9:00 AM and 4:00-6:00 PM.

Table 6.1 Trip Generation – Proposed Development

		Size	24-Hour	AM Peak Hour			PM Peak Hour		
Land Use	ITE Code	(Units)	Volume	Enter	Exit	Total	Enter	Exit	Total
Proposed Development	210	156	1565	29	87	116	98	58	156
Buckhorn Lane (estimated)	210	10	125	3	9	12	7	4	11

7.0 Trip Distribution

Trip Distribution for both the proposed development and the other background developments are based upon the existing traffic patterns in the area.

A summary of the existing traffic volumes that enter and exit the area is shown in Table 7.1. In general traffic is flowing eastbound during the morning and returning westbound during the PM peak hour. The assumed percentages are just rounded estimates for simpler calculations.

Table 7.1 – Trip Distribution Table

AM Outbound	Vol	%	Assumed %	AM Inbound	Vol	%	Assumed %
North on Chilson	159	8.0%	10%	North on Chilson	368	20.4%	20%
West on M-36	247	12.4%	15%	West on M-36	757	41.9%	40%
South on Merrill	346	17.3%	10%	South on Merrill	148	8.2%	10%
East on M-36	602	30.1%	30%	East on M-36	148	8.2%	10%
East on Winans Lake Road	544	27.2%	30%	East on Winans Lake Road	184	10.2%	10%
North on Hamburg Road	102	5.1%	5%	North on Hamburg Road	201	11.1%	10%
Total	2000	100.0%	100%	Total	1806	100.0%	100%
PM Outbound	Vol	%	Assumed %	PM Inbound	Vol	%	Assumed %
North on Chilson	455	18.1%	20%	North on Chilson	254	9.8%	10%
West on M-36	898	35.8%	35%	West on M-36	465	18.0%	20%
South on Merrill	250	10.0%	10%	South on Merrill	532	20.6%	20%
East on M-36	268	10.7%	10%	East on M-36	633	24.5%	25%
East on Winans Lake Road	354	14.1%	15%	East on Winans Lake Road	524	20.3%	20%
North on Hamburg Road	282	11.2%	10%	North on Hamburg Road	179	6.9%	5%
Total	2507	100.0%	100%	Total	2587	100.0%	100%

Figures 7.1 and 7.2 illustrate the generated traffic volumes for the morning and afternoon peak hours assuming that all site traffic enters and exit the site through its proposed driveway access across from Buckhorn Lane.

Figures 7.3 and 7.4 illustrate the generated traffic volumes assuming that the emergency access to the residential neighborhood to the south is open to all traffic. An estimated 30% of the site traffic is assumed to divert and from the south through Huron Rapids Drive to Lake Crest Drive and M-36. Traffic that goes to and comes from the southern connection is assumed to only head to and from east and west M-36 as well as Merrill since those are the most logical destinations.

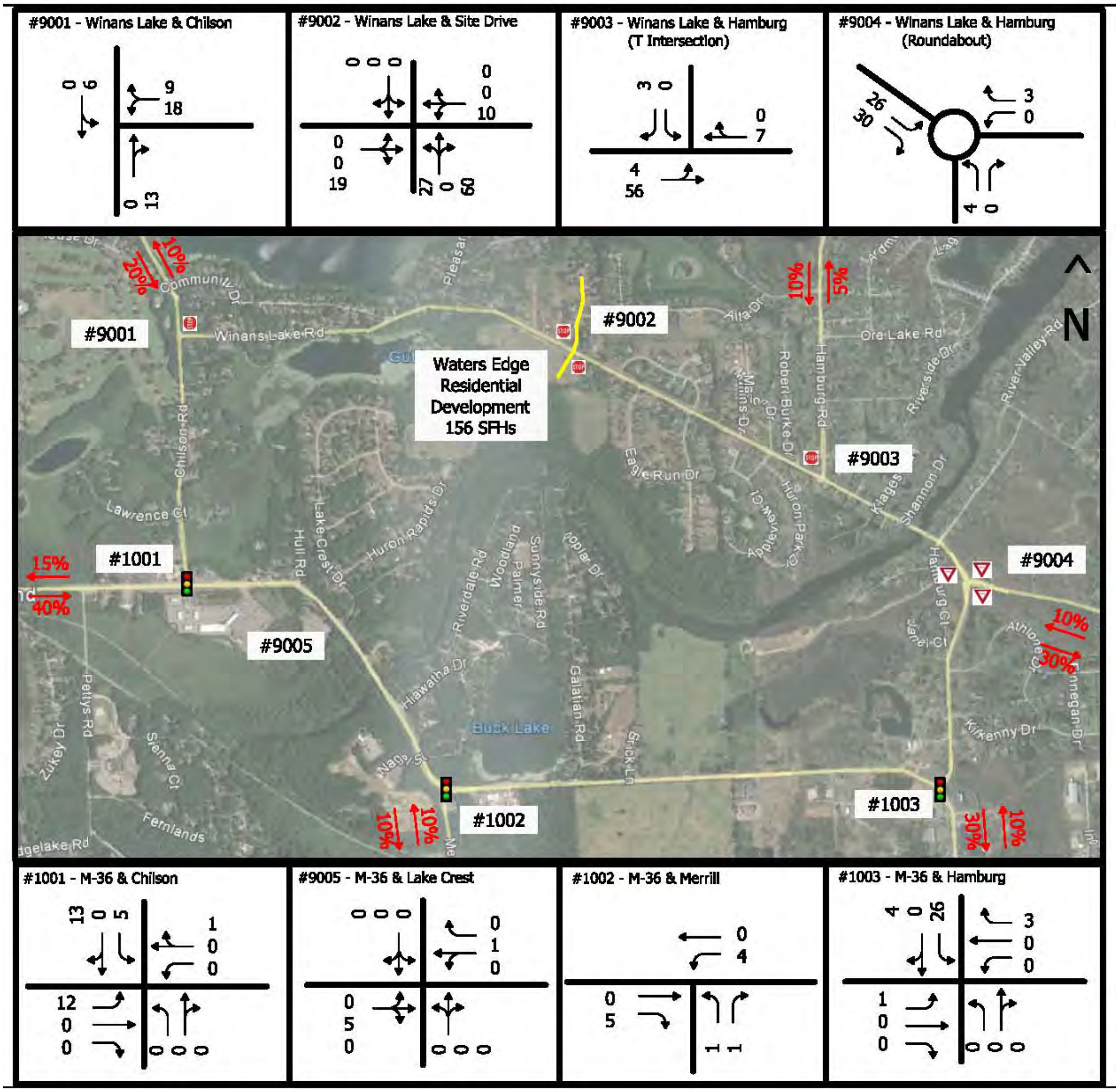


Figure 7.1 – Generated Morning Peak Hour Volumes

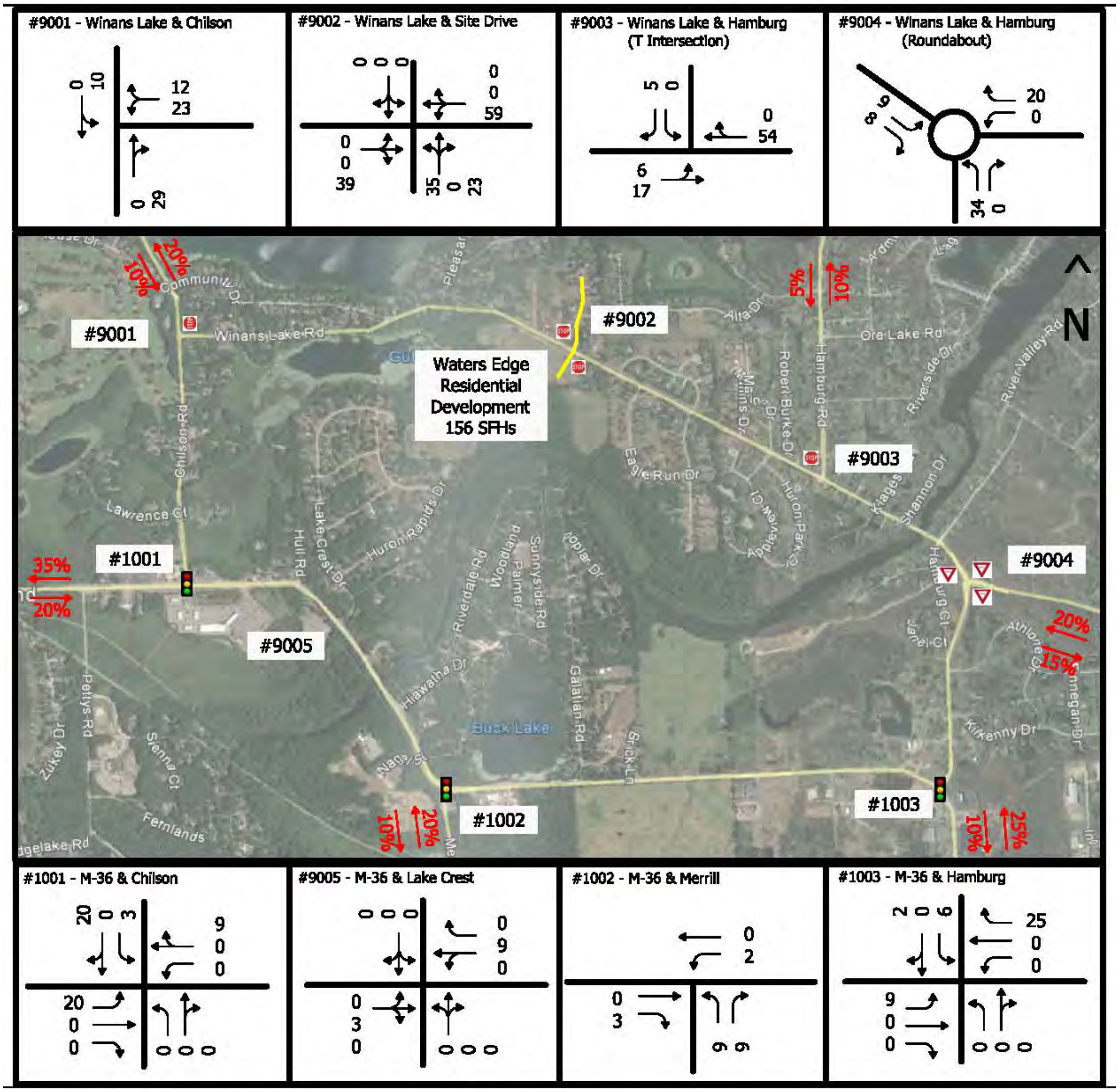


Figure 7.2 – Generated Afternoon Peak Hour Volumes

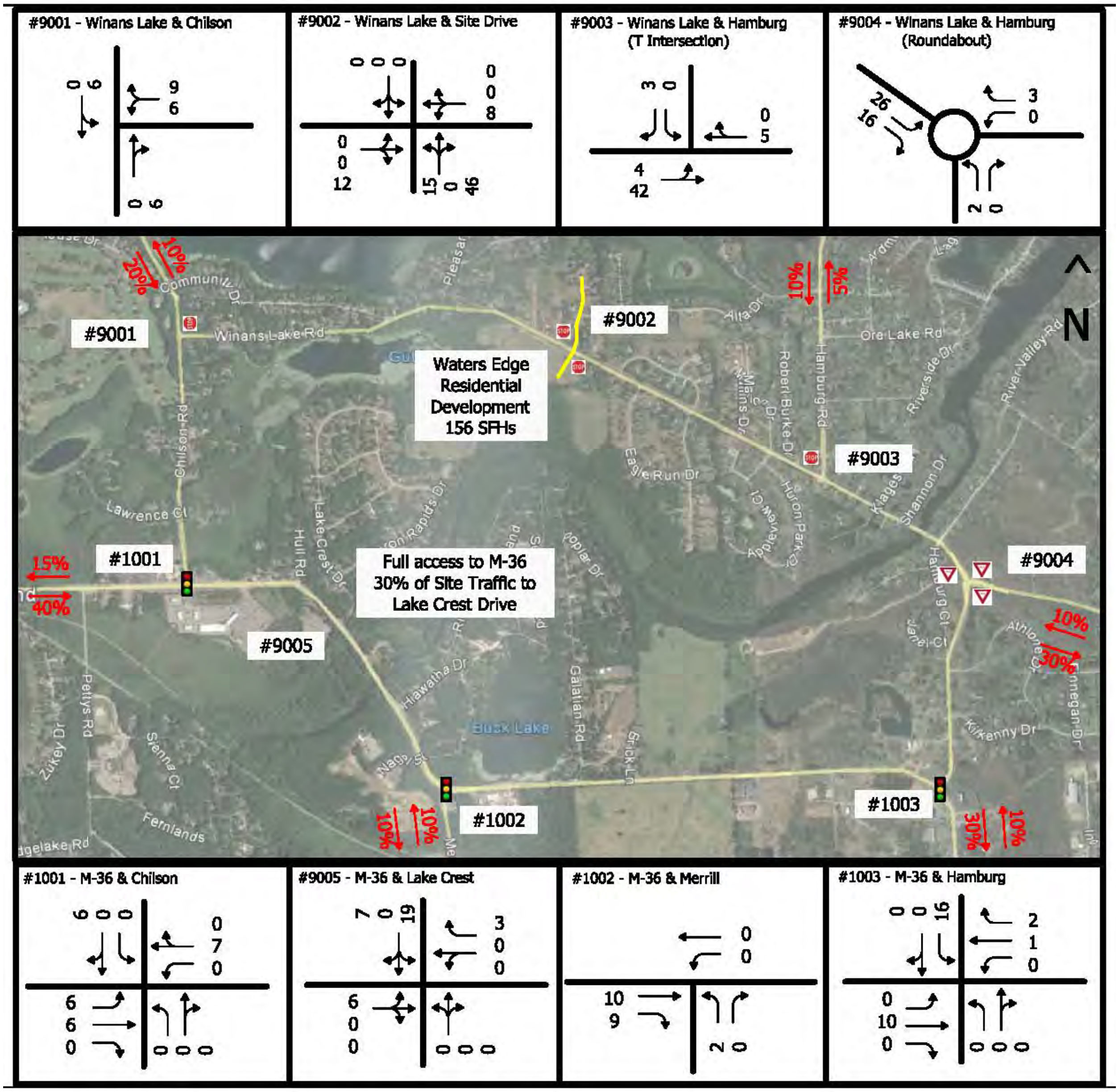


Figure 7.3 – Generated Morning Peak Hour Volumes
(Full Access to Lake Crest Drive)

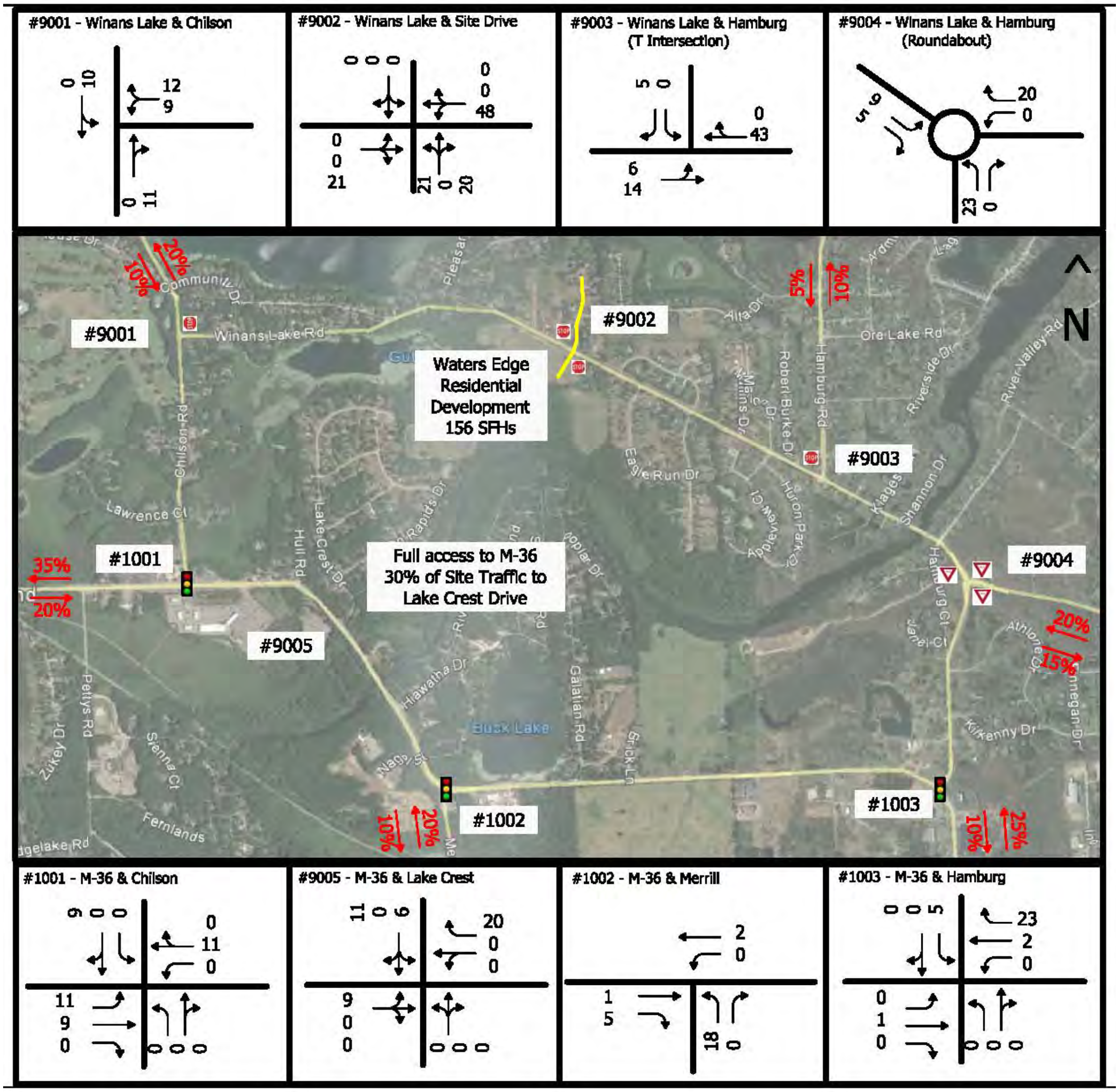


Figure 7.3 – Generated Afternoon Peak Hour Volumes
(Full access to Lake Crest Drive)

8.0 Capacity Analysis (TBD)

8.1 Methodology and Analysis Tools

Capacity analysis for this traffic study utilizes the Synchro/SimTraffic (Version 10) program to create a traffic model of the existing, background growth (if needed), and forecast traffic scenarios. Synchro provides the **Highway Capacity Manual**'s (HCM) level of service for each study intersection, while the SimTraffic model provides an alternative and sometimes more realistic analysis of traffic conditions and impacts where queuing at intersections may impact other driveways, or delays for other turning movements at the same or other nearby intersections.

Neither analysis method is perfect as the equations within the **Highway Capacity Manual** may result in unrealistically long delays at busy unsignalized intersections. Sometimes the vehicle behavior within the SimTraffic model does not always match reality, such as where human drivers would more easily change lanes to avoid a blockage, or instances where more drivers in reality "sneak" through an intersection at the end of a signal phase to turn left.

SimTraffic

The SimTraffic traffic model includes all of the intersections within the scope of this study, detailed with the laneage at each intersection, the links between each intersection, and the traffic control used or proposed for each intersection. Spreadsheets are developed with the existing, background, and forecasted peak hour traffic volumes. The traffic volume data from those spreadsheets (.csv files) is then input into the various traffic models scenarios. Each scenario that is analyzed is run 20 times within SimTraffic to generate average delays at each of the study intersections. The reported average delay per vehicle results in SimTraffic are not calculated utilizing the same methodology as the Highway Capacity Manual. Both AM and PM models were found to be within MDOTs volume thresholds for calibration, and seemed to match field conditions as well.

Synchro - HCM Level-of-service (LOS)

The Highway Capacity Manual assigns the following level-of-service grades to the ranges of control delay in seconds for unsignalized and signalized intersections. Generally LOS D is considered the limit of acceptable delay, although there are many situations where providing road improvements needed to improve a failing intersection LOS grade may be realistically unattainable for a sole developer or even undesirable to a community:

Table 8.1 – Highway Capacity Manual
Level of Service Delay Ranges and Grades

Unsignalized Level-of-service Grades						
Delay (sec.)	0-10	10-15	15-25	25-35	35-50	50+
LOS	A	B	C	D	E	F

Signalized Level-of-service Grades						
Delay (sec.)	0-10	10-20	20-35	35-55	55-80	80+
LOS	A	B	C	D	E	F

The HCM Level of Service grades for each scenario and study intersection is the basis upon which improvements are recommended in this traffic impact study. Any turning movement with a HCM level of service E or F is highlighted and improvements are recommended to mitigate those poor level of service grades. The delays and queues from the SimTraffic Model are included as a check to insure that excessive queuing at an intersection does not significantly impact other locations.

Capacity Analysis: Intersection 1

Intersection # – Scenario #

Scenario	Eastbound			Westbound			Northbound			Southbound			Int.
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Tot.
Volume													
HCM Delay													
HCM LOS													
Delay (Model)													
95% Queue (Model)													n/a

Existing Conditions LOS Summary (Preliminary)

Intersection	AM Delay (sec)	AM LOS	PM Delay(sec)	PM LOS
9001-Winans Lake and Chilson	4.0	n/a	10.8	n/a
9002-Winans Lake and Site Driveway	0.3	n/a	0.1	n/a
9003-Winans Lake and Hamburg T	5.3	n/a	4.1	n/a
9004-Winans Lake and Hamburg Roundabout	7.4	A	9.3	A
1001 – M-36 and Chilson	14.6	B	23.9	C
9005 – M-36 and Lake Crest	1.9	n/a	1.0	n/a
1002 – M-36 and Merrill	8.3	A	17.8	B
1003 – M-36 and Hamburg	11.7	B	14.2	B

Site Access & Circulation (TBD)

Summary (TBD)

Single-Family Detached Housing
(210)

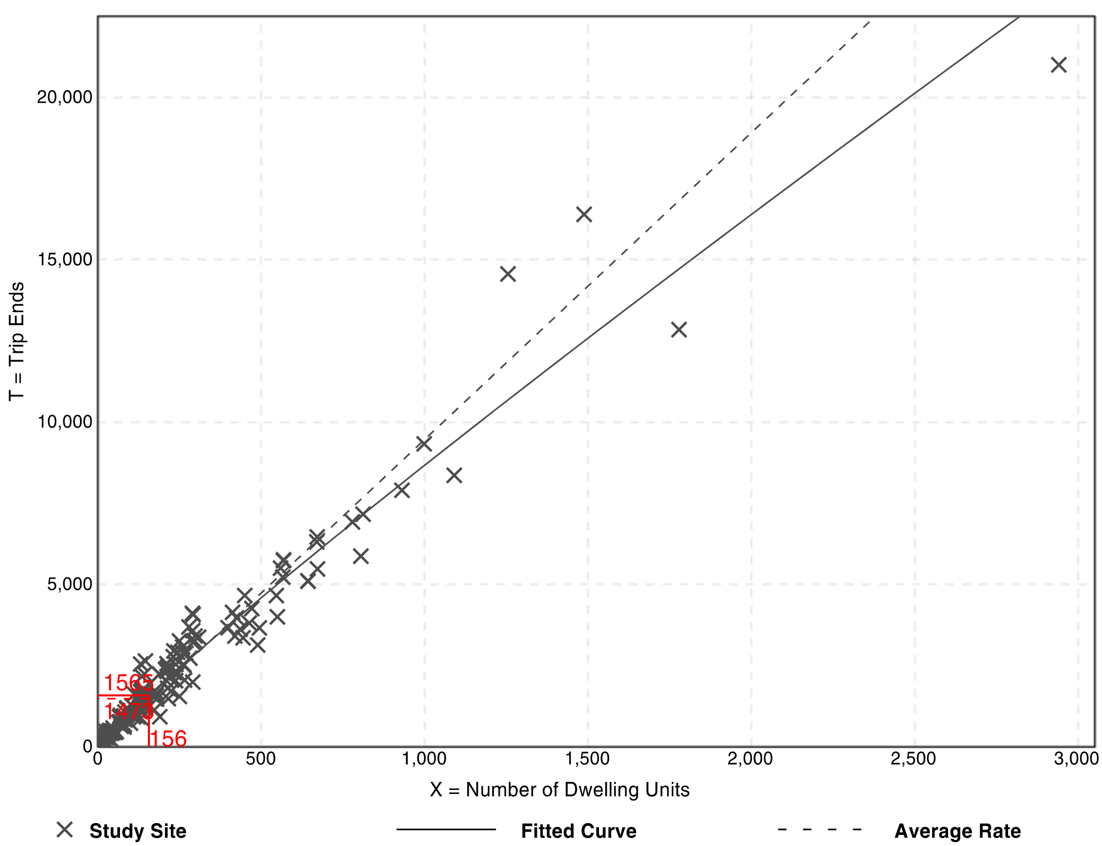
Vehicle Trip Ends vs: Dwelling Units
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 159
Avg. Num. of Dwelling Units: 264
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.44	4.81 - 19.39	2.10

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.92 Ln(X) + 2.71 **R^2= 0.95**

Trip Generation Manual, 10th Edition ● Institute of Transportation Engineers

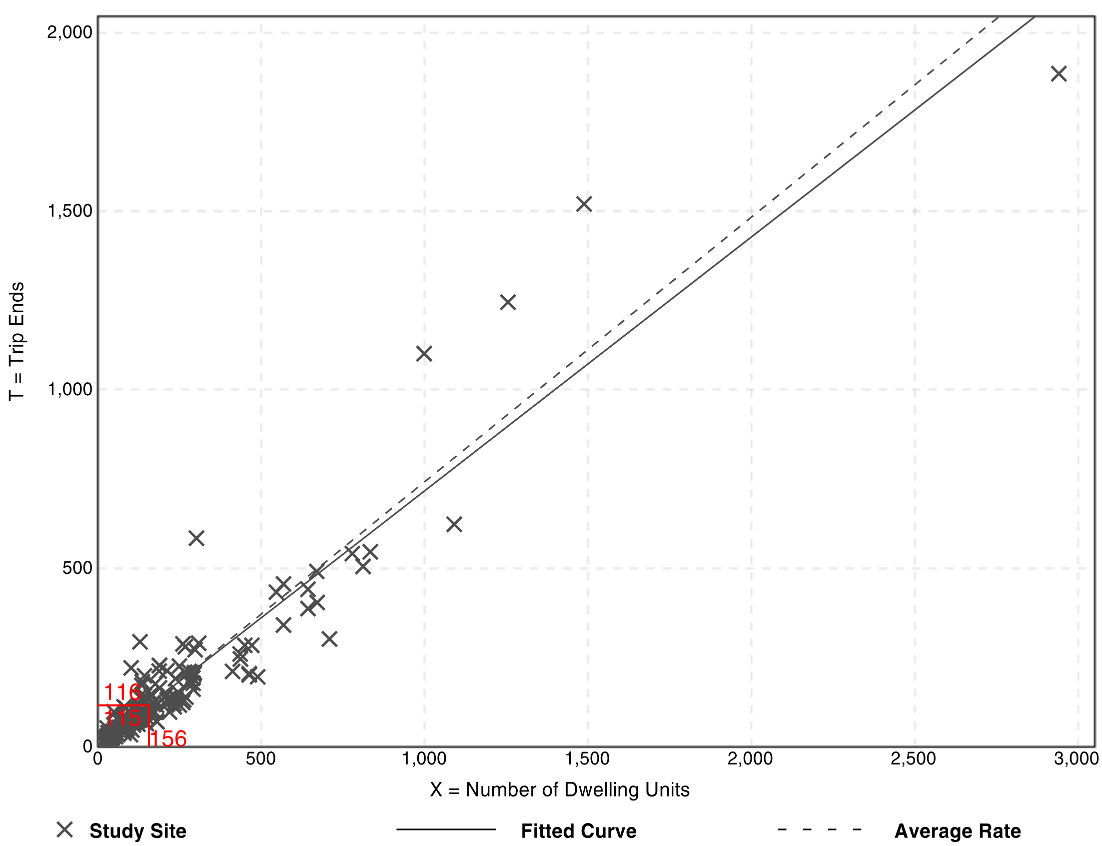
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 7 and 9 a.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	173
Avg. Num. of Dwelling Units:	219
Directional Distribution:	25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.74	0.33 - 2.27	0.27

Data Plot and Equation



Fitted Curve Equation: T = 0.71(X) + 4.80 **R^2= 0.89**

Trip Generation Manual, 10th Edition ● Institute of Transportation Engineers

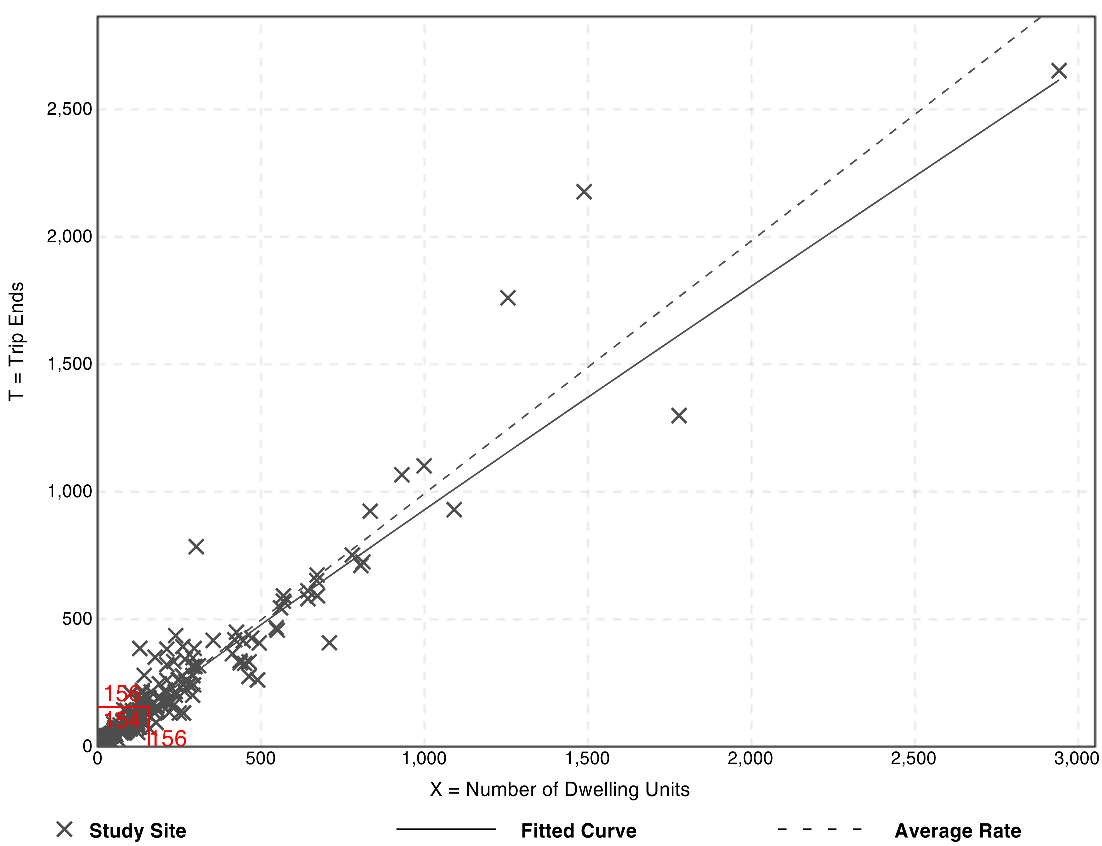
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs:	**Dwelling Units**
On a:	**Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.**
Setting/Location:	**General Urban/Suburban**
Number of Studies:	190
Avg. Num. of Dwelling Units:	242
Directional Distribution:	63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

Data Plot and Equation



Fitted Curve Equation: $Ln(T) = 0.96\ Ln(X) + 0.20$

R^2= 0.92

Trip Generation Manual, 10th Edition • Institute of Transportation Engineers

Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: Winans Lake Road
N/S: Chilson Road
Weather:

File Name : TMC_18037A_Winans Lake and Chilson_Oct-30-2018
Site Code : 9001
Start Date : 10/30/2018
Page No : 1

Groups Printed- Cars - H.V.

