PROPOSED AGENDA

CHARTER TOWNSHIP OF BRIGHTON
PLANNING COMMISSION
4363 BUNO ROAD
BRIGHTON, MI 48114

NOVEMBER 10, 2025
REGULAR MEETING
6:30 P.M.
(810) 229.0562

A. CALL TO ORDER
B. PLEDGE OF ALLEGIANCE
C. ROLL CALL
D. CALL TO THE PUBLIC
E. AGENDA
F. MINUTES

1. OCTOBER 13, 2025 REGULAR MEETING

G. BUSINESS

1. **RE-REVIEW OF PUD REZONING RZ #25/01 FOR THE COVE AT WOODLAND LAKE; ADDRESS: VACANT DANN/N. CHRISTINE; OWNER AND APPLICANT: MITCH HARRIS BUILDING COMPANY; TAX ID#: 12-18-300-011 AND 12-18-400-027; EXISTING ZONING: R-2 (RESIDENTIAL SINGLE FAMILY); PROPOSED ZONING: RESIDENTIAL PLANNED UNIT DEVELOPMENT (PUD)**

H. REPORTS AND CORRESPONDENCE
I. **CALL TO THE PUBLIC**
J. ADJOURNMENT

The Charter Township of Brighton will provide the necessary reasonable auxiliary aids and services, such as signers for the hearing impaired and audiotapes of printed materials being considered at the meeting to individuals with disabilities at the meeting upon 10 days' notice to the Charter Township of Brighton, Attn: Township Manager. Individuals should contact the Charter Township of Brighton by writing or contacting the following: Kelly Mathews, 4363 Buno Road, Brighton, MI 48114. Telephone: 810-229-0562 or e-mail planner@brightontwp.com.

MEMORANDUM

TO:	BRIGHTON TOWNSHIP RESIDENTS
FROM:	JOSEPH R. RIKER, CLERK
SUBJECT:	PLANNING COMMISSION ELECTRONIC PACKETS
DATE:	JANUARY 31, 2019

Packets for the Brighton Township Planning Commission meetings posted to the website contain scanned original documents. These electronic packets are subject to change based on meeting material presented to the Planning Commission throughout the course of the meeting. For a complete original packet following the Planning Commission meeting contact the Clerk's Office at 810-229-0560 or via email: clerk@brightontwp.com

PROPOSED MINUTES

CHARTER TOWNSHIP OF BRIGHTON **OCTOBER 13, 2025**
PLANNING COMMISSION **REGULAR MEETING**
4363 BUNO ROAD **6:30 P.M.**
BRIGHTON, MI 48114 **(810) 229.0562**

Chairperson S. Holden called the meeting to order at 6:30 P.M. The Pledge of Allegiance was said.
Present: C. Doughty, W. Hofsess, B. Anderson, J. Rose, A. Lutes, L. Herzinger, S. Holden

CALL TO THE PUBLIC
None.

AGENDA
J. Rose moved and A. Lutes seconded **to approve the agenda.**
Motion carried.

MINUTES
A. Lutes moved and B. Anderson seconded **to approve the September 8, 2025 regular meeting minutes as presented.**
Abstain: S. Holden, L. Herzinger
Motion carried.

PRESENTATION ON WOODLAND LAKE WATER QUALITY
John Boland, OWL, overviewed a PowerPoint presentation. G. Rose, Township Engineer, Fleis and Vandenbrink overviewed his memo regarding the presentation.

PRELIMINARY SITE PLAN APPROVAL FOR HYNE AIRPARK SITE CONDOMINIUM SP #25/04; ADDRESS: VACANT HYNE RD.; OWNER: LUCY LLC/DAVE KELLER; APPLICANT: NICOLA'S CONTRACTING; TAX ID#: 12-18-200-014; ZONING: R-3 (RESIDENTIAL SINGLE FAMILY)
Applicant Representatives, Brent LaVanway, Boss Engineering, and Steve Morgan overviewed the site condominium project. B. LaVanway stated the project is very similar to the 2006 plans other than an emergency access road to Hyne was proposed. He stated they are in concurrence with the master deed suggestions from the Township Attorney and will incorporate those. He stated they received two (2) variances from the ZBA for the hangars for lot #2-7 and removal of the landscape buffer adjacent to the airport. Township Engineer, G. Rose, F&V, overviewed his letter dated 10/4/25; K. Mathews, Township Planner, overviewed her letter dated 9/29/25; BAFA's letter dated 8/4/25; LCDC's letter dated 8/12/25; LCRC's letter dated 9/24/25; and LCDPH's letter dated 10/8/25 were reviewed.

Public Comment:
7 emails were read into the record.
8/27/25 email from Bill Ross about Hyne Rd. access easement.
10/3/25 email from Greg Annett - concerns about construction traffic on newly paved roads.
10/12/25 email from Jeanette Zweng about removing the excess pavement from existing cul-de-sac on Airport Lane.
10/13/25 email from John Trafford regarding the Hyne Rd. access easement and fire lane signage.
8/25/25 email from several subdivision representatives from Ravines of Woodland Lake regarding recent paving of their roads and construction traffic, garbage trucks, road SAD.
10/13/25 email from BAFA regarding the Hyne Rd. access easement.
10/13/25 email from Kevin Pinegar regarding the airport access agreement, Hyne Rd. access easement, drilling rig, test wells, removal of excess cul-se-sac pavement on Airport Lane, sidewalk, road SAD.

Jackie Droncheff, 8590 Hyne - Concerns with Hyne Rd. access easement.
John Trafford, 8538 Hyne - Concerns with Hyne Rd. access easement.
William Ross, 8516 Hyne - Concerns with Hyne Rd. access easement.
William McKillop, 8799 Skylane - Concerns with Hyne Rd. access easement, use emergency access through airport.

Ginger Bosn, 2166 Airway Dr. - Concerns about repaving of subdivision roads and construction traffic - need bond, traffic, eliminate sidewalk, remove excess pavement for Airport Lane cul-de-sac.
Ron Godair, 8602 Hyne - Concerns with Hyne Rd. access easement, use emergency access at airport, bond - newly repaved roads.
Karen Bowen, 8350 Airport Ln. - Newly paved roads in subdivision concerns.
Keith Walker, Brighton Airport Board - Need to pay fees for 7 airport lots and do an emergency access easement agreement.

B. Anderson moved and L. Herzinger seconded **to recommend approval to the Township Board of the preliminary site plan for Hyne Airpark Site Condominium SP #25/04; Address: Vacant Hyne Rd.; Owner: Lucy LLC/Dave Keller; Applicant: Nicola's Contracting; Tax ID#: 12-18-200-014; Zoning: R-3 (residential single family) contingent upon the following conditions: approval from all of the outside agencies; check with LCRC regarding removing the excess pavement on the Airport Lane cul-de-sac; discuss participating in the Ravines of Woodland Lake Road SAD beyond the one assessment; post a bond/have agreement to repair roads within the Ravines of Woodland Lake with any construction related damage with the neighborhood and LCRC; work with BAFA and get an emergency access easement agreement with the airport instead of the emergency access road proposed (remove from site plan); develop an agreement for road maintenance with the Ravines of Woodland Lake and LCRC on the roads; add 20% maximum lot coverage into the master deed; incorporate John Harris' comments into the master deed; develop agreement with the Ravines of Woodland Lake regarding their garbage SAD; and incorporate LCDPH well and septic approval into the master deed.**
Ayes: C. Doughty, B. Anderson, J. Rose, A. Lutes, L. Herzinger, S. Holden
Nay: W. Hofsess
Motion carried.

REPORTS AND CORRESPONDENCE
C. Doughty - TB update: Audio/video, 911 calls, grass at Veteran's Park, Master Plan.
S. Holden - ZBA Update: 2 residential projects, Henry Ford Health sign, and Hyne Airpark - approved.

CALL TO THE PUBLIC
None.

ADJOURNMENT
L. Herzinger moved and B. Anderson seconded **to adjourn.**
Motion carried.

The meeting adjourned at 9:15 P.M.
Respectfully submitted,

_____ _____
Steve Holden, Chairperson William Hofsess, Secretary

_____
Kelly Mathews, Recording Secretary

THE COVE AT WOODLAND LAKE

N

Charter Township of Brighton

0 112.5 225 450 675 900
Feet

P.U.D. PLAN
FOR
THE COVE AT WOODLAND LAKE
PART OF SW FRACTIONAL 1/4 AND SE 1/4, SECTION 18
BRIGHTON TOWNSHIP, LIVINGSTON COUNTY, MICHIGAN

PROPERTY DESCRIPTION:

PART OF THE SOUTHWEST FRACTIONAL 1/4 AND THE SOUTHEAST 1/4 OF SECTION 18, T2N–R6E, BRIGHTON TOWNSHIP, LIVINGSTON COUNTY, MICHIGAN, MORE PARTICULARLY DESCRIBED AS FOLLOWS: BEGINNING AT THE SOUTH 1/4 CORNER OF SECTION 18, BEING A CALCULATED POSITION IN WOODLAND LAKE, SAID CORNER ALSO BEING THE NORTH 1/4 CORNER OF SECTION 19, T2N–R6E, AS ESTABLISHED BY CLAY W. GORDON FOR THE 1949 PLAT OF "WOODLAND LAKE ESTATES NO. 2", AS RECORDED IN LIBER 5 OF PLATS ON PAGE 29 OF THE LIVINGSTON COUNTY RECORDS; THENCE IN WOODLAND LAKE, S89°43'51"W, 143.00 FEET TO TRAVERSE POINT "A"; A POINT ON THE NORTH LINE OF "WOODLAND LAKE ESTATES NO. 2"; WHICH BEARS S46°25'50"W, 195.98 FEET FROM TRAVERSE POINT "C"; THENCE CONTINUING ALONG THE NORTH LINE OF "WOODLAND LAKE ESTATES NO. 2", S89°43'51"W, 765.52 FEET TO A FOUND MONUMENT, (THE PREVIOUS TWO COURSES HAVING BEEN RECORDED AS S89°25'W, 904.2 FEET); THENCE ALONG THE EASTERLY LINE OF "WOODLAND LAKE ESTATES NO. 1", A SUBDIVISION, AS RECORDED IN LIBER 4 OF PLATS, PAGE 44, LIVINGSTON COUNTY RECORDS, AND ALSO BEING THE EASTERLY LINE OF LAKE SHORE DRIVE (50 FOOT WIDE RIGHT–OF–WAY), ON THE FOLLOWING TWO COURSES:

1.) N58°53'48"W, 184.49 FEET (RECORDED AS N58°55'W 184.2 FEET);
2.) N39°54'06"W (RECORDED AS N39°54'W), 799.85 FEET;

THENCE N50°03'42"E, 103.59 FEET (RECORDED AS N50°09'E, 103.2 FEET); THENCE N00°30'43"E, 193.59 FEET (RECORDED AS N00°31'E, 186.00 FEET); THENCE ALONG THE SOUTH LINE OF "WOODLAND LAKE ESTATES NO. 4", A SUBDIVISION, AS RECORDED IN LIBER 9 OF PLATS, PAGE 38, LIVINGSTON COUNTY RECORDS, AND THE SOUTH LINE OF VISTA VIEW DRIVE (50 FOOT WIDE RIGHT–OF–WAY), S89°29'00"E, 503.43 FEET, TO A FOUND CONCRETE MONUMENT AT THE SOUTHEAST CORNER OF "WOODLAND LAKE ESTATES NO. 4"; THENCE ALONG THE SOUTH LINE OF "ROLLING WOODS", LIVINGSTON COUNTY CONDOMINIUM SUBDIVISION PLAN NO. 268, AS RECORDED IN LIBER 3702, PAGE 585, LIVINGSTON COUNTY RECORDS, S89°37'22"E (RECORDED AS S89°29"W), 984.35 FEET, TO A CONCRETE MONUMENT AT THE SOUTHEAST CORNER OF "ROLLING WOODS"; THENCE ALONG THE EAST LINE OF "ROLLING WOODS" AND THE NORTH–SOUTH ¼ LINE OF SECTION 18 AS PREVIOUSLY SURVEYED AND MONUMENTED, N00°18'28"W, 348.66 FEET; THENCE ALONG THE SOUTH BOUNDARY OF "WOODLAND HILLS NO. 2", A SUBDIVISION, AS RECORDED IN LIBER 15 OF PLATS, PAGE 19, LIVINGSTON COUNTY RECORDS ON THE FOLLOWING FOUR (4) COURSES:

1.) NORTHEASTERLY ALONG THE ARC OF A NON–TANGENTIAL CURVE TO THE LEFT HAVING A LENGTH OF 267.27 FEET (PLATTED AS 266.39 FEET), A RADIUS OF 872.17 FEET, A CENTRAL ANGLE OF 17°33'28" (PLATTED AS 17°30'), AND A LONG CHORD WHICH BEARS N80°52'47"E, 266.23 FEET (PLATTED AS N81°24'W, 265.35 FEET);
2.) S62°24'42"E, 121.83 FEET (PLATTED AS S62°21'E, 121.61 FEET);
3.) S17°54'45"E (PLATTED AS S17°21'E), 140.00 FEET;
4.) S82°54'23"E, 299.10 FEET (PLATTED AS S82°10'E, 300.00 FEET)

THENCE S08°20'23"W, 710.90 FEET; THENCE ALONG THE NORTHERLY LINE OF "TRAPPER'S COVE", A SUBDIVISION, AS RECORDED IN LIBER 26 OF PLATS, PAGE 14, LIVINGSTON COUNTY RECORDS, S66°27'50"W (PLATTED AS S66°58'50"W), 265.19 FEET TO TRAVERSE POINT "B"; THENCE CONTINUING ALONG THE NORTHERLY LINE OF "TRAPPER'S COVE", S66°27'50"W, 40 FEET, MORE OR LESS TO THE EASTERLY WATER'S EDGE OF WOODLAND LAKE; THENCE NORTHERLY, WESTERLY, AND SOUTHERLY ALONG THE WATER'S EDGE OF WOODLAND LAKE, 710 FEET MORE OR, LESS TO A POINT ON THE TRUE NORTH–SOUTH 1/4 LINE OF SECTION 18, BEARING S00°25'35"W, 9 FEET, MORE OR LESS, FROM TRAVERSE POINT "C", BEING THE END OF AN INTERMEDIATE TRAVERSE LINE BEGINNING AT THE AFOREMENTIONED TRAVERSE POINT "B" AND HAVING THE FOLLOWING FIVE (5) COURSES:

1.) N03°39'08"W, 81.20 FEET,
2.) N47°04'26"W, 144.66 FEET,
3.) S63°31'39"W, 181.29 FEET,
4.) S03°11'22"E, 187.44 FEET,
5.) S46°19'55"W, 124.40 FEET;

THENCE ALONG THE TRUE NORTH–SOUTH ¼ LINE OF SECTION 18 AND IN WOODLAND LAKE, S00°25'35"W, 125.5 FEET, MORE OR LESS, TO THE CALCULATED POSITION OF THE SOUTH 1/4 CORNER OF SECTION 18, AND THE POINT OF BEGINNING, SAID POINT BEARING S00°25'35"W, 134.41 FEET FROM TRAVERSE POINT "F", CONTAINING 42.8 ACRES MORE OR LESS AND INCLUDING THE USE OF LAKE SHORE DRIVE (50–FOOT WIDE RIGHT OF WAY). ALSO SUBJECT TO ANY OTHER EASEMENTS OR RESTRICTIONS OF RECORD.

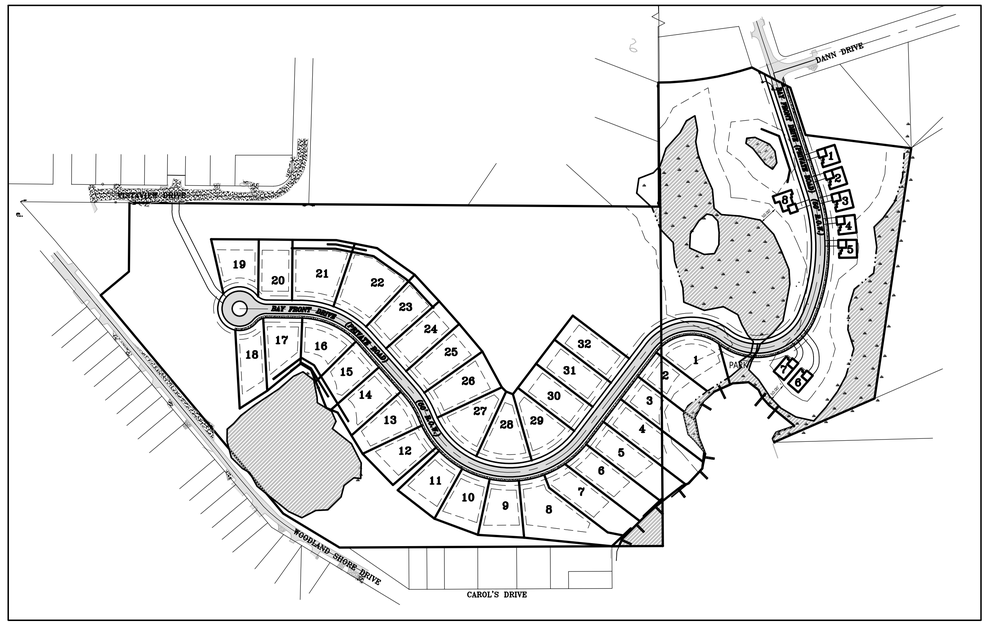
SURVEYOR'S NOTE:

THIS DESCRIPTION INCLUDES BOTTOM LANDS OF WOODLAND LAKE IN THE SOUTHWEST ¼ OF SECTION 18, EAST OF LAKE SHORE DRIVE. THE OWNER MAY HAVE A TITLED INTEREST IN THE BOTTOM LANDS OF WOODLAND LAKE IN THE SOUTHEAST ¼ OF SECTION 18 THAT ARE NOT INCLUDED IN THIS DESCRIPTION.

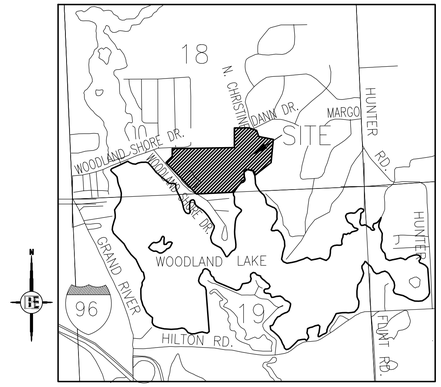
BASIS OF BEARINGS: BEARINGS WERE ESTABLISHED FROM THE RECORDED PLAT OF "WOODLAND LAKE ESTATES NO. 4", AS RECORDED IN LIBER 9 OF PLATS, PAGE 38; LIVINGSTON COUNTY RECORDS:

INDEMNIFICATION STATEMENT

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



OVERALL SITE MAP
NO SCALE



LOCATION MAP
NO SCALE

SHEET INDEX

TABLE OF DEVIATIONS – R–2 TO PUD

CURRENT ZONING: R–2
PROPOSED ZONING: PUD

MINIMUM LOT SIZE R–2 ZONING:	40,000 S.F.
MINIMUM LOT SIZE PROPOSED PUD:	16,000 S.F.
DEVIATION:	24,000 S.F.
MINIMUM SETBACKS R–2 ZONING:	FRONT 35 FT SIDE 12 FT REAR 35 FT
MINIMUM SETBACKS PROPOSED PUD:	FRONT 25 FT SIDE 10 FT REAR 30 FT
DEVIATION:	FRONT 10 FT SIDE 2 FT REAR 5 FT
RIGHT–OF–WAY REQUIRED:	66 FT
RIGHT–OF–WAY PROPOSED:	50 FT
DEVIATION:	16 FT
MAXIMUM ROAD LENGTH ALLOWED:	750 FT
MAXIMUM ROAD LENGTH PROPOSED:	2,888 FT (WITH EMERGENCY ACCESS)
DEVIATION:	2,138 FT
MINIMUM ROAD WIDTH ALLOWED:	30' B/C–B/C
MINIMUM ROAD WIDTH PROPOSED:	28' B/C–B/C
DEVIATION:	2 FT

MAXIMUM LOTS ON A PRIVATE ROAD WITH A SINGLE POINT OF ACCESS: 24
NUMBER OF LOTS PROPOSED ON A PRIVATE ROAD WITH A SINGLE POINT OF ACCESS: 40
DEVIATION: 16

MAXIMUM LOT COVERAGE (%) R–2 ZONING: 15%
MAXIMUM LOT COVERAGE (%) PROPOSED: 40%
DEVIATION: 25%

SINCE THE SITE IS ENTIRELY WOODED, NO TREE SURVEY OR NATURAL FEATURES PLAN WILL BE PROVIDED. GRADING AND TREE REMOVAL WILL BE LIMITED TO THOSE AREAS NECESSARY TO BUILD THE ROAD AND INSTALL UTILITIES. NO TREE REPLACEMENT IS PROPOSED.

MINIMUM LAKE SETBACK PER PUD ORDINANCE:	100 FT
MINIMUM LAKE SETBACK PROPOSED (SINGLE FAMILY HOME):	100 FT
MINIMUM LAKE SETBACK PROPOSED (DETACHED CONDO):	50 FT

PERMITS & APPROVALS

AGENCY	DATE SUBMITTED	DATE APPROVED
• TOWNSHIP PUD APPROVAL	03/03/2025	–
• TOWNSHIP ENGINEERING APPROVAL	–	–
• LCDC SESC	–	–
• NPDES SESC NOC	–	–
• EGLE – ACT 399	–	–
• EGLE – PART 41	–	–
• EGLE – WETLAND	–	–

PREPARED FOR:
MITCH HARRIS BUILDING COMPANY
211 NORTH FIRST STREET, SUITE 100
BRIGHTON, MI 48116
CONTACT: MR. MITCH HARRIS
PHONE: 810.229.7838
EMAIL: MHARRIS@MITCHHARRIS.NET

PREPARED BY:
STATE OF MICHIGAN · MARK DEFRIEZ · ENGINEER · No. 6201309616 · LICENSED PROFESSIONAL ENGINEER
CONTACT: MARK DEFRIEZ
EMAIL: MARKD@BOSSENG.COM

FOR SITE PLAN APPROVAL ONLY!
NOT FOR CONSTRUCTION

NO	BY	CK	REVISION	DATE	JOB NO: 24–419
3	MD	BL	PER TOWNSHIP REVIEW	10/14/25	1
2	MD	BL	PER TOWNSHIP REVIEW	08/28/25	
1	MD	BL	PER PLANNING COMMISSION MEETING	07/31/25	ISSUE DATE: 3/3/25

GENERAL NOTES

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

INDEMNIFICATION STATEMENT

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

CONTRACTOR TO FOLLOW MANUFACTURER SPECS/RECOMMENDATIONS THAT SUPERCEDE PLANS

GENERAL GRADING & SESC NOTES

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

GENERAL LANDSCAPE NOTES

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

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

12. ALL AREAS OF THE SITE THAT BECOME DISTURBED DURING CONSTRUCTION AND ARE NOT TO BE PAVED, STONED, LANDSCAPED, OR SODDED SHALL BE SEEDED AND MULCHED.

    SEED MIXTURE SHALL BE AS FOLLOWS:

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

    THE ABOVE SEED MIXTURE SHALL BE SOWN AT A RATE OF 250 LBS PER ACRE. PRIOR TO SEEDING, THE TOPSOIL SHALL BE FERTILIZED WITH A COMMERCIAL FERTILIZER WITH A 10–0–10 ANALYSIS:

    10% NITROGEN – MIN 25% FROM A UREA FORMALDEHYDE SOURCE
    0 % PHOSPHATE
    10% POTASH – SOURCE POTASSIUM SULFATE OR POTASSIUM NITRATE

    THE FIRST FERTILIZER APPLICATION SHALL BE AT A RATE OF 10 LBS PER 1000 SQ FT OF BULK FERTILIZER.

    IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ESTABLISH A DENSE LAWN OF PERMANENT GRASSES, FREE OF LUMPS AND DEPRESSIONS. ANY PART OF THE AREA THAT FAILS TO SHOW A UNIFORM GERMINATION SHALL BE RE–SEEDED AND SUCH RE–SEEDING SHALL CONTINUE UNTIL A DENSE LAWN IS ESTABLISHED. DAMAGE TO SEEDED AREAS RESULTING FROM EROSION SHALL BE REPAIRED BY THE CONTRACTOR.

13. ALL AREAS OF THE SITE SCHEDULED FOR SEEDING OR SODDING SHALL FIRST RECEIVE A 6–INCH LAYER OF CLEAN, FRIABLE TOPSOIL. THE SOIL SHALL BE DISCED AND SHALL BE GRADED IN CONFORMANCE WITH THE GRADING PLAN.
14. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE LOCATION OF ALL UTILITIES AND TO INFORM THE LANDSCAPE ARCHITECT OF ANY CONFLICTS PRIOR TO COMMENCING LANDSCAPING.

GENERAL UTILITY NOTES

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

GENERAL STORM NOTES

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

COVER	USE	FRAME	GRATE/BACK
'A'	MANHOLE	1040	TYPE 'B'
'B'	TYPE B2 CURB	7085	TYPE 'M1'
'C'	VALLEY CURB	7065	7045 TYPE 'M1' GRATE/7060 TYPE 'T1' BACK
'D'	PARKING LOTS	1040/5100	TYPE 'M1' GRATE OR 5105 TYPE 'M1' GRATE
'E'	LAWN	1040	TYPE 'O2' GRATE
'K'	TYPE C & F CURB	7045	TYPE 'M1' GRATE/7050 TYPE 'T1' BACK

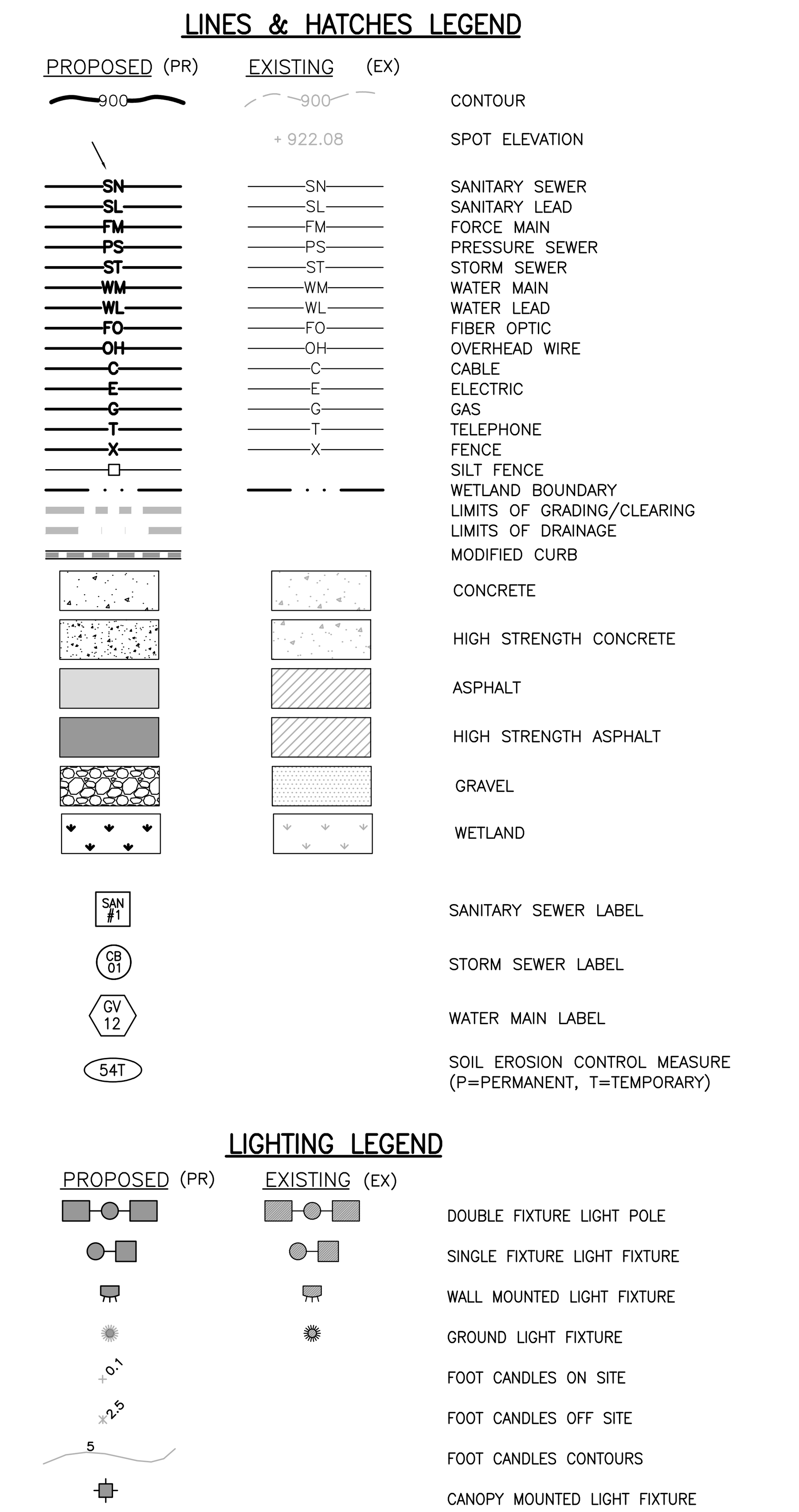
10. THE PROPOSED DRAINAGE SYSTEM IS TO BE OWNED AND PROPERLY MAINTAINED BY THE PROPERTY OWNER (LIVINGSTON COUNTY ONLY)

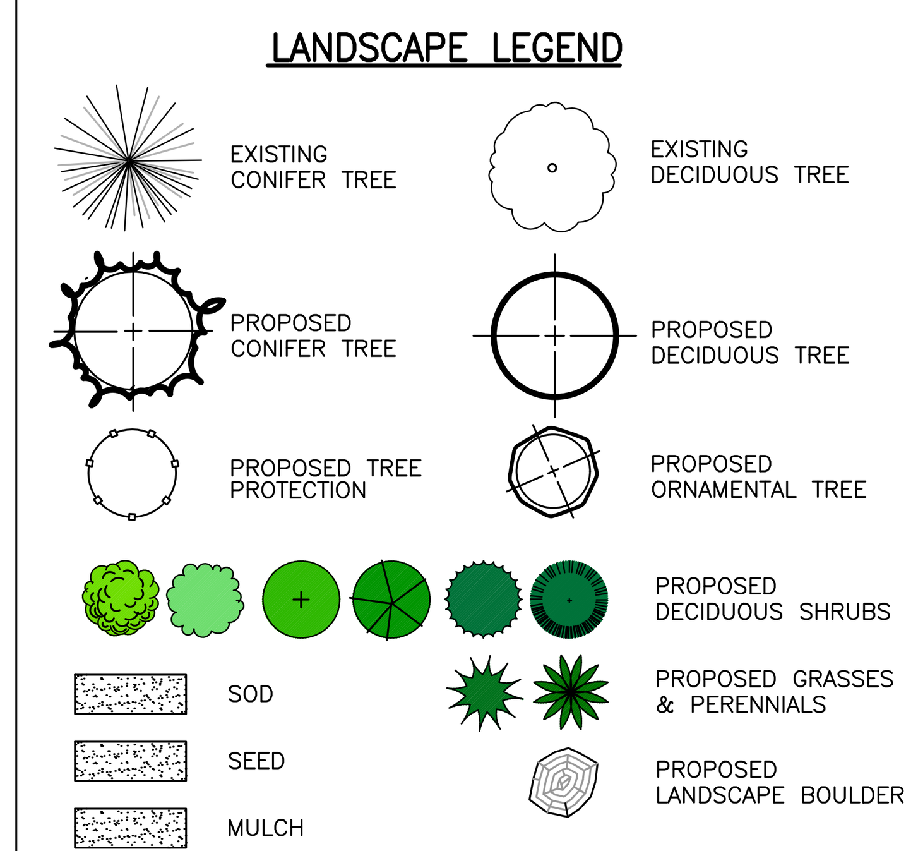
GENERAL SANITARY NOTES

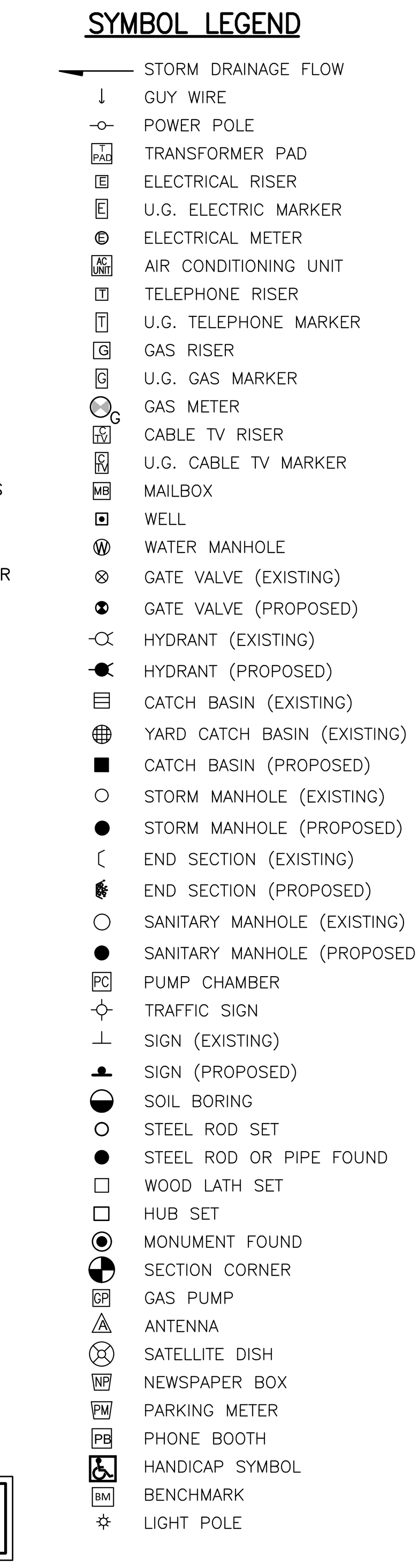
1. ALL SANITARY PIPE LENGTHS ARE SHOWN FROM C/L OF STRUCTURE TO C/L OF STRUCTURE.
2. SANITARY PIPE MATERIALS SHALL BE AS FOLLOWS:
   - 2.1. PVC SDR–26 (SANITARY MAIN)
   - 2.2. PVC SDR–23.5 (SANITARY LEADS)
   - 2.3. HDPE DR–11 (SANITARY FORCEMAIN)
3. ALL PVC SDR SANITARY SEWER PIPE SHALL MEET THE REQUIREMENTS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

GENERAL WATERMAIN NOTES

1. WATERMAIN PIPE MATERIALS SHALL BE AS FOLLOWS:
   - 1.1. D.I.P. CL.52 (WATERMAIN)
   - 1.2. TYPE 'K' COPPER (WATER LATERAL – MAIN TO CURB STOP)
   - 1.3. HDPE DR–9 (WATER LATERAL – CURB STOP TO STUB)
2. WATERMAIN FITTINGS SHALL BE OF DUCTILE IRON WITH CEMENT MORTAR LINING AND MECHANICAL JOINTS CONFORMING TO AWWA C110.
3. WATERMAINS SHALL BE DISINFECTED IN ACCORDANCE WITH AWWA C651. BAC–T SAMPLES SHALL BE TAKEN IN ACCORDANCE WITH R235.11110 OF THE ADMINISTRATIVE RULES PROMULGATED UNDER MICHIGAN SAFE DRINKING WATER ACT, 1976 PA 399, AS AMENDED.
4. ALLOWABLE LEAKAGE OR HYDROSTATIC PRESSURE TESTING SHALL BE IN ACCORDANCE WITH AWWA C600 AND C605.
5. MAXIMUM DEFLECTION AT PIPE JOINTS SHALL BE IN ACCORDANCE WITH PIPE MANUFACTURERS CURRENT RECOMMENDATIONS AND AWWA SPECIFICATIONS.
6. A FULL STICK OF PIPE SHALL BE LAID CENTERED AT A PIPE CROSSING IN ORDER TO MAINTAIN THE MAXIMUM SEPARATION OF WATERMAIN JOINT TO THE CROSSING PIPE.
7. WATERMAIN SHALL BE INSTALLED WITH A MINIMUM OF 5.5' OF COVER FROM FINISHED GRADE TO TOP OF PIPE AND NO MORE THAN 8' OF COVER, UNLESS SPECIAL CONDITIONS WARRANT.
8. WATERMAIN VALVES SHALL BE IRON BODY RESILIENT WEDGE GATE VALVES, NON–RISING STEMS, COUNTERCLOCKWISE OPEN, AWWA C509.
9. FIRE HYDRANTS SHALL BE INSTALLED WITH AN AUXILIARY VALVE WITH CAST IRON VALVE BOX. THE HYDRANT PUMPER HOSE CONNECTION SHALL FACE THE ROADWAY.
10. THE BREAKAWAY FLANGE AND ALL BELOW GRADE FITTINGS SHALL HAVE STAINLESS STEEL NUTS AND BOLTS.
11. PUBLIC WATERMAIN SHALL BE CENTERED WITHIN A 20 FOOT WIDE WATERMAIN EASEMENT.







ABBREVIATIONS

FFE	FINISHED FLOOR ELEVATION
BFE	BASEMENT FLOOR ELEVATION
GFE	GARAGE FLOOR ELEVATION
FG	FINISHED GRADE
T/A	TOP OF ASPHALT
T/C	TOP OF CURB
T/CO	TOP OF CONCRETE
T/W	TOP OF WALK
T/P	TOP OF PIPE
B/P	BOTTOM OF PIPE
F/L	FLOW LINE
RIM	RIM ELEVATION (AT FLOW LINE)
INV	INVERT ELEVATION
MH	MANHOLE
CB	CATCH BASIN
RY	REAR YARD
YD	YARD DRAIN
RD	ROOF DRAIN
FES	FLARED END SECTION
CMP	CORRUGATED METAL PIPE
CPP	CORRUGATED PLASTIC PIPE
RCP	REINFORCED CONCRETE PIPE
HDPE	HIGH DENSITY POLYETHYLENE
PVC	POLYVINYL CHLORIDE
DIP	DUCTILE IRON PIPE
GV	GATE VALVE
GVW	GATE VALVE IN WELL
GVB	GATE VALVE IN BOX
HYD	HYDRANT
FDC	FIRE DEPARTMENT CONNECTION
UP	UTILITY POLE
NFV	NOT FIELD VERIFIED
TBR	TO BE REMOVED
L.	LIBER
P.	PAGE
L.C.R.	LIVINGSTON COUNTY RECORDS
(M&R)	MEASURED AND RECORD
L.O.B.	POINT OF BEGINNING

FOR SITE PLAN APPROVAL ONLY!
NOT FOR CONSTRUCTION

THE LOCATION AND ELEVATION OF EXISTING UNDERGROUND UTILITIES AS SHOWN ON THESE DRAWINGS ARE ONLY APPROXIMATE. NO GUARANTEE IS EITHER EXPRESSED OR IMPLIED AS TO THE COMPLETENESS OR ACCURACY THEREOF. THE CONTRACTOR SHALL BE EXCLUSIVELY RESPONSIBLE FOR DETERMINING THE EXACT LOCATION AND ELEVATION OF EXISTING UTILITIES AND PROPOSED UTILITY CROSSINGS IN THE FIELD PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IF ANY CONFLICTS ARE APPARENT OR IF THE LOCATION OR DEPTH DIFFERS SIGNIFICANTLY FROM THE PLANS.

3 WORKING DAYS
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1–800–482–7171
(TOLL FREE)
FOR THE LOCATION OF UNDERGROUND FACILITIES

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

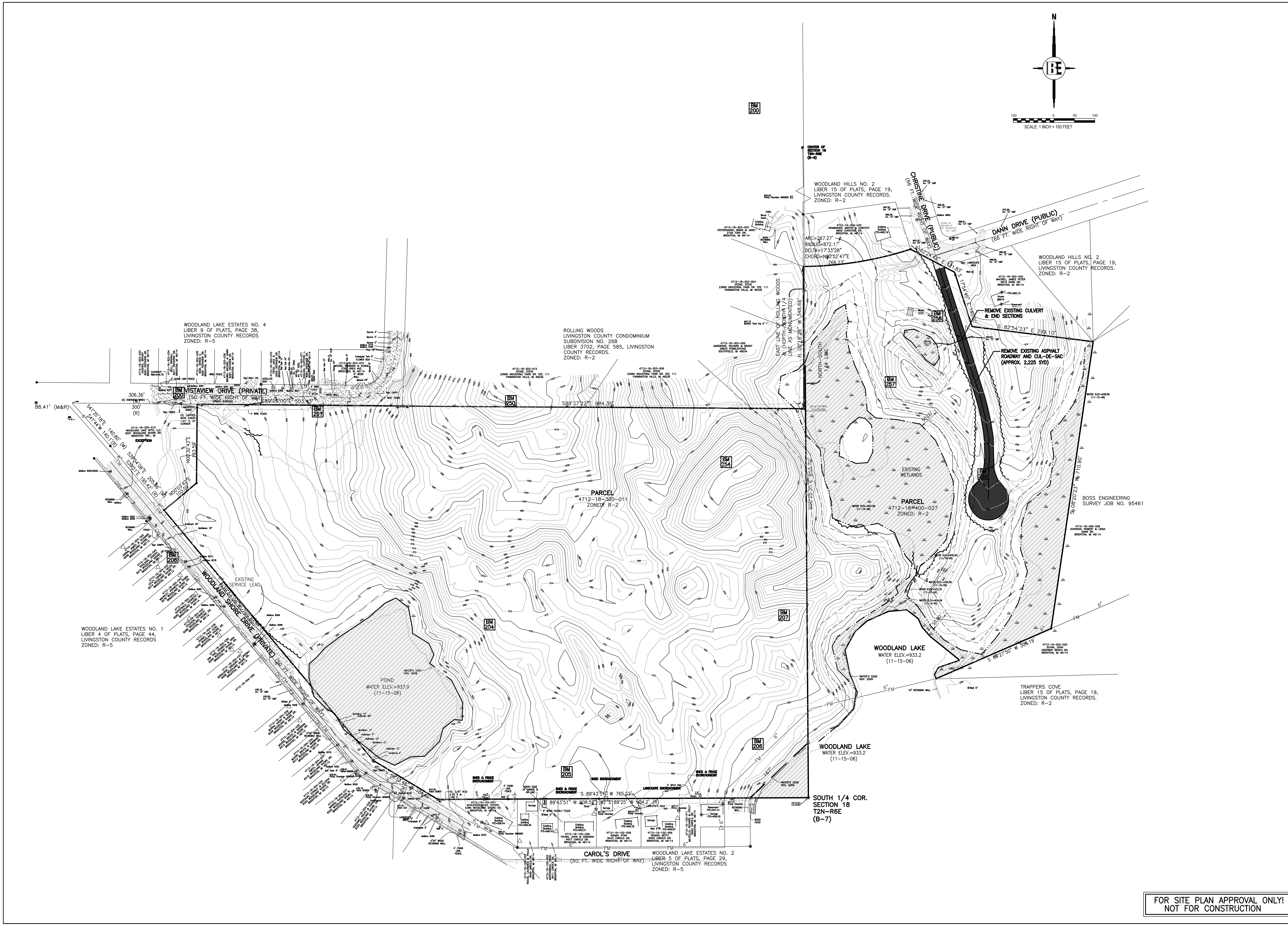
PROJECT
THE COVE AT WOODLAND LAKE

PREPARED FOR
MITCH HARRIS BUILDING COMPANY
211 NORTH FIRST STREET, SUITE 100
BRIGHTON, MI 48116
810.229.7838

TITLE
GENERAL NOTES & LEGEND

NO	BY	REVISION PER	DATE
3	MD	PER TOWNSHIP REVIEW	10/14/25
2	MD	PER TOWNSHIP REVIEW	08/28/25
1	MD	PER PLANNING COMMISSION MEETING	08/04/25

DESIGNED BY: ST
DRAWN BY: NL
CHECKED BY:
SCALE: NO SCALE
JOB NO: 24–419
DATE: 7/14/25
SHEET NO. 2



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PREPARED FOR
MITCH HARRIS BUILDING COMPANY
211 NORTH FIRST STREET, SUITE 100
BRIGHTON, MI 48116
810.229.7838

TITLE
BOUNDARY & TOPOGRAPHIC SURVEY

NO	BY	REVISION PER	DATE
3	MD	PER TOWNSHIP REVIEW	10/14/25
2	MD	PER TOWNSHIP REVIEW	08/28/25
1	MD	PER PLANNING COMMISSION MEETING	08/04/25

DESIGNED BY: ST
DRAWN BY: NL
CHECKED BY:
SCALE: 1" = 100'
JOB NO: 24-419
DATE: 7/14/25
SHEET NO. 3

COMPATIBLE LAND USE MATRIX

Accident Safety Zone	Land Use Characteristics	Land Use Guidelines	Land Use Planning Strategies *All aviation uses are acceptable
Zone 3	Population Density	Avoid land uses which concentrate people indoors or outdoors.	1. < 25 people/acre. 2. Zone land uses, which by their nature, will be relatively unoccupied by people (i.e. mini-storage, small parking lots).
	Residential vs. Non-Residential Land Use	Limit residential development to Low Density housing standards. All non-residential land uses permitted outright subject to the Special Function Land Use guidelines.	1. Create a height hazard overlay ordinance around the airport. 2. Obtain avigation and obstruction easements. 3. During site development process, shift all structures away from the runway centerlines if possible. 4. Prohibit mobile home parks. 5. Landscaping requirements shall establish only low growing vegetation. 6. Prohibit high overhead outdoor lighting. 7. Require downward shading of lighting to reduce glare. 8. Evaluate all possible permitted conditional uses to assure compatible land use.
	Special Function Land Use	Prohibit all Special Function Land Uses.	1. Prohibit overhead utilities and all noise sensitive land uses. 2. Zone land for uses other than for schools, play fields, hospitals, nursing homes, daycare facilities and churches. 3. Limit storage of large quantities of hazardous or flammable material. 4. Ensure permitted uses will not create large areas of standing water, or generate smoke/steam, etc.

THE COVE AT WOODLAND LAKE PUD – NARRATIVE

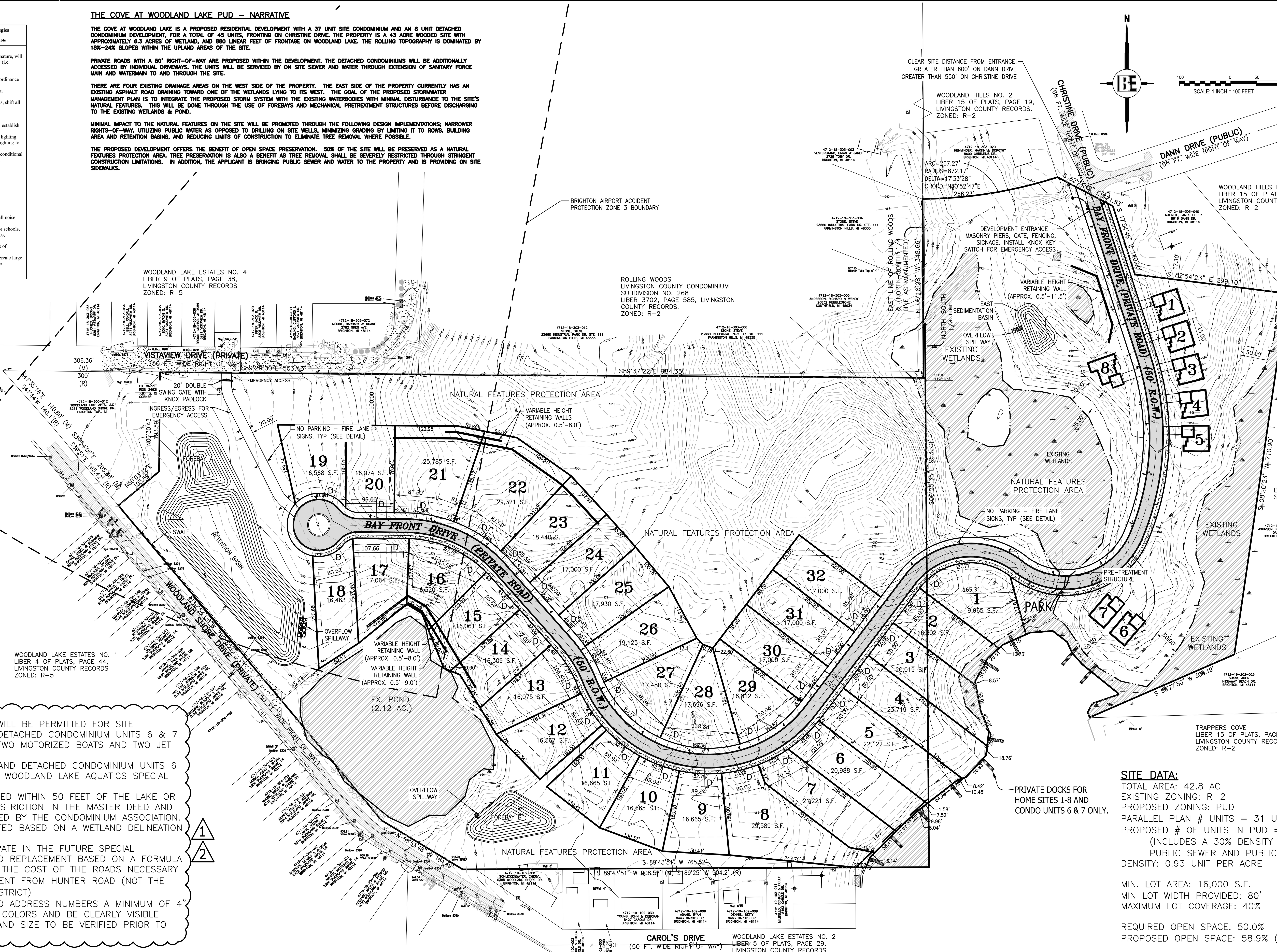
THE COVE AT WOODLAND LAKE IS A PROPOSED RESIDENTIAL DEVELOPMENT WITH A 37 UNIT SITE CONDOMINIUM AND AN 8 UNIT DETACHED CONDOMINIUM DEVELOPMENT, FOR A TOTAL OF 45 UNITS, FRONTING ON CHRISTINE DRIVE. THE PROPERTY IS A 43 ACRE WOODED SITE WITH APPROXIMATELY 6.3 ACRES OF WETLAND, AND 880 LINEAR FEET OF FRONTAGE ON WOODLAND LAKE. THE ROLLING TOPOGRAPHY IS DOMINATED BY 18%–24% SLOPES WITHIN THE UPLAND AREAS OF THE SITE.

PRIVATE ROADS WITH A 50' RIGHT-OF-WAY ARE PROPOSED WITHIN THE DEVELOPMENT. THE DETACHED CONDOMINIUMS WILL BE ADDITIONALLY ACCESSED BY INDIVIDUAL DRIVEWAYS. THE UNITS WILL BE SERVICED BY ON SITE SEWER AND WATER THROUGH EXTENSION OF SANITARY FORCE MAIN AND WATERMAIN TO AND THROUGH THE SITE.

THERE ARE FOUR EXISTING DRAINAGE AREAS ON THE WEST SIDE OF THE PROPERTY. THE EAST SIDE OF THE PROPERTY CURRENTLY HAS AN EXISTING ASPHALT ROAD DRAINING TOWARD ONE OF THE WETLANDS LYING TO ITS WEST. THE GOAL OF THE PROPOSED STORMWATER MANAGEMENT PLAN IS TO INTEGRATE THE PROPOSED STORM SYSTEM WITH THE EXISTING WATERBODIES WITH MINIMAL DISTURBANCE TO THE SITE'S NATURAL FEATURES. THIS WILL BE DONE THROUGH THE USE OF FOREBAYS AND MECHANICAL PRETREATMENT STRUCTURES BEFORE DISCHARGING TO THE EXISTING WETLANDS & POND.

MINIMAL IMPACT TO THE NATURAL FEATURES ON THE SITE WILL BE PROMOTED THROUGH THE FOLLOWING DESIGN IMPLEMENTATIONS; NARROWER RIGHTS-OF-WAY, UTILIZING PUBLIC WATER AS OPPOSED TO DRILLING ON SITE WELLS, MINIMIZING GRADING BY LIMITING IT TO ROWS, BUILDING AREA AND RETENTION BASINS, AND REDUCING LIMITS OF CONSTRUCTION TO ELIMINATE TREE REMOVAL WHERE POSSIBLE.

THE PROPOSED DEVELOPMENT OFFERS THE BENEFIT OF OPEN SPACE PRESERVATION. 50% OF THE SITE WILL BE PRESERVED AS A NATURAL FEATURES PROTECTION AREA. TREE PRESERVATION IS ALSO A BENEFIT AS TREE REMOVAL SHALL BE SEVERELY RESTRICTED THROUGH STRINGENT CONSTRUCTION LIMITATIONS. IN ADDITION, THE APPLICANT IS BRINGING PUBLIC SEWER AND WATER TO THE PROPERTY AND IS PROVIDING ON SITE SIDEWALKS.



ADJACENT PROPERTY ANALYSIS

WOODLAND LAKE ESTATES NO. 1
MINIMUM LOT AREA: 5,156 S.F.
TOTAL AREA OF DEVELOPMENT: 23.43 AC
NUMBER OF UNITS: 88
DENSITY: 3.75 UNITS PER ACRE

WOODLAND LAKE ESTATES NO. 4
MINIMUM LOT AREA: 9,000 S.F.
TOTAL AREA OF DEVELOPMENT: 49.25 AC
NUMBER OF UNITS: 140
DENSITY: 2.84 UNITS PER ACRE

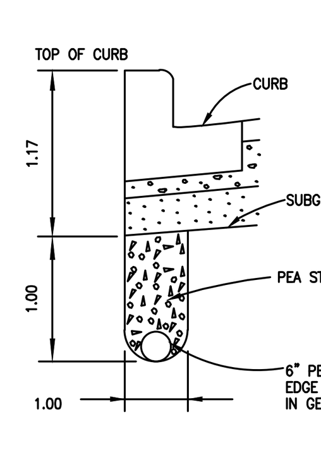
WOODLAND HILLS
MINIMUM LOT AREA: 15,000 S.F.
TOTAL AREA OF DEVELOPMENT: 113.27 AC
NUMBER OF UNITS: 164
DENSITY: 1.45 UNITS PER ACRE

ROLLING WOODS
MINIMUM LOT AREA: 36,098 S.F.
TOTAL AREA OF DEVELOPMENT: 21.83 AC
NUMBER OF UNITS: 12
DENSITY: 0.55 UNITS PER ACRE

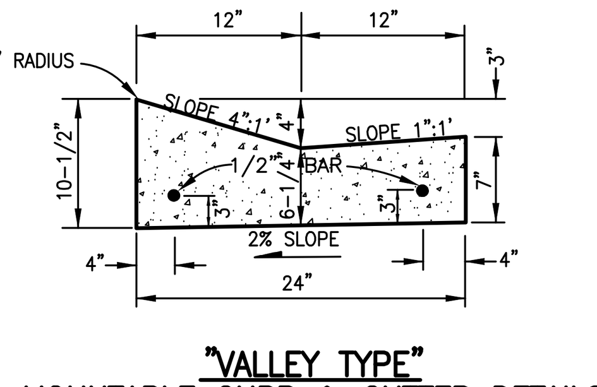
* AREA CALCULATED USING INFORMATION FROM LIVINGSTON COUNTY GIS. ALL AREAS ARE APPROXIMATE.

NOTES

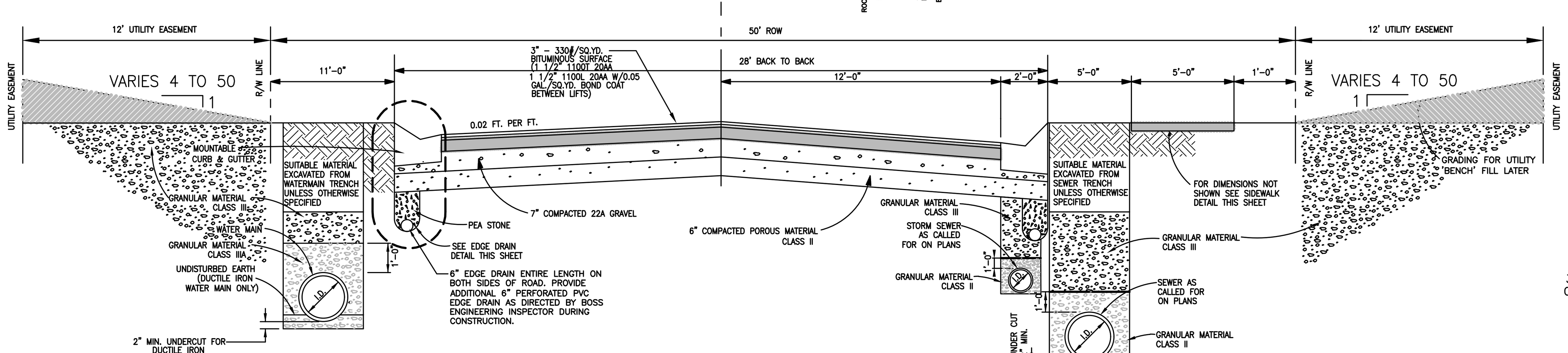
1. DOCK NOTE: INCLUDED DOCKS WILL BE PERMITTED FOR SITE CONDOMINIUM UNITS 1–8 AND DETACHED CONDOMINIUM UNITS 6 & 7. EACH DOCK WILL BE ALLOWED TWO MOTORIZED BOATS AND TWO JET SKIS.
2. SITE CONDOMINIUM UNITS 1–8 AND DETACHED CONDOMINIUM UNITS 6 & 7 SHALL PARTICIPATE IN THE WOODLAND LAKE AQUATICS SPECIAL ASSESSMENT DISTRICT.
3. NO FERTILIZER WILL BE PERMITTED WITHIN 50 FEET OF THE LAKE OR WETLANDS. THIS WILL BE A RESTRICTION IN THE MASTER DEED AND BY-LAWS AND WILL BE ENFORCED BY THE CONDOMINIUM ASSOCIATION.
4. THE WETLAND LIMITS ARE UPDATED BASED ON A WETLAND DELINEATION CONDUCTED IN MAY 2025. (1)
5. DEVELOPER AGREES TO PARTICIPATE IN THE FUTURE SPECIAL ASSESSMENT DISTRICT FOR ROAD REPLACEMENT BASED ON A FORMULA OF 50% CONTRIBUTION TOWARD THE COST OF THE ROADS NECESSARY FOR ACCESS TO THE DEVELOPMENT FROM HUNTER ROAD (NOT THE ENTIRE SPECIAL ASSESSMENT DISTRICT) (2)
6. RESIDENCES SHALL BE PROVIDED ADDRESS NUMBERS A MINIMUM OF 4" HIGH LETTERS OF CONTRASTING COLORS AND BE CLEARLY VISIBLE FROM THE STREET. LOCATION AND SIZE TO BE VERIFIED PRIOR TO INSTALLATION.