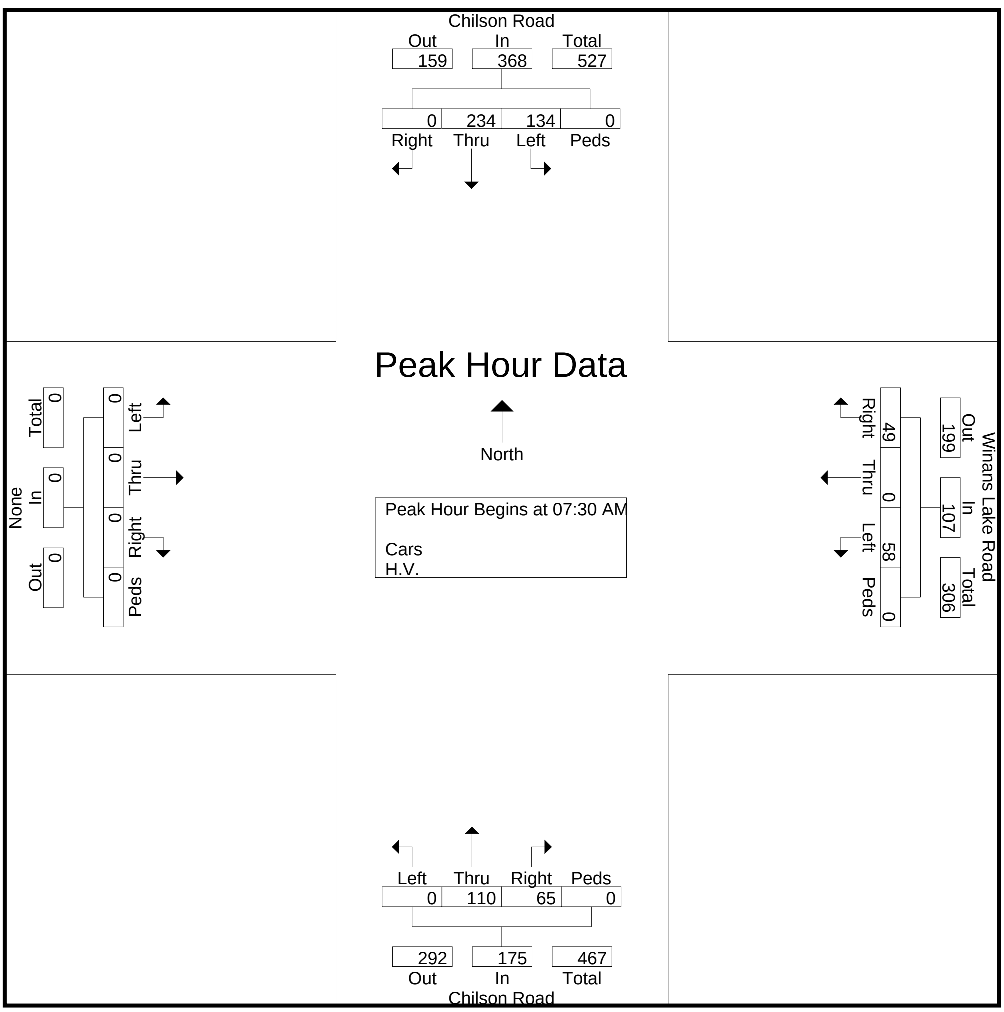
	None Eastbound				Winans Lake Road Westbound				Chilson Road Northbound				Chilson Road Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	0	0	0	0	25	0	12	0	0	25	9	0	40	58	0	0	169
07:15 AM	0	0	0	0	14	0	10	0	0	13	22	0	24	54	0	0	137
07:30 AM	0	0	0	0	12	0	12	0	0	35	22	0	33	59	0	0	173
07:45 AM	0	0	0	0	9	0	20	0	0	22	11	0	30	65	0	0	157
Total	0	0	0	0	60	0	54	0	0	95	64	0	127	236	0	0	636
08:00 AM	0	0	0	0	15	0	11	0	0	27	14	0	42	62	0	0	171
08:15 AM	0	0	0	0	22	0	6	0	0	26	18	0	29	48	0	0	149
08:30 AM	0	0	0	0	17	0	7	0	0	29	18	0	22	50	0	0	143
08:45 AM	0	0	0	0	15	0	8	0	0	20	24	0	18	50	0	0	135
Total	0	0	0	0	69	0	32	0	0	102	74	0	111	210	0	0	598
*** BREAK ***																	
04:00 PM	0	0	0	0	20	0	29	0	0	57	29	0	24	34	0	0	193
04:15 PM	0	0	0	0	31	0	32	0	0	69	27	0	26	42	0	0	227
04:30 PM	0	0	0	0	30	0	29	0	0	79	25	0	7	45	0	0	215
04:45 PM	0	0	0	0	35	0	30	0	0	62	21	0	19	36	0	0	203
Total	0	0	0	0	116	0	120	0	0	267	102	0	76	157	0	0	838
05:00 PM	0	0	0	0	30	0	40	0	0	82	23	0	16	46	0	0	237
05:15 PM	0	0	0	0	42	0	39	0	0	83	17	0	27	51	0	0	259
05:30 PM	0	0	0	0	39	0	28	0	0	79	29	0	18	46	0	0	239
05:45 PM	0	0	0	0	39	0	42	0	0	62	21	0	12	38	0	0	214
Total	0	0	0	0	150	0	149	0	0	306	90	0	73	181	0	0	949
Grand Total	0	0	0	0	395	0	355	0	0	770	330	0	387	784	0	0	3021
Apprch %	0	0	0	0	52.7	0	47.3	0	0	70	30	0	33	67	0	0	
Total %	0	0	0	0	13.1	0	11.8	0	0	25.5	10.9	0	12.8	26	0	0	
Cars	0	0	0	0	391	0	349	0	0	752	322	0	384	755	0	0	2953
% Cars	0	0	0	0	99	0	98.3	0	0	97.7	97.6	0	99.2	96.3	0	0	97.7
H.V.	0	0	0	0	4	0	6	0	0	18	8	0	3	29	0	0	68
% H.V.	0	0	0	0	1	0	1.7	0	0	2.3	2.4	0	0.8	3.7	0	0	2.3

Midwestern Consulting
3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: Winans Lake Road
N/S: Chilson Road
Weather:

File Name : TMC_18037A_Winans Lake and Chilson_Oct-30-2018
Site Code : 9001
Start Date : 10/30/2018

	None Eastbound					Winans Lake Road Westbound					Chilson Road Northbound					Chilson Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	0	0	0	0	12	0	12	0	24	0	35	22	0	57	33	59	0	0	92	173
07:45 AM	0	0	0	0	0	9	0	20	0	29	0	22	11	0	33	30	65	0	0	95	157
08:00 AM	0	0	0	0	0	15	0	11	0	26	0	27	14	0	41	42	62	0	0	104	171
08:15 AM	0	0	0	0	0	22	0	6	0	28	0	26	18	0	44	29	48	0	0	77	149
Total Volume	0	0	0	0	0	58	0	49	0	107	0	110	65	0	175	134	234	0	0	368	650
% App. Total	0	0	0	0		54.2	0	45.8	0		0	62.9	37.1	0		36.4	63.6	0	0		
PHF	.000	.000	.000	.000	.000	.659	.000	.613	.000	.922	.000	.786	.739	.000	.768	.798	.900	.000	.000	.885	.939



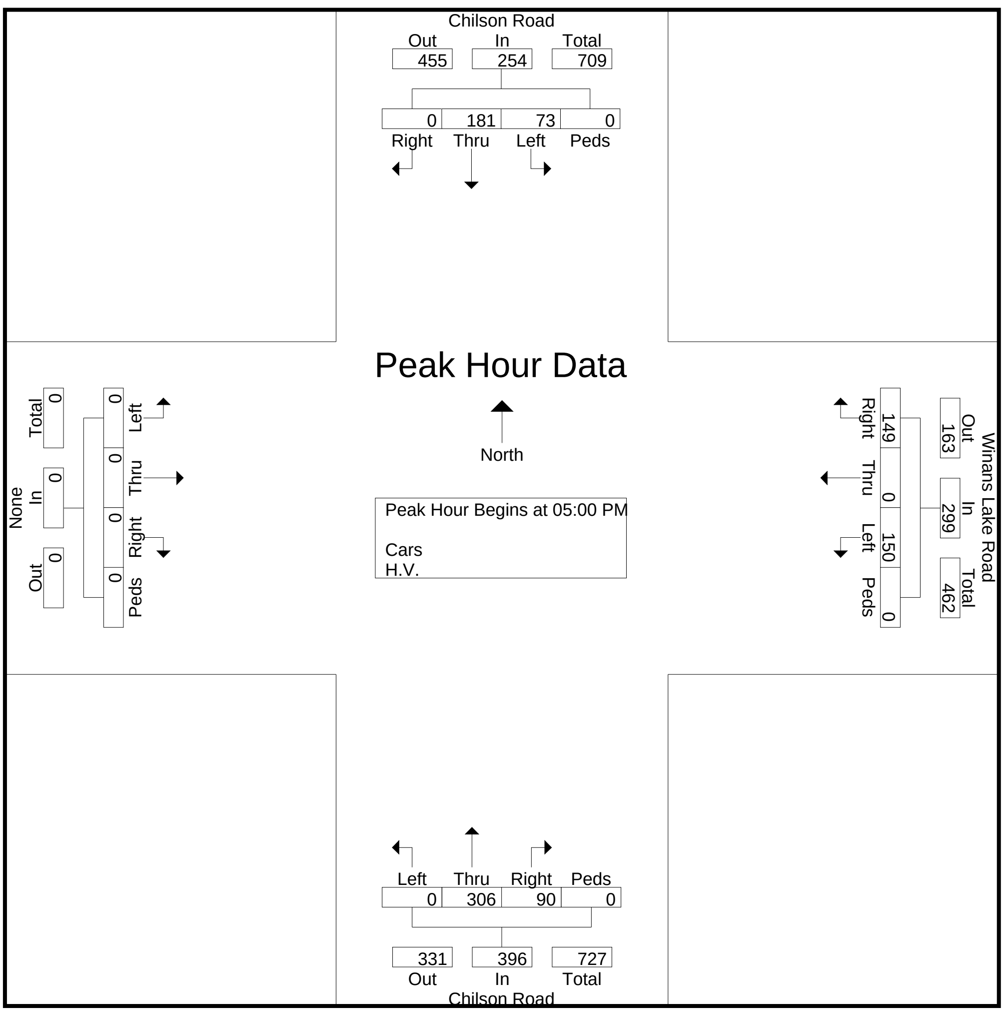
Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: Winans Lake Road
N/S: Chilson Road
Weather:

File Name : TMC_18037A_Winans Lake and Chilson_Oct-30-2018
Site Code : 9001
Start Date : 10/30/2018
Page No : 3

	None Eastbound					Winans Lake Road Westbound					Chilson Road Northbound					Chilson Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	0	0	0	0	30	0	40	0	70	0	82	23	0	105	16	46	0	0	62	237
05:15 PM	0	0	0	0	0	42	0	39	0	81	0	83	17	0	100	27	51	0	0	78	259
05:30 PM	0	0	0	0	0	39	0	28	0	67	0	79	29	0	108	18	46	0	0	64	239
05:45 PM	0	0	0	0	0	39	0	42	0	81	0	62	21	0	83	12	38	0	0	50	214
Total Volume	0	0	0	0	0	150	0	149	0	299	0	306	90	0	396	73	181	0	0	254	949
% App. Total	0	0	0	0		50.2	0	49.8	0		0	77.3	22.7	0		28.7	71.3	0	0		
PHF	.000	.000	.000	.000	.000	.893	.000	.887	.000	.923	.000	.922	.776	.000	.917	.676	.887	.000	.000	.814	.916



Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection File Name : TMC_18037A_Winans Lake and Buckhorn Estimated_9002_Oct-30-2018
E/W: Winans Lake Road Site Code : 9002
N/S: Site Driveway / Buckhorn Lane Start Date : 10/30/2018
Weather: Page No : 1

Groups Printed- Cars - H.V.

	Winans Lake Road Eastbound				Winans Lake Road Westbound				Site Driveway Northbound				Buckhorn Lane (Estimated) Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	0	64	0	0	0	27	1	0	0	0	0	0	1	0	1	0	94
07:15 AM	1	70	0	0	0	23	0	0	0	0	0	0	2	0	1	0	97
07:30 AM	1	63	0	0	0	20	0	0	0	0	0	0	2	0	1	0	87
07:45 AM	0	81	0	0	0	27	0	0	0	0	0	0	1	0	0	0	109
Total	2	278	0	0	0	97	1	0	0	0	0	0	6	0	3	0	387
08:00 AM	0	65	0	0	0	20	1	0	0	0	0	0	1	0	1	0	88
08:15 AM	1	68	0	0	0	25	0	0	0	0	0	0	2	0	1	0	97
08:30 AM	1	61	0	0	0	17	0	0	0	0	0	0	2	0	1	0	82
08:45 AM	0	49	0	0	0	23	0	0	0	0	0	0	1	0	0	0	73
Total	2	243	0	0	0	85	1	0	0	0	0	0	6	0	3	0	340
*** BREAK ***																	
04:00 PM	1	45	0	0	0	66	2	0	0	0	0	0	1	0	0	0	115
04:15 PM	0	50	0	0	0	78	1	0	0	0	0	0	0	0	1	0	130
04:30 PM	1	43	0	0	0	82	1	0	0	0	0	0	0	0	1	0	128
04:45 PM	0	39	0	0	0	68	1	0	0	0	0	0	0	0	1	0	109
Total	2	177	0	0	0	294	5	0	0	0	0	0	1	0	3	0	482
05:00 PM	1	39	0	0	0	88	2	0	0	0	0	0	1	0	0	0	131
05:15 PM	0	38	0	0	0	95	1	0	0	0	0	0	0	0	1	0	135
05:30 PM	1	55	0	0	0	90	1	0	0	0	0	0	0	0	1	0	148
05:45 PM	0	45	0	0	0	93	1	0	0	0	0	0	0	0	1	0	140
Total	2	177	0	0	0	366	5	0	0	0	0	0	1	0	3	0	554
Grand Total	8	875	0	0	0	842	12	0	0	0	0	0	14	0	12	0	1763
Apprch %	0.9	99.1	0	0	0	98.6	1.4	0	0	0	0	0	53.8	0	46.2	0	
Total %	0.5	49.6	0	0	0	47.8	0.7	0	0	0	0	0	0.8	0	0.7	0	
Cars	8	863	0	0	0	831	12	0	0	0	0	0	14	0	12	0	1740
% Cars	100	98.6	0	0	0	98.7	100	0	0	0	0	0	100	0	100	0	98.7
H.V.	0	12	0	0	0	11	0	0	0	0	0	0	0	0	0	0	23
% H.V.	0	1.4	0	0	0	1.3	0	0	0	0	0	0	0	0	0	0	1.3

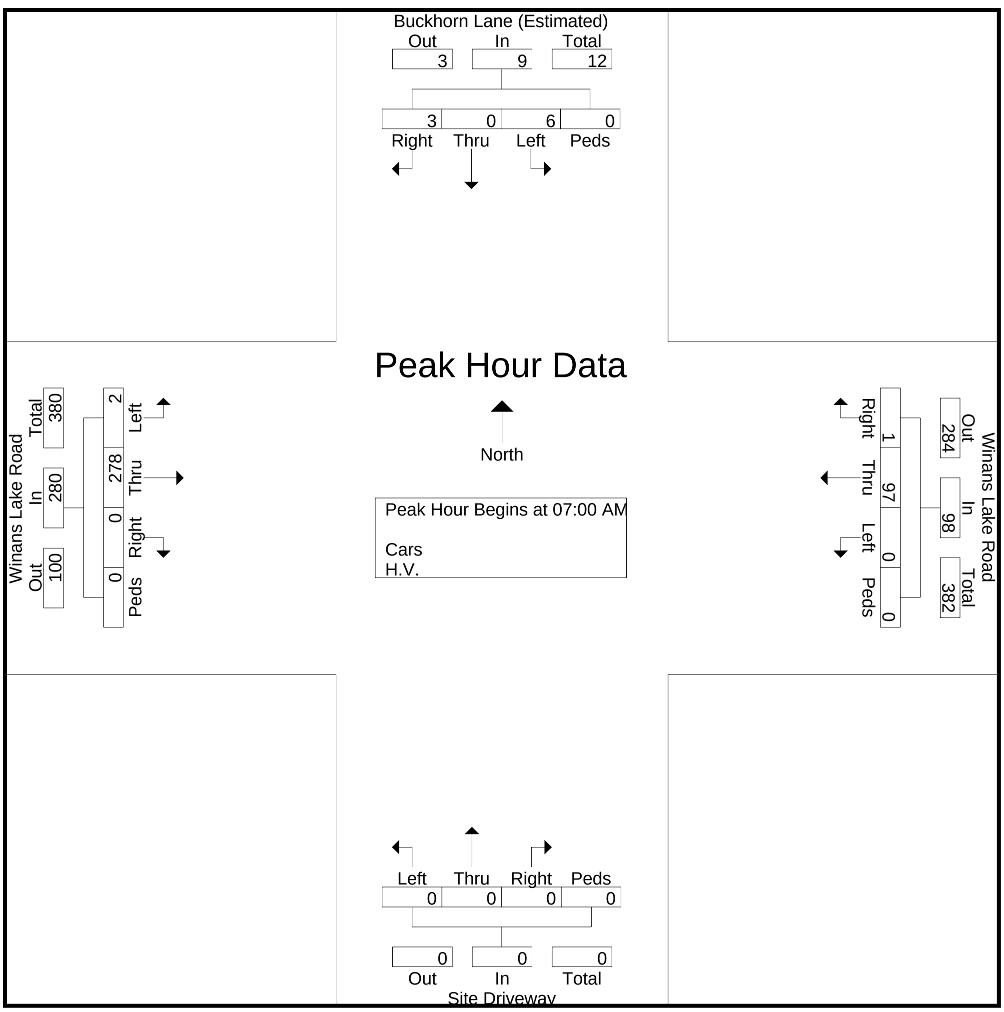
Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: Winans Lake Road
N/S: Site Driveway / Buckhorn Lane
Weather:

File Name : TMC_18037A_Winans Lake and Buckhorn Estimated_9002_Oct-30-2018
Site Code : 9002
Start Date : 10/30/2018
Page No : 2

	Winans Lake Road Eastbound					Winans Lake Road Westbound					Site Driveway Northbound					Buckhorn Lane (Estimated) Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	64	0	0	64	0	27	1	0	28	0	0	0	0	0	1	0	1	0	2	94
07:15 AM	1	70	0	0	71	0	23	0	0	23	0	0	0	0	0	2	0	1	0	3	97
07:30 AM	1	63	0	0	64	0	20	0	0	20	0	0	0	0	0	2	0	1	0	3	87
07:45 AM	0	81	0	0	81	0	27	0	0	27	0	0	0	0	0	1	0	0	0	1	109
Total Volume	2	278	0	0	280	0	97	1	0	98	0	0	0	0	0	6	0	3	0	9	387
% App. Total	0.7	99.3	0	0		0	99	1	0		0	0	0	0		66.7	0	33.3	0		
PHF	.500	.858	.000	.000	.864	.000	.898	.250	.000	.875	.000	.000	.000	.000	.000	.750	.000	.750	.000	.750	.888



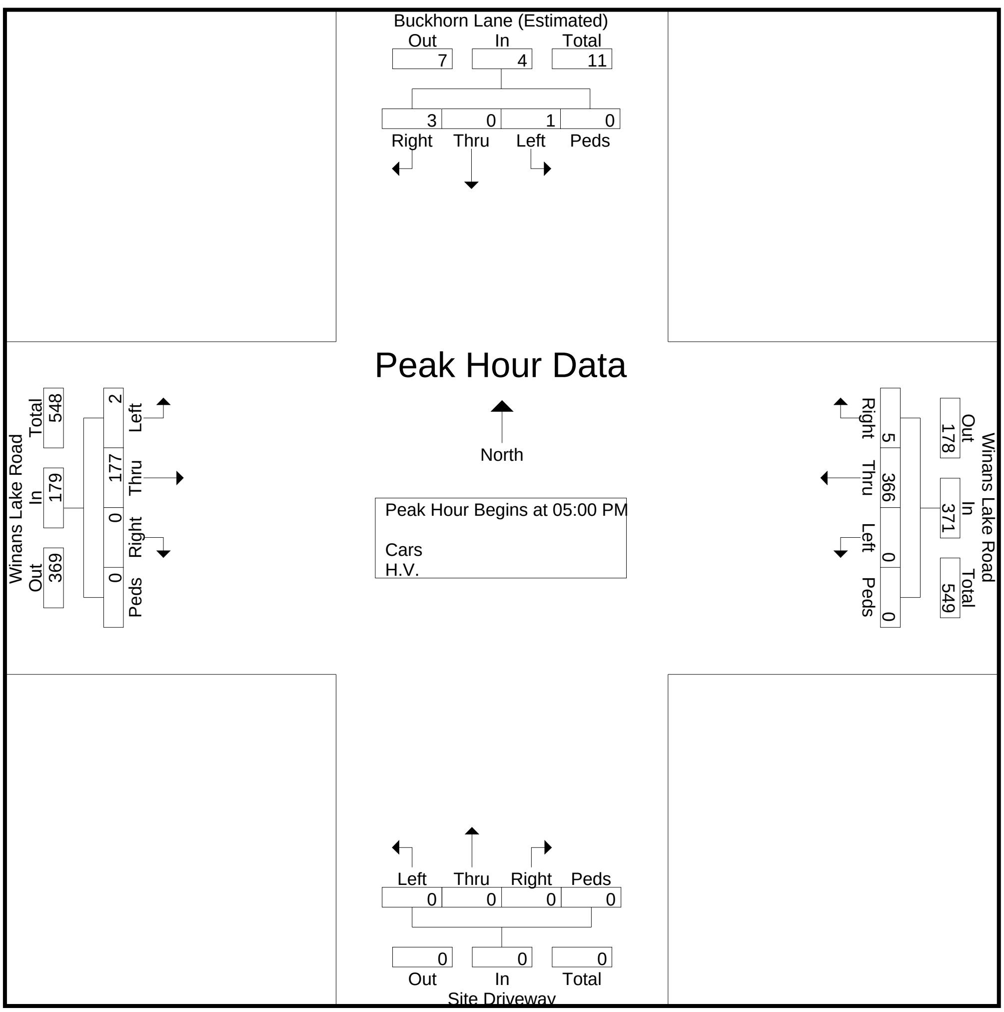
Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: Winans Lake Road
N/S: Site Driveway / Buckhorn Lane
Weather:

File Name : TMC_18037A_Winans Lake and Buckhorn Estimated_9002_Oct-30-2018
Site Code : 9002
Start Date : 10/30/2018
Page No : 3

	Winans Lake Road Eastbound					Winans Lake Road Westbound					Site Driveway Northbound					Buckhorn Lane (Estimated) Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	1	39	0	0	40	0	88	2	0	90	0	0	0	0	0	1	0	0	0	1	131
05:15 PM	0	38	0	0	38	0	95	1	0	96	0	0	0	0	0	0	0	1	0	1	135
05:30 PM	1	55	0	0	56	0	90	1	0	91	0	0	0	0	0	0	0	1	0	1	148
05:45 PM	0	45	0	0	45	0	93	1	0	94	0	0	0	0	0	0	0	1	0	1	140
Total Volume	2	177	0	0	179	0	366	5	0	371	0	0	0	0	0	1	0	3	0	4	554
% App. Total	1.1	98.9	0	0		0	98.7	1.3	0		0	0	0	0		25	0	75	0		
PHF	.500	.805	.000	.000	.799	.000	.963	.625	.000	.966	.000	.000	.000	.000	.000	.250	.000	.750	.000	1.00	.936



Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: Winans Lake Road
N/S: Hamburg Road
Weather:

File Name : TMC_18037A_Winans Lake and Hamburg_T-Int_Oct-30-2018
Site Code : 9003
Start Date : 10/30/2018
Page No : 1

Groups Printed- Cars - H.V.

	Winans Lake Road Eastbound				Winans Lake Road / Hamburg Westbound				None Northbound				Hamburg Road Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	12	53	0	0	0	13	14	0	0	0	0	0	38	0	15	0	145
07:15 AM	12	60	0	0	0	12	11	0	0	0	0	0	34	0	11	0	140
07:30 AM	13	52	0	0	0	11	10	0	0	0	0	0	40	0	9	0	135
07:45 AM	20	62	0	0	0	18	10	0	0	0	0	0	45	0	9	0	164
Total	57	227	0	0	0	54	45	0	0	0	0	0	157	0	44	0	584
08:00 AM	13	53	0	0	0	12	16	0	0	0	0	0	29	0	9	0	132
08:15 AM	23	47	0	0	0	17	12	0	0	0	0	0	24	0	8	0	131
08:30 AM	21	42	0	0	0	11	12	0	0	0	0	0	33	0	6	0	125
08:45 AM	16	34	0	0	0	13	8	0	0	0	0	0	22	0	10	0	103
Total	73	176	0	0	0	53	48	0	0	0	0	0	108	0	33	0	491
*** BREAK ***																	
04:00 PM	21	25	0	0	0	51	43	0	0	0	0	0	22	0	17	0	179
04:15 PM	25	25	0	0	0	60	24	0	0	0	0	0	15	0	19	0	168
04:30 PM	22	21	0	0	0	59	31	0	0	0	0	0	26	0	24	0	183
04:45 PM	20	19	0	0	0	50	39	0	0	0	0	0	13	0	19	0	160
Total	88	90	0	0	0	220	137	0	0	0	0	0	76	0	79	0	690
05:00 PM	21	19	0	0	0	66	48	0	0	0	0	0	17	0	24	0	195
05:15 PM	21	17	0	0	0	68	56	0	0	0	0	0	15	0	28	0	205
05:30 PM	29	26	0	0	0	63	49	0	0	0	0	0	16	0	28	0	211
05:45 PM	14	31	0	0	0	58	44	0	0	0	0	0	15	0	36	0	198
Total	85	93	0	0	0	255	197	0	0	0	0	0	63	0	116	0	809
Grand Total	303	586	0	0	0	582	427	0	0	0	0	0	404	0	272	0	2574
Apprch %	34.1	65.9	0	0	0	57.7	42.3	0	0	0	0	0	59.8	0	40.2	0	
Total %	11.8	22.8	0	0	0	22.6	16.6	0	0	0	0	0	15.7	0	10.6	0	
Cars	299	578	0	0	0	575	425	0	0	0	0	0	399	0	268	0	2544
% Cars	98.7	98.6	0	0	0	98.8	99.5	0	0	0	0	0	98.8	0	98.5	0	98.8
H.V.	4	8	0	0	0	7	2	0	0	0	0	0	5	0	4	0	30
% H.V.	1.3	1.4	0	0	0	1.2	0.5	0	0	0	0	0	1.2	0	1.5	0	1.2

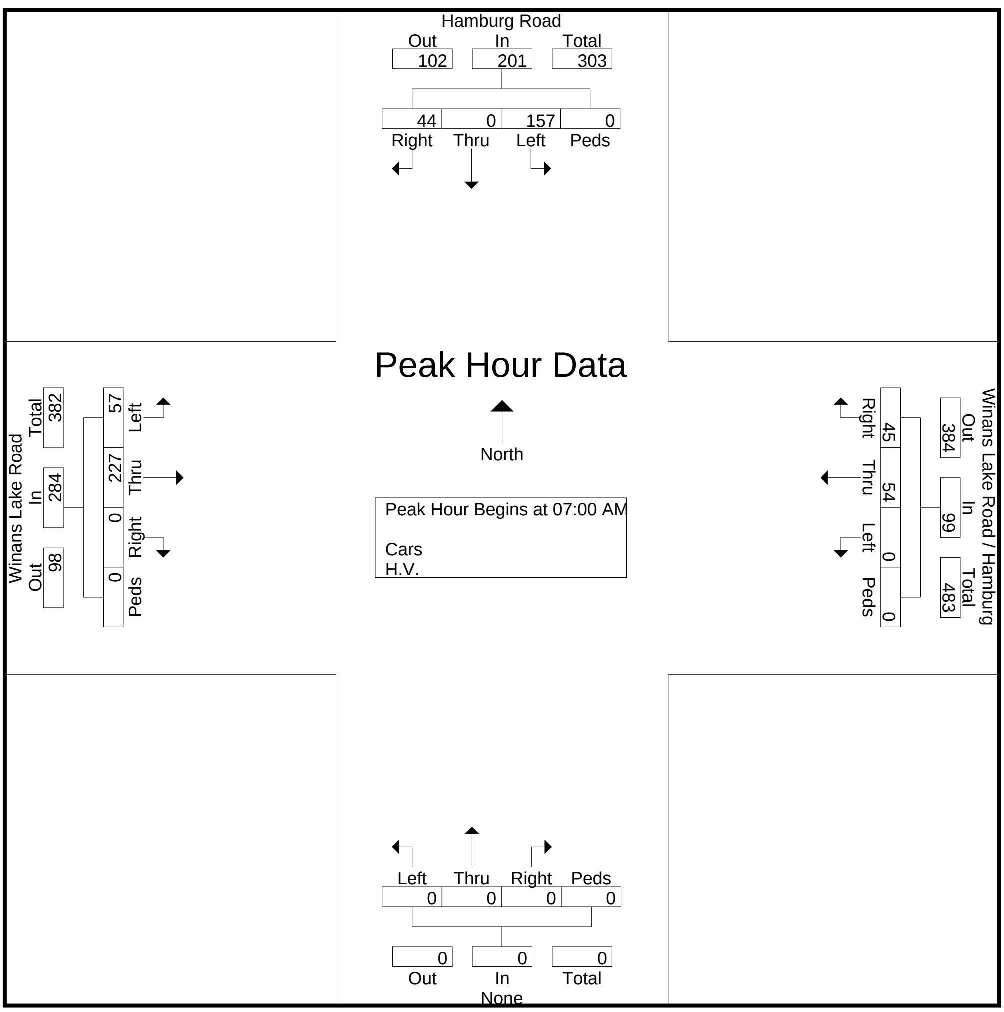
Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: Winans Lake Road
N/S: Hamburg Road
Weather:

File Name : TMC_18037A_Winans Lake and Hamburg_T-Int_Oct-30-2018
Site Code : 9003
Start Date : 10/30/2018

	Winans Lake Road Eastbound					Winans Lake Road / Hamburg Westbound					None Northbound					Hamburg Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	12	53	0	0	65	0	13	14	0	27	0	0	0	0	0	38	0	15	0	53	145
07:15 AM	12	60	0	0	72	0	12	11	0	23	0	0	0	0	0	34	0	11	0	45	140
07:30 AM	13	52	0	0	65	0	11	10	0	21	0	0	0	0	0	40	0	9	0	49	135
07:45 AM	20	62	0	0	82	0	18	10	0	28	0	0	0	0	0	45	0	9	0	54	164
Total Volume	57	227	0	0	284	0	54	45	0	99	0	0	0	0	0	157	0	44	0	201	584
% App. Total	20.1	79.9	0	0		0	54.5	45.5	0		0	0	0	0		78.1	0	21.9	0		
PHF	.713	.915	.000	.000	.866	.000	.750	.804	.000	.884	.000	.000	.000	.000	.000	.872	.000	.733	.000	.931	.890

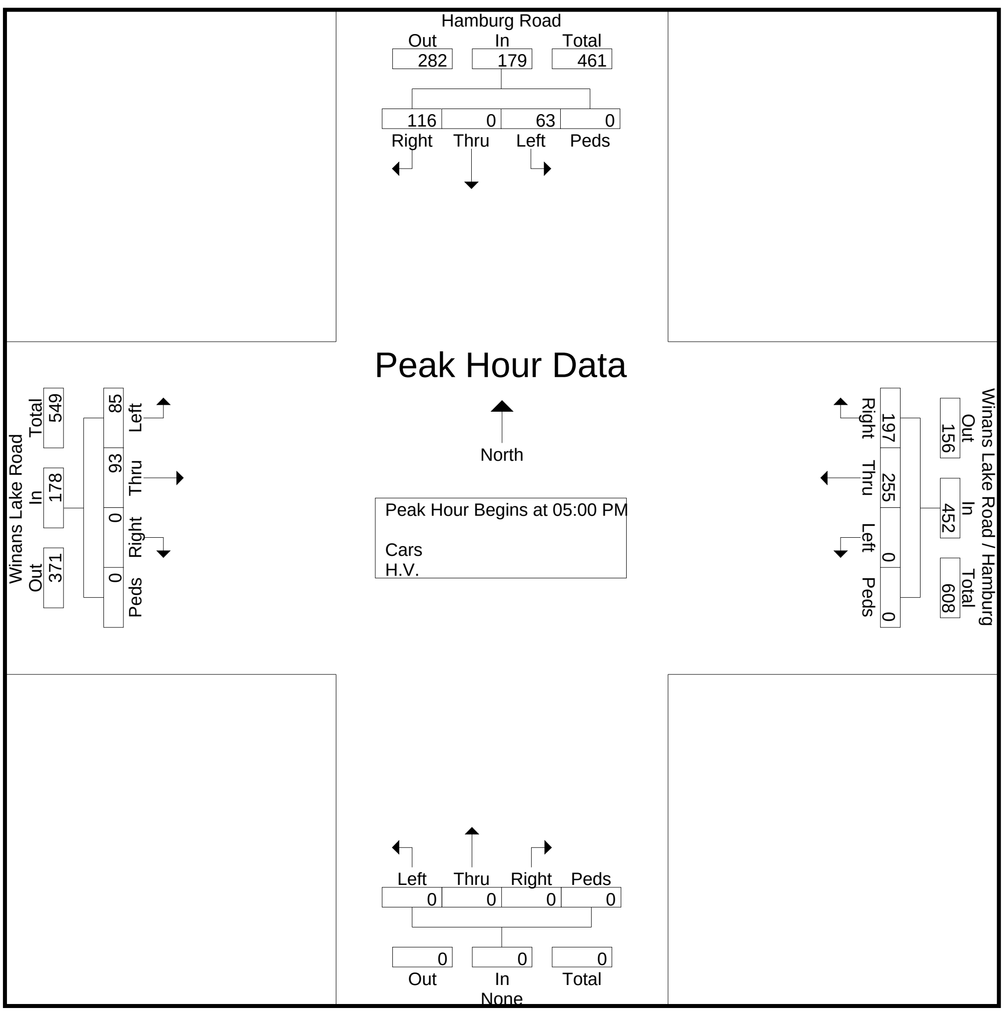


Midwestern Consulting
3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: Winans Lake Road
N/S: Hamburg Road
Weather:

File Name : TMC_18037A_Winans Lake and Hamburg_T-Int_Oct-30-2018
Site Code : 9003
Start Date : 10/30/2018

	Winans Lake Road Eastbound					Winans Lake Road / Hamburg Westbound					None Northbound					Hamburg Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	21	19	0	0	40	0	66	48	0	114	0	0	0	0	0	17	0	24	0	41	195
05:15 PM	21	17	0	0	38	0	68	56	0	124	0	0	0	0	0	15	0	28	0	43	205
05:30 PM	29	26	0	0	55	0	63	49	0	112	0	0	0	0	0	16	0	28	0	44	211
05:45 PM	14	31	0	0	45	0	58	44	0	102	0	0	0	0	0	15	0	36	0	51	198
Total Volume	85	93	0	0	178	0	255	197	0	452	0	0	0	0	0	63	0	116	0	179	809
% App. Total	47.8	52.2	0	0		0	56.4	43.6	0		0	0	0	0		35.2	0	64.8	0		
PHF	.733	.750	.000	.000	.809	.000	.938	.879	.000	.911	.000	.000	.000	.000	.000	.926	.000	.806	.000	.877	.959



Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: Winans Lake Road
N/S: Hamburg Road
Weather:

File Name : TMC_18037A_Winans Lake and Hamburg_Roundabout_Oct-30-2018
Site Code : 9004
Start Date : 10/30/2018
Page No : 1

Groups Printed- Cars - H.V.

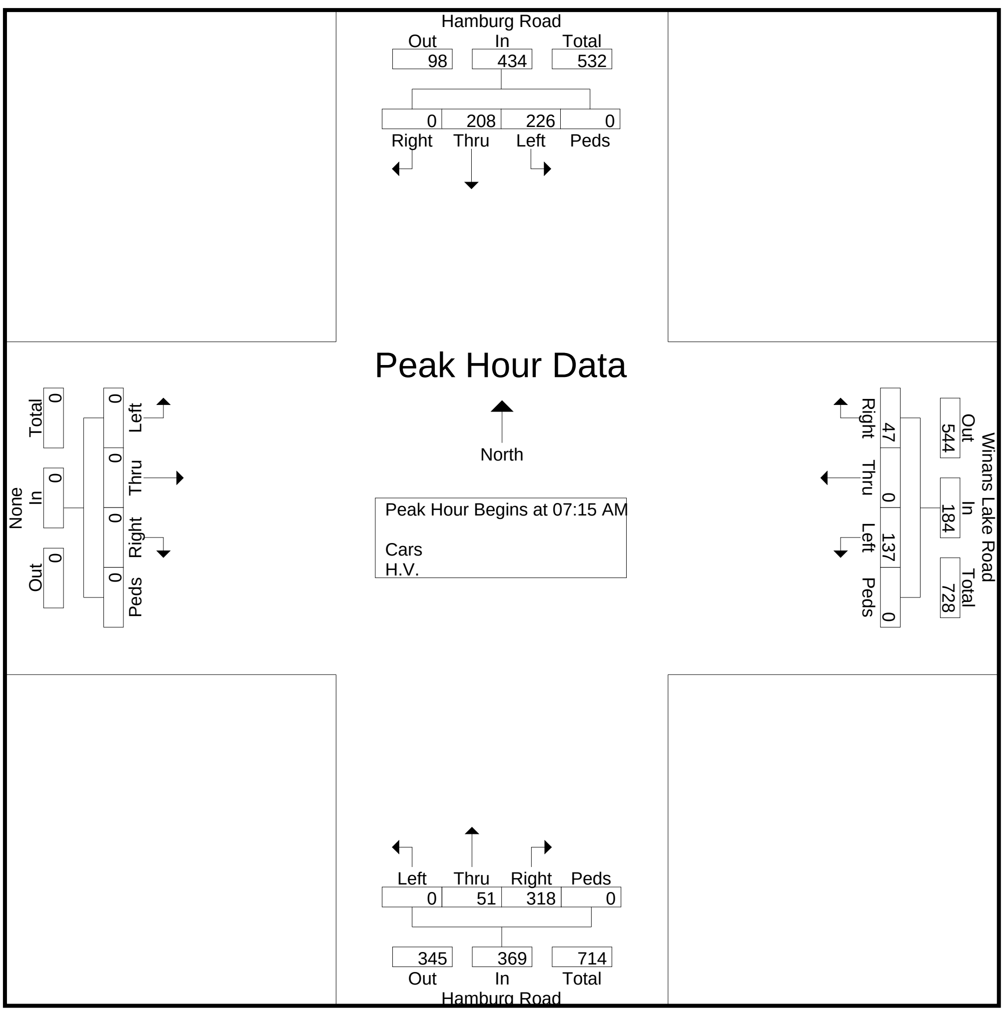
	None Eastbound				Winans Lake Road Westbound				Hamburg Road Northbound				Hamburg Road Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	0	0	0	0	23	0	5	0	0	12	69	0	65	47	0	0	221
07:15 AM	0	0	0	0	24	0	13	0	0	11	105	0	59	53	0	0	265
07:30 AM	0	0	0	0	31	0	9	0	0	11	89	0	55	44	0	0	239
07:45 AM	0	0	0	0	46	0	16	0	0	14	56	0	58	60	0	0	250
Total	0	0	0	0	124	0	43	0	0	48	319	0	237	204	0	0	975
08:00 AM	0	0	0	0	36	0	9	0	0	15	68	0	54	51	0	0	233
08:15 AM	0	0	0	0	26	0	12	0	0	12	63	0	58	26	0	0	197
08:30 AM	0	0	0	0	29	0	16	0	0	7	68	0	48	31	0	0	199
08:45 AM	0	0	0	0	34	0	12	0	0	8	61	0	35	23	0	0	173
Total	0	0	0	0	125	0	49	0	0	42	260	0	195	131	0	0	802
*** BREAK ***																	
04:00 PM	0	0	0	0	103	0	60	0	0	50	58	0	31	23	0	0	325
04:15 PM	0	0	0	0	99	0	56	0	0	38	59	0	21	21	0	0	294
04:30 PM	0	0	0	0	79	0	52	0	0	37	62	0	23	21	0	0	274
04:45 PM	0	0	0	0	71	0	44	0	0	52	75	0	19	12	0	0	273
Total	0	0	0	0	352	0	212	0	0	177	254	0	94	77	0	0	1166
05:00 PM	0	0	0	0	69	0	60	0	0	68	70	0	27	17	0	0	311
05:15 PM	0	0	0	0	91	0	62	0	0	75	64	0	16	24	0	0	332
05:30 PM	0	0	0	0	76	0	51	0	0	71	59	0	24	18	0	0	299
05:45 PM	0	0	0	0	84	0	49	0	0	52	54	0	21	9	0	0	269
Total	0	0	0	0	320	0	222	0	0	266	247	0	88	68	0	0	1211
Grand Total	0	0	0	0	921	0	526	0	0	533	1080	0	614	480	0	0	4154
Apprch %	0	0	0	0	63.6	0	36.4	0	0	33	67	0	56.1	43.9	0	0	
Total %	0	0	0	0	22.2	0	12.7	0	0	12.8	26	0	14.8	11.6	0	0	
Cars	0	0	0	0	898	0	515	0	0	530	1064	0	606	473	0	0	4086
% Cars	0	0	0	0	97.5	0	97.9	0	0	99.4	98.5	0	98.7	98.5	0	0	98.4
H.V.	0	0	0	0	23	0	11	0	0	3	16	0	8	7	0	0	68
% H.V.	0	0	0	0	2.5	0	2.1	0	0	0.6	1.5	0	1.3	1.5	0	0	1.6

Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection	File Name	: TMC_18037A_Winans Lake and Hamburg_Roundabout_Oct-30-2018
E/W: Winans Lake Road	Site Code	: 9004
N/S: Hamburg Road	Start Date	: 10/30/2018
Weather:	Page No	: 2

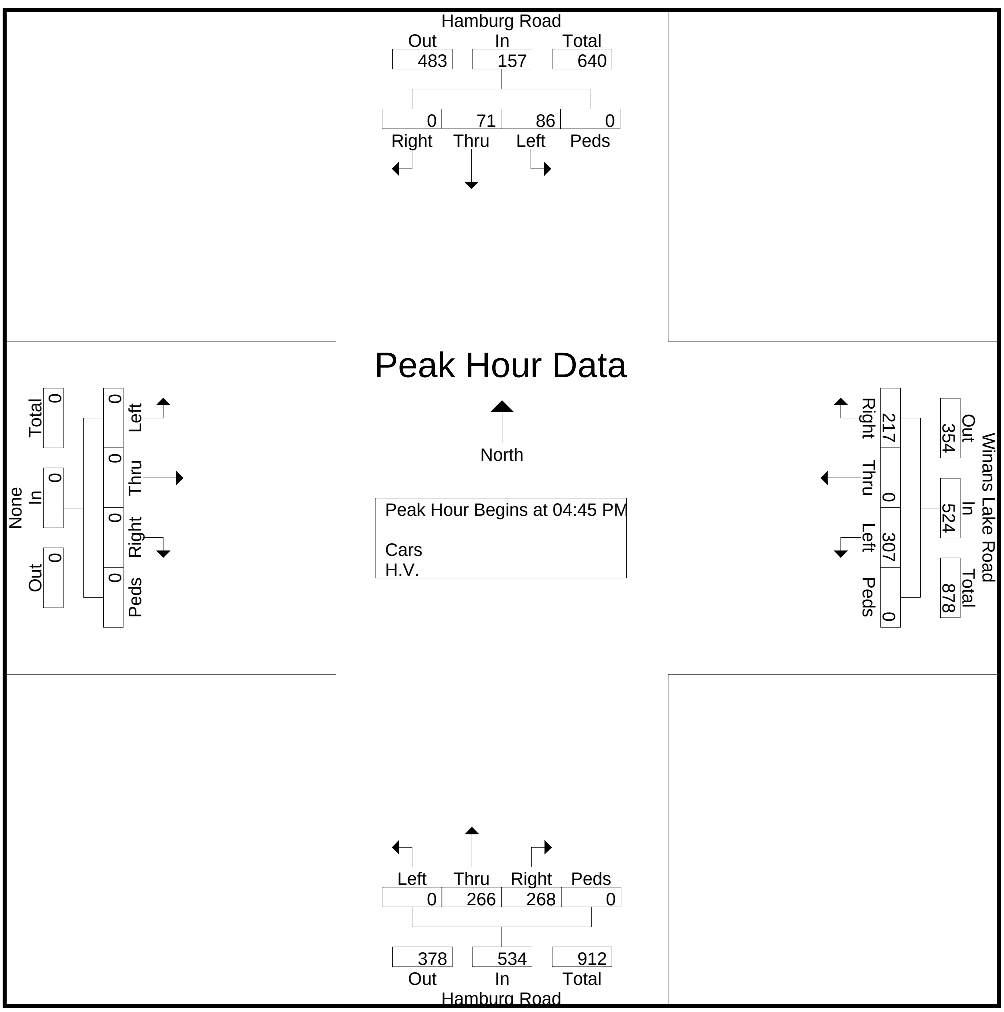
	None Eastbound					Winans Lake Road Westbound					Hamburg Road Northbound					Hamburg Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	0	0	0	0	24	0	13	0	37	0	11	105	0	116	59	53	0	0	112	265
07:30 AM	0	0	0	0	0	31	0	9	0	40	0	11	89	0	100	55	44	0	0	99	239
07:45 AM	0	0	0	0	0	46	0	16	0	62	0	14	56	0	70	58	60	0	0	118	250
08:00 AM	0	0	0	0	0	36	0	9	0	45	0	15	68	0	83	54	51	0	0	105	233
Total Volume	0	0	0	0	0	137	0	47	0	184	0	51	318	0	369	226	208	0	0	434	987
% App. Total	0	0	0	0		74.5	0	25.5	0		0	13.8	86.2	0		52.1	47.9	0	0		
PHF	.000	.000	.000	.000	.000	.745	.000	.734	.000	.742	.000	.850	.757	.000	.795	.958	.867	.000	.000	.919	.931



Midwestern Consulting
3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection	File Name	: TMC_18037A_Winans Lake and Hamburg_Roundabout_Oct-30-2018
E/W: Winans Lake Road	Site Code	: 9004
N/S: Hamburg Road	Start Date	: 10/30/2018
Weather:	Page No	: 3

	None Eastbound					Winans Lake Road Westbound					Hamburg Road Northbound					Hamburg Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	0	0	0	0	71	0	44	0	115	0	52	75	0	127	19	12	0	0	31	273
05:00 PM	0	0	0	0	0	69	0	60	0	129	0	68	70	0	138	27	17	0	0	44	311
05:15 PM	0	0	0	0	0	91	0	62	0	153	0	75	64	0	139	16	24	0	0	40	332
05:30 PM	0	0	0	0	0	76	0	51	0	127	0	71	59	0	130	24	18	0	0	42	299
Total Volume	0	0	0	0	0	307	0	217	0	524	0	266	268	0	534	86	71	0	0	157	1215
% App. Total	0	0	0	0		58.6	0	41.4	0		0	49.8	50.2	0		54.8	45.2	0	0		
PHF	.000	.000	.000	.000	.000	.843	.000	.875	.000	.856	.000	.887	.893	.000	.960	.796	.740	.000	.000	.892	.915



Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: M-36
N/S: Chilson
Weather:

File Name : tmc_18037a_m36 & chilson_1001_nov 01 2018
Site Code : 1001
Start Date : 11/1/2018
Page No : 1

Groups Printed- Cars - H.V.

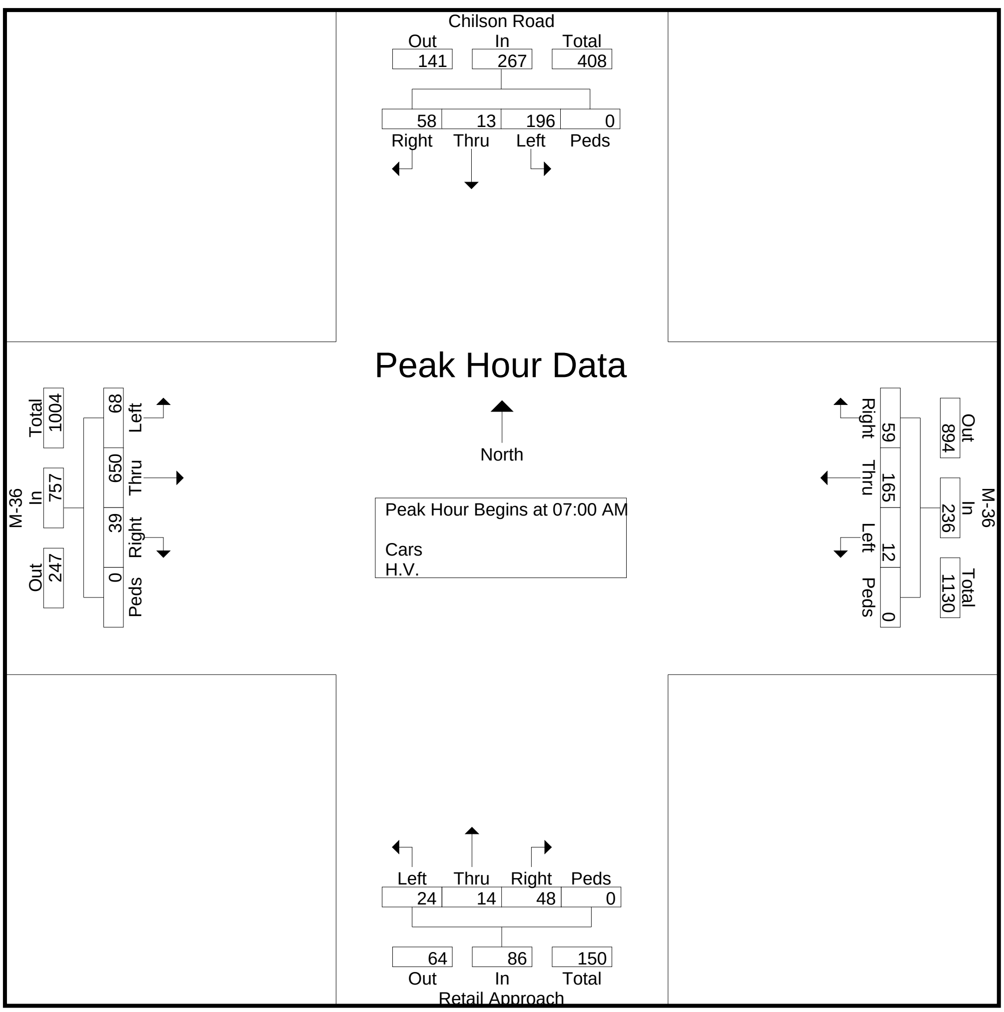
	M-36 Eastbound				M-36 Westbound				Retail Approach Northbound				Chilson Road Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	9	169	11	0	4	44	17	0	11	3	21	0	46	4	20	0	359
07:15 AM	19	172	10	0	4	31	11	0	4	0	11	0	49	2	12	0	325
07:30 AM	19	163	6	0	3	37	12	0	5	5	6	0	55	2	8	0	321
07:45 AM	21	146	12	0	1	53	19	0	4	6	10	0	46	5	18	0	341
Total	68	650	39	0	12	165	59	0	24	14	48	0	196	13	58	0	1346
08:00 AM	12	117	7	0	5	59	15	0	12	4	10	0	48	3	24	0	316
08:15 AM	18	131	29	0	4	48	18	0	10	7	13	0	44	12	16	0	350
08:30 AM	12	120	22	0	1	48	12	0	11	3	16	0	25	9	18	0	297
08:45 AM	15	127	17	0	7	57	10	0	16	5	9	0	26	16	11	0	316
Total	57	495	75	0	17	212	55	0	49	19	48	0	143	40	69	0	1279
*** BREAK ***																	
04:00 PM	14	102	25	0	6	146	37	0	29	27	10	0	22	16	19	0	453
04:15 PM	18	89	18	0	8	131	44	0	34	23	10	0	24	16	27	0	442
04:30 PM	17	65	21	0	10	134	44	0	32	11	8	0	20	9	21	0	392
04:45 PM	15	62	22	0	9	145	56	0	32	16	4	0	25	20	31	0	437
Total	64	318	86	0	33	556	181	0	127	77	32	0	91	61	98	0	1724
05:00 PM	14	87	26	0	9	172	67	0	42	33	4	0	18	16	21	0	509
05:15 PM	16	94	22	0	6	160	45	0	45	23	6	0	22	18	28	0	485
05:30 PM	17	73	17	0	11	153	50	0	38	22	8	0	29	18	31	0	467
05:45 PM	13	64	18	0	10	149	49	0	35	28	5	0	18	15	29	0	433
Total	60	318	83	0	36	634	211	0	160	106	23	0	87	67	109	0	1894
Grand Total	249	1781	283	0	98	1567	506	0	360	216	151	0	517	181	334	0	6243
Apprch %	10.8	77	12.2	0	4.5	72.2	23.3	0	49.5	29.7	20.8	0	50.1	17.5	32.4	0	
Total %	4	28.5	4.5	0	1.6	25.1	8.1	0	5.8	3.5	2.4	0	8.3	2.9	5.3	0	
Cars	242	1753	280	0	96	1523	495	0	355	215	150	0	494	181	324	0	6108
% Cars	97.2	98.4	98.9	0	98	97.2	97.8	0	98.6	99.5	99.3	0	95.6	100	97	0	97.8
H.V.	7	28	3	0	2	44	11	0	5	1	1	0	23	0	10	0	135
% H.V.	2.8	1.6	1.1	0	2	2.8	2.2	0	1.4	0.5	0.7	0	4.4	0	3	0	2.2

Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection	File Name : tmc_18037a_m36 & chilson_1001_nov 01 2018
E/W: M-36	Site Code : 1001
N/S: Chilson	Start Date : 11/1/2018
Weather:	Page No : 2

	M-36 Eastbound					M-36 Westbound					Retail Approach Northbound					Chilson Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	9	169	11	0	189	4	44	17	0	65	11	3	21	0	35	46	4	20	0	70	359
07:15 AM	19	172	10	0	201	4	31	11	0	46	4	0	11	0	15	49	2	12	0	63	325
07:30 AM	19	163	6	0	188	3	37	12	0	52	5	5	6	0	16	55	2	8	0	65	321
07:45 AM	21	146	12	0	179	1	53	19	0	73	4	6	10	0	20	46	5	18	0	69	341
Total Volume	68	650	39	0	757	12	165	59	0	236	24	14	48	0	86	196	13	58	0	267	1346
% App. Total	9	85.9	5.2	0		5.1	69.9	25	0		27.9	16.3	55.8	0		73.4	4.9	21.7	0		
PHF	.810	.945	.813	.000	.942	.750	.778	.776	.000	.808	.545	.583	.571	.000	.614	.891	.650	.725	.000	.954	.937



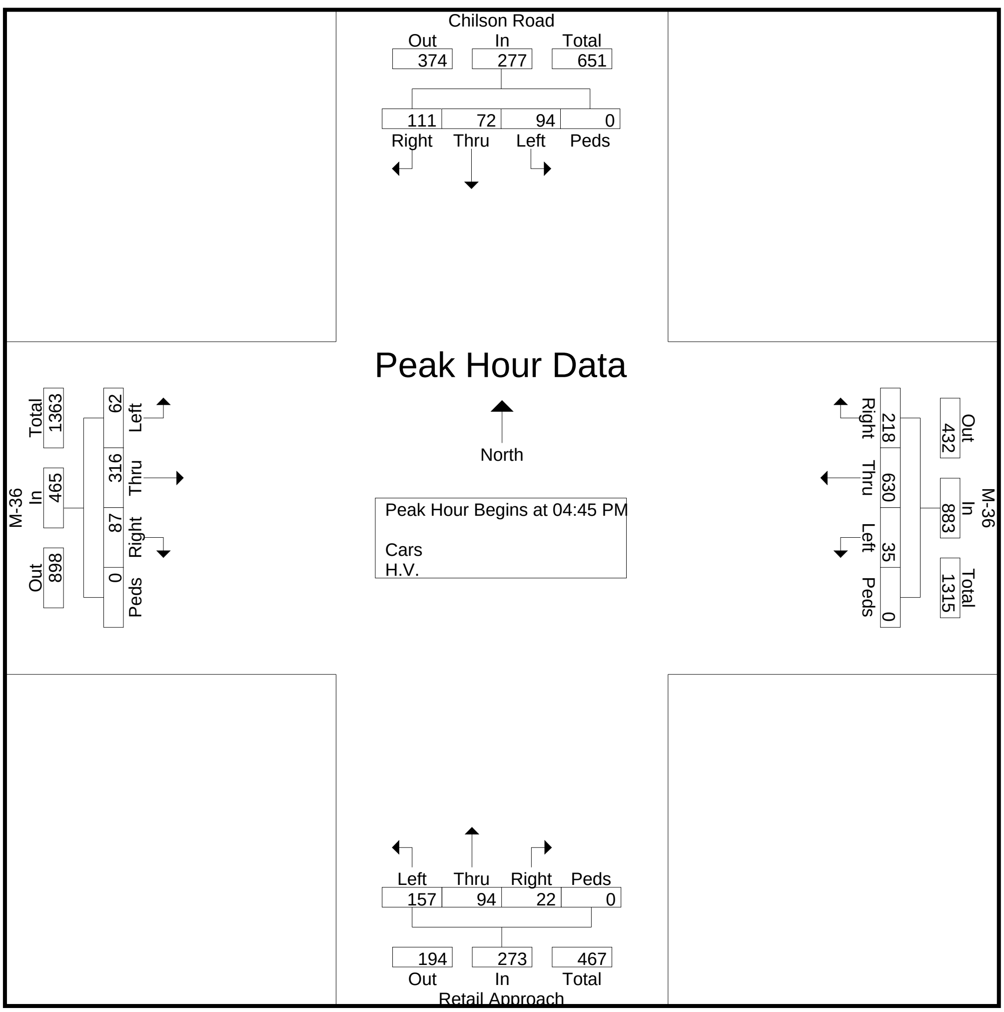
Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: M-36
N/S: Chilson
Weather:

File Name : tmc_18037a_m36 & chilson_1001_nov 01 2018
Site Code : 1001
Start Date : 11/1/2018

	M-36 Eastbound					M-36 Westbound					Retail Approach Northbound					Chilson Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	15	62	22	0	99	9	145	56	0	210	32	16	4	0	52	25	20	31	0	76	437
05:00 PM	14	87	26	0	127	9	172	67	0	248	42	33	4	0	79	18	16	21	0	55	509
05:15 PM	16	94	22	0	132	6	160	45	0	211	45	23	6	0	74	22	18	28	0	68	485
05:30 PM	17	73	17	0	107	11	153	50	0	214	38	22	8	0	68	29	18	31	0	78	467
Total Volume	62	316	87	0	465	35	630	218	0	883	157	94	22	0	273	94	72	111	0	277	1898
% App. Total	13.3	68	18.7	0		4	71.3	24.7	0		57.5	34.4	8.1	0		33.9	26	40.1	0		
PHF	.912	.840	.837	.000	.881	.795	.916	.813	.000	.890	.872	.712	.688	.000	.864	.810	.900	.895	.000	.888	.932



Midwestern Consulting
3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: M-36
N/S: Lake Crest Drive / Club Drive
Weather:

File Name : TMC_18037A_M36 & Lake Crest_9005_Nov 07-08 2018
Site Code : 9005
Start Date : 11/8/2018

Groups Printed- Cars - H.V.

	M-36 Eastbound				M-36 Westbound				Club Driveway Northbound				Lake Crest Drive Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	0	234	0	0	0	62	2	0	0	0	0	0	10	0	9	0	317
07:15 AM	0	256	0	0	0	47	0	0	0	0	0	0	4	0	1	0	308
07:30 AM	0	227	0	0	0	56	1	0	0	0	0	0	5	0	5	0	294
07:45 AM	1	201	0	0	0	86	1	0	0	0	0	0	8	0	4	0	301
Total	1	918	0	0	0	251	4	0	0	0	0	0	27	0	19	0	1220
08:00 AM	0	174	0	0	0	80	1	0	0	0	0	0	7	0	4	0	266
08:15 AM	0	208	0	0	0	72	0	0	0	0	0	0	3	0	0	0	283
08:30 AM	1	161	0	0	0	60	2	0	0	0	0	0	7	0	5	0	236
08:45 AM	1	170	1	0	0	92	3	0	1	0	0	0	2	0	0	0	270
Total	2	713	1	0	0	304	6	0	1	0	0	0	19	0	9	0	1055
*** BREAK ***																	
04:00 PM	2	155	0	0	1	203	7	0	0	0	0	0	1	0	2	0	371
04:15 PM	2	136	3	0	4	200	5	0	0	0	3	0	2	0	2	0	357
04:30 PM	2	93	0	0	1	232	4	0	2	0	1	0	3	0	2	0	340
04:45 PM	3	103	1	0	0	283	2	0	1	0	1	0	2	0	3	0	399
Total	9	487	4	0	6	918	18	0	3	0	5	0	8	0	9	0	1467
05:00 PM	4	133	0	0	1	272	6	0	1	0	0	0	2	0	3	0	422
05:15 PM	6	137	1	0	2	244	5	0	3	0	0	0	1	0	2	0	401
05:30 PM	2	123	0	0	1	259	10	0	0	0	1	0	2	0	4	0	402
05:45 PM	2	105	2	0	0	245	5	0	0	0	0	0	2	0	2	0	363
Total	14	498	3	0	4	1020	26	0	4	0	1	0	7	0	11	0	1588
Grand Total	26	2616	8	0	10	2493	54	0	8	0	6	0	61	0	48	0	5330
Apprch %	1	98.7	0.3	0	0.4	97.5	2.1	0	57.1	0	42.9	0	56	0	44	0	
Total %	0.5	49.1	0.2	0	0.2	46.8	1	0	0.2	0	0.1	0	1.1	0	0.9	0	
Cars	26	2560	8	0	10	2440	50	0	8	0	6	0	61	0	44	0	5213
% Cars	100	97.9	100	0	100	97.9	92.6	0	100	0	100	0	100	0	91.7	0	97.8
H.V.	0	56	0	0	0	53	4	0	0	0	0	0	0	0	4	0	117
% H.V.	0	2.1	0	0	0	2.1	7.4	0	0	0	0	0	0	0	8.3	0	2.2

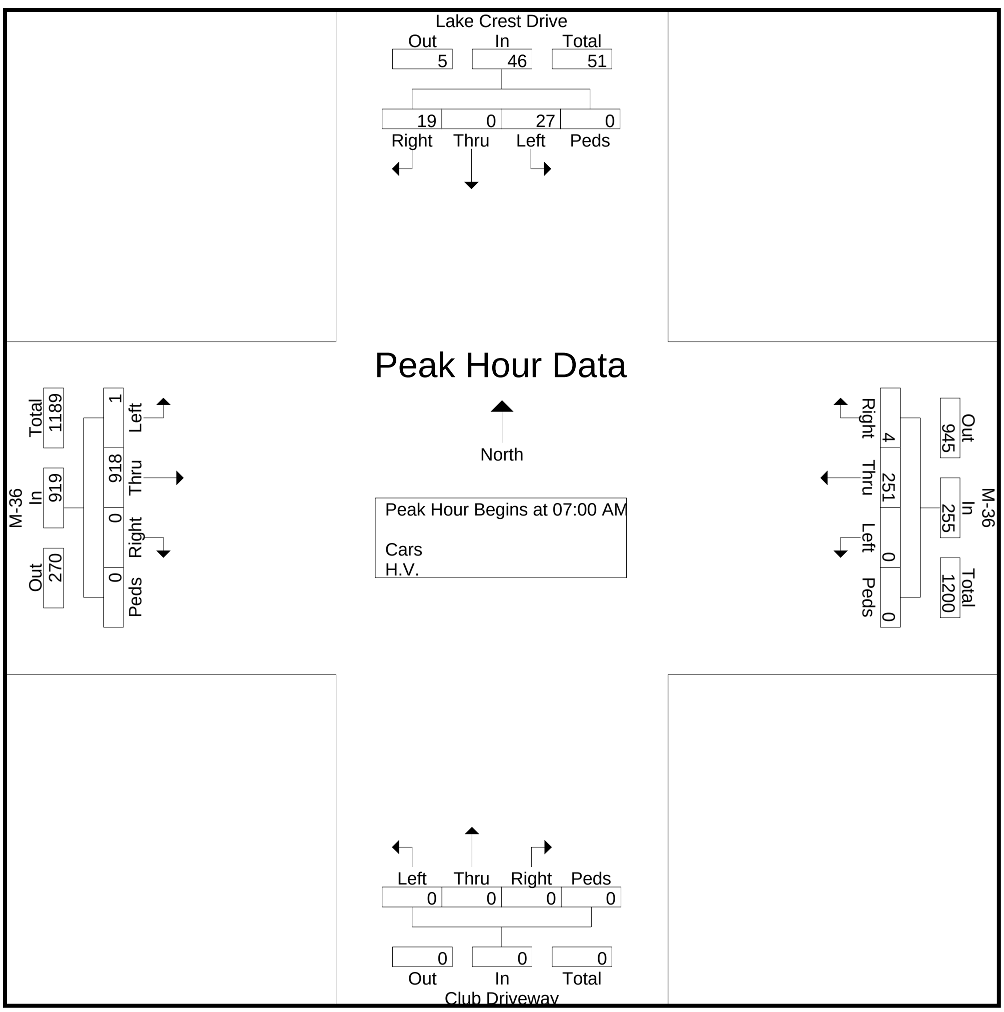
Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: M-36
N/S: Lake Crest Drive / Club Drive
Weather:

File Name : TMC_18037A_M36 & Lake Crest_9005_Nov 07-08 2018
Site Code : 9005
Start Date : 11/8/2018
Page No : 2

	M-36 Eastbound					M-36 Westbound					Club Driveway Northbound					Lake Crest Drive Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	234	0	0	234	0	62	2	0	64	0	0	0	0	0	10	0	9	0	19	317
07:15 AM	0	256	0	0	256	0	47	0	0	47	0	0	0	0	0	4	0	1	0	5	308
07:30 AM	0	227	0	0	227	0	56	1	0	57	0	0	0	0	0	5	0	5	0	10	294
07:45 AM	1	201	0	0	202	0	86	1	0	87	0	0	0	0	0	8	0	4	0	12	301
Total Volume	1	918	0	0	919	0	251	4	0	255	0	0	0	0	0	27	0	19	0	46	1220
% App. Total	0.1	99.9	0	0		0	98.4	1.6	0		0	0	0	0		58.7	0	41.3	0		
PHF	.250	.896	.000	.000	.897	.000	.730	.500	.000	.733	.000	.000	.000	.000	.000	.675	.000	.528	.000	.605	.962



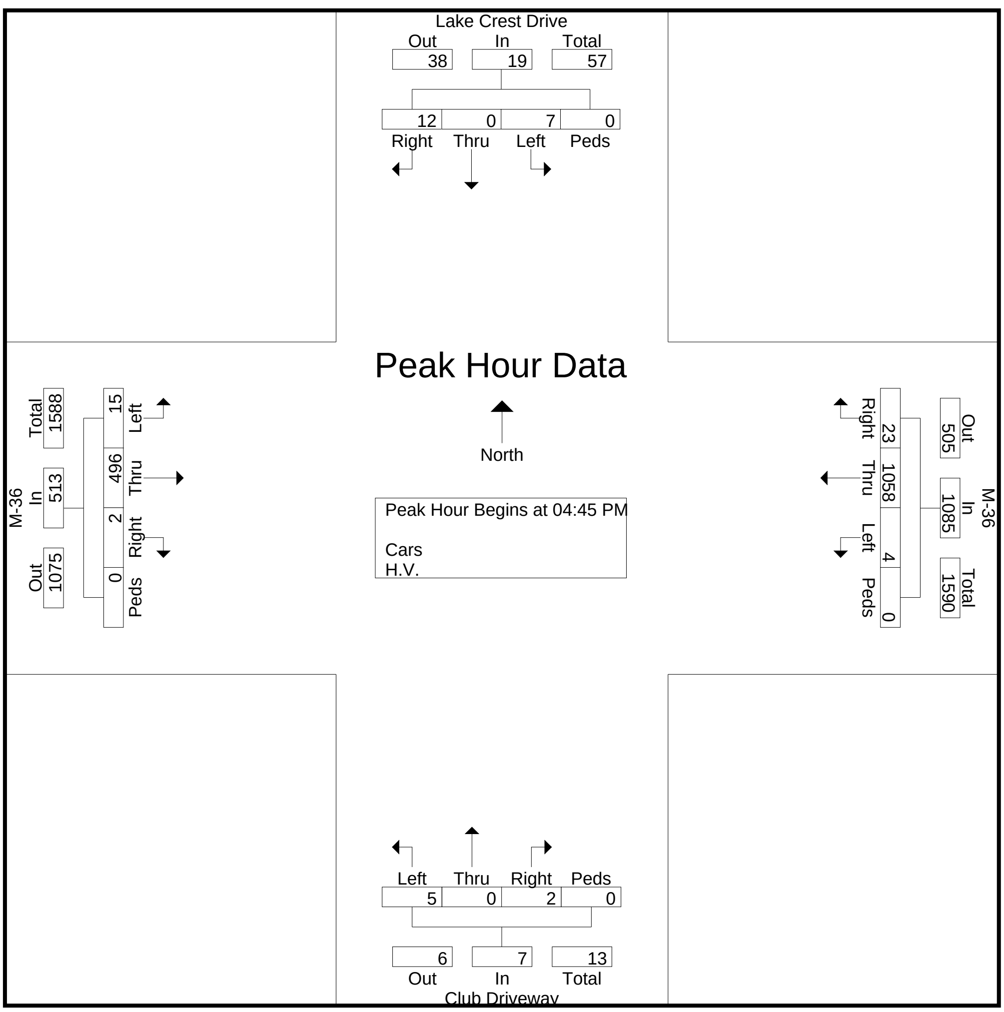
Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: M-36
N/S: Lake Crest Drive / Club Drive
Weather:

File Name : TMC_18037A_M36 & Lake Crest_9005_Nov 07-08 2018
Site Code : 9005
Start Date : 11/8/2018

	M-36 Eastbound					M-36 Westbound					Club Driveway Northbound					Lake Crest Drive Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	3	103	1	0	107	0	283	2	0	285	1	0	1	0	2	2	0	3	0	5	399
05:00 PM	4	133	0	0	137	1	272	6	0	279	1	0	0	0	1	2	0	3	0	5	422
05:15 PM	6	137	1	0	144	2	244	5	0	251	3	0	0	0	3	1	0	2	0	3	401
05:30 PM	2	123	0	0	125	1	259	10	0	270	0	0	1	0	1	2	0	4	0	6	402
Total Volume	15	496	2	0	513	4	1058	23	0	1085	5	0	2	0	7	7	0	12	0	19	1624
% App. Total																					
PHF	.625	.905	.500	.000	.891	.500	.935	.575	.000	.952	.417	.000	.500	.000	.583	.875	.000	.750	.000	.792	.962



Midwestern Consulting
3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: M-36
N/S: Merrill Road
Weather:

File Name : TMC_18037A_M36 & Merrill_1002_Nov 01 2018
Site Code : 1002
Start Date : 11/1/2018
Page No : 1

Groups Printed- Cars - H.V.