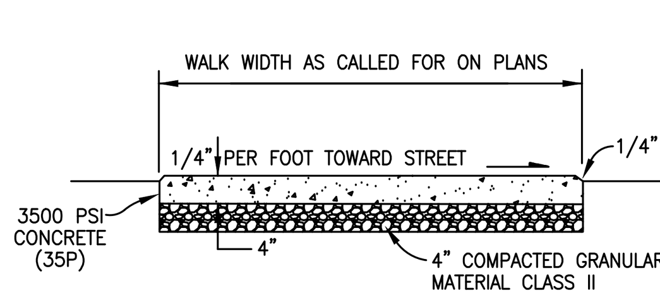
EDGE DRAIN DETAIL
NO SCALE



"VALLEY TYPE" MOUNTABLE CURB & GUTTER DETAILS
(NO SCALE)



TYPICAL ASPHALT ROAD CROSS-SECTION W/EDGE DRAIN
NO SCALE



4" CONCRETE SIDEWALK
(NO SCALE)

SITE DATA:

TOTAL AREA: 42.8 AC
EXISTING ZONING: R-2
PROPOSED ZONING: PUD
PARALLEL PLAN # UNITS = 31 UNITS
PROPOSED # OF UNITS IN PUD = 40 UNITS
(INCLUDES A 30% DENSITY BONUS FOR PUBLIC SEWER AND PUBLIC WATER)
DENSITY: 0.93 UNIT PER ACRE

MIN. LOT AREA: 16,000 S.F.
MIN LOT WIDTH PROVIDED: 80'
MAXIMUM LOT COVERAGE: 40%

REQUIRED OPEN SPACE: 50.0%
PROPOSED OPEN SPACE: 58.9% (25.22 ACRES)

MAXIMUM % OF OPEN SPACE BEING WETLANDS/BASINS: 50.0%
PROPOSED % OF OPEN SPACE BEING WETLAND/BASINS: 25.5%

PROPOSED RIGHT OF WAY WIDTH: 50'
PROPOSED ROAD WIDTH: 28' BACK OF CURB TO BACK OF CURB
SETBACKS:
FRONT: 25'
SIDE: 10'
REAR: 30'
LAKE (SINGLE FAMILY HOME): 100'
LAKE (DETACHED CONDO): 50'
WETLAND: 50'

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3 WORKING DAYS BEFORE YOU DIG CALL MISS DIG 1-800-482-7171 (TOLL FREE) FOR THE LOCATION OF UNDERGROUND FACILITIES

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

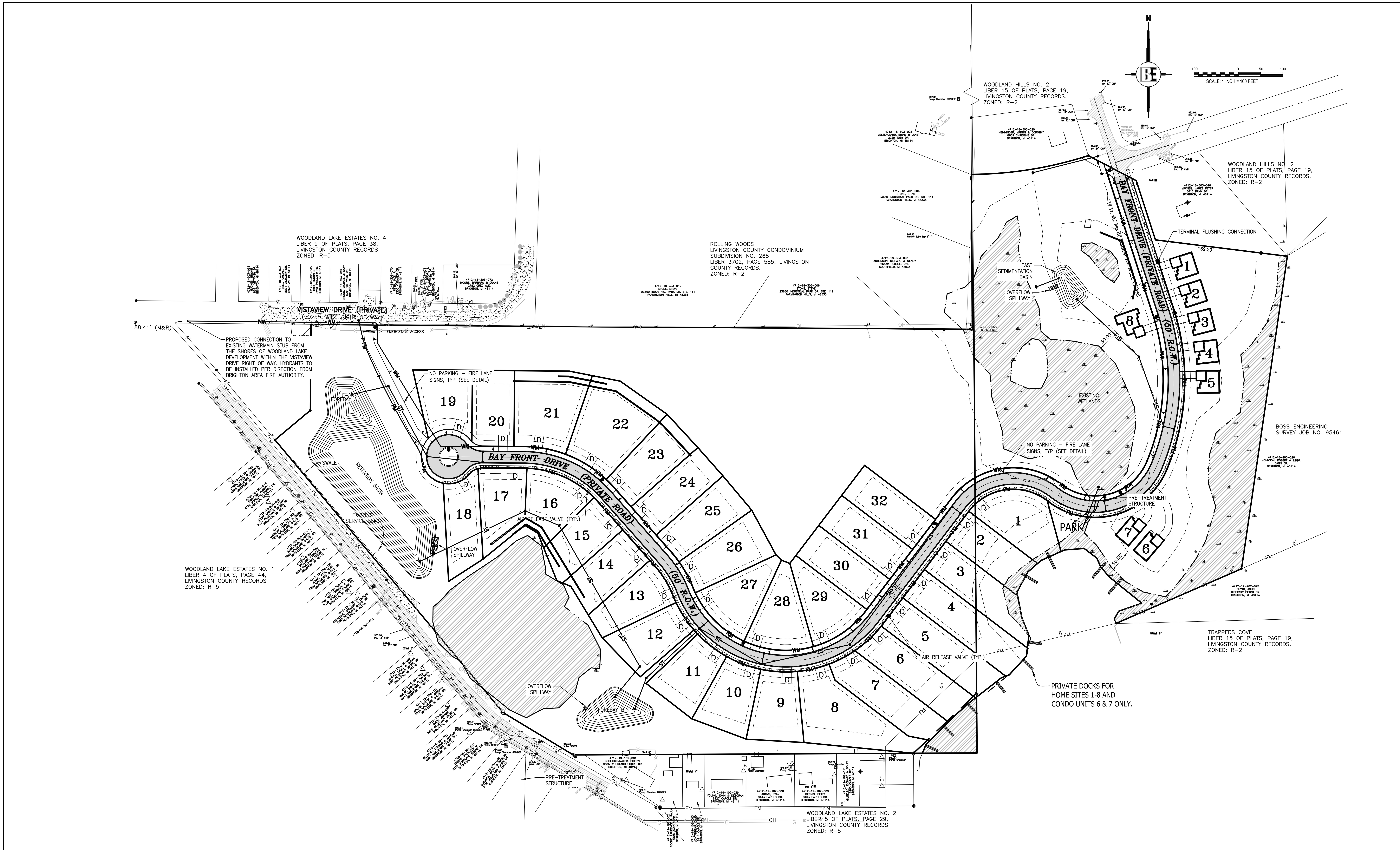
PROJECT: THE COVE AT WOODLAND LAKE

PREPARED FOR: MITCH HARRIS BUILDING COMPANY
211 NORTH FIRST STREET, SUITE 100
BRIGHTON, MI 48116
810.229.7838

TITLE: PLANNED UNIT DEVELOPMENT PLAN

NO	BY	REVISION PER	DATE
3	MD	PER TOWNSHIP REVIEW	10/14/25
2	MD	PER TOWNSHIP REVIEW	08/28/25
1	MD	PER PLANNING COMMISSION MEETING	08/04/25

DESIGNED BY: ST
DRAWN BY: NL
CHECKED BY:
SCALE: 1" = 100'
JOB NO: 24-419
DATE: 7/14/25
SHEET NO. 4



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HOWELL, MI. 48843
517.546.4836 FAX 517.548.1670

PROJECT
THE COVE AT WOODLAND LAKE

PREPARED FOR
MITCH HARRIS BUILDING COMPANY
211 NORTH FIRST STREET, SUITE 100
BRIGHTON, MI 48116
810.229.7838

TITLE
PRELIMINARY UTILITY PLAN

NO	BY	REVISION PER	DATE
3	MD	PER TOWNSHIP REVIEW	10/14/25
2	MD	PER TOWNSHIP REVIEW	08/28/25
1	MD	PER PLANNING COMMISSION MEETING	08/04/25

DESIGNED BY: ST
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JOB NO: 24-419
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SHEET NO. 5

COMPATIBLE LAND USE MATRIX

Accident Safety Zone	Land Use Characteristics	Land Use Guidelines	Land Use Planning Strategies *All aviation uses are acceptable
Zone 3	Population Density	Avoid land uses which concentrate people indoors or outdoors.	1. < 25 people/acre. 2. Zone land uses, which by their nature, will be relatively unoccupied by people (i.e. mini-storage, small parking lots).
	Residential vs. Non-Residential Land Use	Limit residential development to Low Density housing standards. All non-residential land uses permitted outright subject to the Special Function Land Use guidelines.	1. Create a height hazard overlay ordinance around the airport. 2. Obtain avigation and obstruction easements. 3. During site development process, shift all structures away from the runway centerlines if possible. 4. Prohibit mobile home parks. 5. Landscaping requirements shall establish only low growing vegetation. 6. Prohibit high overhead outdoor lighting. 7. Require downward shading of lighting to reduce glare. 8. Evaluate all possible permitted conditional uses to assure compatible land use.
	Special Function Land Use	Prohibit all Special Function Land Uses.	1. Prohibit overhead utilities and all noise sensitive land uses. 2. Zone land for uses other than for schools, play fields, hospitals, nursing homes, daycare facilities and churches. 3. Limit storage of large quantities of hazardous or flammable material. 4. Ensure permitted uses will not create large areas of standing water, or generate smoke/steam, etc.

THE COVE AT WOODLAND LAKE PUD – NARRATIVE

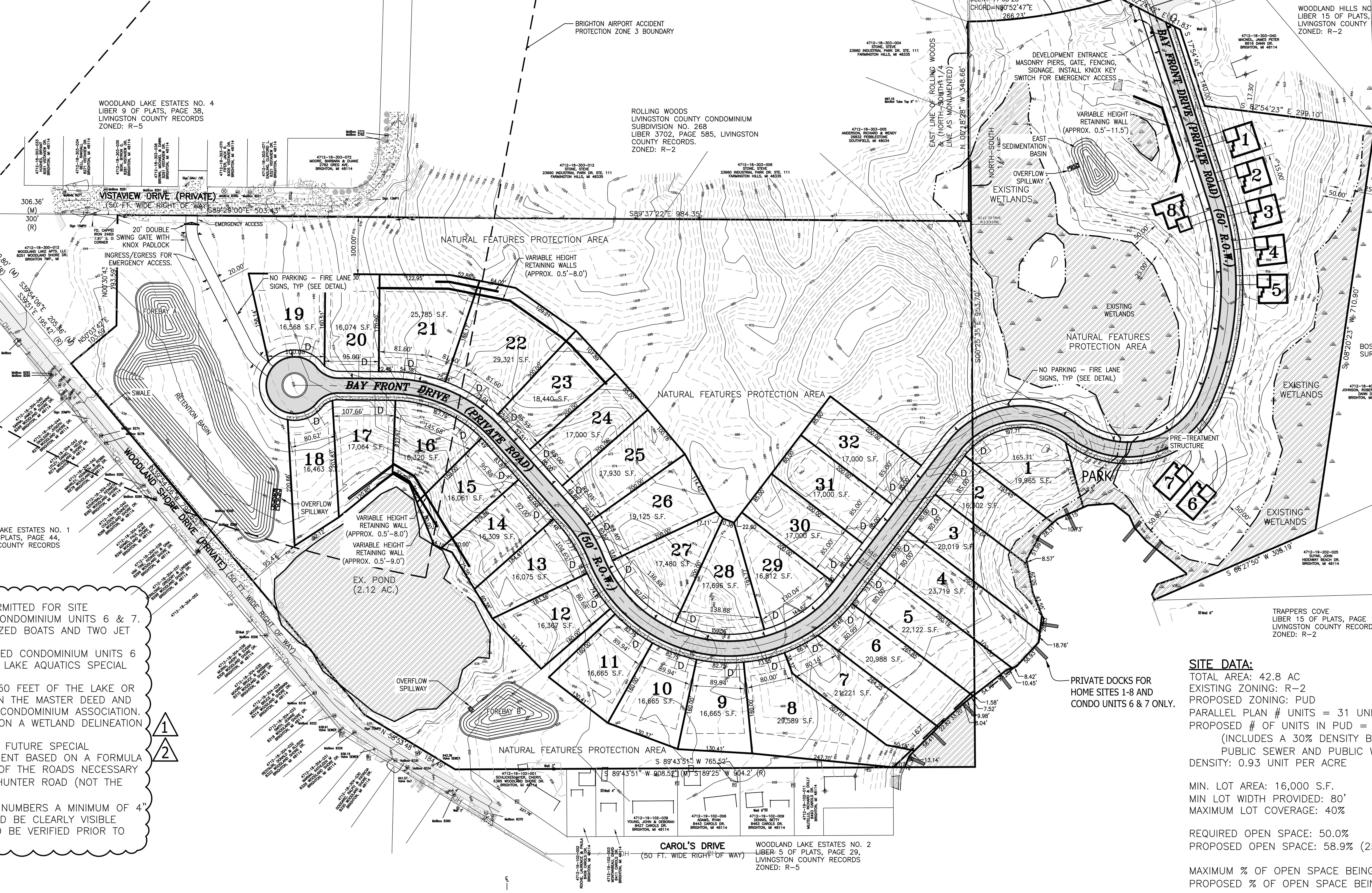
THE COVE AT WOODLAND LAKE IS A PROPOSED RESIDENTIAL DEVELOPMENT WITH A 37 UNIT SITE CONDOMINIUM AND AN 8 UNIT DETACHED CONDOMINIUM DEVELOPMENT, FOR A TOTAL OF 45 UNITS, FRONTING ON CHRISTINE DRIVE. THE PROPERTY IS A 43 ACRE WOODED SITE WITH APPROXIMATELY 6.3 ACRES OF WETLAND, AND 880 LINEAR FEET OF FRONTAGE ON WOODLAND LAKE. THE ROLLING TOPOGRAPHY IS DOMINATED BY 18%–24% SLOPES WITHIN THE UPLAND AREAS OF THE SITE.

PRIVATE ROADS WITH A 50' RIGHT-OF-WAY ARE PROPOSED WITHIN THE DEVELOPMENT. THE DETACHED CONDOMINIUMS WILL BE ADDITIONALLY ACCESSED BY INDIVIDUAL DRIVEWAYS. THE UNITS WILL BE SERVICED BY ON SITE SEWER AND WATER THROUGH EXTENSION OF SANITARY FORCE MAIN AND WATERMAIN TO AND THROUGH THE SITE.

THERE ARE FOUR EXISTING DRAINAGE AREAS ON THE WEST SIDE OF THE PROPERTY. THE EAST SIDE OF THE PROPERTY CURRENTLY HAS AN EXISTING ASPHALT ROAD DRAINING TOWARD ONE OF THE WETLANDS LYING TO ITS WEST. THE GOAL OF THE PROPOSED STORMWATER MANAGEMENT PLAN IS TO INTEGRATE THE PROPOSED STORM SYSTEM WITH THE EXISTING WATERBODIES WITH MINIMAL DISTURBANCE TO THE SITE'S NATURAL FEATURES. THIS WILL BE DONE THROUGH THE USE OF FOREBAYS AND MECHANICAL PRETREATMENT STRUCTURES BEFORE DISCHARGING TO THE EXISTING WETLANDS & POND.

MINIMAL IMPACT TO THE NATURAL FEATURES ON THE SITE WILL BE PROMOTED THROUGH THE FOLLOWING DESIGN IMPLEMENTATIONS; NARROWER RIGHTS-OF-WAY, UTILIZING PUBLIC WATER AS OPPOSED TO DRILLING ON SITE WELLS, MINIMIZING GRADING BY LIMITING IT TO ROWS, BUILDING AREA AND RETENTION BASINS, AND REDUCING LIMITS OF CONSTRUCTION TO ELIMINATE TREE REMOVAL WHERE POSSIBLE.

THE PROPOSED DEVELOPMENT OFFERS THE BENEFIT OF OPEN SPACE PRESERVATION. 50% OF THE SITE WILL BE PRESERVED AS A NATURAL FEATURES PROTECTION AREA. TREE PRESERVATION IS ALSO A BENEFIT AS TREE REMOVAL SHALL BE SEVERELY RESTRICTED THROUGH STRINGENT CONSTRUCTION LIMITATIONS. IN ADDITION, THE APPLICANT IS BRINGING PUBLIC SEWER AND WATER TO THE PROPERTY AND IS PROVIDING ON SITE SIDEWALKS.



ADJACENT PROPERTY ANALYSIS

WOODLAND LAKE ESTATES NO. 1
- MINIMUM LOT AREA: 5,156 S.F.
- TOTAL AREA OF DEVELOPMENT: 23.43 AC
- NUMBER OF UNITS: 88
- DENSITY: 3.75 UNITS PER ACRE

WOODLAND LAKE ESTATES NO. 4
- MINIMUM LOT AREA: 9,000 S.F.
- TOTAL AREA OF DEVELOPMENT: 49.25 AC
- NUMBER OF UNITS: 140
- DENSITY: 2.84 UNITS PER ACRE

WOODLAND HILLS
- MINIMUM LOT AREA: 15,000 S.F.
- TOTAL AREA OF DEVELOPMENT: 113.27 AC
- NUMBER OF UNITS: 164
- DENSITY: 1.45 UNITS PER ACRE

ROLLING WOODS
- MINIMUM LOT AREA: 36,098 S.F.
- TOTAL AREA OF DEVELOPMENT: 21.83 AC
- NUMBER OF UNITS: 12
- DENSITY: 0.55 UNITS PER ACRE

* AREA CALCULATED USING INFORMATION FROM LIVINGSTON COUNTY GIS. ALL AREAS ARE APPROXIMATE.

NOTES

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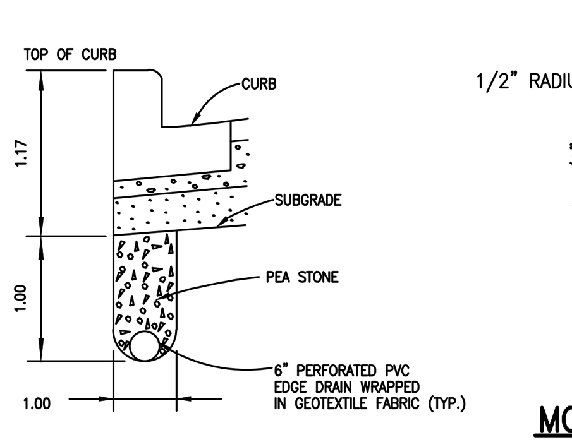
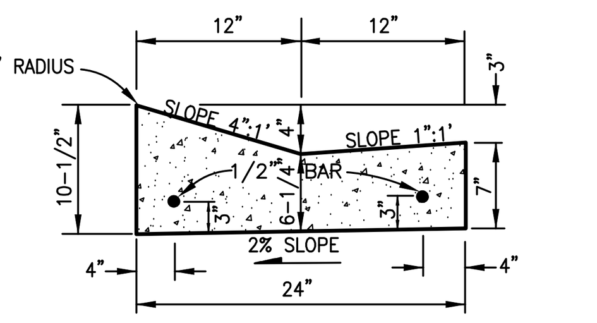


EDGE DRAIN DETAIL
NO SCALE



"VALLEY TYPE" MOUNTABLE CURB & GUTTER DETAILS
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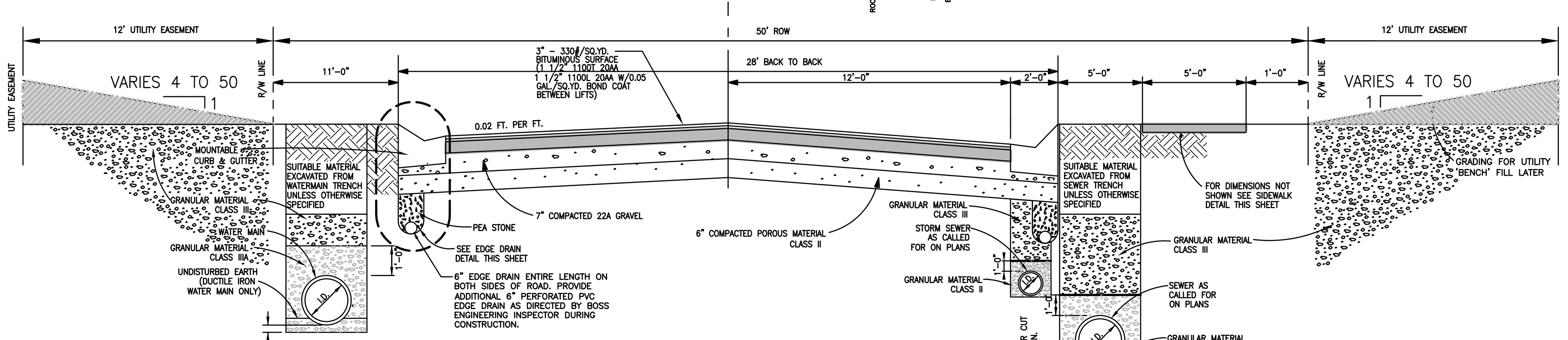

TYPICAL ASPHALT ROAD CROSS-SECTION W/EDGE DRAIN
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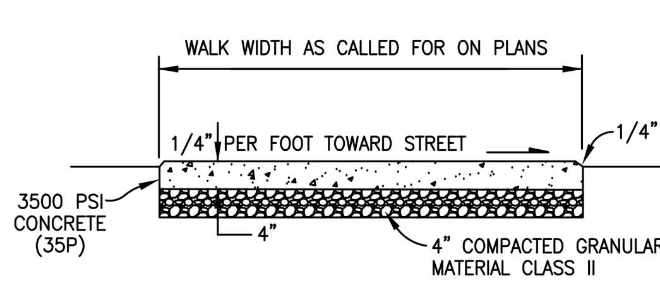

4" CONCRETE SIDEWALK
(NO SCALE)

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PROJECT: THE COVE AT WOODLAND LAKE

PREPARED FOR: MITCH HARRIS BUILDING COMPANY
211 NORTH FIRST STREET, SUITE 100
BRIGHTON, MI 48116
810.229.7838

TITLE: PLANNED UNIT DEVELOPMENT PLAN

NO	BY	REVISION PER	DATE
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2	MD	PER TOWNSHIP REVIEW	08/28/25
1	MD	PER PLANNING COMMISSION MEETING	08/04/25

DESIGNED BY: ST
DRAWN BY: NL
CHECKED BY:
SCALE: 1" = 100'
JOB NO: 24-419
DATE: 7/14/25
SHEET NO. 4

STORMWATER NARRATIVE

PRE-DEVELOPMENT DRAINAGE:

THE SITE CURRENTLY SHEET FLOWS TO A SMALL POND ON THE SOUTWEST EDGE OF THE SITE, TO THE WETLANDS LOCATED IN THE EASTERN SIDE OF THE SITE, OR DIRECTLY INTO WOODLAND LAKE ON THE SOUTHEAST SIDE OF THE SITE.

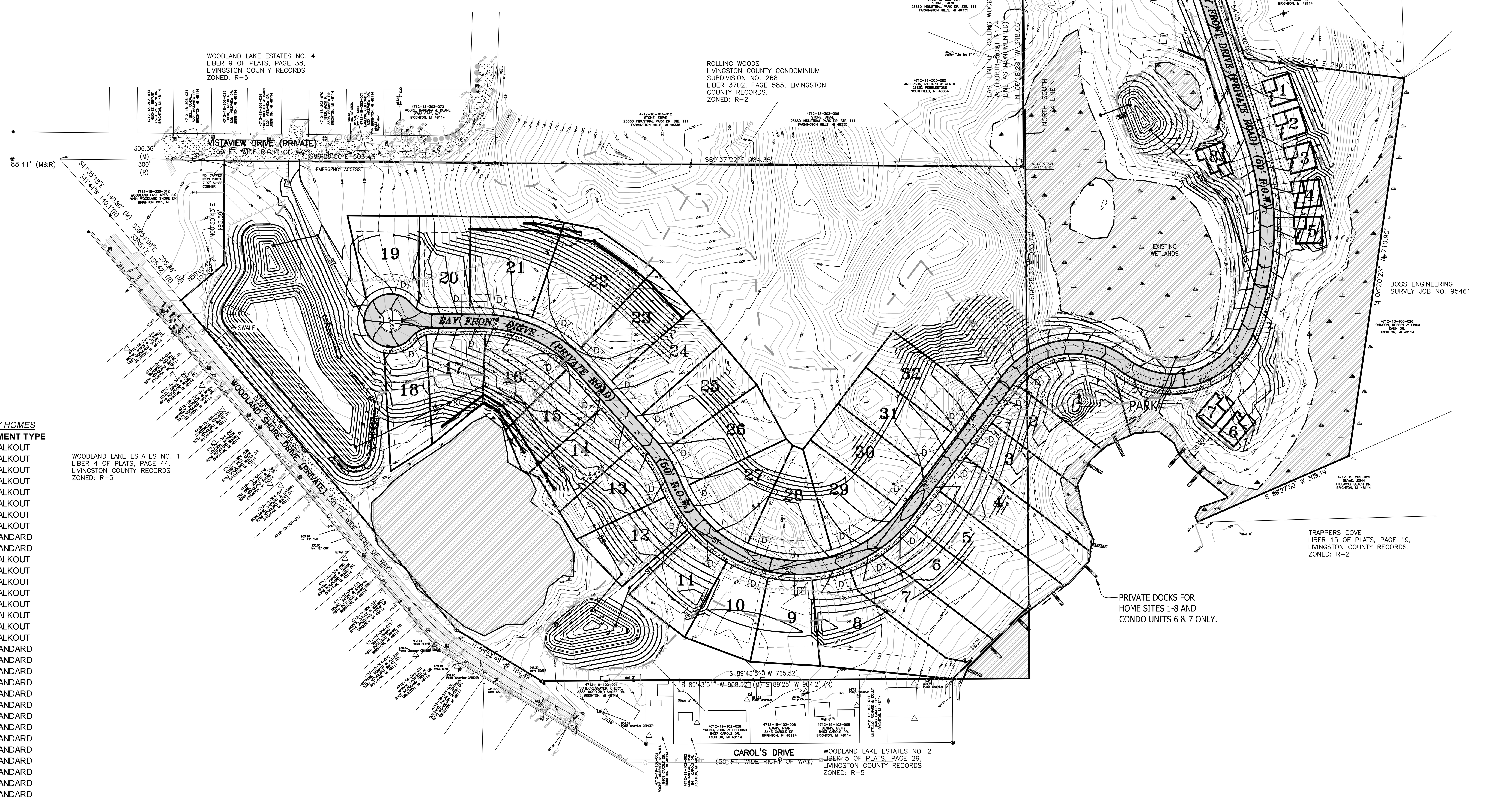
POST-DEVELOPMENT DRAINAGE:

IN THE POST-DEVELOPED CONDITION, THE SITE WILL CONTAIN HOUSING (SINGLE-FAMILY HOMES AND DETACHED CONDOMINUIMS) WITH ASSOCIATED STREETS AND DRIVES. STORM WATER FROM THESE ADDITIONAL IMPERVIOUS SURFACES ARE REQUIRED TO BE DETAINED AND PRE-TREATED ON SITE PRIOR TO DISCHARGE TO NATURAL DRAINAGE COURSES OR TO THE PROPOSED RETENTION BASIN. THE PROPOSED DEVELOPMENT WILL CONTAIN A STORM SEWER SYSTEM THAT WILL DIRECT STORM WATER PRIMARILY THROUGH SEDIMENTATION FOREBAYS TO IMPROVE WATER QUALITY BEFORE DISCHARGE INTO THE RETENTION BASIN OR EXISTING WETLANDS. THE DESIGN OF THE PROPOSED STORMWATER SYSTEM HAS THE PRIMARY GOAL OF MINIMIZING DISCHARGES TO WETLANDS THAT ARE CONNECTED TO WOODLAND LAKE IN AN EFFORT TO MAINTAIN THE WATER QUALITY OF WOODLAND LAKE

A MAJORITY OF THE DRAINAGE AREA ON SITE WILL BE DIRECTED INTO THE RETENTION BASIN LOCATED ON THE SOUTHWEST SIDE OF THE SITE. ON-SITE STORMWATER CATCH BASINS WILL DIRECT FLOW FROM STREETS, HOMES, AND SURROUDING AREAS INTO TWO SEDIMENTATION FOREBAYS (FOREBAYS A AND B) FOR PRE-TREATMENT OF THE STORMWATER. THOSE FOREBAYS WILL DISCHARGE INTO THE RETENTION BASIN. THE RETENTION BASIN HAS NO OUTLET. WATER IN THE RETNTION BASIN WILL INFILTRATE INTO THE SOIL. ALL ELEMENTS OF THE STORMWATER RETENTION SYSTEM HAVE BEEN DESIGNED PER THE LIVINGSTRON COUNTY AND BRIGHTON TOWNSHIP STORMWATER DESIGN STANDARDS.