	M-36 Eastbound				M-36 Westbound				Merrill Road Northbound				None Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	0	169	75	0	6	37	0	0	27	0	5	0	0	0	0	0	319
07:15 AM	0	177	83	0	15	30	0	0	17	0	10	0	0	0	0	0	332
07:30 AM	0	153	79	0	13	34	0	0	23	0	17	0	0	0	0	0	319
07:45 AM	0	150	59	0	16	55	0	0	32	0	17	0	0	0	0	0	329
Total	0	649	296	0	50	156	0	0	99	0	49	0	0	0	0	0	1299
08:00 AM	0	123	58	0	10	44	0	0	37	0	16	0	0	0	0	0	288
08:15 AM	0	146	65	0	9	45	0	0	27	0	14	0	0	0	0	0	306
08:30 AM	0	118	50	0	13	38	0	0	24	0	16	0	0	0	0	0	259
08:45 AM	0	118	54	0	10	63	0	0	32	0	9	0	0	0	0	0	286
Total	0	505	227	0	42	190	0	0	120	0	55	0	0	0	0	0	1139
*** BREAK ***																	
04:00 PM	0	110	46	0	26	143	0	0	68	0	21	0	0	0	0	0	414
04:15 PM	0	103	38	0	19	140	0	0	69	0	24	0	0	0	0	0	393
04:30 PM	0	70	27	0	19	150	0	0	87	0	37	0	0	0	0	0	390
04:45 PM	0	74	32	0	20	173	0	0	112	0	32	0	0	0	0	0	443
Total	0	357	143	0	84	606	0	0	336	0	114	0	0	0	0	0	1640
05:00 PM	0	81	54	0	14	163	0	0	116	0	44	0	0	0	0	0	472
05:15 PM	0	82	56	0	21	171	0	0	80	0	24	0	0	0	0	0	434
05:30 PM	0	86	40	0	13	175	0	0	95	0	29	0	0	0	0	0	438
05:45 PM	0	69	38	0	15	147	0	0	103	0	33	0	0	0	0	0	405
Total	0	318	188	0	63	656	0	0	394	0	130	0	0	0	0	0	1749
Grand Total	0	1829	854	0	239	1608	0	0	949	0	348	0	0	0	0	0	5827
Apprch %	0	68.2	31.8	0	12.9	87.1	0	0	73.2	0	26.8	0	0	0	0	0	
Total %	0	31.4	14.7	0	4.1	27.6	0	0	16.3	0	6	0	0	0	0	0	
Cars	0	1788	839	0	237	1567	0	0	933	0	347	0	0	0	0	0	5711
% Cars	0	97.8	98.2	0	99.2	97.5	0	0	98.3	0	99.7	0	0	0	0	0	98
H.V.	0	41	15	0	2	41	0	0	16	0	1	0	0	0	0	0	116
% H.V.	0	2.2	1.8	0	0.8	2.5	0	0	1.7	0	0.3	0	0	0	0	0	2

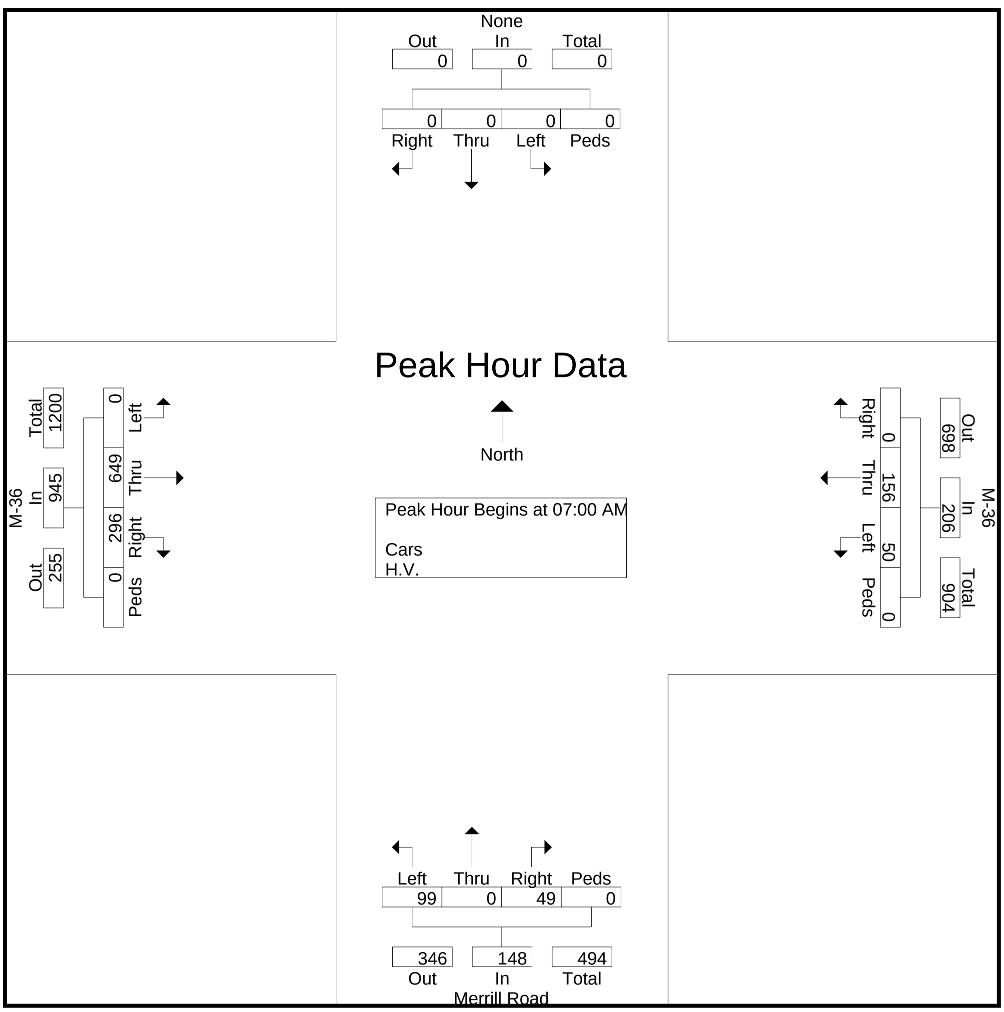
Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: M-36
N/S: Merrill Road
Weather:

File Name : TMC_18037A_M36 & Merrill_1002_Nov 01 2018
Site Code : 1002
Start Date : 11/1/2018
Page No : 2

	M-36 Eastbound					M-36 Westbound					Merrill Road Northbound					None Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	169	75	0	244	6	37	0	0	43	27	0	5	0	32	0	0	0	0	0	319
07:15 AM	0	177	83	0	260	15	30	0	0	45	17	0	10	0	27	0	0	0	0	0	332
07:30 AM	0	153	79	0	232	13	34	0	0	47	23	0	17	0	40	0	0	0	0	0	319
07:45 AM	0	150	59	0	209	16	55	0	0	71	32	0	17	0	49	0	0	0	0	0	329
Total Volume	0	649	296	0	945	50	156	0	0	206	99	0	49	0	148	0	0	0	0	0	1299
% App. Total	0	68.7	31.3	0		24.3	75.7	0	0		66.9	0	33.1	0		0	0	0	0		
PHF	.000	.917	.892	.000	.909	.781	.709	.000	.000	.725	.773	.000	.721	.000	.755	.000	.000	.000	.000	.000	.978



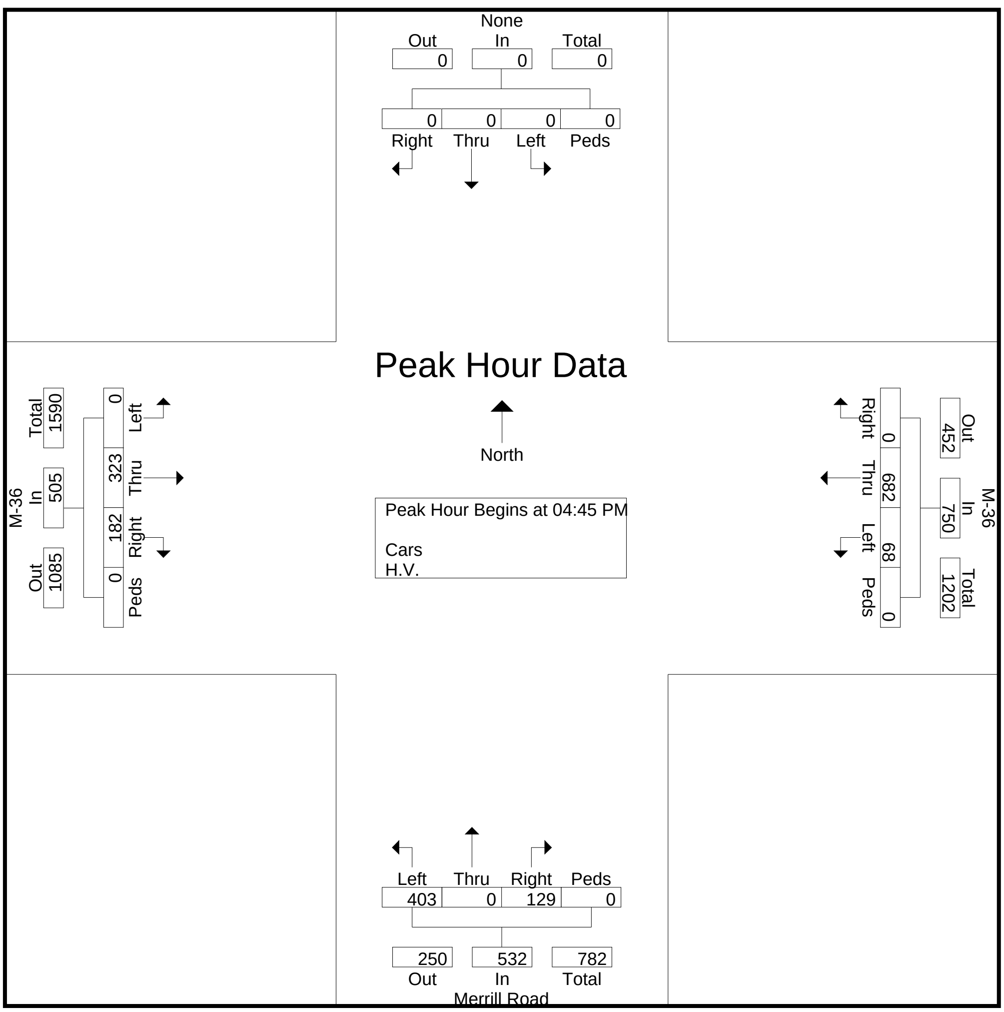
Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: M-36
N/S: Merrill Road
Weather:

File Name : TMC_18037A_M36 & Merrill_1002_Nov 01 2018
Site Code : 1002
Start Date : 11/1/2018
Page No : 3

	M-36 Eastbound					M-36 Westbound					Merrill Road Northbound					None Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	74	32	0	106	20	173	0	0	193	112	0	32	0	144	0	0	0	0	0	443
05:00 PM	0	81	54	0	135	14	163	0	0	177	116	0	44	0	160	0	0	0	0	0	472
05:15 PM	0	82	56	0	138	21	171	0	0	192	80	0	24	0	104	0	0	0	0	0	434
05:30 PM	0	86	40	0	126	13	175	0	0	188	95	0	29	0	124	0	0	0	0	0	438
Total Volume	0	323	182	0	505	68	682	0	0	750	403	0	129	0	532	0	0	0	0	0	1787
% App. Total	0	64	36	0		9.1	90.9	0	0		75.8	0	24.2	0		0	0	0	0		
PHF	.000	.939	.813	.000	.915	.810	.974	.000	.000	.972	.869	.000	.733	.000	.831	.000	.000	.000	.000	.000	.947



Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: M-36
N/S: Hamburg Road
Weather:

File Name : tmc_18037a_m36 & hamburg_1003_nov 01 2018
Site Code : 1003
Start Date : 11/1/2018
Page No : 1

Groups Printed- Cars - H.V.

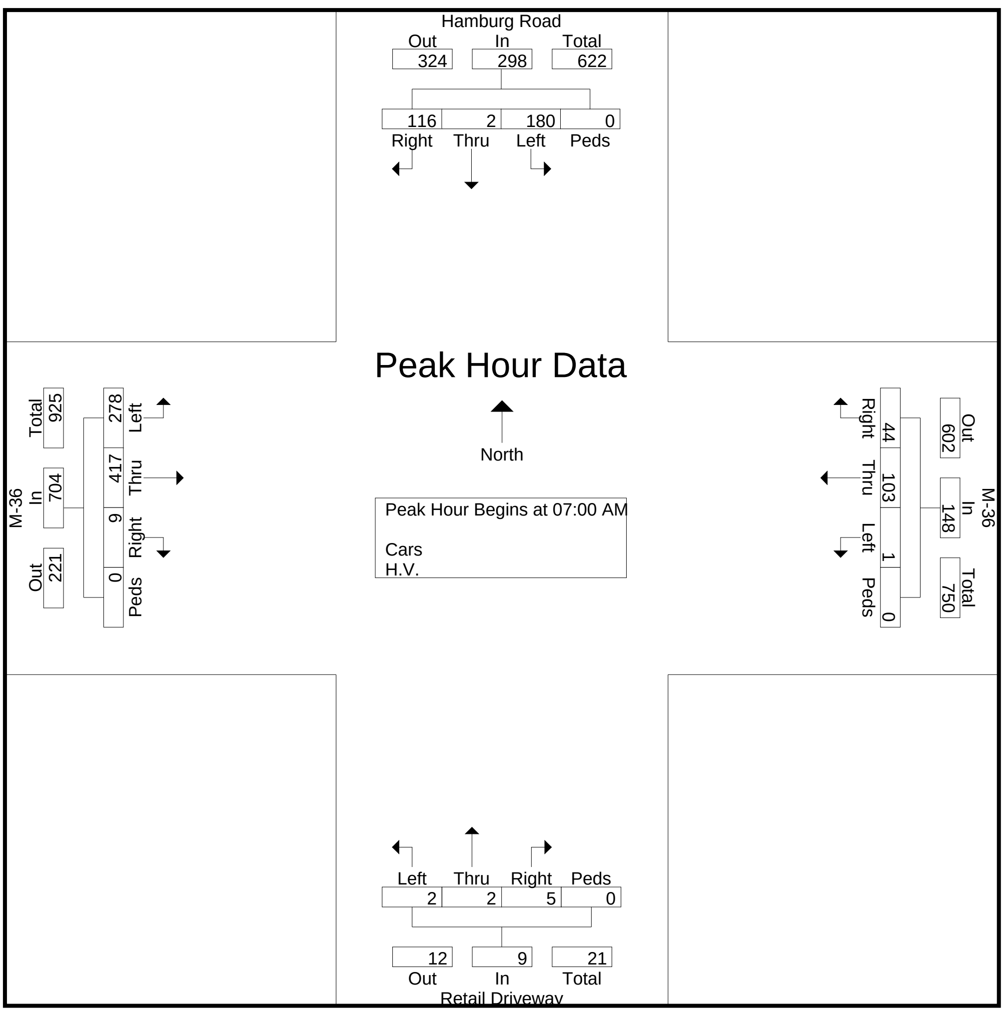
	M-36 Eastbound				M-36 Westbound				Retail Driveway Northbound				Hamburg Road Southbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	73	95	1	0	0	25	12	0	1	1	1	0	45	1	15	0	270
07:15 AM	78	115	1	0	0	22	8	0	0	0	1	0	48	0	28	0	301
07:30 AM	64	108	4	0	1	15	10	0	1	0	1	0	41	0	28	0	273
07:45 AM	63	99	3	0	0	41	14	0	0	1	2	0	46	1	45	0	315
Total	278	417	9	0	1	103	44	0	2	2	5	0	180	2	116	0	1159
08:00 AM	63	75	1	0	0	28	13	0	1	0	0	0	37	2	30	0	250
08:15 AM	72	79	1	0	0	27	8	0	0	0	1	0	33	1	23	0	245
08:30 AM	74	66	3	0	0	23	12	0	1	3	0	0	19	3	26	0	230
08:45 AM	63	50	5	0	0	35	14	0	1	4	1	0	20	3	30	0	226
Total	272	270	10	0	0	113	47	0	3	7	2	0	109	9	109	0	951
*** BREAK ***																	
04:00 PM	51	43	11	0	4	77	49	0	2	5	0	0	12	6	83	0	343
04:15 PM	61	58	13	0	3	78	44	0	8	4	1	0	18	7	66	0	361
04:30 PM	50	46	15	0	1	106	49	0	8	8	2	0	14	4	69	0	372
04:45 PM	59	39	7	0	0	89	61	0	9	8	1	0	24	11	79	0	387
Total	221	186	46	0	8	350	203	0	27	25	4	0	68	28	297	0	1463
05:00 PM	75	45	8	0	1	104	79	0	8	7	1	0	19	5	75	0	427
05:15 PM	57	47	5	0	0	97	46	0	8	2	6	0	23	8	70	0	369
05:30 PM	66	43	10	0	1	105	50	0	6	5	3	0	17	6	79	0	391
05:45 PM	62	37	5	0	0	79	46	0	10	4	1	0	24	2	65	0	335
Total	260	172	28	0	2	385	221	0	32	18	11	0	83	21	289	0	1522
Grand Total	1031	1045	93	0	11	951	515	0	64	52	22	0	440	60	811	0	5095
Apprch %	47.5	48.2	4.3	0	0.7	64.4	34.9	0	46.4	37.7	15.9	0	33.6	4.6	61.9	0	
Total %	20.2	20.5	1.8	0	0.2	18.7	10.1	0	1.3	1	0.4	0	8.6	1.2	15.9	0	
Cars	1018	1022	91	0	10	922	509	0	63	51	21	0	436	58	794	0	4995
% Cars	98.7	97.8	97.8	0	90.9	97	98.8	0	98.4	98.1	95.5	0	99.1	96.7	97.9	0	98
H.V.	13	23	2	0	1	29	6	0	1	1	1	0	4	2	17	0	100
% H.V.	1.3	2.2	2.2	0	9.1	3	1.2	0	1.6	1.9	4.5	0	0.9	3.3	2.1	0	2

Midwestern Consulting
3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: M-36
N/S: Hamburg Road
Weather:

File Name : tmc_18037a_m36 & hamburg_1003_nov 01 2018
Site Code : 1003
Start Date : 11/1/2018
Page No : 2

	M-36 Eastbound					M-36 Westbound					Retail Driveway Northbound					Hamburg Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	73	95	1	0	169	0	25	12	0	37	1	1	1	0	3	45	1	15	0	61	270
07:15 AM	78	115	1	0	194	0	22	8	0	30	0	0	1	0	1	48	0	28	0	76	301
07:30 AM	64	108	4	0	176	1	15	10	0	26	1	0	1	0	2	41	0	28	0	69	273
07:45 AM	63	99	3	0	165	0	41	14	0	55	0	1	2	0	3	46	1	45	0	92	315
Total Volume	278	417	9	0	704	1	103	44	0	148	2	2	5	0	9	180	2	116	0	298	1159
% App. Total	39.5	59.2	1.3	0		0.7	69.6	29.7	0		22.2	22.2	55.6	0		60.4	0.7	38.9	0		
PHF	.891	.907	.563	.000	.907	.250	.628	.786	.000	.673	.500	.500	.625	.000	.750	.938	.500	.644	.000	.810	.920



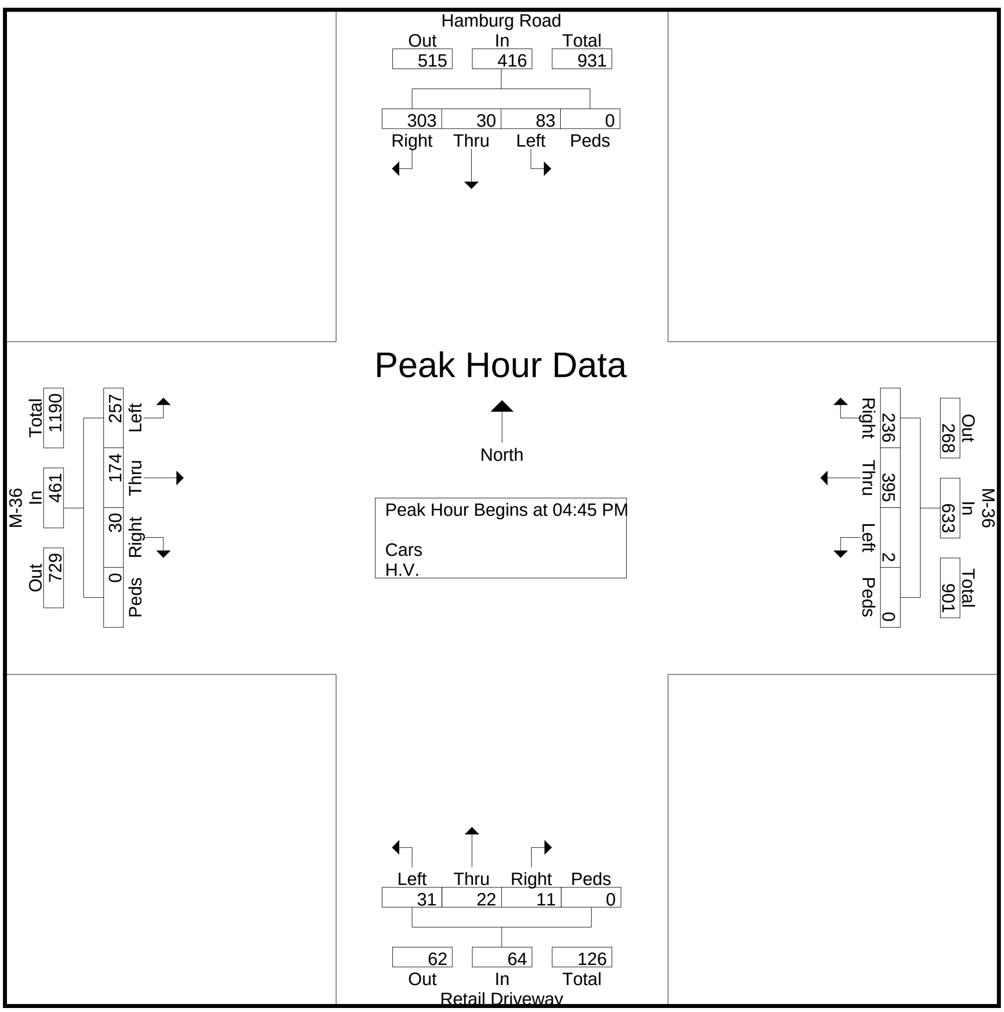
Midwestern Consulting

3815 Plaza Drive
Ann Arbor, MI, 48108
(734) 995-0200

Intersection
E/W: M-36
N/S: Hamburg Road
Weather:

File Name : tmc_18037a_m36 & hamburg_1003_nov 01 2018
Site Code : 1003
Start Date : 11/1/2018

	M-36 Eastbound					M-36 Westbound					Retail Driveway Northbound					Hamburg Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	59	39	7	0	105	0	89	61	0	150	9	8	1	0	18	24	11	79	0	114	387
05:00 PM	75	45	8	0	128	1	104	79	0	184	8	7	1	0	16	19	5	75	0	99	427
05:15 PM	57	47	5	0	109	0	97	46	0	143	8	2	6	0	16	23	8	70	0	101	369
05:30 PM	66	43	10	0	119	1	105	50	0	156	6	5	3	0	14	17	6	79	0	102	391
Total Volume	257	174	30	0	461	2	395	236	0	633	31	22	11	0	64	83	30	303	0	416	1574
% App. Total	55.7	37.7	6.5	0		0.3	62.4	37.3	0		48.4	34.4	17.2	0		20	7.2	72.8	0		
PHF	.857	.926	.750	.000	.900	.500	.940	.747	.000	.860	.861	.688	.458	.000	.889	.865	.682	.959	.000	.912	.922



Midwestern Consulting

Weekly Volumes

Unit ID: MCLLC-#1
Location: Winans Lake at Buckhorn_EB

Week of 10/29/2018

Start Time	10/29 Mon	10/30 Tue	10/31 Wed	11/01 Thu	11/02 Fri	11/03 Sat	11/04 Sun	Average
	EB	EB	EB	EB	EB	EB	EB	EB
00:00	-	2	3	4	5	-	-	4
01:00	-	0	1	1	2	-	-	1
02:00	-	2	1	2	3	-	-	2
03:00	-	6	5	3	3	-	-	4
04:00	-	18	14	14	10	-	-	14
05:00	-	73	69	65	61	-	-	67
06:00	-	171	167	166	147	-	-	163
07:00	-	229	210	196	214	-	-	212
08:00	-	208	192	206	165	-	-	193
09:00	0	138	140	141	118	-	-	107
10:00	0	120	108	100	17	-	-	69
11:00	0	99	109	119	0	-	-	65
12:00	61	127	113	136	-	-	-	109
13:00	109	105	88	102	-	-	-	101
14:00	119	121	116	127	-	-	-	121
15:00	150	165	148	104	-	-	-	142
16:00	143	176	168	139	-	-	-	157
17:00	145	160	201	158	-	-	-	166
18:00	133	135	91	108	-	-	-	117
19:00	76	65	67	60	-	-	-	67
20:00	51	47	74	72	-	-	-	61
21:00	21	44	38	36	-	-	-	35
22:00	11	19	20	21	-	-	-	18
23:00	8	7	11	3	-	-	-	7
Lane Total	1027	2237	2154	2083	745	-	-	2002
Day Total	1027	2237	2154	2083	745	-	-	2002
AM Peak	-	07:38	07:29	07:39	06:53	-	-	07:00
AM Count	-	240	223	213	218	-	-	212
PM Peak	15:23	15:30	16:33	16:43	-	-	-	17:00
PM Count	166	192	211	159	-	-	-	166

Midwestern Consulting
Weekly Volumes

Unit ID: MCLLC-#2
Location: Winans Lake at Buckhorn_WB

Week of 10/29/2018

Start Time	10/29 Mon	10/30 Tue	10/31 Wed	11/01 Thu	11/02 Fri	11/03 Sat	11/04 Sun	Average
	WB	WB	WB	WB	WB	WB	WB	WB
00:00	-	7	13	16	13	-	-	12
01:00	-	4	3	4	3	-	-	4
02:00	-	4	2	1	3	-	-	3
03:00	-	3	2	4	3	-	-	3
04:00	-	2	2	3	5	-	-	3
05:00	-	19	13	15	20	-	-	17
06:00	-	56	69	58	61	-	-	61
07:00	-	108	84	101	84	-	-	94
08:00	-	87	88	113	86	-	-	94
09:00	0	85	89	76	90	-	-	68
10:00	0	115	119	105	16	-	-	71
11:00	0	103	141	117	0	-	-	72
12:00	75	156	125	155	-	-	-	128
13:00	138	130	135	136	-	-	-	135
14:00	165	136	180	171	-	-	-	163
15:00	245	245	246	204	-	-	-	235
16:00	307	267	288	246	-	-	-	277
17:00	316	327	346	299	-	-	-	322
18:00	194	227	122	204	-	-	-	187
19:00	140	167	128	136	-	-	-	143
20:00	111	93	142	115	-	-	-	115
21:00	43	74	102	54	-	-	-	68
22:00	38	33	44	49	-	-	-	41
23:00	22	19	17	23	-	-	-	20
Lane Total	1794	2467	2500	2405	384	-	-	2336
Day Total	1794	2467	2500	2405	384	-	-	2336
AM Peak	-	09:43	10:59	10:45	06:38	-	-	07:00
AM Count	-	120	142	129	98	-	-	94
PM Peak	16:43	17:01	16:54	16:45	-	-	-	17:00
PM Count	343	330	363	321	-	-	-	322

SEMCOG | Southeast Michigan Council of Governments

Community Profiles

YOU ARE VIEWING DATA FOR:

Hamburg Township

10405 Merrill Rd
Hamburg, MI 48139-0157
http://www.hamburg.mi.us/

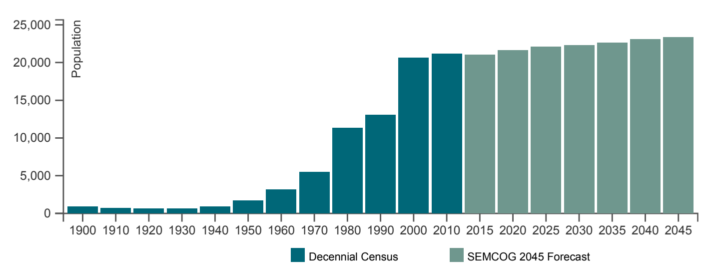
SEMCOG MEMBER

Census 2010 Population: 21,165
Area: 36 square miles

Population and Households

Link to American Community Survey (ACS) Profiles: **Select a Year** 2012-2016 **Social** | **Demographic**
Population and Household Estimates for Southeast Michigan, 2017

Population Forecast



Population and Households

Population and Households	Census 2010	Change 2000-2010	Pct Change 2000-2010	SEMCOG Jul 2017	SEMCOG 2045
Total Population	21,165	538	2.6%	21,213	23,325
Group Quarters Population	14	-233	-94.3%	14	175
Household Population	21,151	771	3.8%	21,199	23,150
Housing Units	8,668	990	12.9%	8,847	-
Households (Occupied Units)	7,860	774	10.9%	8,427	9,491
Residential Vacancy Rate	9.3%	1.6%	-	4.7%	-
Average Household Size	2.69	-0.19	-	2.52	2.44

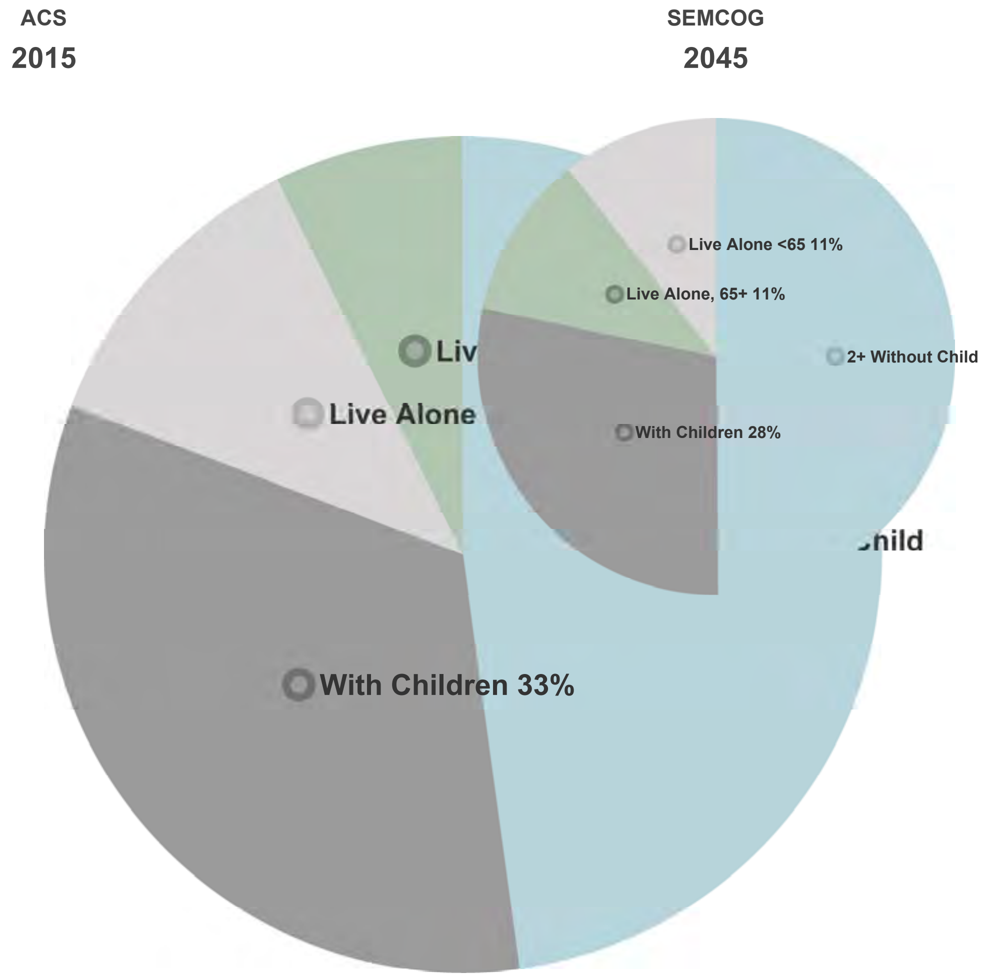
Source: **U.S. Census Bureau**, **SEMCOG Population and Household Estimates**, and **SEMCOG 2045 Regional Development Forecast**