STORMWATER IN THE NORTHEAST PORTION OF THE SITE WILL BE CAPTURED IN CATCH BASINS AND DIRECTED TO THE EAST SEDIMENTATION BASIN. AFTER ADEQUATE PRE-TREATMENT, THE EAST SEDIMENTATION BASIN WILL DISCHARGE INTO THE EXISTING ONSITE WETLANDS. THESE WETLANDS WILL PROVIDE A LARGE AREA FOR DETENTION OF STORMWATER FROM THE EAST SEDIMENTATION BASIN. THESE WETLANDS ARE CONNECTED TO THE SOUTH TO WOODLAND LAKE. THE EAST SEDIMENTATION BASIN HAS BEEN DESIGNED PER TOWNSHIP AND COUNTY DESIGN STANDARDS AND MEETS ALL EGLE REQUIRMENTS FOR DISCHARGE INTO A WETLAND.

THE THIRD DRAINAGE AREA CONTAINS THE HOMES ON LOT 1 AND DETACHED CONDOMINIUMS 5 AND 6, AS WELL AS A SMALL PORTION OF THE ROAD. DUE TO THE LOW ELEVATIONS OF THE ROADS AND EFFORTS TO MINIMIZE IMPACT ON THE SURROUNDING WETLANDS, FLOW FROM THIS AREA WILL BE CAPTURED AND ROUTED INTO A PRE-TREATMENT STORM STRUCTURE THAT WILL ADEQUATELY TREAT THE STORMWATER FLOW PER EGLE REQUIREMENTS. THE DISCHARGE FROM THE PRE-TREAMENT UNIT WILL FLOW INTO THE WETLAND TO THE NORTH, WHICH IS CONNECTED TO WOODLAND LAKE.



SINGLE FAMILY HOMES

NUMBER	BASEMENT TYPE
1	WALKOUT
2	WALKOUT
3	WALKOUT
4	WALKOUT
5	WALKOUT
6	WALKOUT
7	WALKOUT
8	WALKOUT
9	STANDARD
10	STANDARD
11	WALKOUT
12	WALKOUT
13	WALKOUT
14	WALKOUT
15	WALKOUT
16	WALKOUT
17	WALKOUT
18	WALKOUT
19	STANDARD
20	STANDARD
21	STANDARD
22	STANDARD
23	STANDARD
24	STANDARD
25	STANDARD
26	STANDARD
27	STANDARD
28	STANDARD
29	STANDARD
30	STANDARD
31	STANDARD
32	STANDARD

DETACHED CONDOS

NUMBER	BASEMENT TYPE
1	STANDARD
2	STANDARD
3	DAYLIGHT
4	WALKOUT
5	WALKOUT
6	WALKOUT
7	WALKOUT
8	WALKOUT

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PROJECT: THE COVE AT WOODLAND LAKE

PREPARED FOR: MITCH HARRIS BUILDING COMPANY
211 NORTH FIRST STREET, SUITE 100
BRIGHTON, MI 48116
810.229.7838

TITLE: PRELIMINARY GRADING & DRAINAGE PLAN

NO	BY	REVISION PER	DATE
3	MD	PER TOWNSHIP REVIEW	10/14/25
2	MD	PER TOWNSHIP REVIEW	08/28/25
1	MD	PER PLANNING COMMISSION MEETING	08/04/25

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SCALE: 1" = 100'
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DATE: 7/14/25
SHEET NO. 6

FOR SITE PLAN APPROVAL ONLY!
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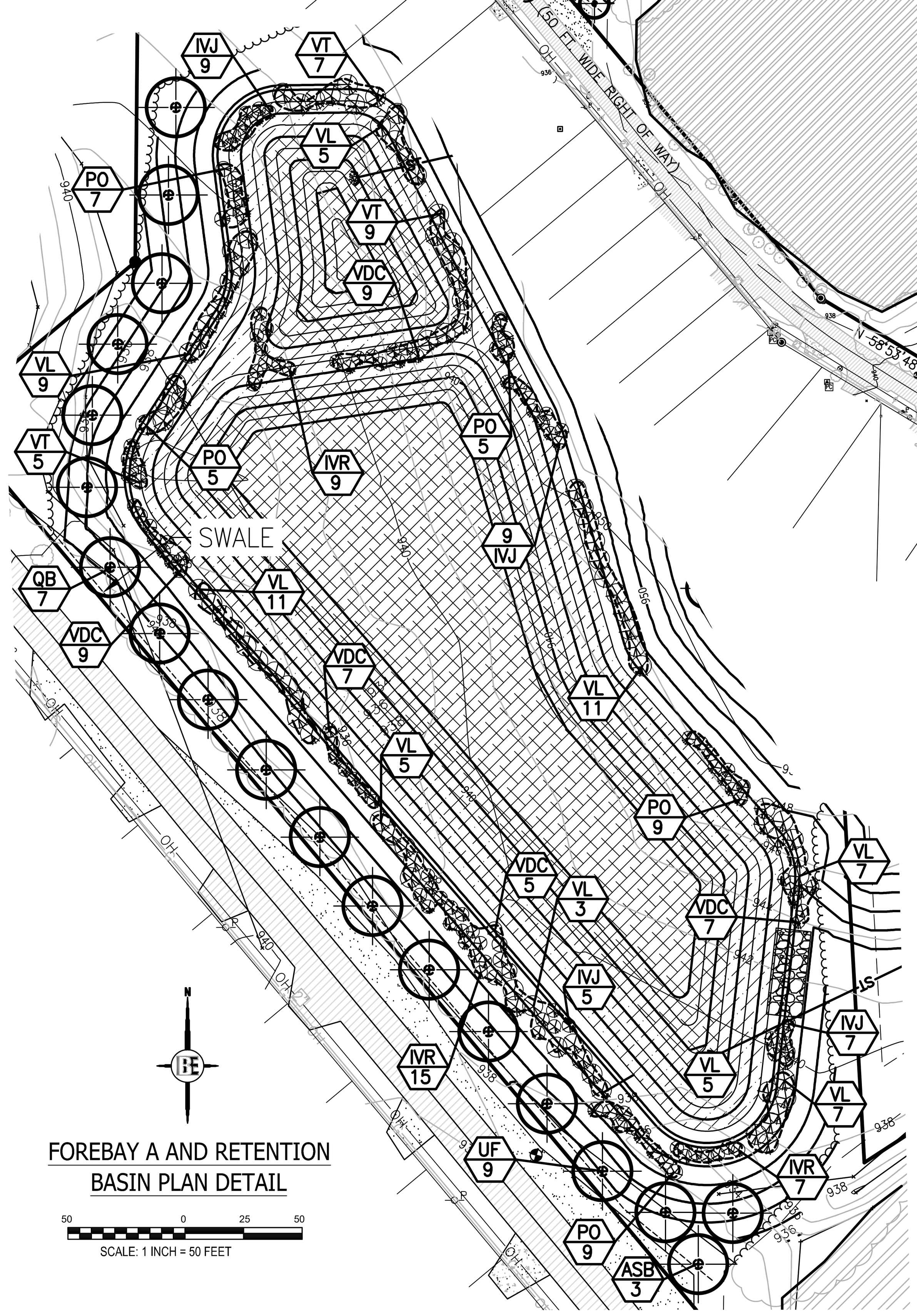
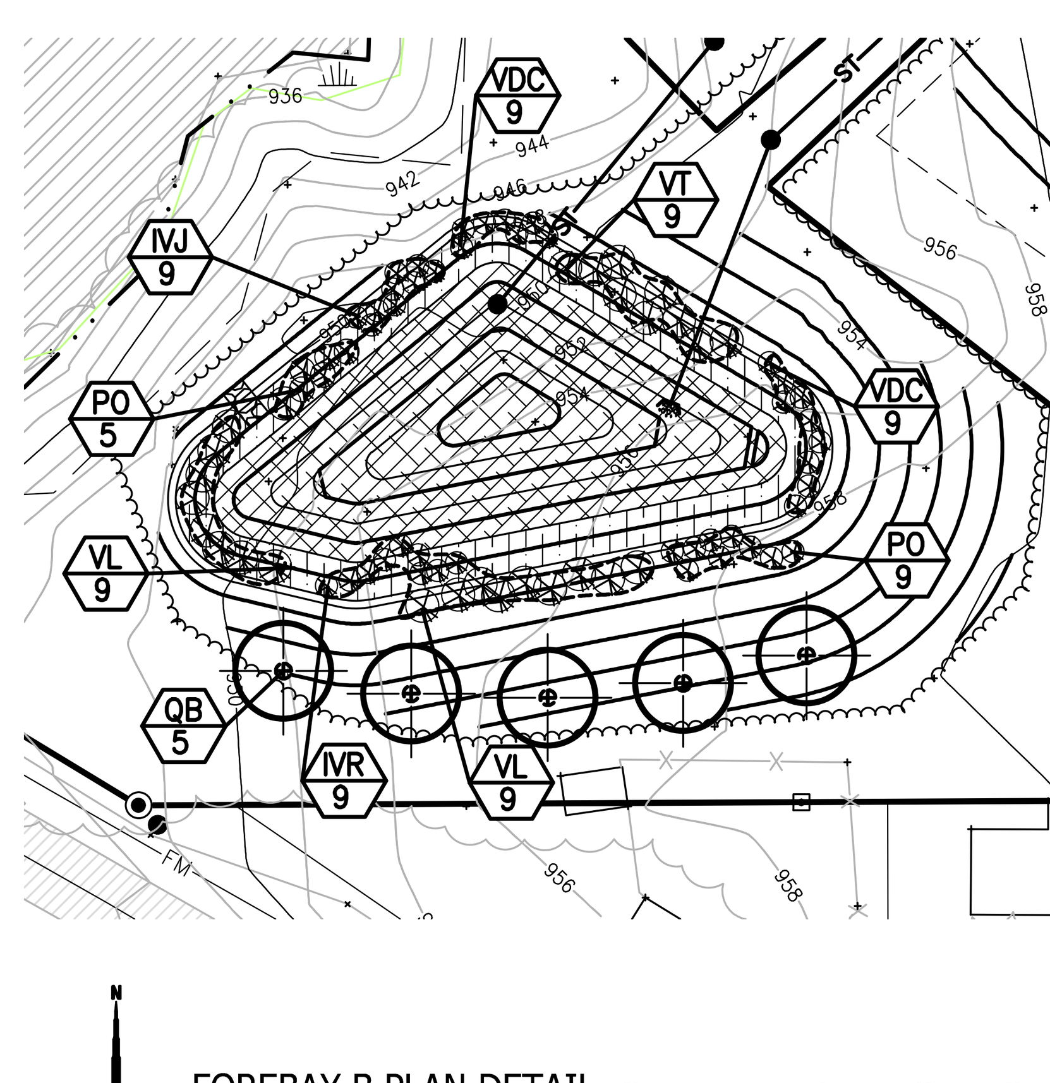
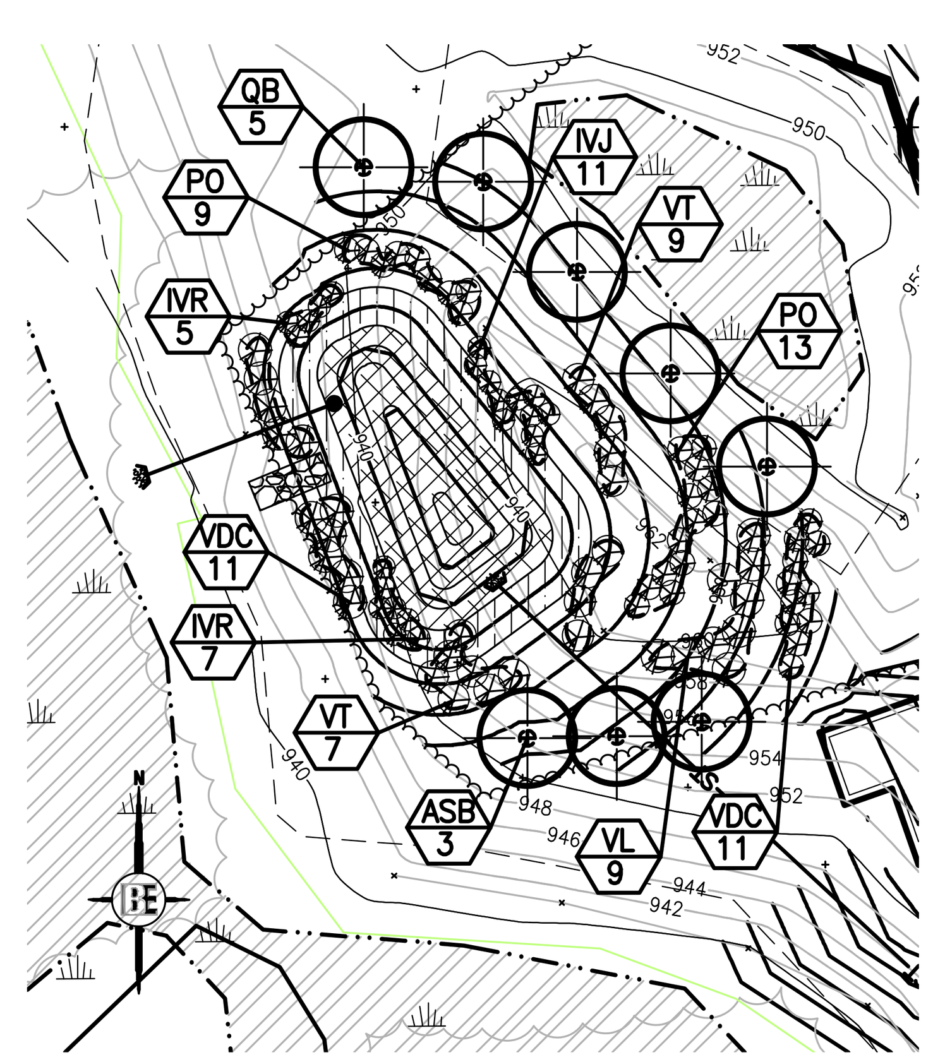
OVERALL LANDSCAPE PLAN / STREET TREE PLAN



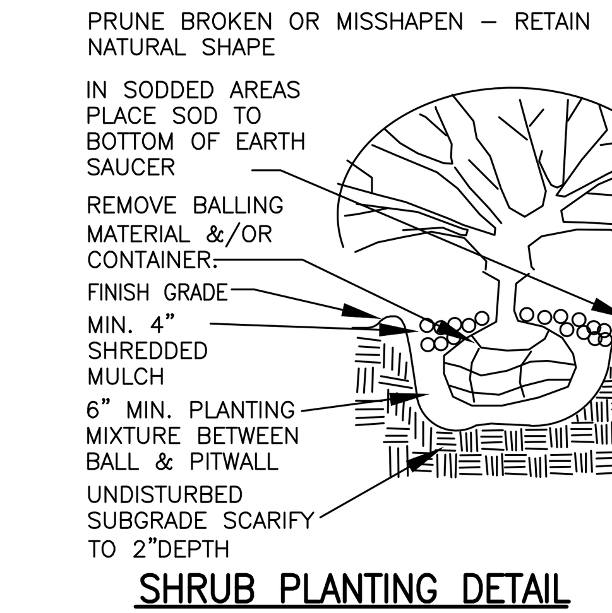
FOREBAY A AND RETENTION BASIN PLAN DETAIL



FOREBAY B PLAN DETAIL

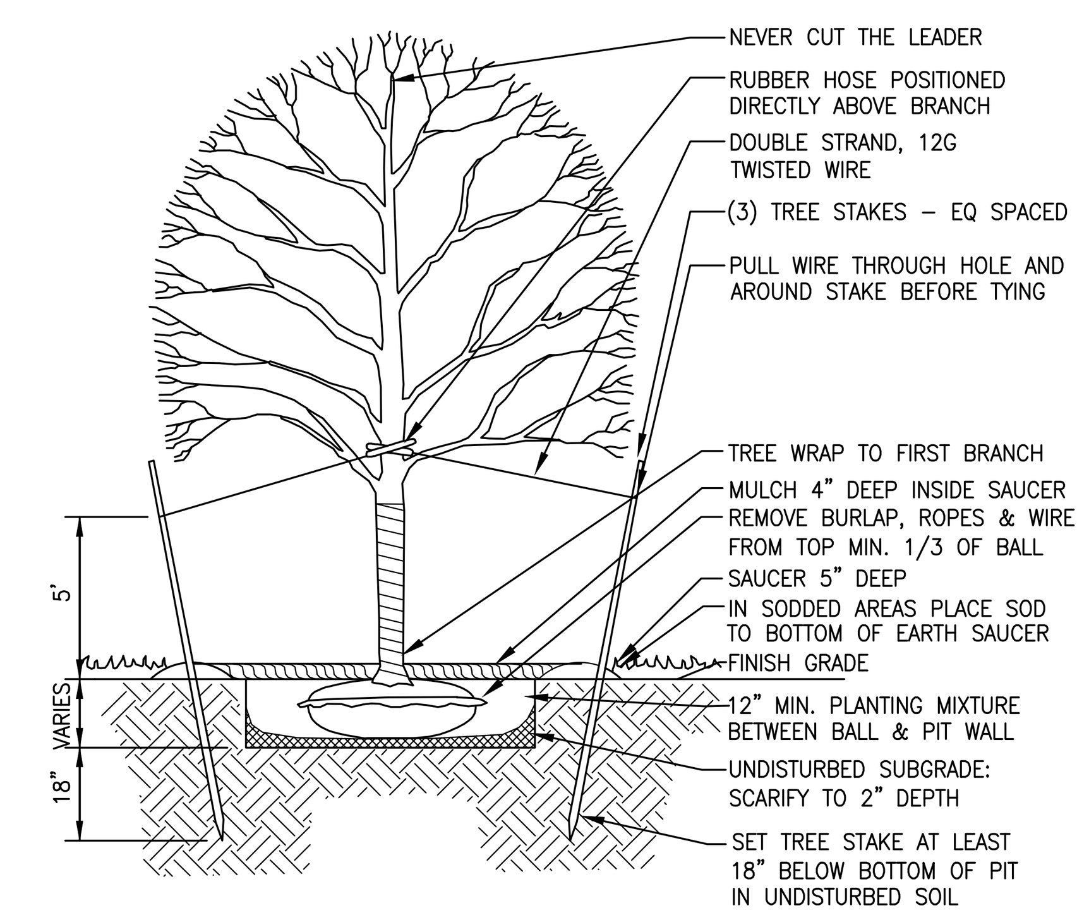


EAST SEDIMENTATION BASIN PLAN DETAIL



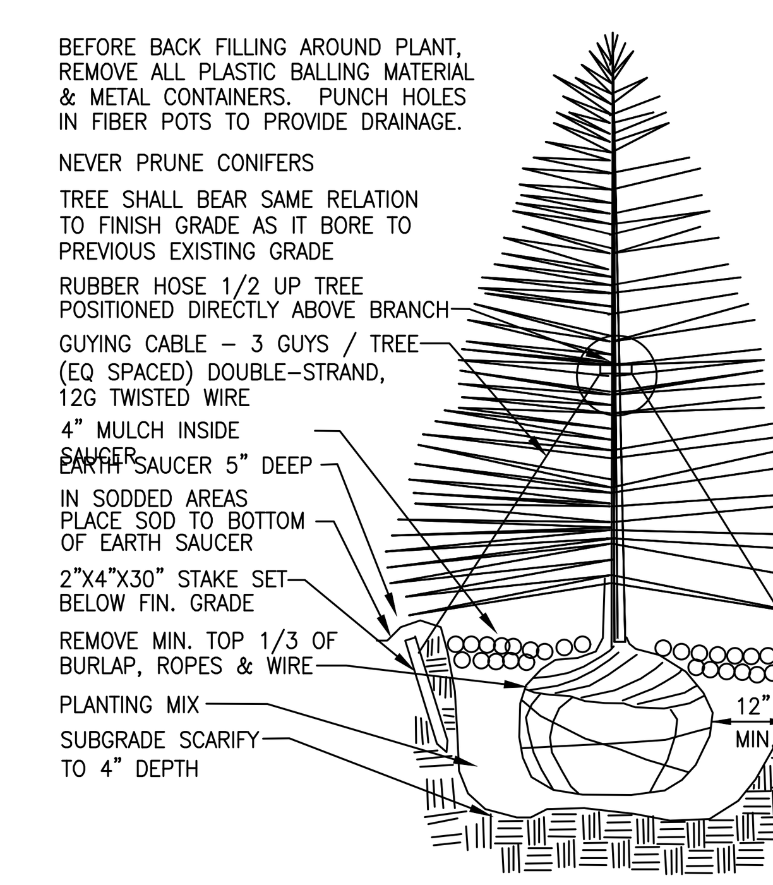
SHRUB PLANTING DETAIL

(NO SCALE)



DECIDUOUS TREE PLANTING DETAIL

(NOT TO SCALE)



CONIFER TREE PLANTING DETAIL

(NOT TO SCALE)

LANDSCAPE NARRATIVE

THE EXISTING SITE INCLUDES A VARIETY OF TREE SPECIES THAT CORRESPOND TO THE VARIED TOPOGRAPHY. DOMINANT SPECIES INCLUDE RED & SUGAR MAPLE, RED OAK, WHITE OAK, BLACK OAK, SHAGBARK HICKORY AND BLACK CHERRY. CLOSER TO THE WETLAND AREAS SPECIES INCLUDE SWAMP WHITE OAK, AMERICAN ELM AND SILVER MAPLE.

PROPOSED TREES ARE INTENDED TO COMPLEMENT / MATCH THESE SPECIES INCLUDING RED AND SUGAR MAPLE, RED OAK, SWAMP WHITE OAK AND ELM.

SPECIAL SEED MIX LEGEND

SPECIAL STORMWATER BASIN SEED MIXES

INSTALL THE FOLLOWING SEED MIXES FROM JFNEW/CARDNO, INC., WWW.CARDNONATIVEPLANTNURSERY.COM, 574-586-2412, WALKERTON, INDIANA OR EQUIVALENT:

1. SEED, BEGINNING 2.0-FT BELOW DESIGN HIGHWATER ELEV. (DHW) (+-6-FT HORIZ. DOWN FROM TOP OF BANK) TO BOTTOM OF BASIN WITH 'STORMWATER' SEED MIX INCL. ANNUAL RYE COVER CROP & AT RATE OF 33 PLS POUNDS(#) /ACRE.
2. SEED 'ECONOMY PRAIRE' SEED MIX BETWEEN 'STORM MIX' & TOP OF BANK (+-6-FT TOTAL WIDTH HORIZ.) INCL. ANNUAL RYE COVER CROP & AT RATE OF 38 PLS #/ACRE.

STREET TREE PLANT LIST

KEY	QUAN.	BOTANICAL NAME	COMMON NAME	SIZE	REMARK
DECIDUOUS TREES					
ARA	13	Acer rubrum 'jfsKw78'	Armstrong Gold Columnar Red Maple	3" cal.	B–B
ARF	22	Acer rubrum 'Frank Jr.'	Redpointe Red Maple	3" cal.	B–B
ASB	19	Acer saccharum 'Bailsta'	Fall Fiesta Sugar Maple	3" cal.	B–B
OV	13	Ostrya virginiana	American Hophornbeam	3" cal.	B–B
QB	5	Quercus bicolor	Swamp White Oak	3" cal.	B–B
QP	30	Quercus palustris	Pin Oak	3" cal.	B–B
QR	14	Quercus rubra	Red Oak	3" cal.	B–B
TC	24	Tilia cordata 'Greenspire'	Greenspire Little Leaf Linden	3" cal.	B–B
UF	21	Ulmus 'Frontier'	Frontier Hybrid Elm	3" cal.	B–B

STORMWATER BASINS PLANT LIST

KEY	QUAN.	BOTANICAL NAME	COMMON NAME	SIZE	REMARK
DECIDUOUS TREES					
ASB	3	Acer saccharum 'Bailsta'	Fall Fiesta Sugar Maple	3" cal.	B–B
QB	17	Quercus bicolor	Swamp White Oak	3" cal.	B–B
UF	9	Ulmus 'Frontier'	Frontier Hybrid Elm	3" cal.	B–B
DECIDUOUS SHRUBS					
IVJ	50	Ilex verticillata 'Jim Dandy'	Jim Dandy Holly (male)	24" ht./#3	Cont.
IVR	52	Ilex verticillata 'Red Sprite'	Red Sprite Holly (female)	24" ht./#3	Cont.
PO	24	Physocarpus opulifolius 'Jefam'	Amber Jubilee Ninebark	24" ht./#3	Cont.
VDC	77	Viburnum dentatum 'Christom'	Blue Muffin Arrowwood Viburnum	30" ht./#5	Cont.
VL	90	Viburnum lentago	Nannyberry Viburnum	30" ht./#5	Cont.
VT	46	Viburnum trilobum 'J.N. Select'	Redwing Cranberry Viburnum	30" ht./#5	Cont.

AMENITY AREAS PLANT LIST

KEY	QUAN.	BOTANICAL NAME	COMMON NAME	SIZE	REMARK
ORNAMENTAL DECIDUOUS TREES					
AG	3	Amelanchier x grandiflora 'Autumn Brilliance'	Autumn Brilliance Serviceberry	2" cal.	B–B
CONIFER TREES					
PGD	3	Picea glauca 'Densata'	Black Hills Spruce	6' Height	B–B
DECIDUOUS SHRUBS					
HQ	5	Hydrangea quercifolia	Oak Leaf Hydrangea	30" ht./#5	Cont.
VF	16	Viburnum farreri Nanum	Dwarf Frangrant Sumac	24" ht./#3	Cont.
CONIFER SHRUBS					
TM	12	Taxus x media 'Densiformis'	Densiform Spreading Yew	30" ht./#5	Cont.

FOR SITE PLAN APPROVAL ONLY!
NOT FOR CONSTRUCTION

THE LOCATION AND ELEVATION OF EXISTING UNDERGROUND UTILITIES AS SHOWN ON THESE DRAWINGS ARE ONLY APPROXIMATE. NO GUARANTEE IS EITHER EXPRESSED OR IMPLIED AS TO THE COMPLETENESS OR ACCURACY THEREOF. THE CONTRACTOR SHALL BE EXCLUSIVELY RESPONSIBLE FOR DETERMINING THE EXACT LOCATION AND ELEVATION OF EXISTING UTILITIES AND PROPOSED UTILITY CROSSINGS IN THE FIELD PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IF ANY CONFLICTS ARE APPARENT OR IF THE LOCATION OR DEPTH DIFFERS SIGNIFICANTLY FROM THE PLANS.