Components of Population Change

Components of Population Change	2000-2005 Avg.	2006-2010 Avg.	2011-2015 Avg.
Natural Increase (Births - Deaths)	140	24	35
Births	241	124	161
Deaths	101	100	126
Net Migration (Movement In - Movement Out)	210	-266	-57
Population Change (Natural Increase + Net Migration)	350	-242	-22

Source: **Michigan Department of Community Health Vital Statistics**, **U.S. Census Bureau**, and SEMCOG

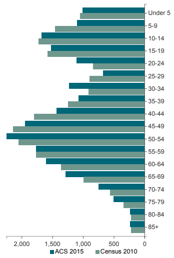
Household Types



Household Types	Census 2010	ACS 2015	Change 2010-2015	Pct Change 2010-2015	SEMCOG 2045
With Seniors 65+	1,629	2,107	478	29.3%	4,137
Without Seniors	6,231	6,077	-154	-2.5%	5,354
Live Alone, 65+	426	597	171	40.1%	1,056
Live Alone, <65	926	976	50	5.4%	1,008
2+ Persons, With children	2,833	2,697	-136	-4.8%	2,688
2+ Persons, Without children	3,675	3,914	239	6.5%	4,739
Total Households	**7,860**	**8,184**	**324**	**4.1%**	9,491

Source: **U.S. Census Bureau**, **Decennial Census**, **2015 American Community Survey 5-Year Estimates**, and **SEMCOG 2045 Regional Development Forecast**

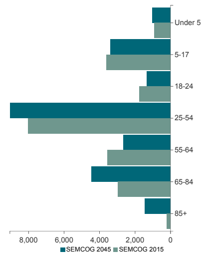
Population Change by Age, 2010-2015



Age Group	Census 2010	Change 2000-2010	ACS 2015	Change 2010-2015
Under 5	1,052	-542	1,008	-44
5-9	1,456	-331	1,097	-359
10-14	1,726	-63	1,680	-46
15-19	1,579	206	1,522	-57
20-24	838	138	1,112	274
25-29	895	-110	675	-220
30-34	914	-810	1,226	312
35-39	1,244	-949	1,076	-168
40-44	1,797	-306	1,437	-360
45-49	2,142	317	1,945	-197
50-54	2,054	547	2,247	193
55-59	1,769	706	1,767	-2
60-64	1,364	702	1,607	243
65-69	994	555	1,290	296
70-74	564	200	748	184
75-79	340	96	507	167
80-84	220	62	232	12
85+	217	120	233	16
Total	21,165	538	21,409	244
Median Age	42.6	6.8	44.7	2.1

Source: **U.S. Census Bureau**, **Decennial Census**, and **2015 American Community Survey 5-Year Estimates**

Forecasted Population Change 2015-2045



Age Group	2015	2020	2025	2030	2035	2040	2045	Change 2015 - 2045	Pct Change 2015 - 2045
Under 5	927	1,073	1,276	1,288	1,164	1,015	1,013	86	9.3%
5-17	3,608	3,008	2,744	2,957	3,361	3,483	3,388	-220	-6.1%
18-24	1,746	1,652	1,354	1,037	881	1,062	1,324	-422	-24.2%
25-54	8,035	8,119	8,243	8,484	8,788	8,972	9,054	1,019	12.7%
55-64	3,553	3,803	3,549	3,105	2,649	2,566	2,654	-899	-25.3%
65-84	2,961	3,635	4,479	4,860	4,974	4,822	4,452	1,491	50.4%
85+	223	336	453	599	828	1,152	1,440	1,217	545.7%
Total	21,053	21,626	22,098	22,330	22,645	23,072	23,325	2,272	10.8%

Source: **SEMCOG 2045 Regional Development Forecast**

Older Adults and Youth Populations

Older Adults and Youth Population	Census 2010	ACS 2015	Change 2010-2015	Pct Change 2010-2015	SEMCOG 2045
60 and over	3,699	4,617	918	24.8%	7,159
65 and over	2,335	3,010	675	28.9%	5,892
65 to 84	2,118	2,777	659	31.1%	4,452
85 and Over	217	233	16	7.4%	1,440
Under 18	5,349	4,786	-563	-10.5%	4,401
5 to 17	4,297	3,778	-519	-12.1%	3,388
Under 5	1,052	1,008	-44	-4.2%	1,013

Note: Population by age changes over time because of the aging of people into older age groups, the movement of people, and the occurrence of births and deaths.

Source: **U.S. Census Bureau**, **Decennial Census**, **2015 American Community Survey 5-Year Estimates**, and **SEMCOG 2045 Regional Development Forecast**

Race and Hispanic Origin

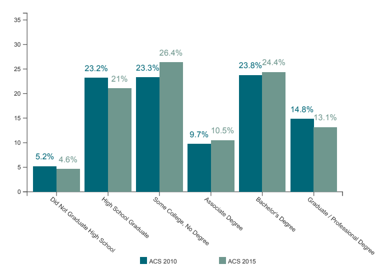
Race and Hispanic Origin	Census 2010	Percent of Population 2010	ACS 2015	Percent of Population 2015	Percentage Point Change 2010-2015
Non-Hispanic	20,886	98.7%	21,045	98.3%	-0.4%
White	20,367	96.2%	20,537	95.9%	-0.3%
Black	66	0.3%	29	0.1%	-0.2%
Asian	122	0.6%	58	0.3%	-0.3%
Multi-Racial	242	1.1%	413	1.9%	0.8%
Other	89	0.4%	8	0%	-0.4%
Hispanic	279	1.3%	364	1.7%	0.4%
Total	21,165	100%	21,409	100%	0%

Source: **U.S. Census Bureau**, **Decennial Census**, and **2015 American Community Survey 5-Year Estimates**

Highest Level of Education

Highest Level of Education*	ACS 2010	ACS 2015	Percentage Point Chg 2010-2015
Did Not Graduate High School	5.2%	4.6%	-0.5%
High School Graduate	23.2%	21%	-2.2%
Some College, No Degree	23.3%	26.4%	3.1%
Associate Degree	9.7%	10.5%	0.8%
Bachelor's Degree	23.8%	24.4%	0.6%
Graduate / Professional Degree	14.8%	13.1%	-1.7%

* Population age 25 and over

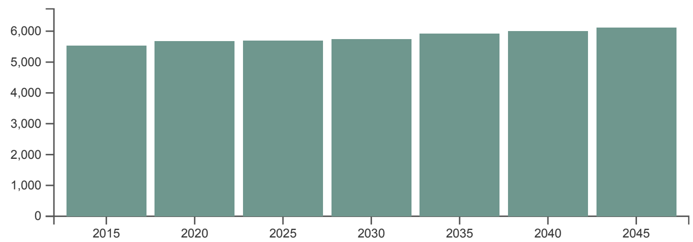


Source: **U.S. Census Bureau**, **2010 and 2015 American Community Survey 5-Year Estimates**

Economy & Jobs

Link to American Community Survey (ACS) Profiles: **Select a Year** 2012-2016 **Economic**

Forecasted Jobs



Source: **SEMCOG 2045 Regional Development Forecast**

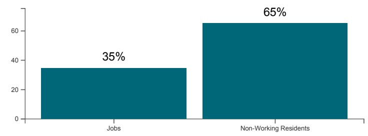
Forecasted Jobs by Industry Sector

Forecasted Jobs By Industry Sector	2015	2020	2025	2030	2035	2040	2045	Change 2015-2045	Pct Change 2015-2045
Natural Resources, Mining, & Construction	508	606	598	595	627	633	652	144	28.3%
Manufacturing	406	391	345	323	310	295	289	-117	-28.8%
Wholesale Trade	95	90	92	94	89	91	97	2	2.1%
Retail Trade	421	427	425	404	399	383	382	-39	-9.3%
Transportation, Warehousing, & Utilities	110	118	115	113	115	119	125	15	13.6%
Information & Financial Activities	1,074	1,069	1,055	1,047	1,062	1,086	1,093	19	1.8%
Professional and Technical Services & Corporate HQ	518	550	570	608	651	677	700	182	35.1%
Administrative, Support, & Waste Services	490	565	603	647	722	721	741	251	51.2%
Education Services	300	293	302	304	308	317	322	22	7.3%
Healthcare Services	245	226	236	256	268	300	327	82	33.5%
Leisure & Hospitality	681	679	684	688	690	700	708	27	4%
Other Services	481	452	447	445	444	453	448	-33	-6.9%
Public Administration	198	212	219	224	227	228	229	31	15.7%
Total Employment Numbers	5,527	5,678	5,691	5,748	5,912	6,003	6,113	586	10.6%

Source: **SEMCOG 2045 Regional Development Forecast**

Daytime Population

Daytime Population	SEMCOG and ACS 2015
Jobs	5,527
Non-Working Residents	10,398
Age 15 and under	4,041
Not in labor force	5,642
Unemployed	715
Daytime Population	15,925



Source: **SEMCOG 2045 Regional Development Forecast** and **2015 American Community Survey 5-Year Estimates**

Note: The number of residents attending school outside Southeast Michigan is not available. Likewise, the number of students commuting into Southeast Michigan to attend school is also not known.

Where Workers Commute From 2013

Rank	Where Workers Commute From *	Workers	Percent
1	**Hamburg Twp**	1,240	58.4%
2	**Green Oak Twp**	88	4.1%
3	**Pinckney or Putnum Township**	84	4%
4	**Genoa Twp**	77	3.6%
5	**Brighton**	51	2.4%
6	**Marion Twp**	43	2%
7	**Grand Blanc Charter Township, Genesee County**	41	1.9%
8	**Lake Orion or Orion Township**	32	1.5%
9	**Owosso City, Shiawassee County**	32	1.5%
10	**Dearborn**	30	1.4%
-	**Elsewhere**	405	19.1%
* Workers, age 16 and over employed in Hamburg township		**2,123**	**100%**

Source: **U.S. Census Bureau** - 2009-2013 CTTP/ACS Commuting Data and **Commuting Patterns in Southeast Michigan**

Where Residents Work 2013

Rank	Where Residents Work *	Workers	Percent
1	**Ann Arbor**	1,712	16.7%
2	**Hamburg Twp**	1,240	12.1%
3	**Brighton**	573	5.6%
4	**Pinckney**	461	4.5%
5	**Green Oak Twp**	399	3.9%
6	**Genoa Twp**	375	3.7%
7	**Pittsfield Twp**	314	3.1%
8	**Novi**	264	2.6%
9	**Livonia**	244	2.4%
10	**Brighton Twp**	242	2.4%
-	**Elsewhere**	4,401	43%
* Workers, age 16 and over residing in Hamburg township		**10,225**	**100%**

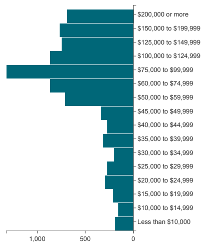
Source: **U.S. Census Bureau** - 2009-2013 CTTP/ACS Commuting Data and **Commuting Patterns in Southeast Michigan**

Household Income

Income (in 2015 dollars)	ACS 2010	ACS 2015	Change 2010-2015	Percent Change 2010-2015
Median Household Income	$92,009	$78,085	$-13,924	-15.1%
Per Capita Income	$37,963	$38,067	$104	0.3%

Source: **U.S. Census Bureau**, **2010 and 2015 American Community Survey 5-Year Estimates**

Annual Household Income



Annual Household Income	ACS 2015
$200,000 or more	689
$150,000 to $199,999	764
$125,000 to $149,999	743
$100,000 to $124,999	864
$75,000 to $99,999	1,318
$60,000 to $74,999	862
$50,000 to $59,999	706
$45,000 to $49,999	332
$40,000 to $44,999	268
$35,000 to $39,999	311
$30,000 to $34,999	202
$25,000 to $29,999	270
$20,000 to $24,999	294
$15,000 to $19,999	213
$10,000 to $14,999	155
Less than $10,000	193
Total	**8,184**

Source: **U.S. Census Bureau**, **2015 American Community Survey 5-Year Estimates**

Poverty

Poverty	ACS 2010	% of Total (2010)	ACS 2015	% of Total (2015)	% Point Chg 2010-2015
Persons in Poverty	758	3.5%	872	4.1%	0.6%
Households in Poverty	228	2.9%	335	4.1%	1.2%

Source: **U.S. Census Bureau**, **2010 and 2015 American Community Survey 5-Year Estimates**

Housing

Link to American Community Survey (ACS) Profiles: **Select a Year** 2012-2016 **Housing**

Building Permits 2000 - 2018

Year	Single Family	Two Family	Attach Condo	Multi Family	Total Units	Total Demos	Net Total
2000	214	0	0	0	214	5	209
2001	124	0	0	0	124	11	113
2002	101	0	0	0	101	4	97
2003	113	4	0	0	117	7	110
2004	187	6	0	0	193	9	184
2005	135	8	0	0	143	11	132
2006	53	10	2	0	65	5	60
2007	22	0	0	0	22	6	16
2008	12	0	0	0	12	5	7
2009	9	0	0	0	9	7	2
2010	11	0	0	0	11	3	8
2011	17	0	0	0	17	0	17
2012	23	0	0	0	23	0	23
2013	51	0	0	0	51	2	49
2014	54	0	0	0	54	3	51
2015	39	0	0	0	39	9	30
2016	50	0	0	0	50	4	46
2017	39	0	0	0	39	10	29
2018	26	0	0	0	26	1	25
2000 to 2018 totals	1,280	28	2	0	1,310	102	1,208

Source: **SEMCOG Development**

Note: Permit data for most recent years may be incomplete and is updated monthly.

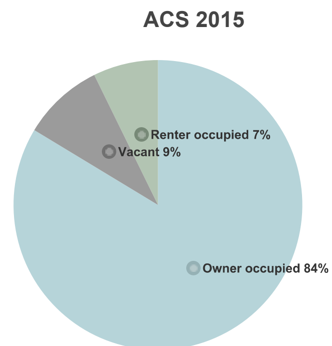
Housing Types

Housing Type	ACS 2010	ACS 2015	Change 2010-2015	New Units Permitted 2015-2018
Single Family Detached	8,083	8,274	191	154
Duplex	81	176	95	0
Townhouse / Attached Condo	67	51	-16	0
Multi-Unit Apartment	19	84	65	0
Mobile Home / Manufactured Housing	367	417	50	0
Other	0	0	0	
Total	8,617	9,002	385	154
Units Demolished				-24
Net (Total Permitted Units - Units Demolished)				130

Source: **U.S. Census Bureau**, **2010 and 2015 American Community Survey 5-Year Estimates**, **SEMCOG Development**

Housing Tenure

Housing Tenure	Census 2010	ACS 2015	Change 2010-2015
Owner occupied	7,227	7,529	302
Renter occupied	633	655	22
Vacant	808	818	10
Seasonal/migrant	474	535	61
Other vacant units	334	283	-51
Total Housing Units	8,668	9,002	334



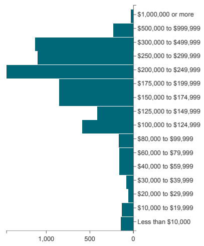
Source: **U.S. Census Bureau**, **2010 and 2015 American Community Survey 5-Year Estimates**

Housing Value and Rent

Housing Value (in 2015 dollars)	ACS 2010	ACS 2015	Change 2010-2015	Percent Change 2010-2015
Median housing value	$256,822	$206,100	$-50,722	-19.8%
Median gross rent	$1,036	$893	$-143	-13.8%

Source: **U.S. Census Bureau**, **Census 2000**, **2010 and2015 American Community Survey 5-Year Estimates**

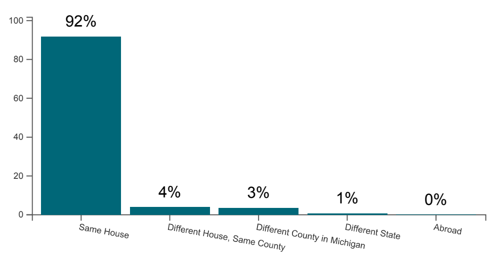
Housing Value



Housing Value	ACS 2015
$1,000,000 or more	27
$500,000 to $999,999	231
$300,000 to $499,999	1,130
$250,000 to $299,999	1,097
$200,000 to $249,999	1,456
$175,000 to $199,999	847
$150,000 to $174,999	849
$125,000 to $149,999	415
$100,000 to $124,999	586
$80,000 to $99,999	165
$60,000 to $79,999	157
$40,000 to $59,999	159
$30,000 to $39,999	78
$20,000 to $29,999	58
$10,000 to $19,999	131
Less than $10,000	143
Owner-Occupied Units	7,529

Source: **U.S. Census Bureau, 2015 American Community Survey 5-Year Estimates**

Residence One Year Ago *



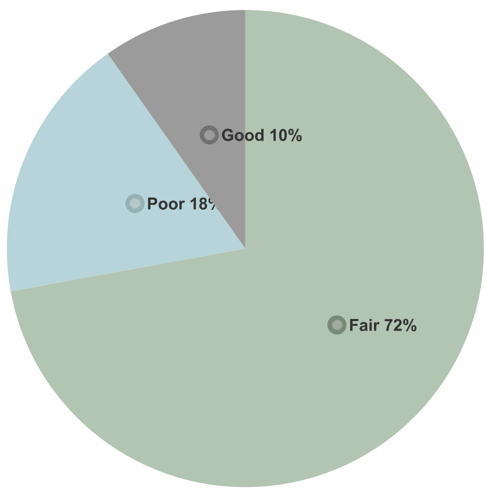
* This table represents persons, age 1 and over, living in Hamburg Township from 2011-2015. The table does not represent person who moved out of Hamburg Township from 2011-2015.

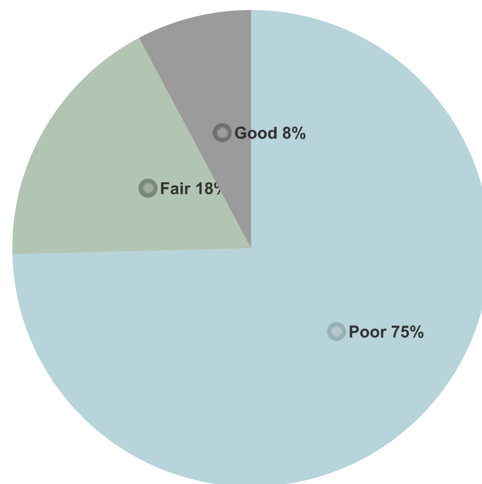
Source: **U.S. Census Bureau, 2015 American Community Survey 5-Year Estimates**

Transportation

Miles of public road (including boundary roads): 103
Source: **Michigan Geographic Framework**

Pavement Condition (in Lane Miles)



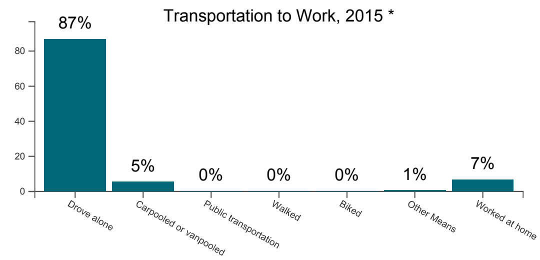


Note: Poor pavements are generally in need of rehabilitation or full reconstruction to return to good condition. Fair pavements are in need of capital preventive maintenance to avoid deteriorating to the poor classification. Good pavements generally receive only routine maintenance, such as street sweeping and snow removal, until they deteriorate to the fair condition.
Source: **SEMCOG**

Bridge Status

Bridge Status	2008	2008 (%)	2009	2009 (%)	2010	2010 (%)	Percent Point Chg 2008-2010
Open	3	100%	3	100%	8	100%	0%
Open with Restrictions	0	0%	0	0%	0	0%	0%
Closed*	0	0%	0	0%	0	0%	0%
Total Bridges	3	100.0%	3	100.0%	8	100.0%	0.0%
Deficient Bridges	1	33.3%	1	33.3%	3	37.5%	4.2%

* Bridges may be closed because of new construction or failed condition.
Note: A bridge is considered deficient if it is structurally deficient (in poor shape and unable to carry the load for which it was designed) or functionally obsolete (in good physical condition but unable to support current or future demands, for example, being too narrow to accommodate truck traffic).
Source: Michigan Structure Inventory and Appraisal Database
Detailed Intersection & Road Data



* Resident workers age 16 and over

Transportation to Work

Transportation to Work	ACS 2010	% of Total (ACS 2010)	ACS 2015	% of Total (ACS 2015)	% Point Chg 2010-2015
Drove alone	9,300	87.5%	9,416	86.8%	-0.7%
Carpooled or vanpooled	619	5.8%	587	5.4%	-0.4%
Public transportation	5	0%	17	0.2%	0.2%
Walked	66	0.6%	28	0.3%	-0.3%
Biked	0	0%	12	0.1%	0.1%
Other Means	100	0.9%	68	0.6%	-0.3%
Worked at home	544	5.1%	723	6.7%	1.6%
Resident workers age 16 and over	10,634	100.0%	10,851	100.0%	0.0%

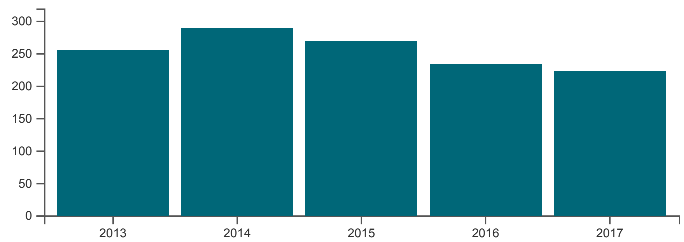
Source: **U.S. Census Bureau, 2010 and 2015 American Community Survey 5-Year Estimates**

Mean Travel Time to Work

Mean Travel Time To Work	ACS 2010	ACS 2015	Change 2010-2015
For residents age 16 and over who worked outside the home	33.4 minutes	31.3 minutes	-2.1 minutes

Source: **U.S. Census Bureau, 2010 and 2015 American Community Survey 5-Year Estimates**

Crashes, 2013-2017



Source: **Michigan Department of State Police with the Criminal Justice Information Center** and **SEMCOG**
Note: Crash data shown is for the entire city.

Crash Severity

Crash Severity	2013	2014	2015	2016	2017	Percent of Crashes 2013 - 2017
Fatal	1	2	1	0	0	0.3%
Serious Injury	1	6	5	6	7	2%
Other Injury	43	40	37	33	25	14%
Property Damage Only	210	242	227	196	192	83.8%
Total Crashes	255	290	270	235	224	100%

Crashes by Type

Crashes by Type	2013	2014	2015	2016	2017	Percent of Crashes 2013 - 2017
Head-on	6	6	3	7	2	1.9%
Angle or Head-on/Left-turn	24	42	47	33	26	13.5%
Rear-End	62	71	65	66	52	24.8%
Sideswipe	17	28	20	18	17	7.8%
Single Vehicle	139	126	127	108	118	48.5%
Backing	N/A	N/A	1	0	5	0.5%
Other or Unknown	7	17	7	3	4	3%

Crashes by Involvement

Crashes by Involvement	2013	2014	2015	2016	2017	Percent of Crashes 2013 - 2017
Red-light Running	1	1	1	2	1	0.5%
Lane Departure	95	90	89	74	63	32.3%
Alcohol	12	14	17	13	19	5.9%
Drugs	5	4	4	2	7	1.7%
Deer	52	48	48	39	53	18.8%
Train	0	0	0	0	0	0%
Commercial Truck/Bus	6	6	3	3	6	1.9%
School Bus	2	4	1	1	1	0.7%
Emergency Vehicle	4	5	4	4	0	1.3%
Motorcycle	6	9	7	5	0	2.1%
Intersection	49	84	72	77	82	28.6%
Work Zone	1	1	0	0	2	0.3%
Pedestrian	0	2	1	2	0	0.4%
Bicyclist	0	1	0	0	0	0.1%
Distracted Driver	0	0	0	1	18	1.5%
Older Driver (65 and older)	34	36	37	40	31	14%
Young Driver (16 to 24)	94	116	103	98	99	40%

High Frequency Intersection Crash Rankings

Local Rank	County Rank	Region Rank	Intersection	Annual Avg 2013-2017
1	25	1,601	Chilson Rd @ M 36 E	9.6
2	45	2,496	M 36 E @ McGregor Rd	7
3	60	3,166	Chilson Rd @ Swarthout Rd	5.8
4	84	4,239	M 36 E @ Merrill Rd	4.6
5	91	4,468	Merrill Rd @ Strawberry Lake Rd	4.4
6	95	4,709	M 36 E @ Pettysville Rd	4.2
7	99	4,951	M 36 E @ Hooker Rd	4
8	125	5,874	M 36 E @ Kress Rd	3.4
9	153	6,779	Pettysville Rd @ Swarthout Rd	3
10	153	6,779	Chilson Rd @ Winans Lake Rd	3

Note: Intersections are ranked by the number of reported crashes, which does not take into account traffic volume. Crashes reported occurred within 150 feet of the intersection.

Source: **Michigan Department of State Police with the Criminal Justice Information Center** and **SEMCOG**

High Frequency Road Segment Crash Rankings

Local Rank	County Rank	Region Rank	Segment	From Road - To Road	Annual Avg 2013-2017
1	12	720	M 36 E	Pettysville Rd - Chilson Rd	26.8
2	48	1,678	Strawberry Lake Rd	Mast Rd - Merrill Rd	16.6
3	56	1,828	M 36 E	Chilson Rd - Merrill Rd	15.6
4	72	2,217	Winans Lake Rd	Winans Lake Rd - Rickett Rd	13.8
5	91	2,858	Pettysville Rd	M 36 E - Swarthout Rd	11.4
6	104	3,197	Chilson Rd	Chilson Rd - Bishop Lake Rd	10.4
7	106	3,261	M 36 E	Farley Rd - McGregor Rd	10.2
8	145	3,836	M 36 E	McGregor Rd - Whitewood Rd	8.8
9	151	3,944	M 36 E	Merrill Rd - Hamburg Rd	8.6
10	172	4,502	Whitewood Rd	Shehan Rd - M 36 E	7.6

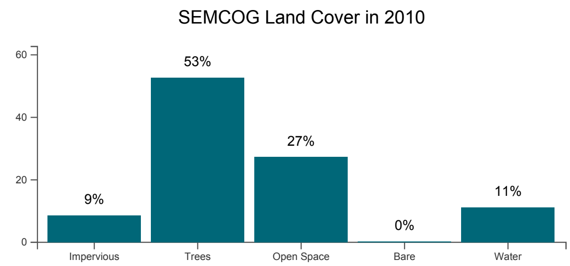
Note: Segments are ranked by the number of reported crashes, which does not take into account traffic volume.

Environment

SEMCOG 2008 Land Use

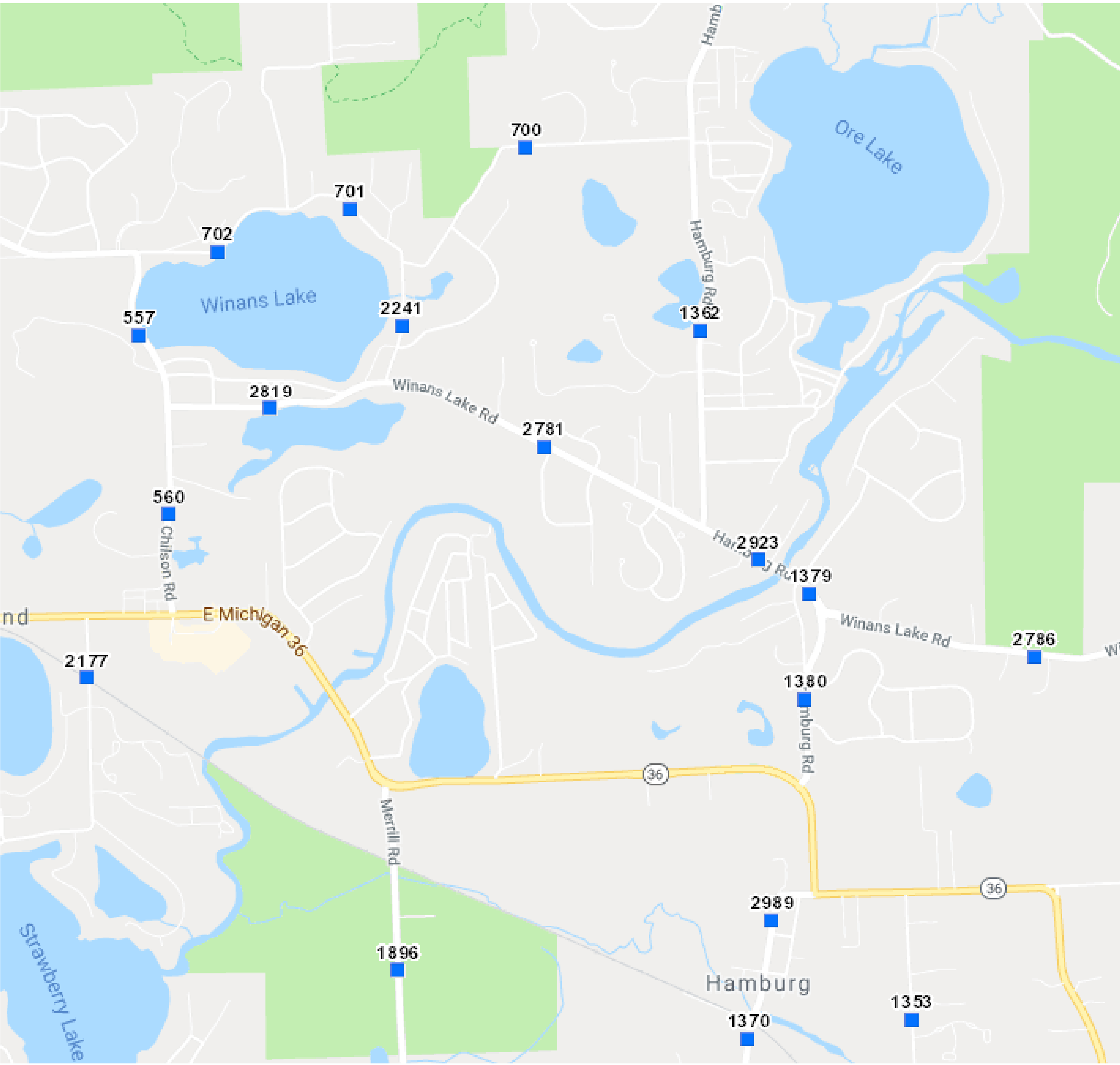
SEMCOG 2008 Land Use	Acres	Percent
Agricultural	731.4	3.2%
Single-family residential	12,534.1	54.4%
Multiple-family residential	18	0.1%
Commercial	200.9	0.9%
Industrial	158	0.7%
Governmental/Institutional	384	1.7%
Park, recreation, and open space	5,400.4	23.4%
Airport	4.6	0%
Transportation, Communication, and Utility	1,177.9	5.1%
Water	2,444.5	10.6%
Total	23,054	100%

Note: Land Cover was derived from SEMCOG's 2010 Leaf off Imagery.
Source: **SEMCOG**



Source Data
SEMCOG - Detailed Data

Type	Description	Acres	Percent
Impervious	buildings, roads, driveways, parking lots	1,976.3	8.6%
Trees	woody vegetation, trees	12,148.8	52.7%
Open Space	agricultural fields, grasslands, turfgrass	6,298	27.3%
Bare	soil, aggregate piles, unplanted fields	63.3	0.3%
Water	rivers, lakes, drains, ponds	2,569.8	11.1%
Total Acres		23,056.1	



700
701
702
Winans Lake
557
2241
1362
Hamburg Rd
Ore Lake
2819
Winans Lake Rd
2781
560
Chilson Rd
2923
1379
E Michigan 36
2177
Winans Lake Rd
2786
1380
36
Merrill Rd
2989
36
1896
Hamburg
1353
1370
Strawberry Lake

Record |◀◀ ◀ 9 ▶ ▶▶| of 10 Goto Record go

Location ID	557	MPO ID	4918
Type	LINK	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group		Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	
Seas Clss Grp			
WIM Group			
Fnct'l Class	-	Milepost	
Located On	CHILSON		
Loc On Alias			
From Road	WINANS LAKE		
To Road	COWELL		

More Detail ▶

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2016	6,630	761	11				
	2014	5,650						
	2012	5,500						
	2010	5,810						
	2008	5,380						

|<< < > >>| 1-5 of 7

Travel Demand Model

	Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

	Date	Int	Total
	Thu 5/5/2016	60	7,516
	Mon 6/16/2014	60	6,273
	Tue 8/7/2012	60	6,109
	Tue 8/3/2010	60	6,451
	Wed 5/21/2008	60	6,108
	Mon 6/21/2004	60	6,534
	Tue 3/23/2004	60	5,260
	Mon 5/22/2000	60	5,830

VOLUME TREND

Year	Annual Growth
2016	8%
2014	1%
2012	-3%
2010	4%
2008	0%
2004	-1%

Record 10 of 10 Goto Record go

Location ID	560	MPO ID	4913
Type	LINK	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group		Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	
Seas Clss Grp			
WIM Group			
Fnct'l Class	-	Milepost	
Located On	CHILSON		
Loc On Alias			
From Road	M-36		
To Road	WINANS LAKE		

More Detail

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2016	7,100	794	11				
	2014	6,260						
	2012	5,920						
	2009	5,720						
	2006	6,310						

|<< < > >>| 1-5 of 8

Travel Demand Model

	Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

	Date	Int	Total
	Thu 5/5/2016	60	8,037
	Mon 6/16/2014	60	6,941
	Tue 5/1/2012	60	6,530
	Tue 12/1/2009	60	5,962
	Mon 6/26/2006	60	6,813
	Wed 7/23/2003	60	5,938
	Mon 5/22/2000	60	6,066
	Thu 7/29/1999	60	6,291

VOLUME TREND

Year	Annual Growth
2016	6%
2014	3%
2012	1%
2009	-3%
2006	6%
2003	-4%
2000	7%

Record 1 of 10 Goto Record go

Location ID	1362	MPO ID	9829
Type	LINK	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group		Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	
Seas Clss Grp			
WIM Group			
Fnct'l Class	-	Milepost	
Located On	HAMBURG		
Loc On Alias			
From Road	WINANS LAKE W		
To Road	COWELL		

More Detail

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2018	3,610						
	2015	3,860						
	2013	3,680						
	2010	3,550						
	2008	3,440						

|<< < > >>| 1-5 of 9

Travel Demand Model

	Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

	Date	Int	Total
	Wed 7/25/2018	60	4,028
	Wed 6/10/2015	60	4,369
	Wed 5/22/2013	60	4,126
	Wed 8/4/2010	60	4,022
	Wed 5/21/2008	60	3,921
	Thu 6/17/2004	60	3,815
	Tue 3/23/2004	60	3,356
	Thu 5/18/2000	60	3,444
	Tue 7/27/1999	60	3,466
	Mon 6/29/1987	60	2,151

VOLUME TREND

Year	Annual Growth
2018	-2%
2015	2%
2013	1%
2010	2%
2008	1%
2004	2%
2000	-4%
1999	4%

Record 2 of 10 Goto Record go

Location ID	1379	MPO ID	9830
Type	LINK	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group		Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	
Seas Clss Grp			
WIM Group			
Fnct'l Class	-	Milepost	
Located On	HAMBURG		
Loc On Alias			
From Road	WINANS LAKE E		
To Road	VAN ANTWERP		

More Detail

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2016	6,930	744	11				
	2014	5,570						
	2012	5,480						
	2009	5,350						
	2007	5,880						

|<< < > >>| 1-5 of 9

Travel Demand Model

	Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

	Date	Int	Total
	Tue 8/2/2016	60	7,648
	Mon 6/16/2014	60	6,162
	Tue 5/1/2012	60	6,039
	Tue 12/1/2009	60	5,580
	Wed 5/16/2007	60	6,517
	Mon 5/3/2004	60	7,065
	Wed 7/23/2003	60	9,200
	Mon 5/22/2000	60	7,596
	Thu 7/29/1999	60	8,174

VOLUME TREND

Year	Annual Growth
2016	12%
2014	1%
2012	1%
2009	-5%
2007	-5%
2004	-15%
2003	3%
2000	4%

Record |<< < 3 > >>| of 10 Goto Record go

Location ID	1380	MPO ID	9824
Type	LINK	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group		Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	
Seas Clss Grp			
WIM Group			
Fnct'l Class	-	Milepost	
Located On	HAMBURG		
Loc On Alias			
From Road	M-36		
To Road	WINANS LAKE E		

More Detail

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2018	11,130						
	2015	9,470						
	2013	8,840						
	2010	7,780						
	2008	7,890						

|<< < > >>| 1-5 of 8

Travel Demand Model

	Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

	Date	Int	Total
	Wed 7/25/2018	60	12,442
	Tue 6/9/2015	60	10,561
	Mon 6/3/2013	60	9,654
	Wed 8/4/2010	60	8,815
	Wed 5/21/2008	60	9,003
	Mon 6/21/2004	60	9,130
	Thu 7/24/2003	60	9,372
	Mon 5/22/2000	60	8,288

VOLUME TREND

Year	Annual Growth
2018	6%
2015	4%
2013	4%
2010	-1%
2008	-1%
2004	-1%
2003	2%

Record 4 of 10 Goto Record go

Location ID	1896	MPO ID	15180
Type	LINK	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group		Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	
Seas Clss Grp			
WIM Group			
Fnct'l Class	-	Milepost	
Located On	MERRILL		
Loc On Alias			
From Road	STRAWBERRY LAKE		
To Road	M-36		

More Detail

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2016	7,400	967	13				
	2014	5,720						
	2013	5,630						
	2012	5,900						
	2010	5,640						

|<< < > >>| 1-5 of 9

Travel Demand Model

	Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

	Date	Int	Total
	Mon 8/1/2016	60	8,113
	Mon 6/2/2014	60	6,337
	Wed 10/23/2013	60	6,278
	Tue 7/17/2012	60	6,353
	Wed 6/30/2010	60	6,146
	Wed 10/10/2007	60	5,202
	Thu 6/17/2004	60	5,523
	Tue 5/23/2000	60	5,260
	Tue 3/30/1982	60	789

VOLUME TREND

Year	Annual Growth
2016	14%
2014	2%
2013	-5%
2012	2%
2010	6%
2007	0%
2004	0%
2000	11%

Record |◀◀ ◀ 5 ▶ ▶▶| of 10 Goto Record go

Location ID	2781	MPO ID	22931
Type	LINK	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group		Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	
Seas Clss Grp			
WIM Group			
Fnct'l Class	-	Milepost	
Located On	WINANS LAKE		
Loc On Alias			
From Road	PLEASANT LAKE		
To Road	HAMBURG N		

More Detail ▶

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2018	4,380						
	2016	4,330	536	12				
	2014	4,820						
	2012	4,110						
	2010	4,590						

|<< < > >>| 1-5 of 7

Travel Demand Model

	Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

	Date	Int	Total
	Thu 10/4/2018	60	4,620
	Wed 10/3/2018	60	4,919
	Thu 5/5/2016	60	4,882
	Tue 7/1/2014	60	5,440
	Tue 7/17/2012	60	4,430
	Mon 6/21/2010	60	4,794
	Tue 8/21/2007	60	5,510
	Mon 5/22/2000	60	5,513

VOLUME TREND

Year	Annual Growth
2018	1%
2016	-5%
2014	8%
2012	-5%
2010	-2%
2007	-1%

Record 6 of 10 Goto Record go

Location ID	2786	MPO ID	22929
Type	LINK	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group		Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	
Seas Clss Grp			
WIM Group			
Fnct'l Class	-	Milepost	
Located On	WINANS LAKE		
Loc On Alias			
From Road	HAMBURG S		
To Road	MUSCH		

More Detail

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2018	10,700						
	2015	9,930						
	2013	9,230						
	2010	8,860						
	2006	9,420						

|<< < > >>| 1-5 of 8

Travel Demand Model

	Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

	Date	Int	Total
	Wed 6/13/2018	60	11,979
	Tue 6/2/2015	60	11,057
	Wed 6/5/2013	60	10,522
	Thu 5/20/2010	60	10,134
	Tue 5/23/2006	60	10,232
	Mon 6/30/2003	60	10,564
	Thu 6/1/2000	60	10,447
	Wed 8/9/1989	60	6,727

VOLUME TREND

Year	Annual Growth
2018	3%
2015	4%
2013	1%
2010	-2%
2006	0%
2003	2%
2000	4%

Record 7 of 10 Goto Record go

Location ID	2819	MPO ID	22928
Type	LINK	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group		Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	HPMS
Seas Clss Grp			
WIM Group			
Fnct'l Class	-	Milepost	
Located On	WINANS LAKE		
Loc On Alias			
From Road	CHILSON		
To Road	PLEASANT LAKE		

More Detail

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2018	4,230						
	2016	4,120	506	12				
	2014	3,580						
	2012	3,920						
	2009	3,820						

|<< < > >>| 1-5 of 8

Travel Demand Model

	Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

	Date	Int	Total
	Thu 10/4/2018	60	4,516
	Wed 10/3/2018	60	4,681
	Thu 5/5/2016	60	4,650
	Mon 6/16/2014	60	3,950
	Wed 5/2/2012	60	4,391
	Tue 12/1/2009	60	3,987
	Mon 6/26/2006	60	4,710
	Wed 7/23/2003	60	5,817
	Mon 4/30/2001	60	4,780

VOLUME TREND

Year	Annual Growth
2018	1%
2016	7%
2014	-4%
2012	1%
2009	-4%
2006	-5%
2003	6%

Record 8 of 10 Goto Record go

Location ID	2923	MPO ID	9828
Type	LINK	HPMS ID	
On NHS		On HPMS	
LRS ID		LRS Loc Pt.	
SF Group		Route Type	
AF Group		Route	
GF Group		Active	Yes
Class Dist Grp		Category	
Seas Clss Grp			
WIM Group			
Fnct'l Class	-	Milepost	
Located On	HAMBURG		
Loc On Alias			
From Road	VAN ANTWERP		
To Road	WINANS LAKE W		

More Detail

STATION DATA

Directions: 2-WAY

AADT

	Year	AADT	DHV-30	K %	D %	PA	BC	Src
	2018	6,170						
	2015	5,300						
	2013	4,960						
	2010	5,300						
	2008	5,650						

|<< < > >>| 1-5 of 6

Travel Demand Model

	Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT

	Date	Int	Total
	Wed 7/25/2018	60	6,886
	Mon 11/16/2015	60	5,329
	Mon 6/10/2013	60	5,423
	Wed 8/4/2010	60	6,008
	Wed 5/21/2008	60	6,456
	Thu 5/19/2005	60	7,821

VOLUME TREND

Year	Annual Growth
2018	5%
2015	3%
2013	-2%
2010	-3%
2008	-5%

MDOT - Bureau of Transportation Planning

Hourly Count Report

10/30/2018
Page 1 of 1

County Livingston **Station** 46 **CS #** 47041 **CS MP** 18.18

Route Desc M-36 **PR #** 932308 **PR MP** 12.38

Station Desc 0.1 MILE WEST OF CHILSON ROAD **City** None

Direction E - W **Year** 2015

Date	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	24 Hour Tc
08/11/2015 Tuesday	0	0	0	0	0	0	0	0	0	779	826	925	1003	915	1041	1198	1367	1666	1446	922	875	651	348	169	**17420**
08/12/2015 Wednesday	87	42	23	38	114	378	779	958	870	856	868	932	1008	1010	1112	1247	1363	1568	1236	1131	995	697	335	154	**17832**
08/13/2015 Thursday	101	53	28	31	126	374	742	938	927	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**

08/11/2015: **AM High** **925** **AM High Hour** **12:00** **PM High** **1666** **PM High Hour** **18:00**

08/12/2015: **AM High** **958** **AM High Hour** **08:00** **PM High** **1568** **PM High Hour** **18:00**

08/13/2015: **AM High** **938** **AM High Hour** **08:00** **PM High** **0** **PM High Hour**

These volumes are raw axle counts and are not adjusted for the impact of vehicles with more than 2 axles

MDOT - Bureau of Transportation Planning

Hourly Count Report

10/30/2018
Page 1 of 1

County Livingston **Station** 12 **CS #** 47041 **CS MP** 23.26

Route Desc M-36 **PR #** 931604 **PR MP** 1.98

Station Desc W OF WHITMORE LK RD - GREEN OAK TWP **City** None

Direction E - W **Year** 2009

Date	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	24 Hour Total
04/07/2009 Tuesday	0	0	0	0	0	0	0	0	0	0	0	0	0	491	495	554	666	692	505	311	231	216	154	106	**8009**
04/08/2009 Wednesday	46	39	23	32	42	182	372	587	493	421	387	424	540	507	575	588	670	762	539	371	275	222	167	110	**8479**
04/09/2009 Thursday	75	42	23	29	33	182	362	547	499	424	473	440	564	0	0	0	0	0	0	0	0	0	0	0	**0**

04/07/2009: **AM High** 0 **AM High Hour** 01:00 **PM High** 692 **PM High Hour** 18:00

04/08/2009: **AM High** 587 **AM High Hour** 08:00 **PM High** 762 **PM High Hour** 18:00

04/09/2009: **AM High** 547 **AM High Hour** 08:00 **PM High** 564 **PM High Hour** 13:00

These volumes are raw axle counts and are not adjusted for the impact of vehicles with more than 2 axles

MDOT - Bureau of Transportation Planning

Hourly Count Report

10/30/2018
Page 1 of 1

County Livingston **Station** 12 **CS #** 47041 **CS MP** 23.26

Route Desc M-36 **PR #** 931604 **PR MP** 1.98

Station Desc W OF WHITMORE LK RD - GREEN OAK TWP **City** None

Direction E - W **Year** 2012

	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	24 Hour Total
05/21/2012 Monday	0	0	0	0	0	0	0	0	0	0	0	565	620	614	664	811	862	916	691	433	293	300	181	100	**10705**
05/22/2012 Tuesday	42	25	25	52	63	333	622	768	671	596	458	568	622	631	652	812	866	921	689	431	291	299	183	100	**10700**
05/23/2012 Wednesday	42	26	25	52	62	334	623	766	670	593	442	564	0	0	0	0	0	0	0	0	0	0	0	0	**564**

05/21/2012: **AM High** 565 **AM High Hour** 12:00 **PM High** 916 **PM High Hour** 18:00

05/22/2012: **AM High** 768 **AM High Hour** 08:00 **PM High** 921 **PM High Hour** 18:00

05/23/2012: **AM High** 766 **AM High Hour** 08:00 **PM High** 0 **PM High Hour**

These volumes are raw axle counts and are not adjusted for the impact of vehicles with more than 2 axles

MDOT - Bureau of Transportation Planning

Hourly Count Report

10/30/2018
Page 1 of 1

County Livingston **Station** 12 **CS #** 47041 **CS MP** 23.26

Route Desc M-36 **PR #** 931604 **PR MP** 1.98

Station Desc W OF WHITMORE LK RD - GREEN OAK TWP **City** None

Direction E - W **Year** 2015

Date	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	24 Hour Total
08/11/2015 Tuesday	0	0	0	0	0	0	0	0	0	0	433	492	612	569	556	669	769	776	559	351	268	290	179	95	**9166**
08/12/2015 Wednesday	56	28	21	32	60	239	465	638	499	510	424	454	522	577	620	592	785	764	588	386	390	319	191	75	**9198**
08/13/2015 Thursday	43	36	28	39	53	214	464	627	518	489	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**

08/11/2015: **AM High** **492** **AM High Hour** **12:00** **PM High** **776** **PM High Hour** **18:00**

08/12/2015: **AM High** **638** **AM High Hour** **08:00** **PM High** **785** **PM High Hour** **17:00**

08/13/2015: **AM High** **627** **AM High Hour** **08:00** **PM High** **0** **PM High Hour**

These volumes are raw axle counts and are not adjusted for the impact of vehicles with more than 2 axles

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	650	39	12	165	59	24	14	48	86	196	13
Future Volume (veh/h)	68	650	39	12	165	59	24	14	48	86	196	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	72	691	37	15	204	48	39	23	54	91	206	10
Peak Hour Factor	0.94	0.94	0.94	0.81	0.81	0.81	0.61	0.61	0.61	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	739	1169	991	398	915	215	180	87	204	281	309	15
Arrive On Green	0.63	0.63	0.63	0.63	0.63	0.63	0.17	0.17	0.17	0.17	0.17	0.17
Sat Flow, veh/h	1128	1870	1585	727	1464	344	1165	496	1165	1322	1769	86
Grp Volume(v), veh/h	72	691	37	15	0	252	39	0	77	91	0	216
Grp Sat Flow(s),veh/h/ln	1128	1870	1585	727	0	1808	1165	0	1661	1322	0	1855
Q Serve(g_s), s	2.1	15.4	0.6	0.9	0.0	4.2	2.3	0.0	2.8	4.5	0.0	7.6
Cycle Q Clear(g_c), s	6.3	15.4	0.6	16.2	0.0	4.2	9.9	0.0	2.8	7.3	0.0	7.6
Prop In Lane	1.00		1.00	1.00		0.19	1.00		0.70	1.00		0.05
Lane Grp Cap(c), veh/h	739	1169	991	398	0	1131	180	0	290	281	0	324
V/C Ratio(X)	0.10	0.59	0.04	0.04	0.00	0.22	0.22	0.00	0.27	0.32	0.00	0.67
Avail Cap(c_a), veh/h	739	1169	991	398	0	1131	299	0	460	416	0	514
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.1	7.8	5.0	12.6	0.0	5.7	31.6	0.0	25.0	28.1	0.0	27.0
Incr Delay (d2), s/veh	0.3	2.2	0.1	0.2	0.0	0.5	0.9	0.0	0.7	0.9	0.0	3.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	4.8	0.2	0.1	0.0	1.2	0.7	0.0	1.1	1.4	0.0	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.4	10.0	5.1	12.8	0.0	6.2	32.4	0.0	25.7	29.1	0.0	30.3
LnGrp LOS	A	A	A	B	A	A	C	A	C	C	A	C
Approach Vol, veh/h		800			267			116			307	
Approach Delay, s/veh		9.5			6.5			28.0			29.9	
Approach LOS		A			A			C			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		51.2		18.8		51.2		18.8				
Change Period (Y+Rc), s		7.4		6.6		7.4		6.6				
Max Green Setting (Gmax), s		36.6		19.4		36.6		19.4				
Max Q Clear Time (g_c+I1), s		17.4		11.9		18.2		9.6				
Green Ext Time (p_c), s		4.6		0.4		1.3		1.4				
Intersection Summary												
HCM 6th Ctrl Delay			14.6									
HCM 6th LOS			B									

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	649	296	50	156	99	49
Future Volume (veh/h)	649	296	50	156	99	49
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	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	713	325	68	214	130	44
Peak Hour Factor	0.91	0.91	0.73	0.73	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1149	1179	352	1149	231	206
Arrive On Green	0.61	0.61	0.61	0.61	0.13	0.13
Sat Flow, veh/h	1870	1585	544	1870	1781	1585
Grp Volume(v), veh/h	713	325	68	214	130	44
Grp Sat Flow(s),veh/h/ln	1870	1585	544	1870	1781	1585
Q Serve(g_s), s	11.6	3.2	4.4	2.4	3.3	1.2
Cycle Q Clear(g_c), s	11.6	3.2	16.0	2.4	3.3	1.2
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1149	1179	352	1149	231	206
V/C Ratio(X)	0.62	0.28	0.19	0.19	0.56	0.21
Avail Cap(c_a), veh/h	1149	1179	352	1149	1094	974
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	5.9	2.0	10.8	4.1	19.9	19.0
Incr Delay (d2), s/veh	2.5	0.6	1.2	0.4	2.1	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	0.9	0.5	0.5	1.2	0.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	8.4	2.6	12.1	4.5	22.1	19.5
LnGrp LOS	A	A	B	A	C	B
Approach Vol, veh/h	1038			282	174	
Approach Delay, s/veh	6.6			6.3	21.4	
Approach LOS	A			A	C	

Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		36.0		12.8		36.0
Change Period (Y+Rc), s		* 6		6.5		* 6
Max Green Setting (Gmax), s		* 30		30.0		* 30
Max Q Clear Time (g_c+I1), s		13.6		5.3		18.0
Green Ext Time (p_c), s		5.2		0.4		1.3

Intersection Summary	
HCM 6th Ctrl Delay	8.3
HCM 6th LOS	A

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	278	417	9	1	103	44	2	2	5	180	2	116
Future Volume (veh/h)	278	417	9	1	103	44	2	2	5	180	2	116
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	305	458	7	1	154	45	3	3	6	222	2	94
Peak Hour Factor	0.91	0.91	0.91	0.67	0.67	0.67	0.75	0.75	0.75	0.81	0.81	0.81
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	767	1087	921	536	1087	921	321	113	226	403	7	316
Arrive On Green	0.58	0.58	0.58	0.58	0.58	0.58	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1183	1870	1585	928	1870	1585	1300	557	1113	1406	33	1557
Grp Volume(v), veh/h	305	458	7	1	154	45	3	0	9	222	0	96
Grp Sat Flow(s),veh/h/ln	1183	1870	1585	928	1870	1585	1300	0	1670	1406	0	1590
Q Serve(g_s), s	9.3	7.9	0.1	0.0	2.2	0.7	0.1	0.0	0.3	8.8	0.0	3.0
Cycle Q Clear(g_c), s	11.5	7.9	0.1	8.0	2.2	0.7	3.1	0.0	0.3	9.0	0.0	3.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.67	1.00		0.98
Lane Grp Cap(c), veh/h	767	1087	921	536	1087	921	321	0	339	403	0	323
V/C Ratio(X)	0.40	0.42	0.01	0.00	0.14	0.05	0.01	0.00	0.03	0.55	0.00	0.30
Avail Cap(c_a), veh/h	767	1087	921	536	1087	921	590	0	685	694	0	653
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.2	6.8	5.1	9.0	5.6	5.3	21.1	0.0	18.7	22.3	0.0	19.8
Incr Delay (d2), s/veh	1.5	1.2	0.0	0.0	0.3	0.1	0.0	0.0	0.0	1.2	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	2.3	0.0	0.0	0.6	0.2	0.0	0.0	0.1	2.6	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.7	8.0	5.2	9.0	5.9	5.4	21.1	0.0	18.7	23.5	0.0	20.3
LnGrp LOS	A	A	A	A	A	A	C	A	B	C	A	C
Approach Vol, veh/h		770			200			12			318	
Approach Delay, s/veh		8.7			5.8			19.3			22.5	
Approach LOS		A			A			B			C	

Timer - Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		40.3		18.2		40.3		18.2
Change Period (Y+Rc), s		6.3		6.3		6.3		6.3
Max Green Setting (Gmax), s		34.0		24.0		34.0		24.0
Max Q Clear Time (g_c+I1), s		13.5		5.1		10.0		11.0
Green Ext Time (p_c), s		3.7		0.0		0.9		0.9

Intersection Summary	
HCM 6th Ctrl Delay	11.7
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	58	49	110	65	134	234
Future Vol, veh/h	58	49	110	65	134	234
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	77	77	89	89
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	63	53	143	84	151	263

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	750	185	0	0	227	0
Stage 1	185	-	-	-	-	-
Stage 2	565	-	-	-	-	-
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	379	857	-	-	1341	-
Stage 1	847	-	-	-	-	-
Stage 2	569	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	329	857	-	-	1341	-
Mov Cap-2 Maneuver	329	-	-	-	-	-
Stage 1	735	-	-	-	-	-
Stage 2	569	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.5	0	2.9
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	458	1341	-
HCM Lane V/C Ratio	-	-	0.254	0.112	-
HCM Control Delay (s)	-	-	15.5	8	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	1	0.4	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	278	0	0	97	1	0	0	0	6	0	3
Future Vol, veh/h	2	278	0	0	97	1	0	0	0	6	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	25	-	-	25	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	88	88	88	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	2	323	0	0	110	1	0	0	0	7	0	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	111	0	0	323	0	0	439	438	323	437	437	110
Stage 1	-	-	-	-	-	-	327	327	-	110	110	-
Stage 2	-	-	-	-	-	-	112	111	-	327	327	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1479	-	-	1237	-	-	528	512	718	530	513	943
Stage 1	-	-	-	-	-	-	686	648	-	895	804	-
Stage 2	-	-	-	-	-	-	893	804	-	686	648	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1479	-	-	1237	-	-	525	511	718	529	512	943
Mov Cap-2 Maneuver	-	-	-	-	-	-	525	511	-	529	512	-
Stage 1	-	-	-	-	-	-	685	647	-	893	804	-
Stage 2	-	-	-	-	-	-	890	804	-	685	647	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	0	10.9
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1479	-	-	1237	-	-	620
HCM Lane V/C Ratio	-	0.002	-	-	-	-	-	0.016
HCM Control Delay (s)	0	7.4	0	-	0	-	-	10.9
HCM Lane LOS	A	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	57	227	54	45	157	44
Future Vol, veh/h	57	227	54	45	157	44
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	50
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	87	87	88	88	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	66	261	61	51	169	47

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	112	0	-	0	480	87
Stage 1	-	-	-	-	87	-
Stage 2	-	-	-	-	393	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1478	-	-	-	545	971
Stage 1	-	-	-	-	936	-
Stage 2	-	-	-	-	682	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1478	-	-	-	517	971
Mov Cap-2 Maneuver	-	-	-	-	517	-
Stage 1	-	-	-	-	887	-
Stage 2	-	-	-	-	682	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	13.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1478	-	-	-	517	971
HCM Lane V/C Ratio	0.044	-	-	-	0.327	0.049
HCM Control Delay (s)	7.5	0	-	-	15.3	8.9
HCM Lane LOS	A	A	-	-	C	A
HCM 95th %tile Q(veh)	0.1	-	-	-	1.4	0.2

Intersection	
Intersection Delay, s/veh	7.4
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	249	485	472
Demand Flow Rate, veh/h	254	494	482
Vehicles Circulating, veh/h	68	251	189
Vehicles Exiting, veh/h	677	420	133
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	4.5	8.7	7.7
Approach LOS	A	A	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	254	494	482
Cap Entry Lane, veh/h	1287	1068	1138
Entry HV Adj Factor	0.980	0.981	0.980
Flow Entry, veh/h	249	485	472
Cap Entry, veh/h	1262	1048	1115
V/C Ratio	0.197	0.462	0.424
Control Delay, s/veh	4.5	8.7	7.7
LOS	A	A	A
95th %tile Queue, veh	1	2	2

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	918	0	0	251	4	0	0	0	27	0	19
Future Vol, veh/h	1	918	0	0	251	4	0	0	0	27	0	19
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	-	-	-	-	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	73	73	73	92	92	92	60	60	60
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1	1020	0	0	344	5	0	0	0	45	0	32

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	349	0	0	1020	0	0	1385	1371	1020	1366	1366	344
Stage 1	-	-	-	-	-	-	1022	1022	-	344	344	-
Stage 2	-	-	-	-	-	-	363	349	-	1022	1022	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1210	-	-	680	-	-	121	146	287	124	147	699
Stage 1	-	-	-	-	-	-	285	313	-	671	637	-
Stage 2	-	-	-	-	-	-	656	633	-	285	313	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1210	-	-	680	-	-	115	146	287	124	147	699
Mov Cap-2 Maneuver	-	-	-	-	-	-	115	146	-	124	147	-
Stage 1	-	-	-	-	-	-	284	312	-	670	637	-
Stage 2	-	-	-	-	-	-	626	633	-	284	312	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	0	36.7
HCM LOS			A	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1210	-	-	680	-	-	188
HCM Lane V/C Ratio	-	0.001	-	-	-	-	-	0.408
HCM Control Delay (s)	0	8	0	-	0	-	-	36.7
HCM Lane LOS	A	A	A	-	A	-	-	E
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	1.8

HCM 6th Signalized Intersection Summary
1001: Chilson Commons/Chilson Road & M-36

11/16/2018

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	62	316	87	35	630	218	157	94	22	94	72	111
Future Volume (veh/h)	62	316	87	35	630	218	157	94	22	94	72	111
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	70	359	65	39	708	223	183	109	17	106	81	80
Peak Hour Factor	0.88	0.88	0.88	0.89	0.89	0.89	0.86	0.86	0.86	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	169	1089	923	556	794	250	291	383	60	326	209	207
Arrive On Green	0.58	0.58	0.58	0.58	0.58	0.58	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	601	1870	1585	963	1364	429	1225	1580	246	1265	864	853
Grp Volume(v), veh/h	70	359	65	39	0	931	183	0	126	106	0	161
Grp Sat Flow(s),veh/h/ln	601	1870	1585	963	0	1793	1225	0	1826	1265	0	1717
Q Serve(g_s), s	9.2	7.9	1.4	1.7	0.0	36.1	11.7	0.0	4.5	6.0	0.0	6.3
Cycle Q Clear(g_c), s	45.2	7.9	1.4	9.7	0.0	36.1	18.0	0.0	4.5	10.4	0.0	6.3
Prop In Lane	1.00		1.00	1.00		0.24	1.00		0.13	1.00		0.50
Lane Grp Cap(c), veh/h	169	1089	923	556	0	1044	291	0	443	326	0	416
V/C Ratio(X)	0.41	0.33	0.07	0.07	0.00	0.89	0.63	0.00	0.28	0.33	0.00	0.39
Avail Cap(c_a), veh/h	169	1089	923	556	0	1044	291	0	443	326	0	416
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	34.1	8.6	7.3	11.1	0.0	14.5	32.9	0.0	24.7	28.9	0.0	25.3
Incr Delay (d2), s/veh	7.3	0.8	0.1	0.2	0.0	11.5	4.9	0.0	0.5	0.8	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	2.8	0.4	0.4	0.0	14.4	3.8	0.0	2.0	1.8	0.0	2.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.5	9.4	7.4	11.4	0.0	26.0	37.8	0.0	25.2	29.7	0.0	26.2
LnGrp LOS	D	A	A	B	A	C	D	A	C	C	A	C
Approach Vol, veh/h		494			970			309			267	
Approach Delay, s/veh		13.7			25.4			32.6			27.6	
Approach LOS		B			C			C			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		54.0		26.0		54.0		26.0				
Change Period (Y+Rc), s		7.4		6.6		7.4		6.6				
Max Green Setting (Gmax), s		46.6		19.4		46.6		19.4				
Max Q Clear Time (g_c+I1), s		47.2		20.0		38.1		12.4				
Green Ext Time (p_c), s		0.0		0.0		4.2		0.9				
Intersection Summary												
HCM 6th Ctrl Delay			23.9									
HCM 6th LOS			C									

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	323	182	68	682	403	129
Future Volume (veh/h)	323	182	68	682	403	129
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	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	351	198	72	718	486	107
Peak Hour Factor	0.92	0.92	0.95	0.95	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	906	1265	430	906	559	498
Arrive On Green	0.48	0.48	0.48	0.48	0.31	0.31
Sat Flow, veh/h	1870	1585	858	1870	1781	1585
Grp Volume(v), veh/h	351	198	72	718	486	107
Grp Sat Flow(s),veh/h/ln	1870	1585	858	1870	1781	1585
Q Serve(g_s), s	7.4	1.8	3.6	19.9	15.9	3.1
Cycle Q Clear(g_c), s	7.4	1.8	11.0	19.9	15.9	3.1
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	906	1265	430	906	559	498
V/C Ratio(X)	0.39	0.16	0.17	0.79	0.87	0.22
Avail Cap(c_a), veh/h	906	1265	430	906	863	768
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.1	1.4	13.6	13.4	20.0	15.6
Incr Delay (d2), s/veh	1.3	0.3	0.8	7.1	6.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	1.3	0.7	8.0	6.1	0.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	11.4	1.7	14.5	20.4	26.2	15.8
LnGrp LOS	B	A	B	C	C	B
Approach Vol, veh/h	549			790	593	
Approach Delay, s/veh	7.9			19.9	24.3	
Approach LOS	A			B	C	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		36.0		26.0		36.0
Change Period (Y+Rc), s		* 6		6.5		* 6
Max Green Setting (Gmax), s		* 30		30.0		* 30
Max Q Clear Time (g_c+I1), s		9.4		17.9		21.9
Green Ext Time (p_c), s		2.5		1.5		3.1
Intersection Summary						
HCM 6th Ctrl Delay			17.8			
HCM 6th LOS			B			

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	257	174	30	2	395	236	31	22	11	83	30	303
Future Volume (veh/h)	257	174	30	2	395	236	31	22	11	83	30	303
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	286	193	22	2	459	181	35	25	8	91	33	223
Peak Hour Factor	0.90	0.90	0.90	0.86	0.86	0.86	0.89	0.89	0.89	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	464	1073	909	733	1073	909	196	291	93	396	45	301
Arrive On Green	0.57	0.57	0.57	0.57	0.57	0.57	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	789	1870	1585	1166	1870	1585	1124	1358	434	1376	208	1408
Grp Volume(v), veh/h	286	193	22	2	459	181	35	0	33	91	0	256
Grp Sat Flow(s),veh/h/ln	789	1870	1585	1166	1870	1585	1124	0	1792	1376	0	1617
Q Serve(g_s), s	19.1	2.9	0.4	0.0	8.2	3.3	1.8	0.0	0.9	3.4	0.0	8.8
Cycle Q Clear(g_c), s	27.3	2.9	0.4	3.0	8.2	3.3	10.5	0.0	0.9	4.2	0.0	8.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.24	1.00		0.87
Lane Grp Cap(c), veh/h	464	1073	909	733	1073	909	196	0	383	396	0	346
V/C Ratio(X)	0.62	0.18	0.02	0.00	0.43	0.20	0.18	0.00	0.09	0.23	0.00	0.74
Avail Cap(c_a), veh/h	464	1073	909	733	1073	909	410	0	726	658	0	655
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.9	6.0	5.5	6.7	7.1	6.1	26.7	0.0	18.7	20.4	0.0	21.8
Incr Delay (d2), s/veh	6.0	0.4	0.0	0.0	1.2	0.5	0.4	0.0	0.1	0.3	0.0	3.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.4	0.9	0.1	0.0	2.5	0.8	0.5	0.0	0.4	1.0	0.0	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	20.9	6.4	5.5	6.7	8.4	6.6	27.1	0.0	18.8	20.6	0.0	24.9
LnGrp LOS	C	A	A	A	A	A	C	A	B	C	A	C
Approach Vol, veh/h		501			642			68			347	
Approach Delay, s/veh		14.6			7.9			23.1			23.8	
Approach LOS		B			A			C			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		40.3		19.0		40.3		19.0				
Change Period (Y+Rc), s		6.3		6.3		6.3		6.3				
Max Green Setting (Gmax), s		34.0		24.0		34.0		24.0				
Max Q Clear Time (g_c+I1), s		29.3		12.5		10.2		10.8				
Green Ext Time (p_c), s		1.3		0.2		3.2		1.4				
Intersection Summary												
HCM 6th Ctrl Delay			14.2									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	10.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	150	149	306	90	73	181
Future Vol, veh/h	150	149	306	90	73	181
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	81	81
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	163	162	333	98	90	223