3 WORKING DAYS BEFORE YOU DIG CALL MISS DIG 1-800-482-7171 (TOLL FREE) FOR THE LOCATION OF UNDERGROUND FACILITIES

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

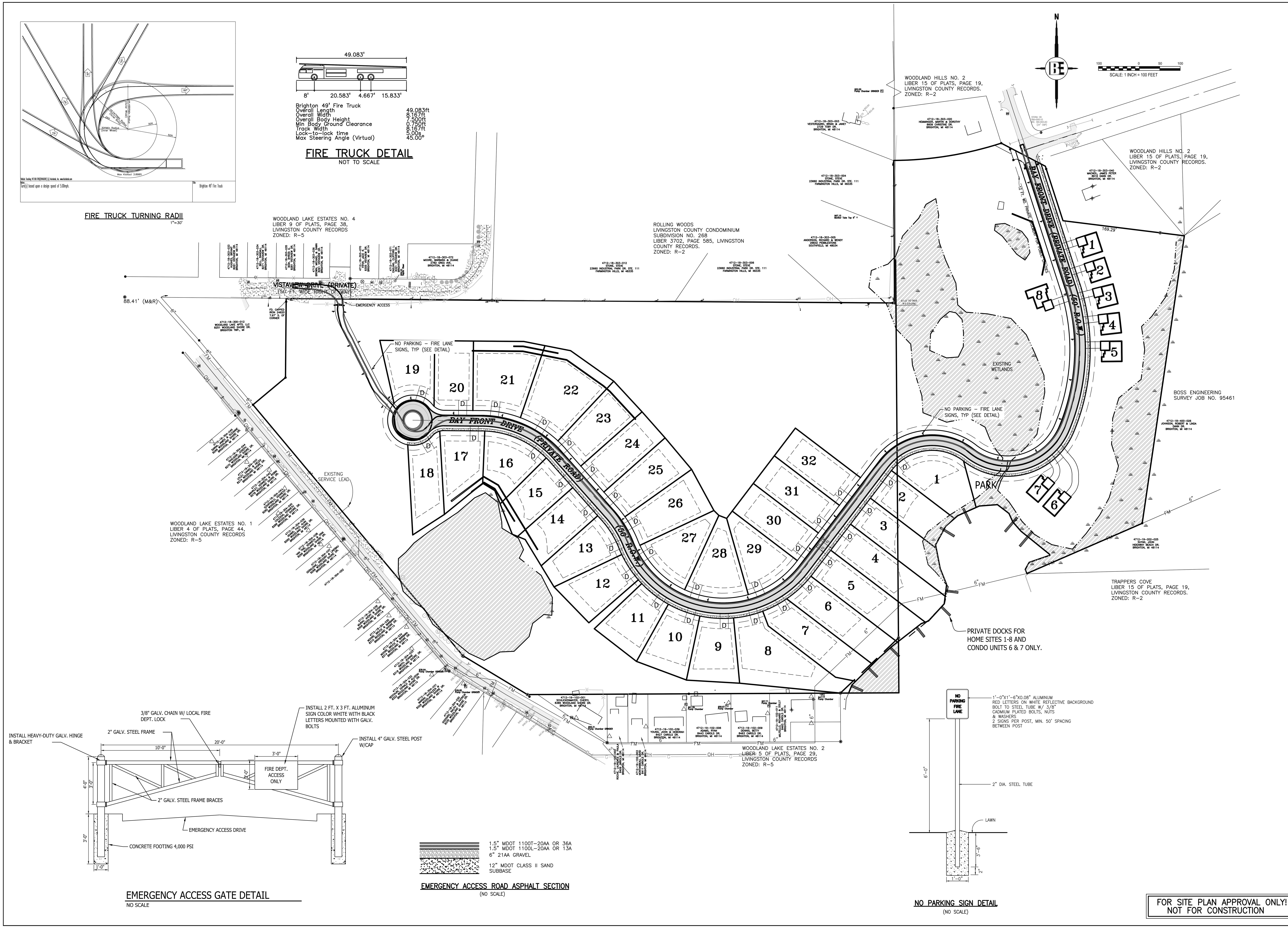
PROJECT: THE COVE AT WOODLAND LAKE

PREPARED FOR: MITCH HARRIS BUILDING COMPANY, 211 NORTH FIRST STREET, SUITE 100, BRIGHTON, MI 48116, 810.229.7838

TITLE: PRELIMINARY LANDSCAPE PLAN

NO	BY	REVISION PER	DATE
3	MD	PER TOWNSHIP REVIEW	10/14/25
2	MD	PER TOWNSHIP REVIEW	08/28/25
1	MD	PER PLANNING COMMISSION MEETING	08/04/25

DESIGNED BY:	PC
DRAWN BY:	PC
CHECKED BY:	
SCALE:	AS NOTED
JOB NO:	24–419
DATE:	7/14/25
SHEET NO.	7



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3 WORKING DAYS BEFORE YOU DIG CALL MISS DIG 1-800-482-7171

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

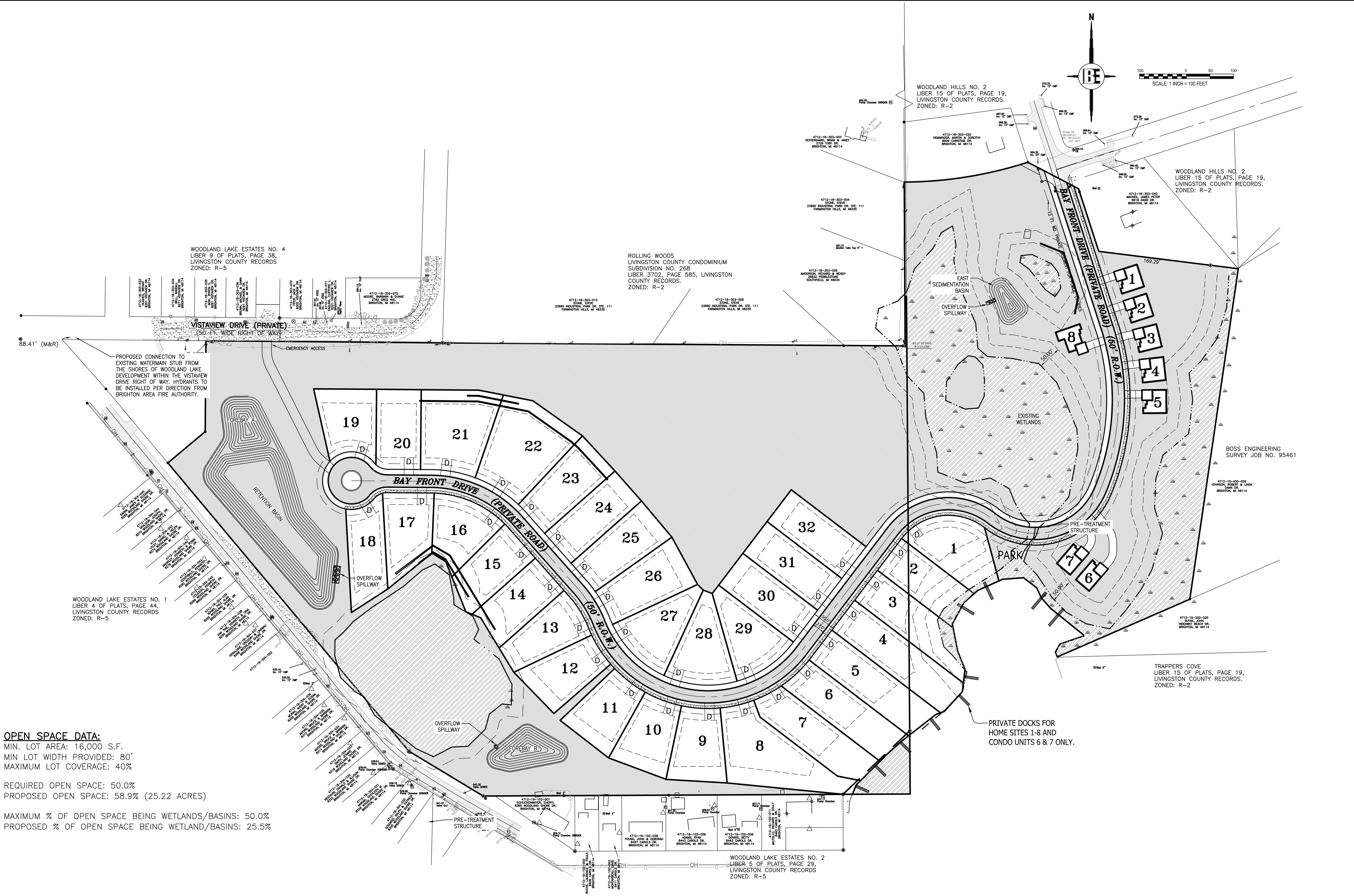
PROJECT
THE COVE AT WOODLAND LAKE

PREPARED FOR
MITCH HARRIS BUILDING COMPANY

TITLE
EMERGENCY VEHICLE CIRCULATION PLAN

NO	BY	REVISION PER	DATE
3	MD	PER TOWNSHIP REVIEW	10/14/25
2	MD	PER TOWNSHIP REVIEW	08/28/25
1	MD	PER PLANNING COMMISSION MEETING	08/04/25

DESIGNED BY: ST
DRAWN BY: NL
CHECKED BY:
SCALE: 1" = 100'
JOB NO: 24-419
DATE: 7/14/25
SHEET NO. 8



OPEN SPACE DATA:

MIN. LOT AREA: 16,000 S.F.
MIN LOT WIDTH PROVIDED: 80'
MAXIMUM LOT COVERAGE: 40%

REQUIRED OPEN SPACE: 50.0%
PROPOSED OPEN SPACE: 58.9% (25.22 ACRES)

MAXIMUM % OF OPEN SPACE BEING WETLANDS/BASINS: 50.0%
PROPOSED % OF OPEN SPACE BEING WETLAND/BASINS: 25.5%

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HOWELL, MI. 48843
517.546.4836 FAX 517.548.1670

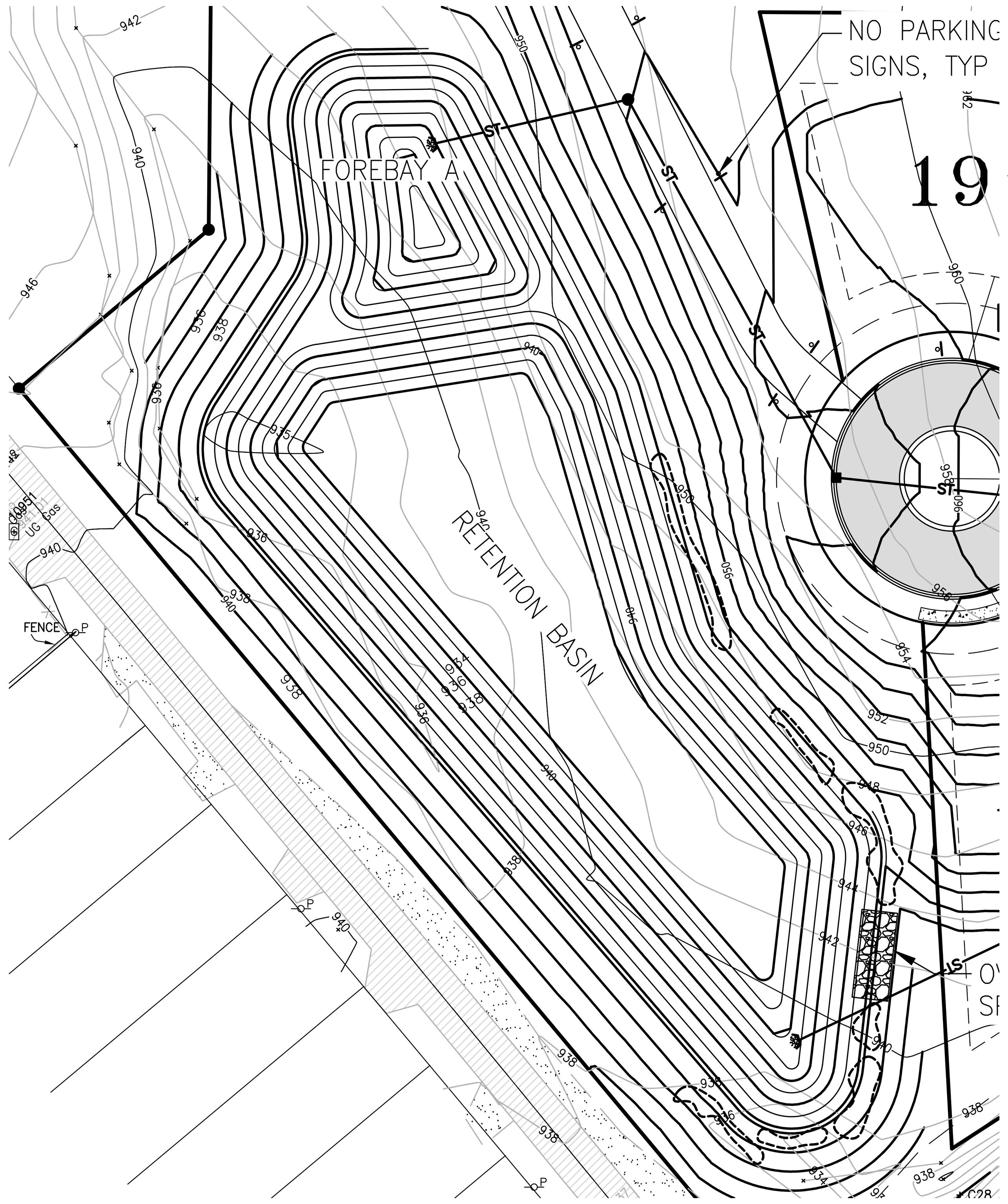
PROJECT: THE COVE AT WOODLAND LAKE

PREPARED FOR: MITCH HARRIS BUILDING COMPANY
211 NORTH FIRST STREET, SUITE 100
BRIGHTON, MI 48116
810.229.7838

TITLE: OPEN SPACE PLAN

NO	BY	REVISION PER	DATE
3	MD	PER TOWNSHIP REVIEW	10/14/25
2	MD	PER TOWNSHIP REVIEW	08/28/25
1	MD	PER PLANNING COMMISSION MEETING	08/04/25

DESIGNED BY: ST
DRAWN BY: NL
CHECKED BY:
SCALE: 1" = 100'
JOB NO: 24-419
DATE: 7/14/25
SHEET NO. 9



RETENTION BASIN PLAN VIEW

SCALE: 1 INCH = 50 FEET

RETENTION BASIN CALCULATIONS

LIVINGSTON COUNTY RETENTION BASIN CALCULATIONS

AREA (ACRES)	IMPERVIOUS FACTOR	ACRE IMPERVIOUS
5.60	0.9	5.04
10.75	0.2	2.15

COMPOUND C: 0.44
TOTAL DRAINAGE AREA: 16.35 ACRES

WATER QUALITY VOLUME V_{WQ}

V_{WQ}= 3,630(C)(A) = 26102 FT^3
Are upstream infiltration BMP's provided? NO
V_F= 0.15(V_{WQ}) = 3915 FT^3

FOREBAY VOLUME REQUIREMENT (as a % of V_{WQ})

Vol Forebay A = 11161 FT^3
Vol Forebay B = 14941 FT^3

WATER QUALITY RATE FOR MECHANICAL STRUCTURE

T_C = MAX TIME OF CONCENTRATION = 16.94 MIN
Q_{WQ}= (C)(A)30.2/(T_C+9.17)$^{.81}$ = 15.46 CFS

CHANNEL PROTECTION VOLUME CONTROL - REQUIRED

V_{CP-R} = 4,719(C)(A) = 33933 FT^3

CHANNEL PROTECTION VOLUME CONTROL - PROVIDED

In-Situ Infiltration rate = 1 IN/HR
Are upstream infiltration BMP's provided? NO
Basin Footrpint Infiltration Area Required = 13573 FT^2
V_{CP-P} = 0 FT^3

100-YEAR RETENTION VOLUME

V_{RB} =	18985 (C)(A)(2)-V_{CP-P} =	273031	FT^3	(requires 1' of freeboard)
V_{2-INCH} =	(2/12)*A =	118703	FT^3	(requires 3' of freeboard)
Q_{100IN} =	(C)(A)83.3/(T_c+9.17)$^{0.81}$ =	42.63	CFS	

FOREBAY A STORAGE VOLUME PROVIDED:

ELEVATION	AREA	VOLUME	TOTALVOLUME	
943	5809	5,202	**12,214**	DHWL
942	4595	4,038	7,012	
941	3481	2,974	2,974	
940	2467	0	0	BOTTOM OF STORAGE
939	492			SUMP
938	190			SUMP
937	190			SUMP

FOREBAY B STORAGE VOLUME PROVIDED:

ELEVATION	AREA	VOLUME	TOTALVOLUME	
943	7164	6,520	**15,945**	DHWL
942	5875	5,282	**9,425**	
941	4688	4,144	**4,144**	
940	3600	0	**0**	BOTTOM OF STORAGE
939	2119			SUMP
938	299			SUMP
937	67			SUMP

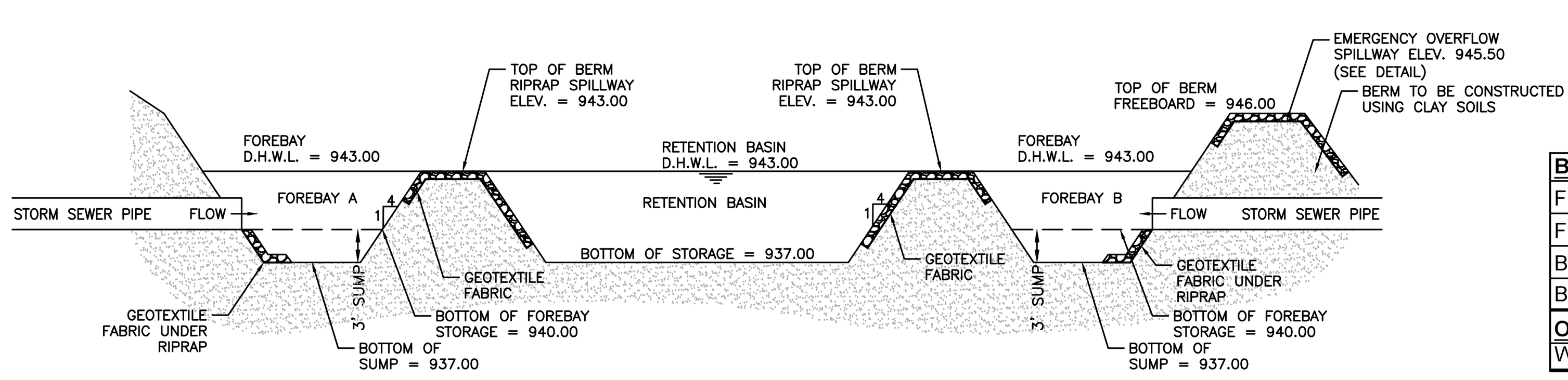
BASIN STORAGE PROVIDED

ELEVATION	AREA (FT^2)	DEPTH (FT)	VOLUME (FT^3)	TOTAL VOLUME (FT^3)	
946	55431	1	53,205	265,871	FREEBOARD
945	50980	1	48,807	212,666	FREEBOARD
944	46633	1	37,671	163,859	FREEBOARD
943	28708	1	27,352	126,188	DHWL
942	25995	1	24,689	98,837	
941	23384	1	22,128	74,147	
940	20872	1	19,667	52,020	
939	18461	1	17,306	32,353	
938	16151	1	15,046	15,046	
937	13942	0	0	0	BOTTOM OF STORAGE

PROVIDED FOOTPRINT OF BASIN BOTTOM AREA 13942 FT^2

OVERFLOW SPILLWAY DESIGN

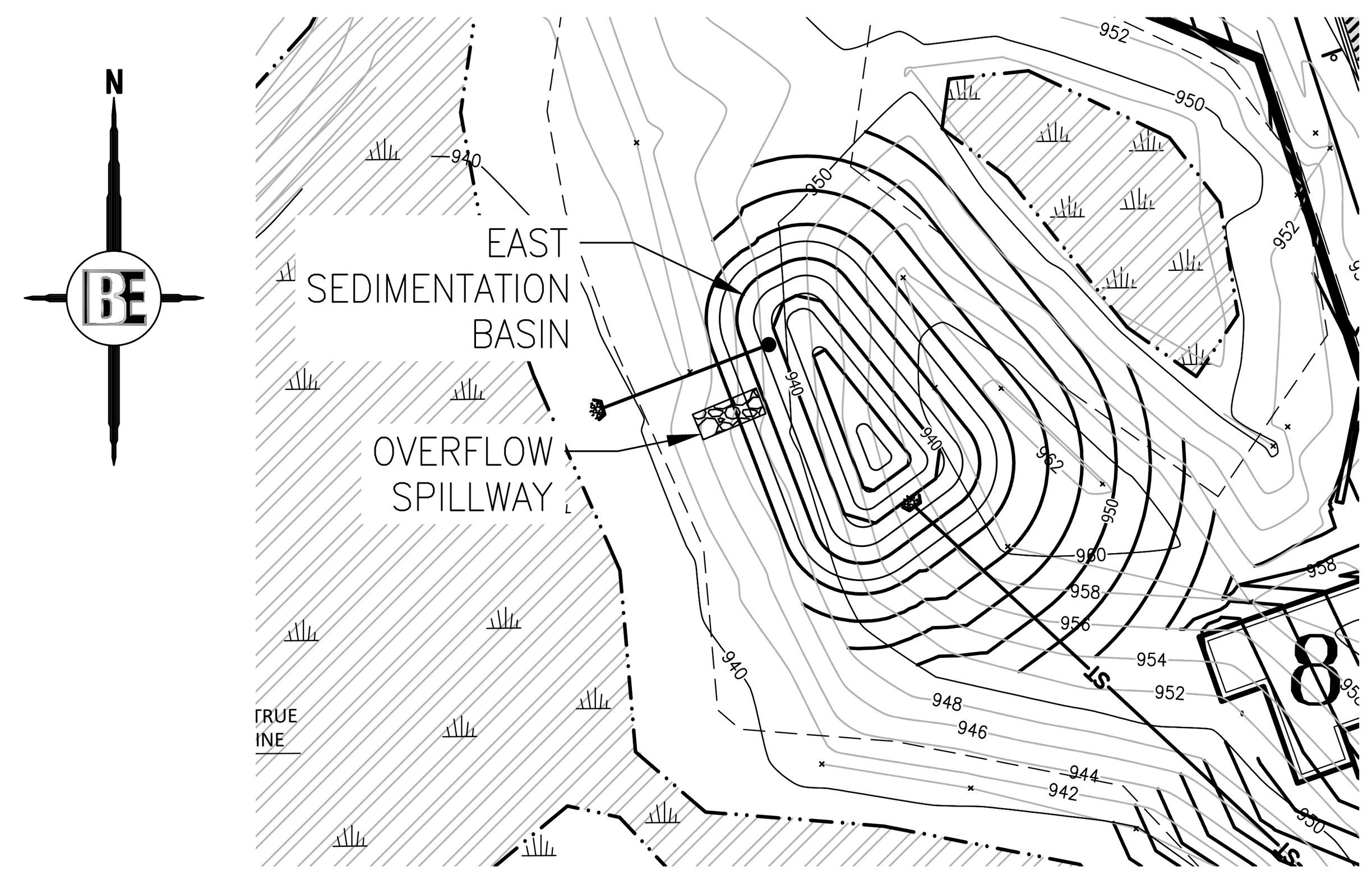
Design Flow Rate: Q_{100IN} = 42.63 CFS
Depth of Spillway: D_{SPILL} = 6 INCHES
Width of Spillway: W_{SPILL} = Q_{100IN}/3.33$D_{SPILL}^{3/2}$= 36.2 FT



RETENTION BASIN CROSS SECTION

NOT TO SCALE

BASIN DESIGN SUMMARY		
FOREBAY SIZE REQUIRED =	26,102	FT^3
FOREBAY SIZE PROVIDED =	28,159	FT^3
BASIN SIZE REQUIRED =	118,703	FT^3
BASIN SIZE PROVIDED =	126,188	FT^3
OVERFLOW SPILLWAY SUMMARY		
WIDTH OF OVERFLOW SPILLWAY =	37	FT



SEDIMENTATION BASIN PLAN VIEW

SCALE: 1 INCH = 50 FEET

EAST SEDIMENTATION BASIN CALCULATIONS

LIVINGSTON COUNTY SEDIMENTATION BASIN CALCULATIONS

AREA (ACRES)	IMPERVIOUS FACTOR	ACRE IMPERVIOUS
1.12	0.9	1.00
1.09	0.2	0.22

COMPOUND C: 0.55
TOTAL DRAINAGE AREA: 2.20 ACRES

WATER QUALITY VOLUME V_{WQ}

V_{WQ}= 3,630(C)(A) = 4435 FT^3
Are upstream infiltration BMP's provided? NO
V_F= 0.15(V_{WQ}) = 665 FT^3
V_F Forebay A = 0 FT^3
V_F Forebay B = 0 FT^3

WATER QUALITY RATE FOR MECHANICAL STRUCTURE

T_C = MAX TIME OF CONCENTRATION = 16.94 MIN
Q_{WQ}= (C)(A)30.2/(T_C+9.17)$^{.81}$ = 2.63 CFS

CHANNEL PROTECTION VOLUME CONTROL - REQUIRED

V_{CP-R} = 4,719(C)(A) = 5765 FT^3

CHANNEL PROTECTION VOLUME CONTROL - PROVIDED

In-Situ Infiltration rate = 1 IN/HR
Are upstream infiltration BMP's provided? NO
Basin Footrpint Infiltration Area Required = 2306 FT^2
V_{CP-P} = 0 FT^3

EAST SEDIMENTATION BASIN STORAGE VOLUME PROVIDED:

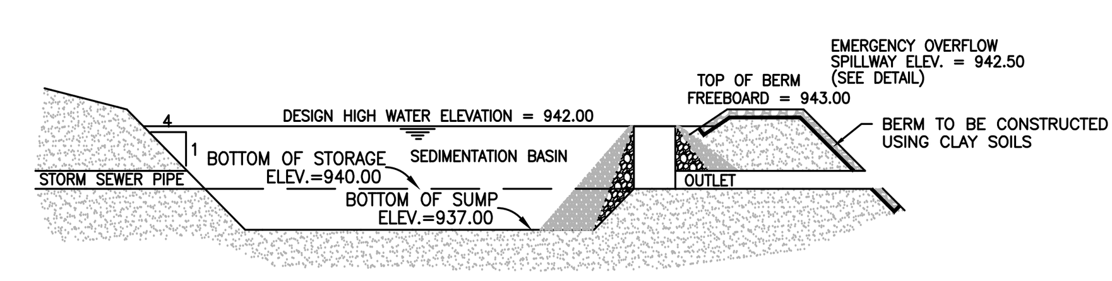
ELEVATION	AREA	VOLUME	TOTALVOLUME	
943	5099	4,453	**9,873**	FREEBOARD
942	3808	3,241	**5,420**	DHWL
941	2674	2,180	**2,180**	
940	1686	0	**0**	BOTTOM OF STORAGE
939	1014			SUMP
938	447			SUMP
937	74			SUMP

PROVIDED FOOTPRINT OF BASIN BOTTOM AREA 1686 FT^2

OVERFLOW SPILLWAY DESIGN

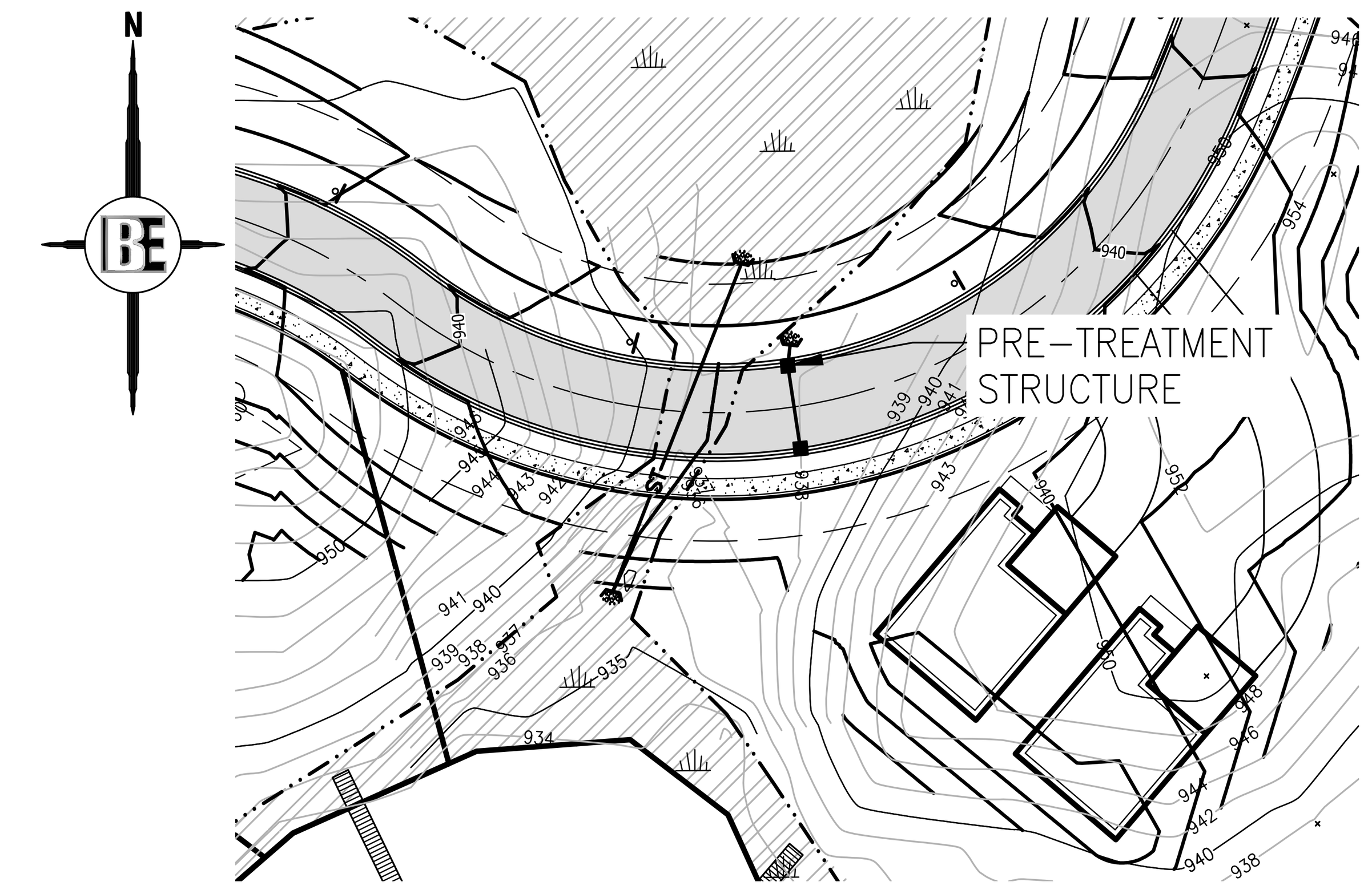
Design Flow Rate: Q_{100IN} = 7.24 CFS
Depth of Spillway: D_{SPILL} = 6 INCHES
Width of Spillway: W_{SPILL} = Q_{100IN}/3.33$D_{SPILL}^{3/2}$= 6.2 FT

BASIN DESIGN SUMMARY		
FOREBAY SIZE REQUIRED =	4,435	FT^3
FOREBAY SIZE PROVIDED =	6,267	FT^3
OVERFLOW SPILLWAY SUMMARY		
WIDTH OF OVERFLOW SPILLWAY =	7	FT



SEDIMENTATION BASIN CROSS SECTION

NOT TO SCALE



WETLAND DISCHARGE PRE-TREATMENT PLAN VIEW

SCALE: 1 INCH = 50 FEET

WETLAND DISCHARGE PRE-TREATMENT CALCULATIONS

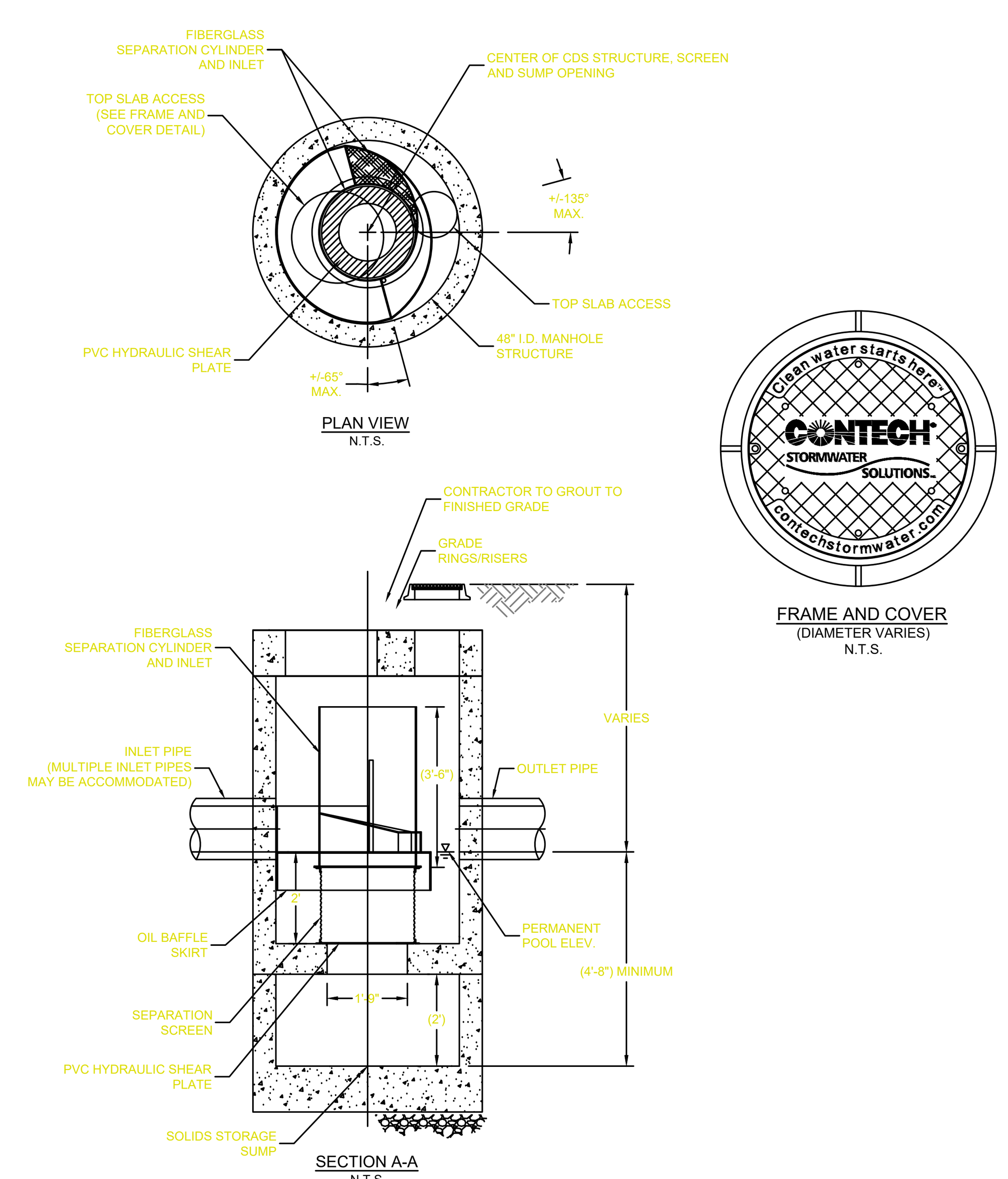
LIVINGSTON COUNTY PRE-TREATMENT CALCULATIONS

AREA (ACRES)	IMPERVIOUS FACTOR	ACRE IMPERVIOUS
0.76	0.9	0.68
0.95	0.2	0.19

COMPOUND C: 0.51
TOTAL DRAINAGE AREA: 1.71 ACRES

WATER QUALITY RATE FOR MECHANICAL STRUCTURE

T_C = MAX TIME OF CONCENTRATION = 16.94 MIN
Q_{WQ}= (C)(A)30.2/(T_C+9.17)$^{.81}$ = 1.87 CFS



TYPICAL PRE-TREATMENT STRUCTURE

NOT TO SCALE

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3 WORKING DAYS
BEFORE YOU DIG
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1-800-482-7171
(TOLL FREE)
FOR THE LOCATION OF UNDERGROUND FACILITIES

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

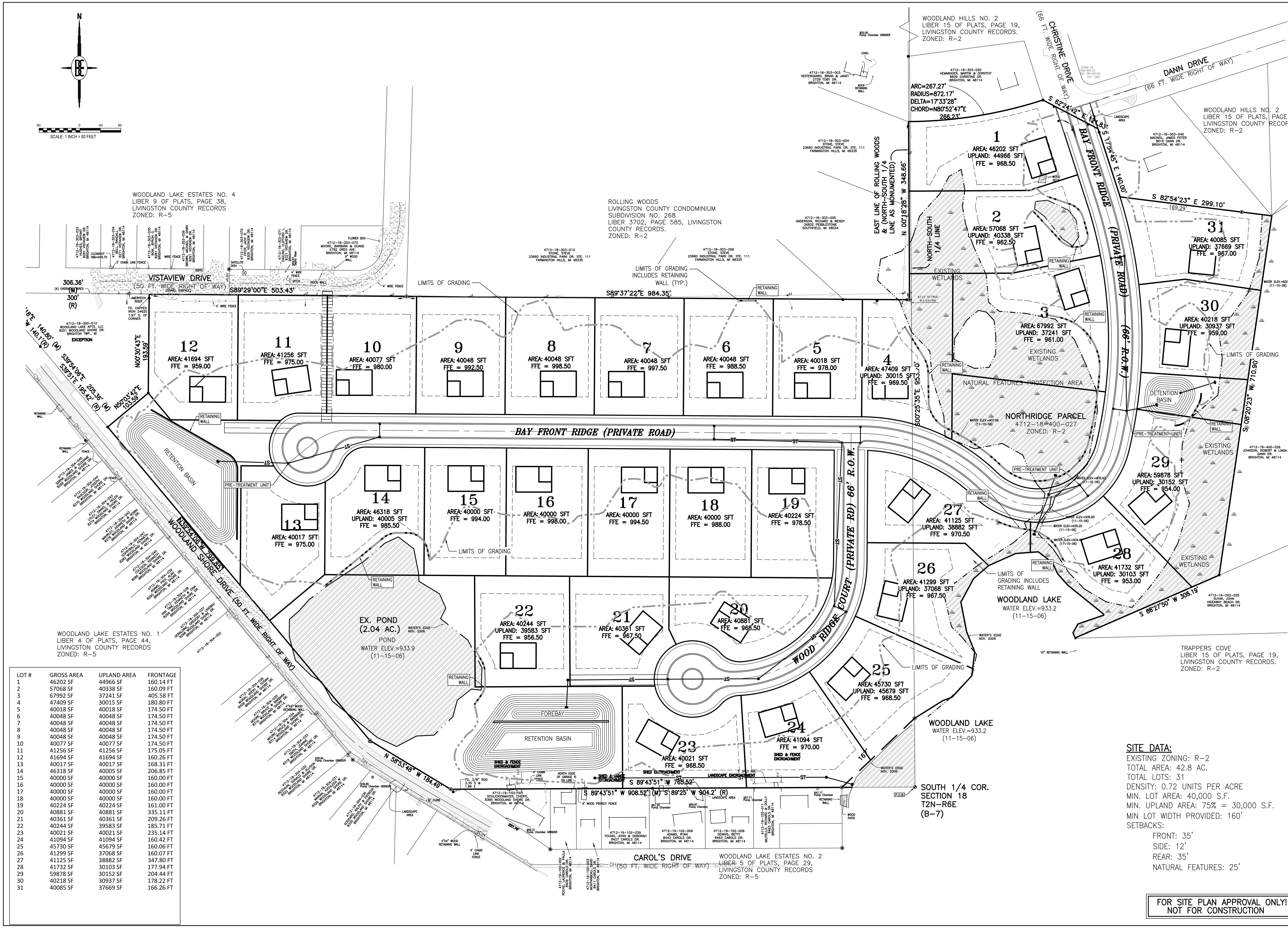
PROJECT: THE COVE AT WOODLAND LAKE

PREPARED FOR: MITCH HARRIS BUILDING COMPANY
211 NORTH FIRST STREET, SUITE 100
BRIGHTON, MI 48116
810.229.7838

TITLE: PUD-STORMWATER DETAILS

NO	BY	REVISION PER	DATE
3	MD	PER TOWNSHIP REVIEW	10/14/25
2	MD	PER TOWNSHIP REVIEW	08/28/25
1	MD	PER PLANNING COMMISSION MEETING	08/04/25

DESIGNED BY: ST
DRAWN BY: NL
CHECKED BY:
SCALE: NO SCALE
JOB NO: 24-419
DATE: 7/14/25
SHEET NO. 10



BAY FRONT RIDGE (PRIVATE ROAD)
WOOD RIDGE COURT (PRIVATE RD) 66' R.O.W.
VISTAVIEW DRIVE
(50 FT. WIDE RIGHT OF WAY)
WOODLAND SHORE DRIVE (50 FT. WIDE RIGHT OF WAY)
CAROL'S DRIVE
(50 FT. WIDE RIGHT OF WAY)
CHRISTINE DRIVE
(66 FT. WIDE RIGHT OF WAY)
DANN DRIVE
(66 FT. WIDE RIGHT OF WAY)
WOODLAND LAKE ESTATES NO. 4
LIBER 9 OF PLATS, PAGE 38,
LIVINGSTON COUNTY RECORDS
ZONED: R-5
ROLLING WOODS
LIVINGSTON COUNTY CONDOMINIUM
SUBDIVISION NO. 268
LIBER 3702, PAGE 585, LIVINGSTON
COUNTY RECORDS.
ZONED: R-2
WOODLAND HILLS NO. 2
LIBER 15 OF PLATS, PAGE 19,
LIVINGSTON COUNTY RECORDS.
ZONED: R-2
WOODLAND LAKE ESTATES NO. 1
LIBER 4 OF PLATS, PAGE 44,
LIVINGSTON COUNTY RECORDS
ZONED: R-5
WOODLAND LAKE ESTATES NO. 2
LIBER 5 OF PLATS, PAGE 29,
LIVINGSTON COUNTY RECORDS
ZONED: R-5
TRAPPERS COVE
LIBER 15 OF PLATS, PAGE 19,
LIVINGSTON COUNTY RECORDS.
ZONED: R-2
NORTHRIDGE PARCEL
4712-18-400-027
ZONED: R-2
NATURAL FEATURES PROTECTION AREA
EXISTING WETLANDS
EX. POND
(2.04 AC.)
POND
WATER ELEV.=933.9
(11-15-06)
WOODLAND LAKE
WATER ELEV.=933.2
(11-15-06)
RETENTION BASIN
FOREBAY
DETENTION BASIN
PRE-TREATMENT UNIT
RETAINING WALL
LIMITS OF GRADING
LIMITS OF GRADING INCLUDES RETAINING WALL (TYP.)
ARC=267.27'
RADIUS=872.17'
DELTA=17°33'28"
CHORD=N80°52'47"E
266.23'
S89°29'00"E 503.43'
S89°37'22"E 984.35'
S 82°54'23" E 299.10'
S 08°20'23" W 710.90'
S 66°27'50" W 305.19'
S 89°43'51" W 908.52' (M) S 89°25' W 904.2' (R)
N 58°53'48" W 184.49'
SOUTH 1/4 COR.
SECTION 18
T2N-R6E
(B-7)
EAST LINE OF ROLLING WOODS & (NORTH-SOUTH 1/4 LINE AS MONUMENTED)
N 00°18'28" W 348.66'
1
AREA: 46202 SFT
UPLAND: 44966 SFT
FFE = 968.50
2
AREA: 57068 SFT
UPLAND: 40338 SFT
FFE = 962.50
3
AREA: 67992 SFT
UPLAND: 37241 SFT
FFE = 961.00
4
AREA: 47409 SFT
UPLAND: 30015 SFT
FFE = 969.50
5
AREA: 40018 SFT
FFE = 978.00
6
AREA: 40048 SFT
FFE = 988.50
7
AREA: 40048 SFT
FFE = 997.50
8
AREA: 40048 SFT
FFE = 998.50
9
AREA: 40048 SFT
FFE = 992.50
10
AREA: 40077 SFT
FFE = 980.00
11
AREA: 41256 SFT
FFE = 975.00
12
AREA: 41694 SFT
FFE = 959.00
13
AREA: 40017 SFT
FFE = 975.00
14
AREA: 46318 SFT
UPLAND: 40005 SFT
FFE = 985.50
15
AREA: 40000 SFT
FFE = 994.00
16
AREA: 40000 SFT
FFE = 998.00
17
AREA: 40000 SFT
FFE = 994.50
18
AREA: 40000 SFT
FFE = 988.00
19
AREA: 40224 SFT
FFE = 978.50
20
AREA: 40881 SFT
FFE = 968.50
21
AREA: 40361 SFT
FFE = 967.50
22
AREA: 40244 SFT
UPLAND: 39583 SFT
FFE = 956.50
23
AREA: 40021 SFT
FFE = 968.50
24
AREA: 41094 SFT
FFE = 970.00
25
AREA: 45730 SFT
UPLAND: 45679 SFT
FFE = 968.50
26
AREA: 41299 SFT
UPLAND: 37068 SFT
FFE = 967.50
27
AREA: 41125 SFT
UPLAND: 38882 SFT
FFE = 970.50
28
AREA: 41732 SFT
UPLAND: 30103 SFT
FFE = 953.00
29
AREA: 59878 SFT
UPLAND: 30152 SFT
FFE = 954.00
30
AREA: 40218 SFT
UPLAND: 30937 SFT
FFE = 959.00
31
AREA: 40085 SFT
UPLAND: 37669 SFT
FFE = 967.00
SCALE: 1 INCH = 80 FEET

LOT #	GROSS AREA	UPLAND AREA	FRONTAGE
1	46202 SF	44966 SF	160.14 FT
2	57068 SF	40338 SF	160.09 FT
3	67992 SF	37241 SF	405.58 FT
4	47409 SF	30015 SF	180.80 FT
5	40018 SF	40018 SF	174.50 FT
6	40048 SF	40048 SF	174.50 FT
7	40048 SF	40048 SF	174.50 FT
8	40048 SF	40048 SF	174.50 FT
9	40048 SF	40048 SF	174.50 FT
10	40077 SF	40077 SF	174.50 FT
11	41256 SF	41256 SF	175.05 FT
12	41694 SF	41694 SF	160.26 FT
13	40017 SF	40017 SF	168.31 FT
14	46318 SF	40005 SF	206.85 FT
15	40000 SF	40000 SF	160.00 FT
16	40000 SF	40000 SF	160.00 FT
17	40000 SF	40000 SF	160.00 FT
18	40000 SF	40000 SF	160.00 FT
19	40224 SF	40224 SF	161.00 FT
20	40881 SF	40881 SF	335.11 FT
21	40361 SF	40361 SF	209.26 FT
22	40244 SF	39583 SF	185.71 FT
23	40021 SF	40021 SF	235.14 FT
24	41094 SF	41094 SF	160.42 FT
25	45730 SF	45679 SF	160.06 FT
26	41299 SF	37068 SF	160.07 FT
27	41125 SF	38882 SF	347.80 FT
28	41732 SF	30103 SF	177.94 FT
29	59878 SF	30152 SF	204.44 FT
30	40218 SF	30937 SF	178.22 FT
31	40085 SF	37669 SF	166.26 FT

SITE DATA:

EXISTING ZONING: R-2
TOTAL AREA: 42.8 AC.
TOTAL LOTS: 31
DENSITY: 0.72 UNITS PER ACRE
MIN. LOT AREA: 40,000 S.F.
MIN. UPLAND AREA: 75% = 30,000 S.F.
MIN LOT WIDTH PROVIDED: 160'
SETBACKS:
FRONT: 35'
SIDE: 12'
REAR: 35'
NATURAL FEATURES: 25'

**FOR SITE PLAN APPROVAL ONLY!
NOT FOR CONSTRUCTION**

THE LOCATION AND ELEVATION OF EXISTING UNDERGROUND UTILITIES AS SHOWN ON THESE DRAWINGS ARE ONLY APPROXIMATE. NO GUARANTEE IS EITHER EXPRESSED OR IMPLIED AS TO THE COMPLETENESS OR ACCURACY THEREOF. THE CONTRACTOR SHALL BE EXCLUSIVELY RESPONSIBLE FOR DETERMINING THE EXACT LOCATION AND ELEVATION OF EXISTING UTILITIES AND PROPOSED UTILITY CROSSINGS IN THE FIELD PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IF ANY CONFLICTS ARE APPARENT OR IF THE LOCATION OR DEPTH DIFFERS SIGNIFICANTLY FROM THE PLANS.

3 WORKING DAYS BEFORE YOU DIG CALL MISS DIG 1-800-482-7171

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

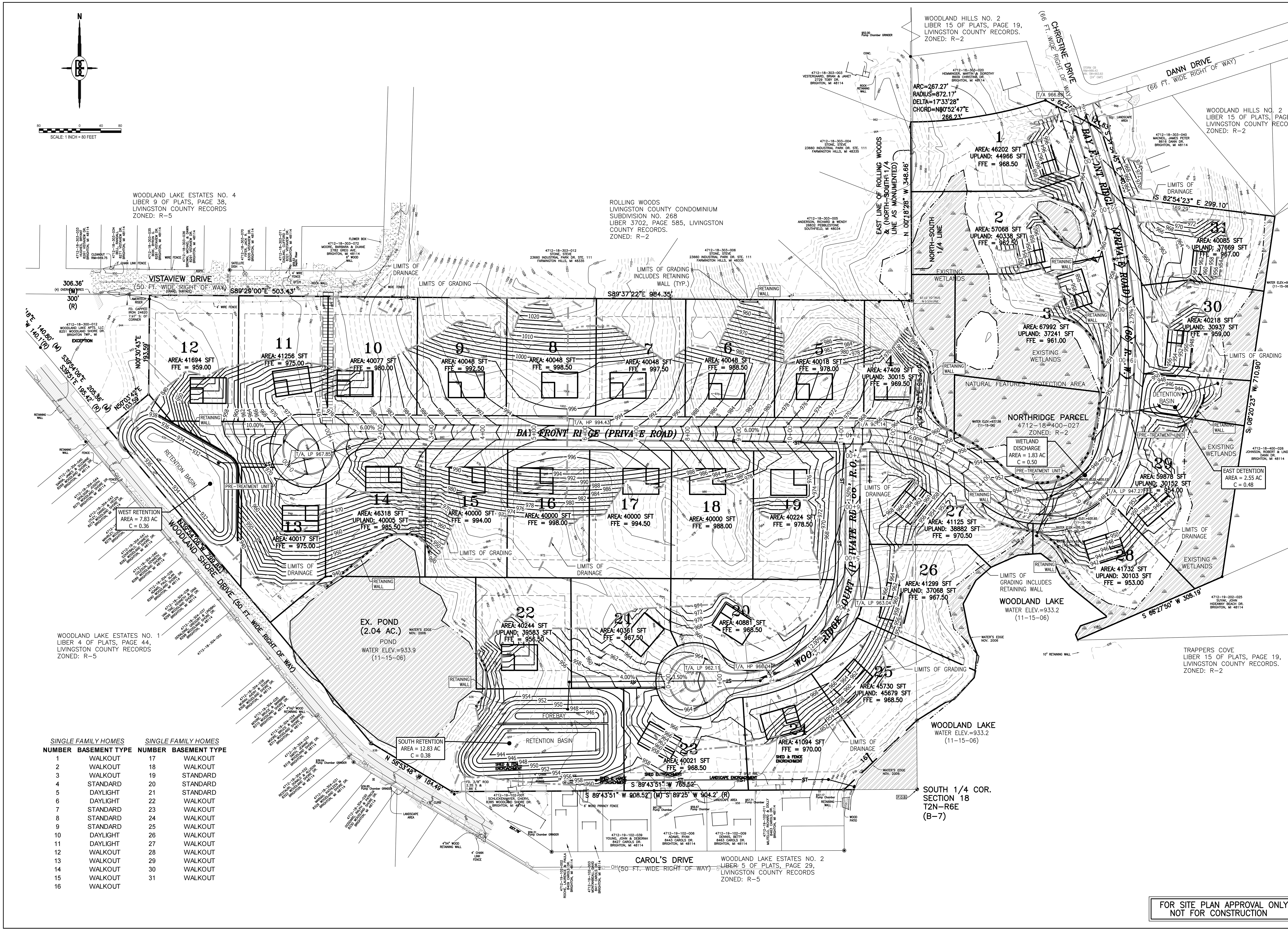
PROJECT: THE COVE AT WOODLAND LAKE

PREPARED FOR: MITCH HARRIS BUILDING COMPANY
211 NORTH FIRST STREET, SUITE 100
BRIGHTON, MI 48116
810.523.6037

TITLE: CONVENTIONAL R-2 SITE PLAN

NO	BY	REVISION PER	DATE
3	MD	PER TOWNSHIP REVIEW	10/14/25
1	MD	PER PLANNING COMMISSION MEETING	07/31/25

DESIGNED BY: ST
DRAWN BY: ST
CHECKED BY:
SCALE: 1" = 80'
JOB NO: 24-419
DATE: 3/3/25
SHEET NO. 11



SINGLE FAMILY HOMES		*SINGLE FAMILY HOMES*	
NUMBER	BASEMENT TYPE	NUMBER	BASEMENT TYPE
1	WALKOUT	17	WALKOUT
2	WALKOUT	18	WALKOUT
3	WALKOUT	19	STANDARD
4	STANDARD	20	STANDARD
5	DAYLIGHT	21	STANDARD
6	DAYLIGHT	22	WALKOUT
7	STANDARD	23	WALKOUT
8	STANDARD	24	WALKOUT
9	STANDARD	25	WALKOUT
10	DAYLIGHT	26	WALKOUT
11	DAYLIGHT	27	WALKOUT
12	WALKOUT	28	WALKOUT
13	WALKOUT	29	WALKOUT
14	WALKOUT	30	WALKOUT
15	WALKOUT	31	WALKOUT
16	WALKOUT		

FOR SITE PLAN APPROVAL ONLY!
NOT FOR CONSTRUCTION

THE LOCATION AND ELEVATION OF EXISTING UNDERGROUND UTILITIES AS SHOWN ON THESE DRAWINGS ARE ONLY APPROXIMATE. NO GUARANTEE IS EITHER EXPRESSED OR IMPLIED AS TO THE COMPLETENESS OR ACCURACY THEREOF. THE CONTRACTOR SHALL BE EXCLUSIVELY RESPONSIBLE FOR DETERMINING THE EXACT LOCATION AND ELEVATION OF EXISTING UTILITIES AND PROPOSED UTILITY CROSSINGS IN THE FIELD PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IF ANY CONFLICTS ARE APPARENT OR IF THE LOCATION OR DEPTH DIFFERS SIGNIFICANTLY FROM THE PLANS.

3 WORKING DAYS
BEFORE YOU DIG
CALL MISS DIG
1-800-482-7171
(TOLL FREE)
FOR THE LOCATION OF UNDERGROUND FACILITIES

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

PROJECT
THE COVE AT WOODLAND LAKE

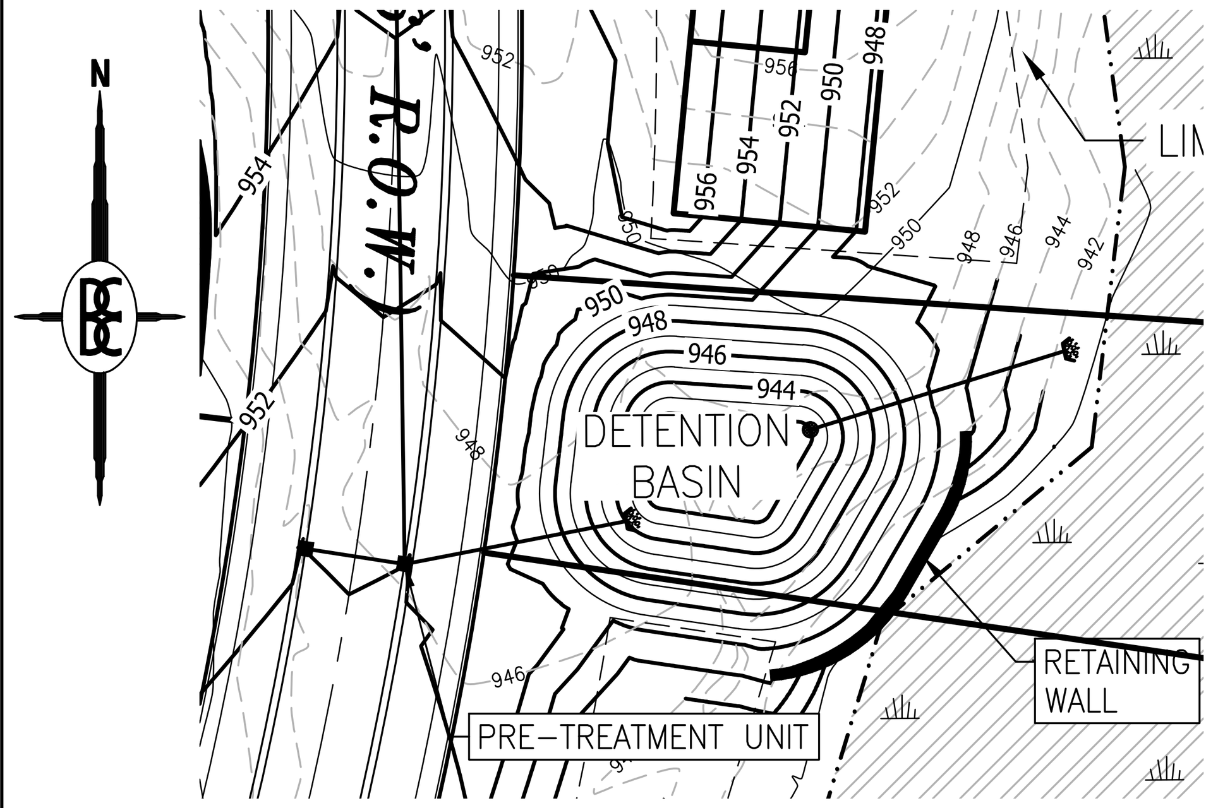
PREPARED FOR
MITCH HARRIS BUILDING COMPANY
211 NORTH FIRST STREET, SUITE 100
BRIGHTON, MI 48116
810.523.6037

TITLE
CONVENTIONAL R-2 GRADING PLAN

NO	BY	REVISION PER	DATE
3	MD	PER TOWNSHIP REVIEW	10/14/25
1	MD	PER PLANNING COMMISSION MEETING	07/31/25

DESIGNED BY: ST
DRAWN BY: ST
CHECKED BY:
SCALE: 1" = 80'
JOB NO: 24-419
DATE: 3/3/25
SHEET NO. 12

G:\24-419\DWG\SP\24-419 Parallel Plan.dwg, 10/14/2025 4:07:59 PM, AutoCAD PDF (General Documentation).pc3



EAST DETENTION BASIN PLAN VIEW

SCALE: 1 INCH = 50 FEET

EAST DETENTION BASIN CALCULATIONS

LIVINGSTON COUNTY DETENTION BASIN CALCULATIONS

AREA (ACRES)	IMPERVIOUS FACTOR	ACRE IMPERVIOUS
1.03	0.9	0.93
1.52	0.2	0.30

COMPOUND C: 0.48
TOTAL DRAINAGE AREA: 2.55 ACRES

WATER QUALITY VOLUME V_{WQ}

V_{WQ}= 3,630(C)(A) = 4472 FT^3
Are upstream infiltration BMP's provided? NO
V_F= 0.15(V_{WQ}) = 671 FT^3

WATER QUALITY RATE FOR MECHANICAL STRUCTURE

T_C = MAX TIME OF CONCENTRATION = 16.94 MIN
Q_{WQ}= $(C)(A)30.2/(T_C+9.17)^{.81}$ = 2.65 CFS

CHANNEL PROTECTION VOLUME CONTROL - REQUIRED

V_{CP-R} = 4,719(C)(A) = 5813 FT^3

CHANNEL PROTECTION VOLUME CONTROL - PROVIDED

In-Situ Infiltration rate = 0 IN/HR
Are upstream infiltration BMP's provided? NO
Basin Footrpint Infiltration Area Required = NO INFILTRATION FT^2
V_{CP-P} = 0 FT^3

CHANNEL PROTECTION RATE CONTROL (EXTENDED DETENTION VOLUME)

V_{ED} = 6,897(C)(A) = 8496 FT^3

EXTENDED DETENTION OUTLET RATE

Q_{ED} = V_{ED}/(48hr) = 0.049 CFS
H_{ED} = $V_{ED}/4,800\ (H)^{1/2}$ = 1.0 1" HOLES
H = 6.00 FT
$ELEV_{ED}$ = 945.91 FT

100-YEAR ALLOWABLE OUTLET RATE

Q_{DRAIN} = Restricted Drain Rate = 0.1 CFS/ACRE
Q_{VRR} = 1.1055 - 0.206LN(A) = 0.912 CFS/ACRE
Q_{100P} = (LESSER OF Q_{DRAIN} & Q_{VRR})*A = 0.255 CFS