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	785	382	0	0	431	0
Stage 1	382	-	-	-	-	-
Stage 2	403	-	-	-	-	-
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	361	665	-	-	1129	-
Stage 1	690	-	-	-	-	-
Stage 2	675	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	328	665	-	-	1129	-
Mov Cap-2 Maneuver	328	-	-	-	-	-
Stage 1	627	-	-	-	-	-
Stage 2	675	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	33.2	0	2.4
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	439	1129	-
HCM Lane V/C Ratio	-	-	0.74	0.08	-
HCM Control Delay (s)	-	-	33.2	8.5	0
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	6	0.3	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	177	0	0	366	5	0	0	0	1	0	3
Future Vol, veh/h	2	177	0	0	366	5	0	0	0	1	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	25	-	-	25	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	95	95	95	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	221	0	0	385	5	0	0	0	1	0	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	390	0	0	221	0	0	616	617	221	612	612	385
Stage 1	-	-	-	-	-	-	227	227	-	385	385	-
Stage 2	-	-	-	-	-	-	389	390	-	227	227	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1169	-	-	1348	-	-	403	405	819	405	408	663
Stage 1	-	-	-	-	-	-	776	716	-	638	611	-
Stage 2	-	-	-	-	-	-	635	608	-	776	716	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1169	-	-	1348	-	-	400	404	819	404	407	663
Mov Cap-2 Maneuver	-	-	-	-	-	-	400	404	-	404	407	-
Stage 1	-	-	-	-	-	-	774	714	-	636	611	-
Stage 2	-	-	-	-	-	-	632	608	-	774	714	-

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

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1169	-	-	1348	-	-	571
HCM Lane V/C Ratio	-	0.002	-	-	-	-	-	0.008
HCM Control Delay (s)	0	8.1	0	-	0	-	-	11.4
HCM Lane LOS	A	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	-	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	85	93	255	197	63	116
Future Vol, veh/h	85	93	255	197	63	116
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	50
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	81	81	91	91	88	88
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	105	115	280	216	72	132

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	496	0	-	0	713	388
Stage 1	-	-	-	-	388	-
Stage 2	-	-	-	-	325	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1068	-	-	-	398	660
Stage 1	-	-	-	-	686	-
Stage 2	-	-	-	-	732	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1068	-	-	-	356	660
Mov Cap-2 Maneuver	-	-	-	-	356	-
Stage 1	-	-	-	-	614	-
Stage 2	-	-	-	-	732	-

Approach	EB	WB	SB
HCM Control Delay, s	4.2	0	13.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1068	-	-	-	356	660
HCM Lane V/C Ratio	0.098	-	-	-	0.201	0.2
HCM Control Delay (s)	8.7	0	-	-	17.6	11.8
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.7	0.7

Intersection			
Intersection Delay, s/veh	9.3		
Intersection LOS	A		

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	609	562	177
Demand Flow Rate, veh/h	621	574	181
Vehicles Circulating, veh/h	286	99	364
Vehicles Exiting, veh/h	387	446	543
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	11.8	7.7	5.7
Approach LOS	B	A	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	621	574	181
Cap Entry Lane, veh/h	1031	1247	952
Entry HV Adj Factor	0.981	0.980	0.980
Flow Entry, veh/h	609	562	177
Cap Entry, veh/h	1011	1222	933
V/C Ratio	0.602	0.460	0.190
Control Delay, s/veh	11.8	7.7	5.7
LOS	B	A	A
95th %tile Queue, veh	4	2	1

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	15	496	2	4	1058	23	5	0	2	7	0	12
Future Vol, veh/h	15	496	2	4	1058	23	5	0	2	7	0	12
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	-	-	-	-	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	95	95	95	60	60	60	79	79	79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	557	2	4	1114	24	8	0	3	9	0	15

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1138	0	0	559	0	0	1734	1738	558	1716	1715	1114
Stage 1	-	-	-	-	-	-	592	592	-	1122	1122	-
Stage 2	-	-	-	-	-	-	1142	1146	-	594	593	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	614	-	-	1012	-	-	69	87	529	71	90	253
Stage 1	-	-	-	-	-	-	493	494	-	250	281	-
Stage 2	-	-	-	-	-	-	244	274	-	491	493	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	614	-	-	1012	-	-	62	83	529	68	85	253
Mov Cap-2 Maneuver	-	-	-	-	-	-	62	83	-	68	85	-
Stage 1	-	-	-	-	-	-	473	474	-	240	278	-
Stage 2	-	-	-	-	-	-	227	271	-	468	473	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0	55.3	40.2
HCM LOS			F	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	83	614	-	-	1012	-	-	126
HCM Lane V/C Ratio	0.141	0.027	-	-	0.004	-	-	0.191
HCM Control Delay (s)	55.3	11	0	-	8.6	0	-	40.2
HCM Lane LOS	F	B	A	-	A	A	-	E
HCM 95th %tile Q(veh)	0.5	0.1	-	-	0	-	-	0.7

1001: Chilson Commons/Chilson Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	2.4	0.8	2.3	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.5
Total Del/Veh (s)	12.0	12.5	5.1	21.1	7.2	3.7	33.3	18.7	9.6	27.1	24.1	15.1	14.1
Vehicles Exited	68	650	40	13	202	60	24	15	50	86	198	14	1420
Hourly Exit Rate	68	650	40	13	202	60	24	15	50	86	198	14	1420
Input Volume	68	650	39	12	200	59	24	14	48	86	200	13	1412
% of Volume	100	100	103	108	101	102	100	107	104	100	99	106	101

1002: Merrill Road & M-36 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	3.9	0.4	0.3
Total Del/Veh (s)	13.8	6.4	26.0	5.4	16.5	7.2	11.5
Vehicles Exited	654	295	49	176	98	49	1321
Hourly Exit Rate	654	295	49	176	98	49	1321
Input Volume	656	296	50	171	99	49	1321
% of Volume	100	100	98	103	99	100	100

1003: CVS Driveway/Hamburg Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	11.8	7.2	2.0	10.4	6.0	1.4	29.9	19.2	5.1	24.1	1.4	3.9	9.8
Vehicles Exited	277	415	10	1	108	47	1	2	4	177	49	115	1206
Hourly Exit Rate	277	415	10	1	108	47	1	2	4	177	49	115	1206
Input Volume	278	418	9	1	103	44	2	2	5	180	49	116	1208
% of Volume	100	99	108	100	105	106	44	89	84	98	100	99	100

9001: Chilson Road & Winans Lake Road Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.3	0.3	0.2
Total Del/Veh (s)	11.0	5.4	1.6	0.7	3.2	2.0	3.1
Vehicles Exited	57	52	109	68	135	236	657
Hourly Exit Rate	57	52	109	68	135	236	657
Input Volume	58	49	110	65	134	234	650
% of Volume	99	106	99	104	101	101	101

9002: Site Driveway/Buckhorn Lane & Winans Lake Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.3	0.1	0.0	0.0	0.1	0.1	0.1
Total Del/Veh (s)	3.4	1.6	0.7	0.2	5.3	3.3	1.5
Vehicles Exited	2	284	99	1	6	3	395
Hourly Exit Rate	2	284	99	1	6	3	395
Input Volume	2	278	98	1	6	3	388
% of Volume	100	102	101	100	96	100	102

9003: Winans Lake Road & Hamburg Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.2	2.0	0.2
Total Del/Veh (s)	2.9	3.0	1.0	0.2	8.5	3.6	4.1
Vehicles Exited	57	233	59	47	156	45	597
Hourly Exit Rate	57	233	59	47	156	45	597
Input Volume	57	228	59	45	157	44	590
% of Volume	100	102	100	104	99	102	101

9004: Hamburg Road & Winans Lake Road Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.0	0.0	0.0
Total Del/Veh (s)	2.8	2.6	7.0	4.7	5.0	7.5	5.1
Vehicles Exited	132	48	53	322	229	210	994
Hourly Exit Rate	132	48	53	322	229	210	994
Input Volume	137	47	51	318	226	208	987
% of Volume	96	103	103	101	101	101	101

9005: Club Driveway/Lake Crest Drive & M-36 Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.2	0.0	0.0	0.1	0.1	0.1
Total Del/Veh (s)	2.4	1.6	2.7	2.9	17.3	6.3	2.2
Vehicles Exited	1	912	255	4	27	20	1219
Hourly Exit Rate	1	912	255	4	27	20	1219
Input Volume	1	918	252	4	27	19	1222
% of Volume	100	99	101	94	100	104	100

Total Network Performance

Denied Del/Veh (s)	0.7
Total Del/Veh (s)	32.3
Vehicles Exited	2344
Hourly Exit Rate	2344
Input Volume	17307
% of Volume	14

Intersection: 1001: Chilson Commons/Chilson Road & M-36

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (ft)	77	249	71	44	126	55	84	121	189
Average Queue (ft)	26	129	11	10	49	17	25	50	96
95th Queue (ft)	58	216	47	33	99	46	59	97	165
Link Distance (ft)		1963			1169	153	153		1615
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	500		110	160				130	
Storage Blk Time (%)		8			0			0	3
Queuing Penalty (veh)		8			0			1	2

Intersection: 1002: Merrill Road & M-36

Movement	EB	EB	WB	WB	NB	NB
Directions Served	T	R	L	T	L	R
Maximum Queue (ft)	243	103	86	97	104	61
Average Queue (ft)	122	29	32	33	41	20
95th Queue (ft)	212	77	69	77	83	46
Link Distance (ft)	2305			878		642
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		100	75		160	
Storage Blk Time (%)	9	0	2	1		
Queuing Penalty (veh)	26	0	3	0		

Intersection: 1003: CVS Driveway/Hamburg Road & M-36

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	T	R	L	TR	L	TR
Maximum Queue (ft)	166	181	28	14	69	41	16	25	147	121
Average Queue (ft)	75	71	3	1	21	11	1	3	72	35
95th Queue (ft)	143	147	18	7	55	31	9	16	125	84
Link Distance (ft)		436			517		112	112		789
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	450		180	150		250			75	
Storage Blk Time (%)		0							8	0
Queuing Penalty (veh)		1							9	0

Intersection: 9001: Chilson Road & Winans Lake Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	95	6	93
Average Queue (ft)	43	0	25
95th Queue (ft)	77	5	68
Link Distance (ft)	2273	1309	456
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9002: Site Driveway/Buckhorn Lane & Winans Lake Road

Movement	EB	SB
Directions Served	LT	LTR
Maximum Queue (ft)	6	31
Average Queue (ft)	0	9
95th Queue (ft)	5	31
Link Distance (ft)	2607	475
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 9003: Winans Lake Road & Hamburg Road

Movement	EB	WB	SB	SB
Directions Served	LT	TR	L	R
Maximum Queue (ft)	69	1	94	69
Average Queue (ft)	9	0	35	23
95th Queue (ft)	42	1	70	52
Link Distance (ft)	1442	1535	1863	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				50
Storage Blk Time (%)			2	0
Queuing Penalty (veh)			1	0

Intersection: 9004: Hamburg Road & Winans Lake Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	49	114	95
Average Queue (ft)	9	40	33
95th Queue (ft)	35	86	78
Link Distance (ft)	380	305	517
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9005: Club Driveway/Lake Crest Drive & M-36

Movement	EB	SB
Directions Served	LTR	LTR
Maximum Queue (ft)	11	68
Average Queue (ft)	0	25
95th Queue (ft)	8	55
Link Distance (ft)	781	371
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 53

1001: Chilson Commons/Chilson Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	2.5	0.5	2.4	0.0	0.0	0.0	4.6	2.6	4.7	0.0	0.0	0.0	0.7
Total Del/Veh (s)	135.8	8.9	2.9	27.2	24.2	24.2	56.1	25.0	11.8	34.5	15.9	18.6	26.2
Vehicles Exited	60	317	84	34	826	217	155	92	24	96	126	114	2145
Hourly Exit Rate	60	317	84	34	826	217	155	92	24	96	126	114	2145
Input Volume	62	316	87	35	822	218	157	94	22	94	126	111	2144
% of Volume	97	100	97	96	101	100	99	98	108	102	100	103	100

1002: Merrill Road & M-36 Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.0	0.1	0.3	0.1	3.4	1.2	0.9
Total Del/Veh (s)	13.6	3.9	25.8	22.6	20.5	6.6	17.5
Vehicles Exited	327	188	63	702	395	131	1806
Hourly Exit Rate	327	188	63	702	395	131	1806
Input Volume	328	182	68	691	403	129	1802
% of Volume	100	103	92	102	98	102	100

1003: CVS Driveway/Hamburg Road & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.8	0.1	0.2	0.0	0.0	0.0	0.1	0.1	0.1	0.4	0.0	0.0	0.2
Total Del/Veh (s)	81.3	11.2	4.6	16.7	11.1	3.7	27.2	17.0	4.4	22.9	20.5	9.9	22.3
Vehicles Exited	257	176	29	1	401	239	27	22	11	82	27	301	1573
Hourly Exit Rate	257	176	29	1	401	239	27	22	11	82	27	301	1573
Input Volume	257	174	30	2	395	236	31	22	11	83	30	303	1574
% of Volume	100	101	97	50	101	101	86	100	98	99	90	99	100

9001: Chilson Road & Winans Lake Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.1
Total Del/Veh (s)	18.7	1.9	14.4	2.6	1.4	4.3	1.7	6.5
Vehicles Exited	148	71	149	301	91	74	186	1020
Hourly Exit Rate	148	71	149	301	91	74	186	1020
Input Volume	150	70	149	306	90	73	181	1019
% of Volume	99	102	100	98	101	102	103	100

9002: Site Driveway/Buckhorn Lane & Winans Lake Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1		0.1	0.0
Total Del/Veh (s)	3.5	1.7	1.7	1.2		4.3	1.7
Vehicles Exited	2	180	368	6	0	4	560
Hourly Exit Rate	2	180	368	6	0	4	560
Input Volume	2	177	372	5	1	3	560
% of Volume	89	102	99	120	0	133	100

9003: Winans Lake Road & Hamburg Road Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.3	2.1	0.3
Total Del/Veh (s)	7.1	4.6	3.6	1.4	12.7	4.8	4.4
Vehicles Exited	84	97	283	196	63	119	842
Hourly Exit Rate	84	97	283	196	63	119	842
Input Volume	85	94	285	197	63	116	840
% of Volume	99	103	99	99	100	102	100

9004: Hamburg Road & Winans Lake Road Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.5	6.2	6.6	4.2	3.4	5.7	5.7
Vehicles Exited	300	217	268	272	88	74	1219
Hourly Exit Rate	300	217	268	272	88	74	1219
Input Volume	307	217	272	268	86	74	1222
% of Volume	98	100	99	102	103	100	100

9005: Club Driveway/Lake Crest Drive & M-36 Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SBL	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0
Total Del/Veh (s)	8.4	1.6	0.5	7.0	6.2	5.2	22.4	5.2	26.5	12.2	5.0
Vehicles Exited	14	498	3	4	1074	24	5	2	6	13	1643
Hourly Exit Rate	14	498	3	4	1074	24	5	2	6	13	1643
Input Volume	15	496	2	4	1073	23	5	2	7	12	1640
% of Volume	95	100	150	100	100	103	100	89	89	108	100

Total Network Performance

Denied Del/Veh (s)	1.4
Total Del/Veh (s)	52.5
Vehicles Exited	3207
Hourly Exit Rate	3207
Input Volume	23472
% of Volume	14

Intersection: 1001: Chilson Commons/Chilson Road & M-36

Movement	EB	EB	EB	WB	WB	B4	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	T	L	TR	L	TR
Maximum Queue (ft)	211	159	51	230	640	1	179	127	126	168
Average Queue (ft)	81	69	17	39	293	0	105	51	59	84
95th Queue (ft)	203	128	42	150	564	1	179	103	110	145
Link Distance (ft)		1963			1169	781	153	153		1615
Upstream Blk Time (%)					0		11	0		
Queuing Penalty (veh)					0		0	0		
Storage Bay Dist (ft)	500		110	160					130	
Storage Blk Time (%)		1			21				0	2
Queuing Penalty (veh)		2			8				1	2

Intersection: 1002: Merrill Road & M-36

Movement	EB	EB	WB	WB	NB	NB
Directions Served	T	R	L	T	L	R
Maximum Queue (ft)	198	68	226	444	228	182
Average Queue (ft)	86	17	53	212	138	42
95th Queue (ft)	160	52	157	384	211	112
Link Distance (ft)	2305			878		642
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		100	75		160	
Storage Blk Time (%)	5	0	2	31	5	0
Queuing Penalty (veh)	9	0	10	21	6	0

Intersection: 1003: CVS Driveway/Hamburg Road & M-36

Movement	EB	EB	EB	B6	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	T	L	T	R	L	TR	L	TR
Maximum Queue (ft)	391	411	71	127	17	187	81	67	51	119	175
Average Queue (ft)	194	97	10	17	1	87	36	19	14	41	75
95th Queue (ft)	377	329	45	141	8	155	65	50	39	85	139
Link Distance (ft)		436		4563		517		112	112		789
Upstream Blk Time (%)	3	4						0			
Queuing Penalty (veh)	0	19						0			
Storage Bay Dist (ft)	450		180		150		250			75	
Storage Blk Time (%)	3	0				1				1	7
Queuing Penalty (veh)	7	0				2				3	6

Intersection: 9001: Chilson Road & Winans Lake Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	201	5	89
Average Queue (ft)	94	0	25
95th Queue (ft)	161	3	65
Link Distance (ft)	2273	1309	456
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9002: Site Driveway/Buckhorn Lane & Winans Lake Road

Movement	EB	SB
Directions Served	LT	LTR
Maximum Queue (ft)	14	32
Average Queue (ft)	1	4
95th Queue (ft)	8	21
Link Distance (ft)	2607	475
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 9003: Winans Lake Road & Hamburg Road

Movement	EB	WB	SB	SB
Directions Served	LT	TR	L	R
Maximum Queue (ft)	112	25	84	71
Average Queue (ft)	38	2	22	36
95th Queue (ft)	85	13	54	64
Link Distance (ft)	1442	1535	1863	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				50
Storage Blk Time (%)			1	2
Queuing Penalty (veh)			1	1

Intersection: 9004: Hamburg Road & Winans Lake Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	154	80	66
Average Queue (ft)	54	29	21
95th Queue (ft)	114	70	53
Link Distance (ft)	380	305	517
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 9005: Club Driveway/Lake Crest Drive & M-36

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	R	LTR	LTR
Maximum Queue (ft)	115	41	4	32	52
Average Queue (ft)	17	2	0	6	14
95th Queue (ft)	72	18	4	25	39
Link Distance (ft)	781	2305		171	371
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			100		
Storage Blk Time (%)		0			
Queuing Penalty (veh)		0			

Network Summary

Network wide Queuing Penalty: 97

TRAFFIC SIGNAL TIMING PERMIT

PHASE	1	2	3	4	5	6	7	8
APPROACH	EB & WB	NB & SB						
MINIMUM GREEN	10	7						
PASSAGE	0.0	4.0						
MAXIMUM NO. 1	54	26						
MAXIMUM NO. 2	54	26						
YELLOW CHANGE	4.4	3.6						
RED CLEARANCE	3.0	3.0						
WALK	7	8						
PEDESTRIAN CLEARANCE	22	24						
EXTENDED PED. CLEARANCE	2	2						
REST IN WALK	0	0						
INITIALIZATION	4	1						
NON-ACT RESPONSE	0	0						
VEHICLE RECALL	3	0						
PEDESTRIAN RECALL	2	0						
NON-LOCK MEMORY	0	0						
DUAL ENTRY	0	0						

DIAL	SPLIT	CYCLE	1	2	3	4	5	6	7	8	O1	O2	O3
1	1	70	44	26							0		
2	1	70	44	26							0		
3	1	80	54	26							0		
		MODE	1	0									

TIMING INSTALLED

REMARKS

Pole-Mounted, Epac Type Controller.

The pedestrian pushbuttons have been replaced and the ramps have been upgraded in order to meet compliance with the Americans with Disabilities Act (ADA).

The Pedestrian Clearance Times are based on a walking speed of 3.5 feet per second.

Equipped with CONVENTIONAL TRAFFIC LOOPS in the Chilson Road approach lanes.

PREPARED BY: HHH DATE: 09/16/14

FLASH HOURS: 21:30 to 06:00 DAILY ☒ NONE ☐

NIGHT FLASH:

FY = M-36 FR = Chilson Road

CONFLICT FLASH:

FY = M-36 FR = Chilson Road

CONTROLLER TYPE: ☒ EPAC ☐ Other:

PRE-EMPT ☐

COUNTDOWN PEDS ☐

LOCATION: M-36 at Chilson Road

CITY/TWP: Hamburg Township

COUNTY : Livingston

MILE POINT	CONTROL SECTION-SPOT #
18.51	47041-01-012

Job # (If Applicable): 124469 A

PHASE

1 M-36

2 Chilson Road

3

4

5

6

7

8

D1/S1/O1: Normal
D2/S1/O1: 06:00 - 09:00 Monday - Friday
D3/S1/O1: 15:00 - 19:00 Monday - Friday

The Calculated Pedestrian Clearance Time (CPCT) for the Chilson Road Pedestrians is 27.0 seconds, but a value of 24.0 seconds [CPCT - Buffer Interval (3.0 seconds)] has been used to help reduce impacts on progression along the M-36 Corridor.

OVERLAPS

Overlap Phase	*Load Bays*	*Phases Overlapped*	T.G. (s)	Y (s)	R (s)	-G/Y	+GRN
=							
=							
=							
=							

Page 3 included only if Pre-Empt Checked

ADVANCED TIMING PARAMETERS FORM

SYSTEM INFORMATION

Controller Type:
- ☒ EPAC
- ☐ Other:

System Type:
- ☐ Closed Loop
  - ☐ Stand By
  - ☐ Group 1
  - ☐ Group 2
  - Address:
- ☒ TBC
- ☐ TBC/GPS
- ☐ None
- ☐ Other:

If TBC, Synch by:
- ☒ TOD
- ☐ Event

Interconnect Type:
- ☐ Hardwire
- ☐ Fiber-Optic
- ☐ Radio
- ☐ Phone Drop
- ☐ None
- ☐ Other:

If Phone Drop, Phone #

Controller Status:
- ☐ Master
- ☐ Slave
- ☐ Isolated
- ☒ TBC

If Slave, Master Location:

Master Spot # :

LEFT-TURN PHASING

Phase # / Description	*Permissive-Protected* Lead	*Permissive-Protected* Lag	*Protected-Only* Split	*Protected-Only* Lead	*Protected-Only* Lag
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

RING AND BARRIER STRUCTURE

	B1				B2				B3				B4			
R1	1				2											
R2																
R3																
R4																

VEHICULAR AND PEDESTRIAN DETECTION

Approach	*Vehicular Detection* Movements and Call Delay (s) Left		Thru		Right		Type Loop	Video	Other	*Pedestrian Detection* Push-Button Crossing Locations
Northbound Chilson Road	☒		☒		☐		☒	☐	☐	M-36 at the EAST leg
Southbound Chilson Road	☒		☒		☐		☒	☐	☐	M-36 at the WEST leg
	☐		☐		☐		☐	☐	☐	
	☐		☐		☐		☐	☐	☐	
	☐		☐		☐		☐	☐	☐	
	☐		☐		☐		☐	☐	☐	

DISAPPEARING LEGEND CASE SIGNS

ADDITIONAL DIAL SPLIT DATA

		PHASE	1	2	3	4	5	6	7	8	O1	O2	O3
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											

COORDINATION DATA

Operation Mode	1
Coordination Mode	0
Maximum Mode	0
Correction Mode	2
Offset Mode	0
Force Mode	0
Max Dwell	0
Yield Period	0

REMARKS:

ADDITIONAL OVERLAP DATA

Overlap Phase	*Load Bays*	*Phases Overlapped*	T.G. (s)	Y (s)	R (s)	-G/Y	+GRN
=							
=							
=							
=							

PREPARED BY: HHH DATE: 09/16/14

☒ MDOT ☐ County ☐ City ☐ Consultant

LOCATION: M-36 at Chilson Road

CONTROL SECTION-SPOT # 47041-01-012

CLEAR PAGE 2

PREEMPTION INFORMATION FORM

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
SEL Ped Cl		Vehicle	Track																	☐ Locking	
SEL Yellow			Dwell																	☐ Non-Locking	
SEL Red Cl			Cycle																		
TRACK Green			Exit																		
TRACK Ped Cl		Ped	Track																	Delay (s)	
TRACK Yellow			Dwell																	Extend (s)	
TRACK Red CL			Cycle																	Duration (s)	
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Max Call (s)	
RET Ped Cl			Track																	Lockout (s)	
RET Yellow			Dwell																	Link PE #	
RET Red Cl			Cycle																		

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
SEL Ped Cl		Vehicle	Track																	☐ Locking	
SEL Yellow			Dwell																	☐ Non-Locking	
SEL Red Cl			Cycle																		
TRACK Green			Exit																		
TRACK Ped Cl		Ped	Track																	Delay (s)	
TRACK Yellow			Dwell																	Extend (s)	
TRACK Red CL			Cycle																	Duration (s)	
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Max Call (s)	
RET Ped Cl			Track																	Lockout (s)	
RET Yellow			Dwell																	Link PE #	
RET Red Cl			Cycle																		

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
SEL Ped Cl		Vehicle	Track																	☐ Locking	
SEL Yellow			Dwell																	☐ Non-Locking	
SEL Red Cl			Cycle																		
TRACK Green			Exit																		
TRACK Ped Cl		Ped	Track																	Delay (s)	
TRACK Yellow			Dwell																	Extend (s)	
TRACK Red CL			Cycle																	Duration (s)	
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Max Call (s)	
RET Ped Cl			Track																	Lockout (s)	
RET Yellow			Dwell																	Link PE #	
RET Red Cl			Cycle																		

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
SEL Ped Cl		Vehicle	Track																	☐ Locking	
SEL Yellow			Dwell																	☐ Non-Locking	
SEL Red Cl			Cycle																		
TRACK Green			Exit																		
TRACK Ped Cl		Ped	Track																	Delay (s)	
TRACK Yellow			Dwell																	Extend (s)	
TRACK Red CL			Cycle																	Duration (s)	
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Max Call (s)	
RET Ped Cl			Track																	Lockout (s)	
RET Yellow			Dwell																	Link PE #	
RET Red Cl			Cycle																		

Preempt System Data

Ring	1	2	3	4	
MIN GRN/WLK (s)					
Priority	PE/FL	PE1/2	PE2/3	PE3/4	PE4/5	PE5/6
Status						

REMARKS :

PREPARED BY: HHH DATE: 09/16/14

LOCATION:

M-36 at Chilson Road

CONTROL SECTION-SPOT #
47041-01-012

CLEAR PAGE 3

TRAFFIC SIGNAL TIMING PERMIT

PHASE	1	2	3	4	5	6	7	8	
APPROACH		EB		NB		WB		SB	
MINIMUM GREEN		10		7		10		7	
PASSAGE		0.0		0.0		0.0		0.0	
MAXIMUM NO. 1		34		24		34		24	
MAXIMUM NO. 2		0		0		0		0	
YELLOW CHANGE		4.3		4.3		4.3		4.3	
RED CLEARANCE		2.0		2.0		2.0		2.0	
WALK		7		0		0		0	
PEDESTRIAN CLEARANCE		17		0		0		0	
EXTENDED PED. CLEARANCE		2		0		0		0	
REST IN WALK		0		0		0		0	
INITIALIZATION		4		1		4		1	
NON-ACT RESPONSE		0		0		0		0	
VEHICLE RECALL		3		0		3		0	
PEDESTRIAN RECALL		2		0		0		0	
NON-LOCK MEMORY		0		0		0		0	
DUAL ENTRY		0		0		0		0	

		CYCLE									O1	O2	O3
DIAL 1	SPLIT 1												
DIAL 2	SPLIT 1												
DIAL 3	SPLIT 1												
DIAL	SPLIT												
DIAL	SPLIT												
DIAL	SPLIT												
		MODE											

TIMING INSTALLED 06/09/10

REMARKS

MODERNIZATION: PERMIT JOB.
16-LOAD-SWITCH, BASE-MOUNTED EPAC TYPE CONTROLLER.

A WEST LEG COMPONENT OF THE INTERSECTION HAS BEEN CONSTRUCTED DUE TO A NEW DEVELOPMENT.

SEMI-ACTUATED OPERATION.
RUNS FREE (MAXIMUM # 1 TIMES).

TIMING AS INSTALLED BY THE REGION ELECTRICIAN ON 6/9/2010.

PREPARED BY: HHH DATE: 06/11/10

FLASH HOURS: 23:00 to 04:00 DAILY ☒ NONE ☐

NIGHT FLASH:
FY = M-36 FR = HAMBURG RD. & DEVELOPMENT DR.

CONFLICT FLASH:
FY = M-36 FR = HAMBURG RD. & DEVELOPMENT DR.

CONTROLLER TYPE:
☒ EPAC
☐ Other:

PRE-EMPT ☐
COUNTDOWN PEDS ☐

PHASE

1
2 EASTBOUND M-36
3
4 SOUTHBOUND HAMBURG ROAD
5
6 WESTBOUND M-36
7
8 NB DEVELOPMENT DRIVE

THE MODERNIZATION PROCESS AND THE CONSTRUCTION OF THE NEW WEST LEG COMPONENT OF THE INTERSECTION OCCURRED DURING PHASE # 1 OF THE DEVELOPMENT.

PHASE # 1 OF THE DEVELOPMENT HAS BEEN COMPLETED.
PHASE # 2 OF THE DEVELOPMENT IS CURRENTLY PENDING.

OVERLAPS

Overlap Phase	*Load Bays*	*Phases Overlapped*	T.G. (s)	Y (s)	R (s)	-G/Y	+GRN
=							
=							
=							
=							

LOCATION:
M-36 AT HAMBURG RD./DEVELOPMENT DR.
CITY/TWP: HAMBURG TOWNSHIP
COUNTY : LIVINGSTON

MILE POINT	CONTROL SECTION-SPOT #
20.52	47041-01-017

Job # (If Applicable): PERMIT

CLEAR PAGE 1 CLEAR ALL

Page 3 included only if Pre-Empt Checked

ADVANCED TIMING PARAMETERS FORM

SYSTEM INFORMATION

Controller Type:
- [x] EPAC
- [ ] Other:

System Type:
- [ ] Closed Loop
  - [ ] Stand By
  - [ ] Group 1
  - [ ] Group 2
  - Address:
- [ ] TBC
- [ ] TBC/GPS
- [x] None
- [ ] Other:

If TBC, Synch by:
- [ ] TOD
- [ ] Event

Interconnect Type:
- [ ] Hardwire
- [ ] Fiber-Optic
- [ ] Radio
- [ ] Phone Drop
- [x] None
- [ ] Other:

If Phone Drop, Phone #

Controller Status:
- [ ] Master
- [ ] Slave
- [x] Isolated
- [ ] TBC

If Slave, Master Location:

Master Spot # :

LEFT-TURN PHASING

Phase # / Description	Permissive-Protected Lead	Permissive-Protected Lag	Protected-Only Split	Protected-Only Lead	Protected-Only Lag
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

RING AND BARRIER STRUCTURE

	B1				B2				B3				B4			
R1	2				4											
R2																
R3																
R4																

VEHICULAR AND PEDESTRIAN DETECTION

Approach	Vehicular Detection: Movements and Call Delay (s) Left		Thru		Right		Type: Loop	Video	Other	Pedestrian Detection: Push-Button Crossing Locations
SB HAMBURG ROAD	☒		☐		☒	10	☒	☐	☐	
DEVELOPMENT DRIVE	☐		☐		☐		☐	☒	☐	
	☐		☐		☐		☐	☐	☐	
	☐		☐		☐		☐	☐	☐	
	☐		☐		☐		☐	☐	☐	
	☐		☐		☐		☐	☐	☐	

DISAPPEARING LEGEND CASE SIGNS

ADDITIONAL DIAL SPLIT DATA

		PHASE	1	2	3	4	5	6	7	8	O1	O2	O3
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											

COORDINATION DATA

Operation Mode	1
Coordination Mode	0
Maximum Mode	0
Correction Mode	2
Offset Mode	0
Force Mode	0
Max Dwell	0
Yield Period	0

REMARKS:

THE HAMBURG ROAD APPROACH IS ACTUATED VIA TRAFFIC LOOPS AND THE DEVELOPMENT DRIVE IS ACTUATED VIDEO DETECTION (CAMERA).

ADDITIONAL OVERLAP DATA

Overlap Phase	Load Bays	Phases Overlapped	T.G. (s)	Y (s)	R (s)	-G/Y	+GRN
=							
=							
=							
=							

PREPARED BY: HHH DATE: 06/11/10

☒ MDOT ☐ County ☐ City ☐ Consultant

LOCATION:
M-36 AT HAMBURG RD./DEVELOPMENT DR.

CONTROL SECTION-SPOT #
47041-01-017

CLEAR PAGE 2

PREEMPTION INFORMATION FORM

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SEL Ped Cl		Vehicle	Track																
SEL Yellow			Dwell																
SEL Red Cl			Cycle																
TRACK Green			Exit																
TRACK Ped Cl		Ped	Track																
TRACK Yellow			Dwell																
TRACK Red CL			Cycle																
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
RET Ped Cl			Track																
RET Yellow			Dwell																
RET Red Cl			Cycle																

☐ Locking

☐ Non-Locking

Delay (s)	
Extend (s)	
Duration (s)	
Max Call (s)	
Lockout (s)	
Link PE #	

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SEL Ped Cl		Vehicle	Track																
SEL Yellow			Dwell																
SEL Red Cl			Cycle																
TRACK Green			Exit																
TRACK Ped Cl		Ped	Track																
TRACK Yellow			Dwell																
TRACK Red CL			Cycle																
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
RET Ped Cl			Track																
RET Yellow			Dwell																
RET Red Cl			Cycle																

☐ Locking

☐ Non-Locking

Delay (s)	
Extend (s)	
Duration (s)	
Max Call (s)	
Lockout (s)	
Link PE #	

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SEL Ped Cl		Vehicle	Track																
SEL Yellow			Dwell																
SEL Red Cl			Cycle																
TRACK Green			Exit																
TRACK Ped Cl		Ped	Track																
TRACK Yellow			Dwell																
TRACK Red CL			Cycle																
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
RET Ped Cl			Track																
RET Yellow			Dwell																
RET Red Cl			Cycle																

☐ Locking

☐ Non-Locking

Delay (s)	
Extend (s)	
Duration (s)	
Max Call (s)	
Lockout (s)	
Link PE #	

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SEL Ped Cl		Vehicle	Track																
SEL Yellow			Dwell																
SEL Red Cl			Cycle																
TRACK Green			Exit																
TRACK Ped Cl		Ped	Track																
TRACK Yellow			Dwell																
TRACK Red CL			Cycle																
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
RET Ped Cl			Track																
RET Yellow			Dwell																
RET Red Cl			Cycle																

☐ Locking

☐ Non-Locking

Delay (s)	
Extend (s)	
Duration (s)	
Max Call (s)	
Lockout (s)	
Link PE #	

Preempt System Data

Ring	1	2	3	4	
MIN GRN/WLK (s)					

Priority	PE/FL	PE1/2	PE2/3	PE3/4	PE4/5	PE5/6
Status						

REMARKS :

PREPARED BY: HHH DATE: 06/11/10

LOCATION:

M-36 AT HAMBURG RD./DEVELOPMENT D

CONTROL SECTION-SPOT #

47041-01-017

CLEAR PAGE 3

TRAFFIC SIGNAL TIMING PERMIT

PHASE	1	2	3	4	5	6	7	8
APPROACH		EB & WB		NB				
MINIMUM GREEN		10		7				
PASSAGE		0.0		3.0				
MAXIMUM NO. 1		30		30				
MAXIMUM NO. 2		0		0				
YELLOW CHANGE		4.3		5.0				
RED CLEARANCE		1.7		1.5				
WALK		0		0				
PEDESTRIAN CLEARANCE		0		0				
EXTENDED PED. CLEARANCE		0		0				
REST IN WALK		0		0				
INITIALIZATION		4		1				
NON-ACT RESPONSE		0		0				
VEHICLE RECALL		3		0				
PEDESTRIAN RECALL		0		0				
NON-LOCK MEMORY		0		0				
DUAL ENTRY		0		0				

	CYCLE	1	2	3	4	5	6	7	8	O1	O2	O3
DIAL 1 SPLIT 1												
DIAL 2 SPLIT 1												
DIAL 3 SPLIT 1												
DIAL SPLIT												
DIAL SPLIT												
DIAL SPLIT												
	MODE											

PHASE

MAXIMUM # 1 TIMES: NORMAL

1
2 M-36
3
4 MERRILL ROAD
5
6
7
8

OVERLAPS

Overlap Phase	Load Bays	Phases Overlapped	T.G. (s)	Y (s)	R (s)	-G/Y	+GRN
A = EB M-36 RTGA		4	0.0	5.0	1.5		
=							
=							
=							

TIMING INSTALLED 02/21/12

REMARKS

NEW TRAFFIC SIGNAL INSTALLATION IN CONJUNCTION WITH JOB NUMBER 113862 A.

16-LOAD-SWITCH, BASE-MOUNTED EPAC TYPE CONTROLLER.

SEMI-ACTUATED OPERATION WITH WIRELESS LOOPS IN THE MERRILL ROAD APPROACH LANES.

RUNS FREE (MAXIMUM # 1 TIMES). PLACE A 10-SECOND DELAY IN THE MERRILL ROAD RIGHT-TURN APPROACH LANE.

PREPARED BY: HHH DATE: 10/04/11

FLASH HOURS: ____ to ____ DAILY ☐ NONE ☒

NIGHT FLASH:

FY = M-36 FR = MERRILL ROAD

CONFLICT FLASH:

FY = M-36 FR = MERRILL ROAD

CONTROLLER TYPE:
☒ EPAC
☐ Other:

PRE-EMPT ☐
COUNTDOWN PEDS ☐

LOCATION:
M-36 AT MERRILL ROAD
CITY/TWP: HAMBURG TOWNSHIP
COUNTY : LIVINGSTON

MILE POINT	CONTROL SECTION-SPOT #
19.35	47041-01-004

Job # (If Applicable): 113862 A

Page 3 included only if Pre-Empt Checked

ADVANCED TIMING PARAMETERS FORM

SYSTEM INFORMATION

Controller Type:
- [x] EPAC
- [ ] Other:

System Type:
- [ ] Closed Loop
  - [ ] Stand By
  - [ ] Group 1
  - [ ] Group 2
  - Address:
- [ ] TBC
- [ ] TBC/GPS
- [x] None
- [ ] Other:

If TBC, Synch by:
- [ ] TOD
- [ ] Event

Interconnect Type:
- [ ] Hardwire
- [ ] Fiber-Optic
- [ ] Radio
- [ ] Phone Drop
- [x] None
- [ ] Other:

If Phone Drop, Phone #

Controller Status:
- [ ] Master
- [ ] Slave
- [x] Isolated
- [ ] TBC

If Slave, Master Location:

Master Spot # :

LEFT-TURN PHASING

Phase # / Description	Permissive-Protected Lead	Permissive-Protected Lag	Protected-Only Split	Protected-Only Lead	Protected-Only Lag
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

RING AND BARRIER STRUCTURE

	B1	B2	B3	B4
R1	2	4		
R2				
R3				
R4				

VEHICULAR AND PEDESTRIAN DETECTION

Approach	Left	Left Delay	Thru	Thru Delay	Right	Right Delay	Loop	Video	Other	Pedestrian Detection: Push-Button Crossing Locations
NB MERRILL ROAD	☒		☐		☒	10	☐	☐	☒	
	☐		☐		☐		☐	☐	☐	
	☐		☐		☐		☐	☐	☐	
	☐		☐		☐		☐	☐	☐	
	☐		☐		☐		☐	☐	☐	
	☐		☐		☐		☐	☐	☐	

(Vehicular Detection: Movements and Call Delay (s); Type)

DISAPPEARING LEGEND CASE SIGNS

ADDITIONAL DIAL SPLIT DATA

		PHASE	1	2	3	4	5	6	7	8	O1	O2	O3
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											
DIAL	SPLIT	CYCLE											

COORDINATION DATA

Operation Mode	1
Coordination Mode	0
Maximum Mode	1
Correction Mode	0
Offset Mode	0
Force Mode	0
Max Dwell	0
Yield Period	0

REMARKS:

WIRELESS LOOPS HAVE BEEN PLACED IN THE MERRILL ROAD APPROACH LANES.

ADDITIONAL OVERLAP DATA

Overlap Phase	Load Bays	Phases Overlapped	T.G. (s)	Y (s)	R (s)	-G/Y	+GRN
=							
=							
=							
=							

PREPARED BY: HHH DATE: 10/04/11

☒ MDOT ☐ County ☐ City ☐ Consultant

LOCATION:
M-36 AT MERRILL ROAD

CONTROL SECTION-SPOT #
47041-01-004

CLEAR PAGE 2

PREEMPTION INFORMATION FORM

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
SEL Ped Cl		Vehicle	Track																	☐ Locking	
SEL Yellow			Dwell																	☐ Non-Locking	
SEL Red Cl			Cycle																		
TRACK Green			Exit																		
TRACK Ped Cl		Ped	Track																	Delay (s)	
TRACK Yellow			Dwell																	Extend (s)	
TRACK Red CL			Cycle																	Duration (s)	
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Max Call (s)	
RET Ped Cl			Track																	Lockout (s)	
RET Yellow			Dwell																	Link PE #	
RET Red Cl			Cycle																		

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
SEL Ped Cl		Vehicle	Track																	☐ Locking	
SEL Yellow			Dwell																	☐ Non-Locking	
SEL Red Cl			Cycle																		
TRACK Green			Exit																		
TRACK Ped Cl		Ped	Track																	Delay (s)	
TRACK Yellow			Dwell																	Extend (s)	
TRACK Red CL			Cycle																	Duration (s)	
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Max Call (s)	
RET Ped Cl			Track																	Lockout (s)	
RET Yellow			Dwell																	Link PE #	
RET Red Cl			Cycle																		

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
SEL Ped Cl		Vehicle	Track																	☐ Locking	
SEL Yellow			Dwell																	☐ Non-Locking	
SEL Red Cl			Cycle																		
TRACK Green			Exit																		
TRACK Ped Cl		Ped	Track																	Delay (s)	
TRACK Yellow			Dwell																	Extend (s)	
TRACK Red CL			Cycle																	Duration (s)	
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Max Call (s)	
RET Ped Cl			Track																	Lockout (s)	
RET Yellow			Dwell																	Link PE #	
RET Red Cl			Cycle																		

Preemption Description:

Preempt # =	Time (s)	Phases		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
SEL Ped Cl		Vehicle	Track																	☐ Locking	
SEL Yellow			Dwell																	☐ Non-Locking	
SEL Red Cl			Cycle																		
TRACK Green			Exit																		
TRACK Ped Cl		Ped	Track																	Delay (s)	
TRACK Yellow			Dwell																	Extend (s)	
TRACK Red CL			Cycle																	Duration (s)	
DWELL Green		Overlap Vehicle	Overlap	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Max Call (s)	
RET Ped Cl			Track																	Lockout (s)	
RET Yellow			Dwell																	Link PE #	
RET Red Cl			Cycle																		

Preempt System Data

Ring	1	2	3	4	
MIN GRN/WLK (s)					
Priority	PE/FL	PE1/2	PE2/3	PE3/4	PE4/5	PE5/6
Status						

REMARKS :

PREPARED BY: HHH DATE: 10/04/11

LOCATION:

M-36 AT MERRILL ROAD

CONTROL SECTION-SPOT #
47041-01-004

CLEAR PAGE 3

EXHIBIT I

LIVINGSTON COUNTY ROAD COMMISSION
LAND SPLIT / SIGHT DISTANCE REVIEW

NOTE: THIS IS NOT A DRIVEWAY PERMIT.

Review Number 1807-005

Property Owner and Applicant Information

Owner: Forlenza Marie Eleanor Trust
Street Address: 15 Geddes Hts
City, State, ZIP: Ann Arbor, MI 48104
Day Phone: Fax:

Applicant: Rachel Wandmacher
Company: Midwestern Consulting, LLC
Address: 3815 Plaza Drive
City,State: Ann Arbor MI, 48108
Applicant Phone: (724) 995-0200 Applicant Fax:

Location

Township: Hamburg Section: 14
Development: Waters Edge Village
Approach Type: Private Road
Speed Limit (if posted): 45
Speed Factors (if any):

Roadway On: Winans Lake Road Side of Street: South

Field Measurements

Location of existing property corners from nearest crossroad: -1371 and 449 feet West of Buckhorn

Parcel	Property/ Easement Corners	Access Point(s)	Sight Distance Req. Std	Sight Distance Req. Min	Sight Distance Measured		Sight Distance Comply	Clear Vision Comply	Neighbor Consent Required	Approve
East Road		5	725		725 East	725 West	Yes	Yes	No	Yes
West Road		1091	575		448 West	375 East	No	No	No	No
Huron Rapids							Yes	Yes	No	Yes

Comments:
The entrance for the "East Road" shall be lined up across from Buckhorn Lane to reduce left-turn conflicts. The "West Road" is denied due to lack of sight distance due to curvature in the roadway. An extension of Huron Rapids Drive would be adequate for an emergency entrance. No encroachments allowed on neighboring parcels. A Private Road Permit Application will need to be submitted along with the proposed road name(s). See the LCRC specification booklet and contact this office for further requirements.

Inspection Date: 7/12/2018 Inspector: Pat Hogan/cat
Pat Hogan

EXHIBIT J

MIDWESTERN CONSULTING

3815 Plaza Drive
Ann Arbor, Michigan 48108
734.995.0200

Land Development • Land Surveying • Municipal • Wireless Communications • Institutional • Transportation • Landfill Services

November 19, 2018

To: Township of Hamburg
Township
PO Box 157
10405 Merrill Road
Hamburg, MI 48139

Attn: Amy Steffens, AICP, Planning and Zoning Administrator
Scott Pacheco, AICP, Planning Department

Re: Waters Edge Village Open Space Community PUD
Response to McKenna's Review #3
Midwestern File No.: 18037

Dear Ms. Steffens:

Midwestern Consulting has previously preliminary site plans for review for Waters Edge, and has received Planning comments from McKenna. We have revised the plans to incorporate the requested changes, and offer the following as a response to the comments and description of changes.

McKenna – John R. Jackson, AICP, President – November 14, 2018

2A Eligibility Review – Recognizable Benefit

Done. The plans have been revised to demonstrate a recognizable and substantial benefit to the community by providing the following design elements in excess of the requirements of the Ordinance:

- ***High Quality Architectural Design***
- ***Transition Areas from Adjacent Residential Land Uses***
- ***Unified Access***
- ***Extensive landscaping has been provided on the Landscape Plan Sheet No. 5. Landscaping above and beyond ordinance requirements is shown along Winans Lake Road, along the east side of the site and adjacent to Huron River Highlands. 175 trees are provided along Winans Lake Road when only 92 trees are required which equates to an almost 100% landscaping bonus along Winans Lake Road. It should be noted that Landscaping is required at the Final Site Plan stage according to Article 4.00, Section 4.5.5 (Final Site Plan Review) of the Hamburg Township Zoning Ordinance, not the Preliminary Site Plan Stage.***
- ***Unique site features including two spectacular fountains, extension of almost one mile of off-site public water main to the site benefiting other Hamburg Township properties, storm water best management practices, 154 sanitary sewer taps, integrated mixture of housing options and lot sizes, 150 foot buffer adjacent to residential areas and recreational facilities outlined below***
- ***Preservation of 3.68 acres of Woodlands in the middle of the site and the preservation of woodlands along the Huron River, Gil Lake and throughout the site***

- ***Preservation of 5.67 acres of wetlands***
- ***Preservation of Open Space***
- ***Recreation facilities are proposed including two pickle ball courts, a river bluff walking path, walking path through forest preservation area, a 10'x18' observation/gathering platform to view the Huron River, provisions for kayaks, canoes, row boats, paddle boats and recreation boats, a fishing dock, Gill Lake Overlook, Gill Lake Common Shorelines, dog waste stations, extensive walking paths, benches, large gazebo, picnic area, active recreation areas***
- ***The units have been set back more than 100 feet from the top of the bluff along the north side of the Huron River. The development has been buffered from Gill Lake, the Huron River and wetlands.***

The plans have been revised to demonstrate that 3.68 acres of woodlands will be preserved in Fountain Park. In addition, 13.73 acres of woodlands will be preserved along the Huron River, 4.97 acres will be preserved along Gill Lake, 22.98 acres of woodlands will be preserved in other locations on the site. In total, 627 trees are proposed to be saved out of the 1598 trees that were required to be surveyed (Section 9.4.5 of the Hamburg Township Zoning Ordinance requires that "Site Plans shall show existing trees which are located in the portions of the site that will be built upon or otherwise altered." The Preservation of Existing Plant Material Calculation has been shown on Sheet 8.

The plans have been revised to reduce the number of units that back up to the Huron River from 34 to 31. In reality, the westerly four lots along the Huron River do not back up to the river, so the number of units has been reduced to 30. In order to clearly delineate the public/private space, an intentional tree line has been added in order to indicate that the shoreline of the Huron River will be a public area.

The plans have been revised to increase the width of common shoreline from 145 feet to 300 feet. The 150 feet area on the west end of Gill Lake is also considered common shoreline in order to indicate three areas instead of two. In order to create public use of the Gill Lake shoreline, pathways and benches have been added to the common shoreline areas. At the Site Walk on November 7, 2018, the Gill Lake overlook site was considered by a few Planning Commission Members to be a beautiful location for a lookout site.

We do not consider the 45-foot example in West Bloomfield to be an accurate scale of the recognizable benefit that will be provided by Waters Edge. Our proposed openings are 75-150 feet which is much larger than your 45-foot example. The homes in Waters Edge have much more architectural character and a rolling topography with woodlands.

We have revised the plans to increase the width of two openings to the Huron River to 50 feet from 15 feet. The two common shoreline openings to Gill Lake have been increased to 75 feet.

We have added extensive fencing to delineate the public from the private space. Please reference the Preliminary Site Plan Sheet 4.

The docks have been removed from the Huron River.

The above-mentioned recognizable benefits will be provided to the Township, not only the Waters Edge neighborhood. In order to achieve this, public parking spaces have been provided. Four parking areas have been provided along the Huron River for a total of 14 spaces along the river. Two parking areas have been provided along Gill Lake for a total of 11 spaces. Ten parking spaces have been provided in the Community Park. These areas will allow the Township to enjoy the benefit of the preserved natural

features on the site, including woodlands and wetlands.

Waters Edge Village will provide a benefit to the community by creating a walkable neighborhood with community gathering spaces and preserved natural features including wooded areas, wetland adjacent to Gill Lake, and the natural bluff to the Huron River. 56% of the site is maintained as open space, benefitting the ecosystems of Gill Lake and the Huron River.

2B Eligibility Review - Open Space

Done. The Site Analysis Plan has been added to the Preliminary Site Plan submittal showing:

- ***Significant Natural Assets***
- ***Quality Woodlands***
- ***Trees over 12-inch diameter***
- ***Rolling topography with grades exceeding 15%***
- ***Significant Views***
- ***Natural Drainage Ways***
- ***Wetlands***
- ***Water Bodies***
- ***Preserved Natural River Bluff/corridors that connect quality wildlife habitats***
- ***Recreation Facilities***
  - ***Usable recreation facilities will be provided so all residents of the development have reasonable access. Recreation areas provided include four neighborhood parks, passive recreational facilities, pickle ball courts, gazebo, fields, paths, etc. All of these provide a feature of community-wide significance and enhance residential development.***
- ***Creation of storm water basins***

52% of the site will be preserved as open space, including the preservation of the existing bluffs along the Huron River and wetland ecosystems to the south. Approximately 3 acres of woods will be preserved within the central portion of the property and trees will be preserved adjacent to Gill Lake and the associated wetland as well as along the Winans Lake road corridor. Storm water management areas will be landscaped in a manner to create focal points within the proposed open space. Proposed recreation facilities include pedestrian walking paths throughout the community with benches in strategic locations, an optional floating dock for 2-3 recreational boats, a lookout location near Gill Lake, a gazebo, pickle ball courts, and a picnic area.

It should be noted that the Site Analysis Plan is required at the Final Site Plan stage according to Article 4.00, Section 4.5.5 (Final Site Plan Review) of the Hamburg Township Zoning Ordinance, not the Preliminary Site Plan Stage.

2C Eligibility Review – Guarantee of Open Space

Documents including the Master Deed and by-laws will be provided at the Final Site Plan stage regarding maintenance of open spaces. The approved PUD Site Plan as well as the Master Deed and By-laws will dictate the preservation of the natural features and open space.

2D Eligibility Review – Cohesive Neighborhood

The proposed neighborhood utilizes alleys, sidewalks and trails, varied home styles, and shared open space to foster a compact community. The centrally located houses have front porches that face the community open space and there are several amenities proposed within the open space, such as benches, gazebo, pickle ball courts, and a natural areas lookout to encourage active and passive recreation as well as interaction within the neighborhood.

Additional pathways have been added to complete the well-connected pedestrian system throughout the development. A walking path has been added along the west side of the 3.68 acre forest to remain in order to give the residents adjacent to the woods the requested access.

Neighborhood elements have been added including four benches at the common shoreline of Gill Lake, pathways to the end of the common shoreline of Gill Lake, benches in three parks and recreation amenities. Signs will be included indicating the preservation of the woodlands along the Huron River. Wetland indicator signs have been added.

Active recreation areas have been added in three of the four parks. Passive recreation areas are proposed in three parks and throughout the development.

Eight parking areas have been provided along with extensive walking paths to make the development available to all residents.

Amenities have been added to Fountain Park, Garden Park and Water Park including benches, dog waste stations and pathways

The proposed development has been designed to create a cohesive community neighborhood through common open space areas for passive or active recreation and resident interaction. Open space areas are equally available to all residents of the Open Space Community.

2F Eligibility Review – Density Impact

Done. A Natural Features Impact Statement and a Traffic Impact Study have been provided. It should be noted that Impact Statements are required at the Final Site Plan stage according to Article 4.00, Section 4.5.5 (Final Site Plan Review) of the Hamburg Township Zoning Ordinance, not the Preliminary Site Plan Stage.

A quantitative comparison to impacts permitted under conventional zoning regulations will be provided at the Final Site Plan stage, if necessary.

The proposed density is considered a low to medium density and will not result in an unreasonable impact on public services or infrastructure. The neighborhood is will have a minimal impact on the local school system. The property is located within the future sanitary sewer service districts as identified in the Township Master Plan and will tap into the existing sanitary sewer at Winans Lake Road.

2G Eligibility Review – Township Master Plan

The proposed residential neighborhood development at this location is consistent with the Township Master Plan. The property is located in an area designated for Medium Density Residential (one dwelling unit per acre) and along the Natural River District 1 along the edge of the Huron River to the south. Developments in the Medium Density Residential district are encouraged to take advantage of the Township's open space provisions. The

preservation of the bluff along the Huron River and the proposed lookout area to both the Gill Lake ecosystem reflect the Master Plan emphasis on scenic features within the Township.

A list of Exemplary Project Items has been added to the right hand side of the Open Space PUD Development Plan Sheet 3. It should be noted that Waters Edge is proposing less of a density bonus than the 100% granted to Regency Village last year. The submittal for Waters Edge is more exemplary than Regency Village was.

The layout along the Huron River was developed with sensitive site design principles. The units have been set back more than 100 feet from the top of the bluff located along the north side of the river. The woodlands along the Huron River are proposed to be preserved.

3.14.14.2: Project Design Standards – Permitted Uses

Done. Provisions have been made for natural study by including a pedestrian hiking path along the Huron River. A 10 feet by 18 feet platform has been added. Signs educating the Township about environmental interpretive areas will be added.

The number of homes along the Huron River has been reduced from 38 homes to 31. The homes along the river protect existing woodlands and the river that are home to fish, wildlife and their habitats. Provisions have been made for recreation along the river including kayaking and canoeing and hiking.

3.14.14.3: Project Design Standards – Dwelling Density

Done. The Parallel Site Plan on Sheet 3 has been updated with the dimension information reported to be missing in your letter.

3.14.14.5: Project Design Standards – Water and Sewer Service

We would like to take this opportunity to request that McKenna and Hamburg Township please acknowledge that Winans Lake Development LLC proposes to install over 4,500 lineal feet of off-site 16-inch water main. This water main will not only benefit Waters Edge but will benefit several other Hamburg Township properties. Winans Lake Development LLC will also be providing approximately $385,000 in sanitary sewer tap fees to Hamburg Township.

Public water and sanitary sewer connections are proposed with this development.

3.14.14.7: Project Design Standards – Regulatory Flexibility

A Regulatory Flexibility chart table will be provided on the site plan and e-mailed prior to the Planning Commission Meeting scheduled for November 28, 2018. This table will indicate how the project deviates from the established zoning area regulations such as height, setbacks, or general provisions, and reasons for why the proposed deviations are sought.

3.14.14.8: Project Design Standards – Open Space Requirements

Done. The Open Space Calculation chart has been added to the Open Space Development Plan Sheet 3. More than 40% (56%) of the site is open space. 88% of the open space area is upland of the wetlands which exceeds the 25% required by the ordinance. This calculation is shown in the above mentioned chart.

3.14.14.9: Project Design Standards – Compatibility with Adjacent Uses

Done. The pickle ball courts have been moved out of the 150 feet perimeter setback. Extensive landscaping has been provided on the Landscape Plan Sheet 5 to screen the area from the adjacent residences. Three parking areas providing parking for 19 vehicles and walkways leading to Community Park have been provided so that all residents of Waters Edge can enjoy the amenities.

3.14.14.10: Project Design Standards – Transition Area

Done. A 150 feet wide perimeter setback has been provided between Waters Edge and the neighboring communities in Huron River Highlands and Eagle Run. Landscape Screening and preservation of existing trees/woodlands have been provided in these transition strips. Please reference Sheet No. 4 and 5. In addition, the proposed units are similar in nature to those in the neighboring communities. Open/recreation spaces also provide additional buffers between the neighborhoods. Winans Lake Development, LLC proposes to keep the amenities as proposed in Community Park.

3.14.14.11: Project Design Standards – Architectural and Site Element Design

Done. The Waters Edge Architectural Guidebook was updated on November 14, 2018 and is attached. The Preliminary Site Plan Sheet 4 indicates locations of recessed, side entry and conventional garages. Lot Details have been revised on the Architectural Details Sheet No. 7. Note No. 3 on the Preliminary Site Plan Sheet 4 indicates the proposed quantities of the garages. 40% of the homes proposed along private roads are side entry or will have recessed garages. Side entry or recessed garage products are proposed for at least 20% of the entire development. This proposal was approved earlier this year by Hamburg Township staff and two members of the Planning Commission.

Updated Elevations are included in the above-mentioned Architectural Guidebook. Lookout\walkout elevations will be provided at the Final Site Plan stage. Specific floor plans are also included in the guidebook.

3.14.14.12: Project Design Standards – Access

Done. A traffic study is enclosed and was e-mailed McKenna and to Hamburg Township on November 16, 2018. Livingston County Road Commission's Site Distance approval is attached. Kim Hiller has also approved the geometrics shown in an e-mail. A permit will be obtained at the Final Site Plan stage.

3.14.14.13: Project Design Standards – Internal Roads

Done. The site plan has been provided to comply with Hamburg Township's Private Road Ordinance. Please

reference the Landscape Plan Sheet No. 5 which shows the proposed landscaping along the roadways. The cross-access easements and maintenance plan will be provided at the Final Site Plan stage. The Internal Street Tree Calculation has been provided at the bottom right hand corner of the Landscape Plan Sheet No. 5

3.14.14.14: Project Design Standards – Pedestrian Circulation

In order to preserve the natural state of the woodlands along the Huron River, Winans Lake Development LLC does not propose to pave the path in asphalt. Instead, a 10 feet wide woodchip path is proposed with a 10'x18' viewing platform and two access points to the river.

The development provides extensive pedestrian access to open space areas from residential areas, between open spaces and off-site connections.

On the Preliminary Site Plan Sheet 4, the location for the school bus stops has been identified at the entrance. Note No. 4 on this sheet documents the conversation that we had with Pinckney Community Schools regarding the bus stop.

3.14.14.15: Project Design Standards – Natural Features

Done. The Site Analysis Plan has been provided detailing the preservation of natural features, including the Huron River and Gill Lake. The Tree Survey Plans and Lists have been updated to note the trees to be preserved and those to be removed.

The dock use has been added to the Preliminary Site Plan Sheet 4. The dock in Gill Lake is proposed for fishing and for row boats, kayaks, canoes and similar recreation boats. Dock design will be provided at the Final Site Plan stage. The number of recreational boats has been added to Sheet 4.

4: Provisions for Exemplary Projects

As stated above in this letter, Waters Edge meets and exceeds the standards of Section 14.3 and therefore should qualify for the requested density bonus.

The access points to the Huron River and Gill Lake have been widened. Five wide openings are proposed to the Huron River and three openings are now proposed to Gill Lake. A 10'x18' platform has been added to view the Huron River and an overlook is proposed for the viewing of Gill Lake.

A list of Exemplary Project Items has been added to the Preliminary Site Plan Sheet 4.

5.1: Site Plan Requirements-Natural Features Impact Statement

Done. The Natural Features Impact Statement is enclosed. It should be noted that the Natural Features Impact Statement is required at the Final Site Plan stage and not the Preliminary Site Plan stage, according to

Hamburg Township Ordinances.

5.2: Site Plan Requirements-Zoning Setbacks and Requirements

Done. The parallel plan has been updated. Under the current regulations, swimming pools and swing sets would be allowed to be adjacent to the residences to the west and to the east of Waters Edge.

5.3: Site Plan Requirements-Design Elements

Done. The above-mentioned Architectural Guidebook has been updated. The site plan has been updated to indicate the new layout of the newly added architectural products. The typical lot layouts have been updated on the Preliminary Site Plan Sheet 4 to indicate a mix of housing. The Architectural Details Sheet 7 indicates dimensions, setbacks, porches, walkways and common areas.

Information on building and siding materials will be provided at the Final Site Plan stage. These materials will be high quality in nature.

As stated above, garages will not dominate the facades of the units in order to achieve an attractive and cohesive design that supports walkability and connectivity. Unit designs are provided in the above-mentioned Architectural Guidebook.

The mailbox location has been indicated southeast of the entrance. The design will be provide at the Final Site Plan stage.

5.4: Site Plan Requirements-Wetland Setback

Per Section 9.9.3 of the Hamburg Township Zoning Ordinance, Open Space Developments are excluded from the 50 feet wetland setback. Regency Village did not show wetland setbacks. Having said that, Waters Edge exceeds this ordinance by providing a natural buffer from the wetlands as a good site design principal.

5.5: Site Plan Requirements-Site Circulation

Done. Road Cross-Sections and an Approach Detail has been added to the Site Details Sheet 6.

5.7: Site Plan Requirements-Site Frontage

Done. An extensive landscape buffer has been provided along Winans Lake Road. Please reference the Landscape Plan Sheet No. 5. This will provide for the separation of residences from traffic and improve aesthetics.

5.8: Site Plan Requirements-Emergency Access

On November 16, 2018, Amy Steffens indicated that the Police Department will defer to the Fire Department regarding emergency access. We have obtained approval of the emergency assess from the Fire Marshal. We will attempt to obtain a more formal approval prior to the Planning Commission Meeting.

5.9: Site Plan Requirements-Storm Water Management

A detention basin has been added to the Parallel Plan on the Parallel Plan on Sheet 3. Storm water management details are required at the Final Site Plan stage and not the Preliminary Site Plan stage. We will work with the Township Engineer to obtain an approved storm water management plan. Best management practices will be utilized to make the storm water management features an environmental and sustainable asset to the site. Excess storm water volume will be proposed to be detained on the site. Storm water best management practices are listed as Exemplary Project Items on Sheet 3.

5.10: Site Plan Requirements-Landscaping

Done. Please reference the Landscape Plan Sheet No. 5. Typical Lot Landscape Plans will be provided at the Final Site Plan stage.

5.11: Site Plan Requirements-Lighting

Photocell Lighting will be provided on the garages. Upighting will also be provided at the entrance. These details will be provided at the Final Site Plan stage.

5.12: Site Plan Requirements-Master Deed and Bylaws

The Master Deed and Bylaws will be provided at the Final Site Plan stage.

5.12: Site Plan Requirements-Agency Approvals

Agency approvals will be provided at the Final Site Plan stage.

#

Should you have any further concerns or have further questions, please feel free to contact Robert C. Wagner by phone at (734)995-0200 (Ext. 274), or email at rcw@midwesternconsulting.com. We look forward to your feedback.

Sincerely,
MIDWESTERN CONSULTING, LLC

Robert C. Wagner

Robert C. Wagner, P.E.
Project Manager

EXEMPLARY PROJECT ITEMS

1. PRESERVATION OF NATURAL FEATURES WITH AN EMPHASIS ON PROVIDING UNINHIBITED ACCESS AND ENJOYMENT OF THESE FEATURES, INCLUDING:
   - RIVER BLUFF WALKING PATH
   - RIVER BLUFF OBSERVATION/GATHERING POINT
   - RIVERSIDE ACCESS FOR KAYAKS AND CANOES
   - COMMON SHORELINE ACCESS TO GILL LAKE
   - GILL LAKE LOOKOUT AREA
   - OPTIONAL DOCK PROVIDING LAKE ACCESS FOR KAYAKS AND CANOES
   - PRESERVED WOODLAND WITH WALKING PATH THROUGH MIDDLE
2. EXTENSION OF WATER MAIN TO SITE PROVIDING PUBLIC SERVICE OPPORTUNITIES TO MORE OF HAMBURG TOWNSHIP
3. STORMWATER BMPS INCLUDING INFILTRATION/DETENTION BASIN AND PERMEABLE PAVEMENT PARKING AREAS (IF FEASIBLE)
4. STORMWATER DETENTION PONDS/BASIN PROVIDING VOLUMES FAR EXCEEDING REQUIRED VOLUMES AND CONTROLLING RELEASE TO NATURAL WATER FEATURES
5. ELIMINATING NEED FOR GRINDER PUMPS – SITE TO BE SERVED BY A COMBINATION OF GRAVITY SEWER AND PUMP STATION(S) TO CONNECT VIA ON–SITE FORCE MAIN TO EXISTING PUBLIC SANITARY FORCE MAIN
6. BRINGING APPROXIMATELY $380,000 TO $390,000 TO THE TOWNSHIP BY WAY OF SANITARY SEWER TAP FEES.
7. EXTENSIVE WALKING PATHS THROUGHOUT DEVELOPMENT ENCOURAGING COHESIVE NEIGHBORHOOD
8. INTEGRATED MIXTURE OF HOUSING OPTIONS AND LOT SIZES
9. MEETING THE INTENT OF THE 150–FOOT DEPTH PERIMETER TRANSITION AREAS AROUND THE SITE WITH SEPARATION AS WELL AS LANDSCAPE SCREENING
10. COMMUNITY AMENITIES INCLUDING:
    - OPEN WATER FEATURES AND FOUNTAINS WITH SURROUNDING BENCHES
    - LARGE GAZEBO
    - PICKLEBALL COURTS
    - PICNIC AREA
    - ACTIVE OPEN SPACE AREAS
    - DOG WASTE STATIONS
    - EXTENSIVE WALKING PATHS THROUGHOUT DEVELOPMENT AND ALONG SCENIC FEATURES
11. EXTENSIVE LANDSCAPING SUPPLEMENTAL TO REQUIRED LANDSCAPING ALONG WINANS LAKE ROAD CORRIDOR