CONTACT LIVINGSTON COUNTY DRAIN COMMISSION FOR ALLOWABLE RELEASE RATE

100-YEAR DETENTION VOLUME

V_{100R} = 18985 (C)(A) = 23388 FT^3
Q_{100IN} = $(C)(A)83.3/(T_c+9.17)^{0.81}$ = 7.30 CFS
R = 0.206-.15(ln(Q_{100P}/Q_{100IN}) = 0.7091
V_{100D} = V_{100R}*R-V_{CP-P} = 16584 FT^3
Is $V_{100D} \geq V_{ED}$? YES
V_{100D} = 16584 FT^3

BASIN STORAGE PROVIDED

ELEVATION	AREA (FT^2)	DEPTH (FT)	VOLUME (FT^3)	TOTAL VOLUME (FT^3)	
949	6800	1	6,232	24,322	**FREEBOARD**
948	5663	1	5,145	**18,091**	**DHWL**
947	4627	1	4,159	12,946	.
946	3691	1	3,274	8,787	
945	2856	1	2,489	5,513	
944	2121	1	1,804	3,025	
943	1487	1	1,221	1,221	
942	954	0	0	0	**BOTTOM OF STORAGE**

PROVIDED FOOTPRINT OF BASIN BOTTOM AREA 2121 FT^2

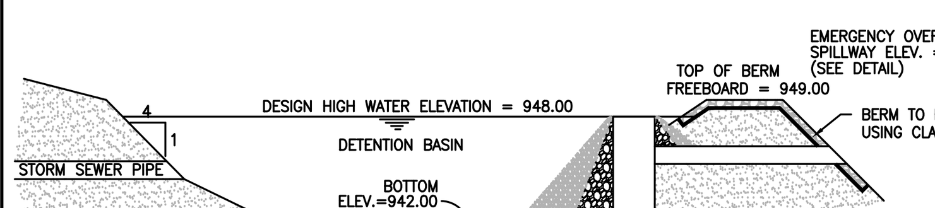
OUTLET CONTROL STRUCTURE

Q_{ED} ACTUAL
H_{ED} = 1 (1" HOLES)
A_{ED} = 0.0055 FT^2
$Q_{ED-ACTUAL}$ = $(A_{ED})(0.62 \times (2 \times 32.2 \times h)^{0.5})$ = 0.066 CFS

Q_{100ALL} OUTLET
$Q_{100-ACTUAL} = Q_{100P} - Q_{ED-ACTUAL}$ = 0.189 CFS
$A_{100} = Q_{100-ACTUAL} / (0.62 * (2 *32.2 * (ELEV_{DHWL} - ELEV_{ED}))^{0.5})$ = 0.026 FT^2
AREA OF 1 INCH DIAMETER ORIFICE = 0.005 FT^2
ORIFICES = A100 / 0.005 = 4.0 ORIFICES

OVERFLOW SPILLWAY DESIGN

Design Flow Rate: Q_{100IN} = 7.30 CFS
Depth of Spillway: D_{SPILL} = 6 INCHES
Width of Spillway: $W_{SPILL} = Q_{100IN}/3.33D_{SPILL}^{3/2}$= 6.2 FT



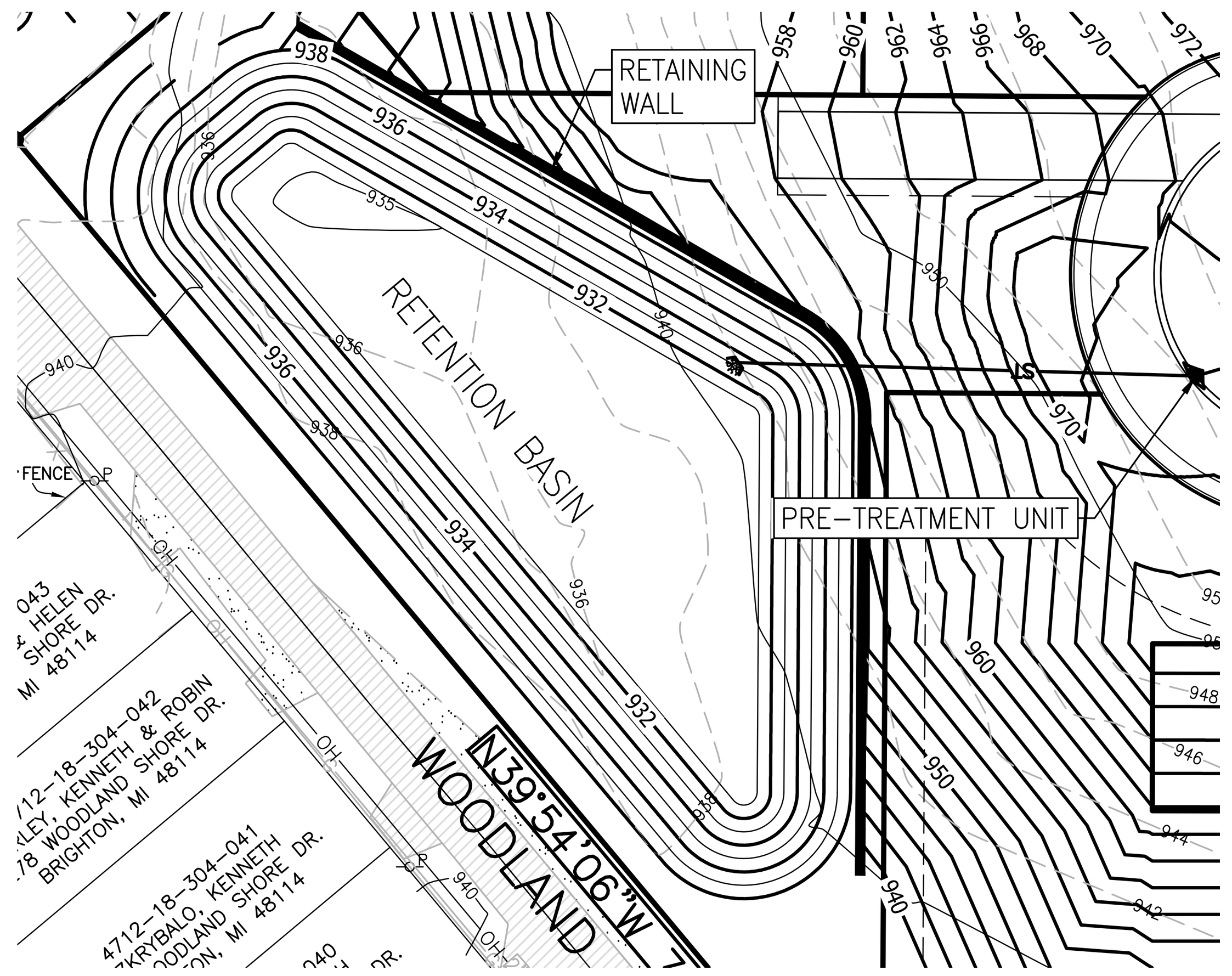
EAST DETENTION BASIN CROSS SECTION

NOT TO SCALE

BASIN DESIGN SUMMARY		
BASIN SIZE REQUIRED =	16584	FT^3
BASIN SIZE PROVIDED =	18,091	FT^3

ORIFICE DESIGN SUMMARY		
ELEVATION	# OF HOLES	DIAMETER OF HOLES
942.00	1.0	1 -INCH
945.91	4.0	1 -INCH

OVERFLOW SPILLWAY SUMMARY		
WIDTH OF OVERFLOW SPILLWAY =	7	FT



WEST RETENTION BASIN PLAN VIEW

SCALE: 1 INCH = 50 FEET

WEST RETENTION BASIN CALCULATIONS

LIVINGSTON COUNTY RETENTION BASIN CALCULATIONS

AREA (ACRES)	IMPERVIOUS FACTOR	ACRE IMPERVIOUS
1.74	0.9	1.57
6.09	0.2	1.22

COMPOUND C: 0.36
TOTAL DRAINAGE AREA: 7.83 ACRES

WATER QUALITY VOLUME V_{WQ}

V_{WQ}= 3,630(C)(A) = 10107 FT^3
Are upstream infiltration BMP's provided? NO
V_F= 0.15(V_{WQ}) = 1516 FT^3

WATER QUALITY RATE FOR MECHANICAL STRUCTURE

T_C = MAX TIME OF CONCENTRATION = 16.94 MIN
Q_{WQ}= $(C)(A)30.2/(T_C+9.17)^{.81}$ = 5.98 CFS

CHANNEL PROTECTION VOLUME CONTROL - REQUIRED

V_{CP-R} = 4,719(C)(A) = 13139 FT^3

CHANNEL PROTECTION VOLUME CONTROL - PROVIDED

In-Situ Infiltration rate = 1 IN/HR
Are upstream infiltration BMP's provided? NO
Basin Footrpint Infiltration Area Required = 5256 FT^2
V_{CP-P} = 0 FT^3

100-YEAR RETENTION VOLUME

V_{RB} = 18985 (C)(A)(2)-V_{CP-P} = 105718 FT^3 (requires 1' of freeboard)
V_{2-INCH} = (2/12)*A = 56846 FT^3 (requires 3' of freeboard)
Q_{100IN} = $(C)(A)83.3/(T_c+9.17)^{0.81}$ = 16.51 CFS

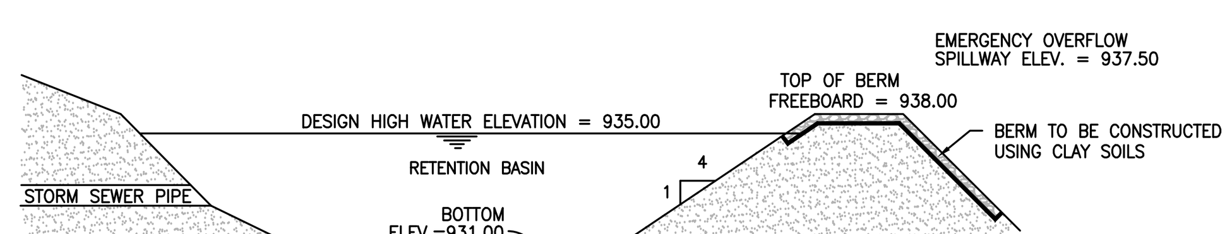
BASIN STORAGE PROVIDED

ELEVATION	AREA (FT^2)	DEPTH (FT)	VOLUME (FT^3)	TOTAL VOLUME (FT^3)	
938	29610	1	28,193	142,415	**FREEBOARD**
937	26776	1	25,410	114,222	**FREEBOARD**
936	24043	1	22,727	88,813	**FREEBOARD**
935	21410	1	20,144	**66,086**	**DHWL**
934	18878	1	17,662	45,942	
933	16446	1	15,281	28,280	
932	14115	1	13,000	13,000	
931	11884				**BOTTOM OF STORAGE**

PROVIDED FOOTPRINT OF BASIN BOTTOM AREA 11884 FT^2

OVERFLOW SPILLWAY DESIGN

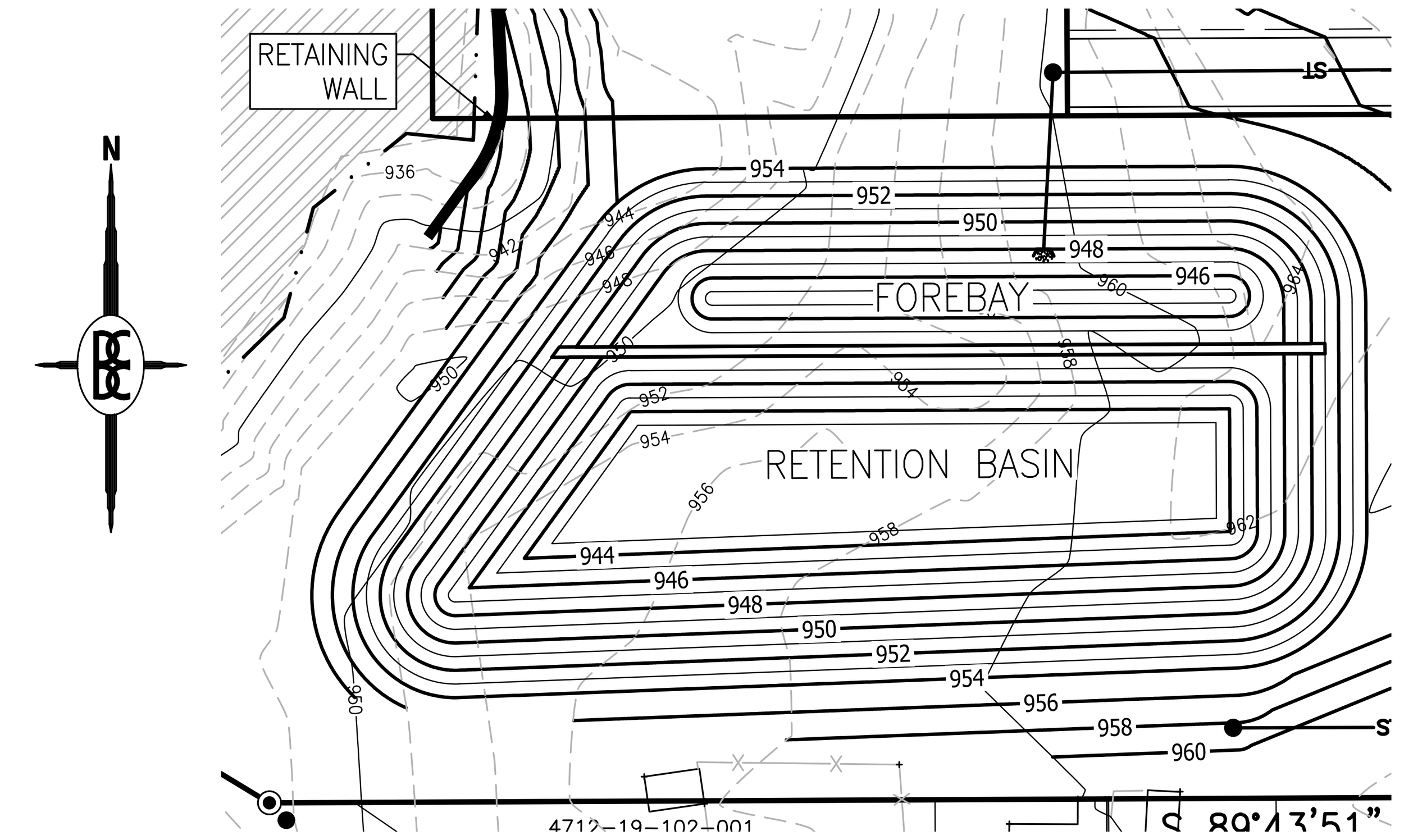
Design Flow Rate: Q_{100IN} = 16.51 CFS
Depth of Spillway: D_{SPILL} = 6 INCHES
Width of Spillway: $W_{SPILL} = Q_{100IN}/3.33D_{SPILL}^{3/2}$= 14.0 FT



WEST RETENTION BASIN CROSS SECTION

NOT TO SCALE

BASIN DESIGN SUMMARY		
BASIN SIZE REQUIRED =	56,846	FT^3
BASIN SIZE PROVIDED =	66,086	FT^3
OVERFLOW SPILLWAY SUMMARY		
WIDTH OF OVERFLOW SPILLWAY =	15	FT



SOUTH RETENTION BASIN PLAN VIEW

SCALE: 1 INCH = 50 FEET

SOUTH RETENTION BASIN CALCULATIONS

LIVINGSTON COUNTY RETENTION BASIN CALCULATIONS

AREA (ACRES)	IMPERVIOUS FACTOR	ACRE IMPERVIOUS
3.31	0.9	2.98
9.52	0.2	1.90

COMPOUND C: 0.38
TOTAL DRAINAGE AREA: 12.83 ACRES

WATER QUALITY VOLUME V_{WQ}

V_{WQ}= 3,630(C)(A) = 17719 FT^3
Are upstream infiltration BMP's provided? NO
V_F= 0.15(V_{WQ}) = 2658 FT^3

WATER QUALITY RATE FOR MECHANICAL STRUCTURE

T_C = MAX TIME OF CONCENTRATION = 16.94 MIN
Q_{WQ}= $(C)(A)30.2/(T_C+9.17)^{.81}$ = 10.49 CFS

CHANNEL PROTECTION VOLUME CONTROL - REQUIRED

V_{CP-R} = 4,719(C)(A) = 23035 FT^3

CHANNEL PROTECTION VOLUME CONTROL - PROVIDED

In-Situ Infiltration rate = 1 IN/HR
Are upstream infiltration BMP's provided? NO
Basin Footrpint Infiltration Area Required = 9214 FT^2
V_{CP-P} = 0 FT^3

100-YEAR RETENTION VOLUME

V_{RB} = 18985 (C)(A)(2)-V_{CP-P} = 185344 FT^3 (requires 1' of freeboard)
V_{2-INCH} = (2/12)*A = 93144 FT^3 (requires 3' of freeboard)
Q_{100IN} = $(C)(A)83.3/(T_c+9.17)^{0.81}$ = 28.94 CFS

FOREBAY STORAGE VOLUME PROVIDED:

ELEVATION	*AREA*	*VOLUME*	*TOTALVOLUME*	
951	8178	7,651	**19,917**	**DHWL**
950	7123	6,622	12,266	
949	6120	5,645	5,645	
948	5169	0	0	**BOTTOM OF STORAGE**
947	3336			SUMP
946	1926			SUMP
945	617			SUMP

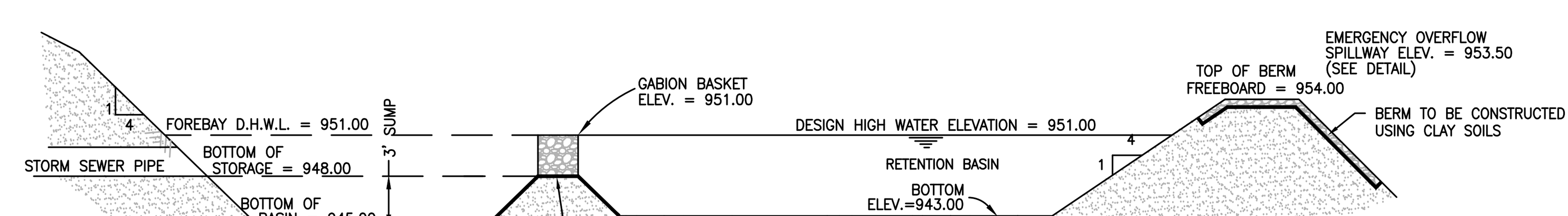
BASIN STORAGE PROVIDED

ELEVATION	AREA (FT^2)	DEPTH (FT)	VOLUME (FT^3)	TOTAL VOLUME (FT^3)	
954	38918	1	37,368	207,101	**FREEBOARD**
953	35818	1	34,318	169,733	**FREEBOARD**
952	32818	1	26,942	135,415	**FREEBOARD**
951	21066	1	20,208	**108,473**	**DHWL**
950	19349	1	18,515	88,266	
949	17681	1	16,872	69,751	
948	16062	1	14,875	52,879	
947	13687	1	12,585	38,005	
946	11482	1	10,443	25,420	
945	9403	1	8,429	14,978	
944	7454	1	6,549	6,549	
943	5644	0	0	0	**BOTTOM OF STORAGE**

PROVIDED FOOTPRINT OF BASIN BOTTOM AREA 17681 FT^2

OVERFLOW SPILLWAY DESIGN

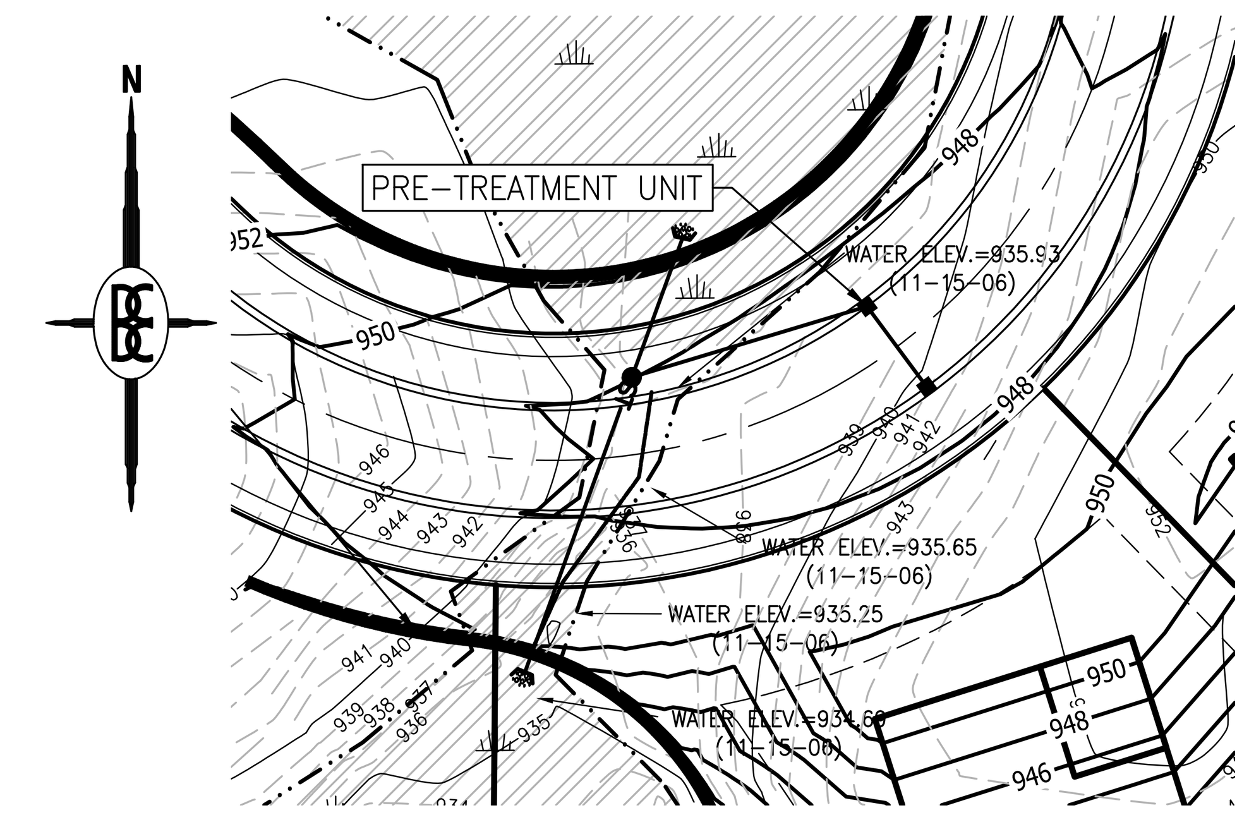
Design Flow Rate: Q_{100IN} = 28.94 CFS
Depth of Spillway: D_{SPILL} = 6 INCHES
Width of Spillway: $W_{SPILL} = Q_{100IN}/3.33D_{SPILL}^{3/2}$= 24.6 FT



SOUTH RETENTION BASIN CROSS SECTION

NOT TO SCALE

BASIN DESIGN SUMMARY		
FOREBAY SIZE REQUIRED =	17,719	FT^3
FOREBAY SIZE PROVIDED =	19,917	FT^3
BASIN SIZE REQUIRED =	93,144	FT^3
BASIN SIZE PROVIDED =	108,473	FT^3
OVERFLOW SPILLWAY SUMMARY		
WIDTH OF OVERFLOW SPILLWAY =	25	FT



WETLAND DISCHARGE PRE-TREATMENT PLAN VIEW

SCALE: 1 INCH = 50 FEET

WETLAND DISCHARGE PRE-TREATMENT CALCULATIONS

LIVINGSTON COUNTY PRE-TREATMENT CALCULATIONS

AREA (ACRES)	IMPERVIOUS FACTOR	ACRE IMPERVIOUS
0.78	0.9	0.70
1.05	0.2	0.21

COMPOUND C: 0.50
TOTAL DRAINAGE AREA: 1.83 ACRES

WATER QUALITY RATE FOR MECHANICAL STRUCTURE

T_C = MAX TIME OF CONCENTRATION = 16.94 MIN
Q_{WQ}= $(C)(A)30.2/(T_C+9.17)^{.81}$ = 1.96 CFS

FOR SITE PLAN APPROVAL ONLY!
NOT FOR CONSTRUCTION

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3 WORKING DAYS BEFORE YOU DIG CALL MISS DIG 1-800-482-7171 (TOLL FREE) FOR THE LOCATION OF UNDERGROUND FACILITIES

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

PROJECT: THE COVE AT WOODLAND LAKE

PREPARED FOR: MITCH HARRIS BUILDING COMPANY
211 NORTH FIRST STREET, SUITE 100
BRIGHTON, MI 48116
810.523.6037

TITLE: CONVENTIONAL R-2 STORMWATER DETAILS

NO	BY	REVISION PER	DATE
3	MD	PER TOWNSHIP REVIEW	10/14/25
1	MD	PER PLANNING COMMISSION MEETING	07/31/25

DESIGNED BY: ST
DRAWN BY: ST
CHECKED BY:
SCALE: 1" = 80'
JOB NO: 24-419
DATE: 3/3/25
SHEET NO. 13

CHARTER TOWNSHIP OF BRIGHTON

4363 Buno Rd. • Brighton, Michigan 48114-9298 • Telephone: (810) 229-0550 Fax: (810) 229-1778
www.brightontwp.com

PUD RZ#25/01

PLANNING COMMISSION APPLICATION

1. **Date Filed** 3/4/25
2. **Meeting Date** ~~4/14/25~~ 6/9/25
3. **PC Number** ~~SP# 25/02~~
4. **Fee Paid** ✓

5. **Applicant Information**

Name: Mr. Mitch Harris - Mitch Harris Building Company
Address: 211 North First Street, Suite 100
City/State/Zip: Brighton, MI 48116
Phone: (810)229-7838 Email: mharris@mitchharris.net
Interest in the Property (e.g. fee simple, land option, etc.)
■ Property Owner ❑ Other (Specify) _____

RECEIVED
MAR 04 2025
BRIGHTON TOWNSHIP

6. **Current Property Owner Information**

Name Address: Same as Applicant
City/State/Zip: _____
Phone: _____ Email: _____
Length of Ownership: _____

7. **Location of Property for which the Application is Requested**

Address: 0 Dann Dr Brighton, MI 48116
Cross Streets: Dann Dr & N Christine Dr
Tax I.D. #: 4712-18-300-011 & 4712-18-400-027

8. **Property Information**

Zoning District: R-2 Residential Single Family/.91 Acres
Area (Acreage): 42.8 AC Width: 4,630' Depth: 1,134'
Current Use: Vacant

9. Type and Description of Development

45 unit Planned Unit Development, made up of 37 single family lots & 8 detached condominiums.

PUD	✔	Subdivision		Site Condo	
New Site Plan		Revised Site Plan		Additional Phase	

10. Site Plan Request

Describe your Request: Request to go before the Brighton Township Planning Commission and Township Board to obtain their approval to develop a vacant site, bordering Woodland Lake, as a residential planned unit development made up of single family lots and detached condominium units.

I, Mitch Harris (applicant), do hereby swear that the above statements are true.

I, Mitch Harris (property owner), hereby give permission for the Charter Township of Brighton staff and consultants to go on the property for which the above referenced petition is proposed for purposes of verifying information provided on the submitted application.

Signature of Applicant _____ Date: 3.3.25

Signature of Property Owner _____ Date: 3.3.25

Brighton Township Planning Commission Action

Approved/Denied _____
Date _____
Conditions of Approval _____

PLANNING COMMISSION
SITE PLAN REVIEW
PROCEDURES AND SPECIFICATIONS

1. All plans or blueprints shall be prepared, signed and sealed by a licensed Architect or Engineer.

2. All petitions and plans must be filed with the Planning Department no later than thirty (30) days prior to the regular meeting of the Township Planning Commission. RESUBMITTALS MUST BE IN THE PLANNING OFFICE FOURTEEN (14) DAYS PRIOR TO THE NEXT SCHEDULED REGULAR MEETING DATE.

3. The applicant(s), architect, or engineer of record or his/her authorized agent (by way of written letter) must appeal at the meeting. A brief presentation of the proposed project may be done at that time.

4. Applicant must initially submit five (5) paper copies and one (1) digital copy; when ready for planning commission approval (5) paper copies and one (1) digital copy of the site plan with the application. Email address is planner@brightontwp.com.

5. **The following fees are non-refundable and include two (2) reviews by the staff:**

Residential site plan review for a plat/site condo	$4,000***
Residential site plan review for a plat/site condo and PUD/Conditional Zoning:	$5,300***
Commercial site plan review	$2,100***
Revised Commercial site Plan Review-	$1,800***
Revised Residential site plan review-	$2,900***

The above fees include the cost of one meeting per phase (optional, preliminary, etc.) If additional meetings are necessary, applicant will be responsible for additional costs. If reviews go beyond two (2) reviews, applicant is responsible for additional costs.

* * *Note: If the property is located within the Natural Features Overlay district, per Section 10-04 of the Zoning Ordinance, an Environmental Impact Assessment will be required. In addition, a Traffic Impact Study and a wetland survey may be required for all projects with impacts, as stated per Section 18-09. Additional costs incurred for these studies/surveys, will be the sole responsibility of the developer.

6. Following the site plan phase of the project, there is a final site plan/construction plan review phase of the project. This phase is handled administratively and the fee for this phase of the project is based on the construction cost of the job and includes two (2) plan reviews; the fee is paid at the time of submittal of plans. Construction plan reviews beyond two (2) submittals will be charged on an hourly basis but an escrow amount will be established up-front which will need to be paid prior to any additional reviews. After the construction plans are approved and the engineer issues his final letter, an inspection escrow amount based on the construction cost, performance bond amount, and any other fees associated with the project will be identified in the engineer's letter which will need to be paid prior to the issuance of a building permit. In addition, the building department has permit fees. The adopted Brighton Township Engineering Standards are on the Township's web site which applicants can review for more detail on the entire construction process.

7. NOTE: An evaluation of water and sewer REUs will be part of the review.

REQUIRED SPECIFICATIONS:

GENERAL INFORMATION:

☑ Include a north arrow, drawing scaled, drawing numbers, drawing date and revision dates, area location map, the proposed use, the property zoning, and adjacent zoning.

☑ Include the name of the developer, developer's name, address and phone number.

☑ All site plans should be prepared, signed and sealed by a registered architect or engineer.

GENERAL SITE INFORMATION:

☑ The legal description of the property, a boundary survey, and the tax numbers of the parcel need to be provided. The location and dimensions of lot lines and easements need to be shown.

☑ All existing and proposed topography shall be represented on a contour map which will accompany all proposed new structures. Existing topography information at a contour interval of two (2) feet or less plus proposed grading plan (including design of any on site storm water retention/detention area).

☑ The site plan needs to identify natural features such as wooded areas, soils, flood plains, wetlands and watercourses. The Planning Commission may require scenic

easements, woodlands, or portions of woodlands, rock formations or any natural feature of land or resource which would perpetuate the natural attractiveness of any site. All such scenic easements shall be maintained in perpetuity as described and approved on the site plan and supporting documents of record.

PROPOSED DEVELOPMENT INFORMATION:

☑ Structures need to meet the area, height and bulk requirements for the zoning district. All required yards and setbacks need to be shown.

☑ Screening walls, greenbelts and landscaped areas need to be detailed and labeled. The location of any trees (5" caliper of greater) to be removed must be indicated.

☐ A lighting plan showing lighting location, height, area of illumination, and fixture details should be provided.

☐ Solid waste disposal methods need to be identified including the location of dumpsters and screening details.

☐ Details on signage need to be provided such as the type, size, height, illumination and location.

☐ Off-street parking calculations as required by the Ordinance should be met. Parking spaces (double striped), driveways, maneuvering lanes and acceleration and deceleration lanes shall be drawn to scale on all site plans. Barrier-free parking per ADA standards shall be designed in the same method and manner.

☐ Loading/unloading areas shall be accurately drawn and labeled. Access to loading areas need to provide adequate turning radii for trucks.

☑ Storm water drainage plan should be provided indicating drainage routes, slopes, materials, manholes, inverts and catch basin locations, and storm water detention / retention with supporting calculations.

☑ Sanitary sewage disposal and water systems should be identified.

☑ Include details on any pavement surface showing a cross section with pavement materials. An access permit from the Livingston County Road Commission may be required.

☐ Type and proposed location of any outdoor storage.

☑ Proposed use of each existing and each proposed structure in this development, number of stories, gross building floor space, and distances between structures.

☑ Elevation plans, including height of exterior (front, side, and rear) facades of all buildings or structures on site, indicating proposed construction materials, including color and architecture.

Revised 6/14/23

The Cove at Woodland Lake
Site Condominium & Detached Condominium

A PLANNED UNIT DEVELOPMENT

Brighton Township

PUD REPORT
Prepared for:

Mitch Harris Building Company

Prepared by:
Boss Engineering
3/3/25

INDEX

SITE DESCRIPTION

The site is located south of both Dann and Vista View Drives and east of Woodland Shore Drive. The property has frontage on approximately 750' of Woodland Lake. There are two parcels under the same ownership that combine to form The Cove at Woodland Lake, a single family Site Condominium and a single family Detached Condominium development. The total site is 42.8 acres and is owned by Mitch Harris Building Company, who is also the applicant. The property is surrounded by residentially developed land, while the property itself is undeveloped. It is completely wooded except for the areas covered by wetland and open water.

The applicant is planning to construct a 45 unit planned unit development, with 37 single family home sites located on the west side of the property and 8 detached condominiums located on the east side of the property. The property will have access off Christine and Dann Drives by way of an approximately 2,900 linear foot private cul-de-sac. The development will be serviced by public utilities by way of sanitary force main and watermain that will have to cross wetland to access all proposed units.

The site is located on the north end of Woodland Lake in Brighton Township. The 42.8-acre site is primarily wooded with a large wetland running up through the east side of the property from Woodland Lake. There is also a large pond along the southwest side of the property.

ENVIRONMENTAL IMPACT ANALYSIS

Woodland and Upland Areas

The Upland areas on this site consist of forested woodlands. Dominant species include white oak, red oak, cottonwood, black cherry, silver maple, sugar maple, hickory, box elder, iron wood and ash. Very little understory except iron wood is present and typically include small saplings of the species mentioned above. The forest floor is carpeted with poison ivy. There was no evidence of standing water or saturated soils in any of the upland areas.

According to the Soil Survey of Livingston County, the soils across the majority of the upland area of property are either Hillsdale Sandy Loam or Fox-Boyer complex. The soils are listed as being in areas of 18 to 40 percent slopes, which are consistent with what is on site. The soils are primarily sand loam or loamy sand with areas of brown or yellowish-brown sandy clay loam.

The entire upland area of the site currently drains to the pond located to the east of Woodland Shore Drive, to the wetlands distributed throughout the central and eastern portion of the site and ultimately to Woodland Lake. Very small portions of the north central upland area drain to low pocketed areas and stay on site to percolate back into the ground.

The site is consistently undulating with the steepest slopes located in the central portion of the site. An elevation at the top of the hill located here at 1002' drops down to the northeast quickly to an elevation of 940' within 150 feet, creating a slope of 38%. This area is heavily wooded and should be considered undevelopable along with areas to the west of this hill.

Wildlife

Wildlife observed on the subject parcel was squirrel, chipmunk, several species of birds and evidence of deer, raccoon and rabbit. No other wildlife was observed at the time of the study, although the type of vegetation identified typically attracts various types of water fowl, red-winged black birds, woodpeckers, nuthatches and chickadee.

Wildlife movement appeared to correlate with where accessible water was located. Traffic patterns were identified through trails leading to and from the waters edge both on the south eastern edge of the site as well as the pond located at the western side of the property.

Since the property has been heavily used by off road vehicles, bikes and pedestrian traffic, wildlife habitat has been disrupted. Although there is minor evidence of deer bedding area and animal traffic patterns from small woodland species, there is no evidence of unusually high counts of animals or unusual or rare species. What animals remain on the property are those that tend to coexist with a human population such as birds, raccoons, chipmunk and squirrels. The animals tend to remain in the wooded

areas of the site, therefore maintaining contiguous areas of vegetation should be considered during design stages of development.

The pond located adjacent to Woodland Shore Drive has evidence of aquatic activity. The pond bottom appears silty with layers of decomposing vegetation over approximately 60% of the pond bottom as identified through site analysis both in the field and via aerial photographers. A variety of fish such as Bluegill, Sunfish and Bass were identified. The pond itself is exhibiting early signs of eutrophication. Vegetation surrounding the pond has reached its edge and drop leaves, twigs and branches regularly. This debris combined with the lack of water movement contributes to the slow aging process of the body of water. Over time, the build up of nutrients and vegetation will likely contribute to a decrease in the amount of aquatic activity. The pond area should be considered undevelopable.

Wetland Determination

An updated wetland determination is scheduled to be completed in the Spring of 2025. Previously, a wetland determination had been conducted for the above site. The intent of this determination is to provide a report of the character of the wetland areas and the upland areas within the subject parcel; and an opinion as to the possible jurisdiction of the Michigan Department of Environment, Great Lakes, and Energy (MDEGLE) over wetland areas identified on-site.

The methods used to conduct this wetland determination are consistent with the procedures and general practices used by the MDEGLE within the growing season. This determination included review of in-office information including the Livingston County Soil Survey and National Wetland Inventory mapping. Based on the Livingston County Drain Commission, the established high water elevation for Woodland Lake is 935.80 feet above sea level. An onsite evaluation was conducted on September 23 and 24, 2013. The wetlands on site have been flagged.

Wetland A

Wetland A is a forested wetland located adjacent to the existing asphalt cul-de-sac located on the north east quadrant of the site. Vegetation identified in this area included some lake sedge, scattered ferns, poison ivy, white oak, iron wood and cottonwood. The soils are described in the Livingston County Soils Survey as Carlisle Muck and are consistent with the soils identified onsite in this area. The wetland appears to hold water intermittently. A culvert on the east side of the wetland was observed just below road grade which goes under Christine Road and daylights on the other side. Wetlands were observed on the south west end of the culvert. The wetland appears to have been created as a result of the road being built, restricting natural drainage patterns. Due to its small size and isolated condition, the wetland is of low quality. In addition it has been used as a dumping ground by adjacent property owners for quite some time.

It is our professional opinion and that of the MDEGLE during an onsite pre-application conference that it is not critical this area be avoided during development.

Wetland B

Wetland B is a scrub-shrub wetland located on the east portion of the project site that continues south and wraps around inward to occupy the central portion of the property.

Vegetation identified in this area included species such as cottonwood, iron wood, lake sedges, cattails, poison ivy, grey dogwood, ferns, spicebush, and varieties of honeysuckle, and red-osier dogwood. The uplands adjacent to the wetland that are actually a peninsula extending south, are covered with white oak and silver maple and carpeted with poison ivy. The soils are described by the Livingston County Soil Survey as Houghton Muck and Carlisle Muck, both poorly drained soils. The soils evaluated on-site were consistent with this description. This wetland flows directly into Woodland Lake and is a relatively high-quality wetland consisting of high quality vegetation and hydrology. The northwestern portion of this wetland is not as indicative of the same quality as this area has expanded due to a higher than normal water table and greater amounts of seasonal rainfall. Where the southern and eastern portions of this wetland are important to maintain and to be avoided with regard to development due to is close proximity and environmental relationship to Woodland Lake, the northwestern portion is not as critical and therefore does not need to be avoided.

Wetland C

Wetland C is all the emergent wetlands located adjacent to open water of the existing pond on the west side of the property adjacent to Woodland Shore Drive. The open water could have been part of Woodland Lake at one time. Vegetation identified in this area included red-osier dogwood, weeping willow, and lake sedge as well as scattered ferns and poison ivy. The soils evaluated on site appear to be Carlisle Muck, which is not consistent with the Livingston County Soils Survey that indicates Hillsdale Sandy Loam in this area. The wetland appears to have been created due to lower than normal water levels.

Because these wetland areas are directly connected to the open water, it is advised to avoid this wetland to the extent possible in any development plan.

MDEGLE Jurisdiction/Regulatory Discussion

In order for the MDEGLE to have regulatory authority over a wetland area, the wetland area must be over 5 acres in size (for counties with a population over 100,000 such as Livingston County), be located within 500 feet of an inland lake, pond or stream, or be contiguous to a lake, pond, and/or stream. A “lake” is defined as a water body over 5 acres in size. A “pond” is defined as a water body having over an acre of permanent open water. A “stream” is defined as a watercourse having a bed, banks and evidence of continued flow or occurrence of water.

All wetlands located on site appear to be regulated by the MDEGLE due to their proximity, 500 feet or less, to Woodland Lake or their proximity to a pond over one acre in size.

A permit must be obtained from the MDEGLE prior to conducting most filling, dredging, and/or draining activities or maintaining a use of a regulated wetland.

Please be advised: The information provided in this report is a professional opinion. The ultimate decision on wetland boundary locations and jurisdiction thereof rests with the MDEGLE and, in some cases, the Federal government. Therefore, there may be adjustments to boundaries based upon review of the regulatory agency. An agency determination can vary, depending on various factors including, but not limited to, experience of agency representative making the determination and the season of the

year. In addition, the physical characteristics of the site can change with time, depending on the weather, vegetation patterns, drainage activities on adjacent parcels, or other events. Any of these factors can change the nature/ extent of wetlands on the site.

A pre-application conference with the MDEGLE was performed on November 13, 2013. All wetlands identified on site and how they will be impacted within the development were discussed. Since the entire site predevelopment is draining to and through the wetlands, the same scenario will be utilized post development to not disrupt the hydrologic patterns. A Michigan Department of Environmental Quality Joint Application will be submitted for all work to be performed within or discharging to a wetland.

Wetland Area

For the MDEGLE all contiguous wetland is located relevant to the subject property regardless if it continues offsite. Therefore, wetland area quantified for MDEGLE purposes is typically larger than what would be quantified for Township purposes because it contains area that may be offsite or not pertinent to site planning requirements.

Wetland A = 0.12 Ac
Wetland B = 4.5 Ac
Wetland C = 0.05 Ac

PUD ANALYSIS

Design alternatives were considered during the planning of the project to effectively preserve natural features on the site while at the same time preserving the applicant's development opportunities. In the case where straight zoning techniques were applied, removal of significant amounts of vegetative cover as well as the earthwork necessary to engineer the site would cause extreme disruption to the existing woodlands, topography, hydrology and other ecosystems. The creation of more run-off through the larger home sites that were proposed in the R2 parallel plan (included in the Preliminary PUD plan set dated 3/3/25) and the increased road system necessary to service this concept would require more disruption to the topography and greater tree loss due to a large footprint impact. A development utilizing the R2 zoning designation would likely result in significant tree removal and the removal of large areas of significant slope in order to achieve the allowable density.

By utilizing a reduced lot size through the Township's PUD ordinance and clustering the home sites around a cul-de-sac, it is possible to significantly reduce the development area and preserve natural features. As seen in the two layouts attached, the difference between the amount of undeveloped area in the R2 development (sheet 8) and the PUD development (sheet 4) is significant. The cluster option in the PUD also reduces the amount of run-off, reduces the amount of tree and vegetation removal and therefore the amount of hydrology that would be impacted is significantly reduced as well. With the topography staying as close to its existing condition through very strict and reduced limits of grading, natural drainage patterns would remain the same and the steep slopes discussed previously would be preserved. The proposed layout attempts to minimize wetland disturbance from the proposed lots, proposed grading, and proposed utilities. Access to Woodland Lake would be limited to only 8 of the proposed 37 single family lots, and 2 of the proposed 8 detached condominiums. The eastern portion of the site was converted to a detached condominium development which historically has a less significant environmental impact in terms of development then a traditional single family site condominium development. In addition, through the course of design discussions, it was decided to reduce the width of the proposed private roads to 27' back of curb to back of curb to further reduce impervious surfaces. The new utilization of the cluster design allows for contiguous and more equitable distribution of open space resulting in a more effective massing of vegetation, buffering of development along Woodland Shore Drive and more significant preservation of wildlife corridors in and through the development.

<u>Open Space</u>

The proposed PUD offers 54.5% open space. Wetlands and stormwater basins may be counted for up to 50% of the minimum required open space. The open space was calculated utilizing the following areas;

Wetland area onsite and not on proposed lots
= 290,975 sf
Retention ponds and forebays that are not on proposed lots
= 12,221 sf
Undeveloped upland areas
= 712,086 sf

Open space is not comprised of the following areas;

Ponds, lakes, streams or other inundated areas
Area within right-of-way
Area designated as single family site condominium lots
Area occupied by structures or driveways

The existing densities surrounding the property are such that the Master Plan for the Township may not call out the best fit for future development at an R2 zoning. As densities get higher closer to Woodland Lake with smaller lot sizes clustered tightly around the water, the subject parcel is a transition piece. Woodland Lake Estates No. 1-4, a development that surrounds the subject site to the south and west, has lot sizes as small as 5,900 SF. The PUD designation is appropriate, as a buffer to the lower density development to the north and east, with proposed lot sizes at 16,000 SF. The planned unit development with the utilization of cluster development to preserve vegetation and steep slopes provides a superior development in our professional opinion because it allows a significant portion of the property to remain as natural as possible while still permitting the property owner their right to development.

Traffic Impact Analysis

The Cove at Woodland Lake Planned Unit Development will consist of 45 single family residential units. There are two distinct components to the development, with 37 single family home sites located on the west side of the property and 8 detached condominiums located on the east side of the property. The development has access from Dann and Christine Drives in the Woodland Hills subdivision that extend east to Hunter Road. A traffic analysis for the proposed development is in progress and will be provided for Planning Commission review upon completion.

List of Benefits

- Preserves large areas of wooded open space.
- Provides a buffer along Woodland Lake Estates from adjacent residences.
- Minimizes tree removal through reduction in right-of-way width on and careful placement of lots and structures.
- Minimizes lot grading through the use of public sewer and water.
- Preserves wetlands through careful placement of lots, infrastructure and stormwater treatment.
- Provides maximum stormwater management techniques and avoids direct discharge into Woodland Lake.
- Private Road allows utilities to be closer to pavement, reducing grading requirements.
- Reduced right-of-way allows preservation of natural features and proposed reduction in road width reduces overall impact due to reduction in impervious surface.
- Road layout avoids neighboring “cut through” traffic by way of cul-de-sacs as opposed to connecting across the site.
- Lake access is limited to eight single family lots and three detached condominium docks.
- Avoids steepest terrain for development, centerline of road placed where topography was most suitable for drainage.
- Public sewer and water is proposed for the developments.
- Preservation of 54.5% open space.
- Stormwater system taking into consideration low impact methods Such as bioretention and filtration landscaping to be addressed During Final Site Plan design.
- Use of contiguous open space promotes wildlife corridors and Massing of existing vegetation.

The Cove and The Ridge at Woodland Lake
List of Deviations – R-2 to PUD

1. Zoning: R-2
   Proposed zoning: PUD

2. Minimum lot size R-2: 40,000 S.F.
   Minimum lot size PUD/R-2: 16,000 S.F.
   Deviation: 24,000 S.F.

3. Minimum setbacks R-2: Front - 35 Ft.
   Side - 12 Ft.
   Rear - 35 Ft.

   Minimum setbacks proposed: Front - 25 Ft.
   Side - 10 Ft.
   Rear - 30 Ft.

   Deviation: Front - 10 Ft.
   Side – 2 Ft.
   Rear - 5 Ft.

4. Right-of-way required: 66 Ft.
   Right-of-way proposed: 50 Ft.
   Deviation: 16 Ft.

5. Maximum Road Length allowed: 750 Ft.
   Maximum Road Length proposed: 2,888 Ft.
   Deviation: 2,138 Ft.

6. Maximum Lots on a private road with a single point of access: 24
   Number of lots proposed on a private road with a single point of access: 45
   Deviation: 21

7. Maximum lot coverage (%) R-2 zoning: 15
   Maximum lot coverage (%) proposed: 40
   Deviation: 25

8. Since the site is entirely wooded, no tree survey or natural features plan will be provided. Grading and tree removal will be limited to those areas necessary to build the road and install utilities. No tree replacement is proposed.

9. Minimum lake setback per PUD ordinance: 100 Ft.
   Minimum lake setback proposed (Single Family Home): 100 Ft.
   Minimum lake setback proposed (Detached Condo): 50 Ft.

10. Minimum wetland setback per PUD ordinance: 50 Ft.
    Minimum wetland setback proposed: 50 Ft.

Architectural and Development Elements: Site Condominium

- The single family homes in this development shall at a minimum comply with ordinance 14-01(f)
- Side entry garages
- Conglomerate mailboxes located at development entrance
- Minimum roof pitch shall exceed ordinance requirement
- Mix of building materials to allow for custom home style yet consistency of quality and detail retained through single building company
- Boat access to Woodland Lake limited to lots 1-8
- Gated entrance

The Cove at Woodland Lake

Single Family Site Condominium

Architectural Components

Option 1: Single Family Residential

Option 2: Single Family Residential

Option 3: Single Family Residential

Option 4: Single Family Residential

Option 5: Single Family Residential

Option 6: Single Family Residential

Option 7: Single Family Residential

Option 8: Single Family Residential

Option 9: Single Family Residential

Option 10: Single Family Residential

Option 11: Single Family Residential

Option 12: Single Family Residential

Option 13: Single Family Residential

Option 14: Single Family Residential

Option 15: Single Family Residential

Option 16: Single Family Residential

Architectural and Development Elements: Detached Condominium

- The single family homes in this development shall at a minimum comply with ordinance 14-01(f)
- Attached garages
- Minimum roof pitch shall exceed ordinance requirement
- Mix of building materials to allow for custom home style yet consistency of quality and detail retained through single building company
- Private driveways to each unit
- Boat access to Woodland Lake limited to units 6 & 7
- Gated entrance

The Cove and The Ridge at Woodland Lake

Drainage Narrative

The Cove at Woodland Lake is a proposed 45-unit single family site condominium & single family detached condominium, combining to a total of 42.8 acres. The property is bisected by a wetland creating two upland parcels. Both parcels are proposed to be accessed by the existing private road extension of Christine Drive. The property has significant elevation change and is heavily wooded. All efforts have been made to minimize grading and the removal of trees.

The west parcel contains a 2.05-acre pond with no apparent outlet. The predevelopment condition for the west parcel consists of four drainage areas. Drainage area 1 is 7.89 acres and drains overland to an existing low area at the west side of the property. Drainage area 2 is 15.11 acres and drains to the existing pond along Woodland Shore Drive. Drainage area 3, 17.04 acres, also covers a part of the east parcel. This drainage area drains directly to Woodland Lake and to an existing wetland that ultimately drains to Woodland Lake. Drainage area 4, 2.83 acres, flows north overland offsite to a pothole on the Rolling Woods Subdivision.

The existing asphalt private road at the east parcel drains through a cross culvert near the mid length of the road and by sheet flow at the cul-de-sac. The culvert discharges to a pothole then flows overland to the existing wetland. The sheet flow at the cul-de-sac discharges to the existing wetland. The east side of the property, pre-development Drainage Area 5, contains 3.51 acres and drains to the wetland at the east boundary and Woodland Lake.

The goal of this stormwater management plan is to integrate the proposed storm system with the existing waterbodies with minimal disturbance of the site's natural features. To accomplish this, we are proposing to provide pre-treatment of the site run-off prior to discharging to the existing wetlands and pond.

For the west parcel, two forebays are proposed to the northwest and southeast of the existing 2.04-acre pond. Proposed catch basins & storm sewer will convey surface flow from parts of existing drainage areas 1, 2, & 3 to the forebays, where sedimentation will occur before ultimately discharging to the existing pond. The forebay to the northwest of the pond is proposed in an area currently used as an off-road vehicle track to minimize required tree removal. The western portion of existing drainage area 1 and all of existing drainage area 4 will remain undisturbed and continue flowing overland to their respective low points. On the east end of the west parcel, run-off from a portion of existing drainage area 3 will be captured by proposed catch basins & storm sewer and conveyed easterly to

the existing wetlands. Since there is not enough room to provide a forebay without major disturbance to the surrounding natural features, a pre-treatment structure is proposed at the downstream end of this prior to wetland discharge. For the east parcel, surface run-off from parts of existing drainage areas 3 & 5 will be collected by proposed catch basins and storm sewer and conveyed to the existing wetlands, as it has since the existing private road was constructed. Like the east end of the west parcel, a pre-treatment structure is proposed prior to wetland discharge. The east end of existing drainage area 5 will remain undisturbed and will continue draining to the wetland at the east boundary of Woodland Lake.

AGREEMENT FOR THE WOODLAND COVE PLANNED UNIT DEVELOPMENT

This Agreement for the Woodland Cove Planned Unit Development ("Agreement") is by and between Mitch Harris Building Company, Inc., a Michigan corporation, whose address is 211 N. 1st Street, Suite 100, Brighton, MI 48116 ("Developer") and Charter Township of Brighton ("Township"), whose address is 4363 Buno Road, Brighton, Michigan 48114.

RECITALS

Developer is the land contract vendee of the property described in the attached Exhibit A Property Description Exhibit ("Property"), located in the Township of Brighton, Livingston County, Michigan, with a property tax identification number _4712-18-300-011 and 4712-18-400-027_.

Developer has voluntarily proposed rezoning and development of the Property as a planned unit development ("PUD"). Accordingly, Developer has applied for approval of an amendment to the Charter Township of Brighton Zoning Ordinance ("Zoning Ordinance") granting a rezoning of the Property to PUD, with the zoning on the Property to be known as the Residential, Open Space Planned Unit Development pursuant to section Ordinance section) 12-04. Developer is the developer and proprietor of Woodland Cove Planned Unit Development (the "Development" or "Woodland Cove").

As part of the application and approval process, Developer has offered and agreed to make the improvements and to proceed with undertakings as described in the PUD Documents (as defined in Section 1 below), which Developer and Township agree are necessary and roughly proportional to the burden imposed in order to (1) ensure that public services and facilities affected by the Development will be capable of accommodating increased service and facility loads caused by the Development, (2) protect the natural environment and conserve natural resources, (3) ensure compatibility with adjacent uses of land, (4) promote use of the Property in a socially and economically desirable manner, and (5) achieve other legitimate objectives authorized under the Michigan Zoning Enabling Act, MCL 125.3101, *et seq.*

For the purpose of confirming the rights and obligations in connection with the improvements, development, and other obligations to be undertaken on the Property once it has been rezoned to Woodland Cove PUD, the parties have entered into this Agreement to be effective on the effective date of the Township's Zoning Ordinance amendment granting rezoning of the Property to PUD. Now, therefore, as an integral part of the grant of the rezoning of the Property and approval of the Development on the Property, and for

other good and valuable consideration, the receipt and sufficiency of which are acknowledged, it is agreed as follows:

GENERAL TERMS OF AGREEMENT

1. **Acknowledgement of Truth and Accuracy.** The Township and Developer acknowledge and represent that the foregoing recitals are true and accurate and binding on the respective parties.

2. **PUD Zoning Designation.** The Township acknowledges and represents that the Property has been rezoned to a PUD Zoning District, and that the PUD Plan and this Agreement may be relied upon for future land use and development of the Property by Developer, its successors, assigns and transferees. This Agreement is for the benefit of the Property, and shall run with the Property, and shall bind and inure to the benefit of the successors, assigns, and transferees of the parties to this Agreement

3. Development as Residential PUD. The Property shall be developed and improved only in accordance with the following (referred to collectively as the "PUD Documents"):

a. Article 12, Section 12-04 of the Township Zoning Ordinance, as amended.

b. The PUD Plan, attached as Exhibit B, has been approved by the Township in accordance with its authority granted by the Brighton Township Zoning Ordinance, the Michigan Zoning Enabling Act, being MCL 125.3101 et seq, and the Michigan Planning Enabling Act, MCL 125.3801 et seq, subject to the terms of this Agreement.

c. Deviations from the Township Zoning Ordinance shall be permitted as set forth in this Agreement or the PUD Plan, or as otherwise agreed upon between the Township and the Developer. Changes to the PUD Plan and/or PUD Agreement shall be processed as set forth in the Brighton Township Zoning ordinance and this Agreement.

d. All improvements constructed in accordance with this Agreement and the PUD Plan shall be deemed to be conforming under the Township Zoning Ordinance and in compliance with all other ordinances of the Township.

e. This Agreement.

f. Documents relating to the establishment of Woodland Cove condominium, including the Master Deed, and homeowners' association, including the articles and bylaws ("Condominium Documents").

g. Deed restrictions covering all property within the PUD, to be approved and recorded in the manner set forth in this Agreement

h. The Conservation Easement for the Development, to be approved and recorded in the manner set forth in this Agreement.

i. Any and all conditions of the approval of the Township Board and Planning Commission pertaining to the Development as reflected in the official minutes of such meetings.

4. **Open Space**. Woodland Cove shall utilize over 50% Open Space as set forth on the PUD Plans. The Open Space shall be owned by unit owners as a common element and shall be available to those unit owners of the Development. The Open Space shall be dedicated to preservation by way of an irrevocable Conservation Easement in accordance with Zoning Ordinance Section 12-08(b)(4) and this restriction shall run with the land. The homeowners' association for Woodland Cove shall have all maintenance and oversight responsibilities.

5. **Deviations**. The following approximate deviations from the requirements of the Zoning Ordinance have been approved by the Township and are as set forth on the approved PUD Plans:

Setbacks: Front - 25
Side - 10
Rear - 30'

Other Deviations:

Minimum Lot Area — 16,000 sf
Minimum Lot Width — 80'
Right-of-Way Width — 50'

6. **Tree Removal and Grading**. Tree removal and grading shall be kept at an absolute minimum. Developer shall remove trees for the sole purposes of constructing the roads and providing for utilities, soil erosion, other infrastructure, and building envelopes. Builders shall be required to use extreme care in preservation of trees during construction.

7. **Public Water and Sewer**. The Township hereby agrees to assign all easement rights to Developer relating to the construction and extension of all utilities, including but not limited to public water and sanitary sewer service, that are necessary for the Development. The Development will connect to the available public sewer and water as set forth on the PUD Plans.

8. **Sewer and Utilities**. A special assessment district shall be established for the additional REUs necessary for every lot to be provided with public sewer. The utilities shall be installed underground within easements running parallel to the road, further decreasing the need for grading.

9. **Riparian rights.** The area designated as a Park on the PUD Plans shall be for the use and enjoyment of all co-owners in the Development for access to the lake for activities such as the launching of canoes and kayaks, swimming and fishing. All lakefront condominium units shall possess full riparian rights, including the right to install private docks and boat mooring devices in the bottomlands of Woodland Lake.

10. **Ownership and Control**. Developer is the land contract vendee of the Property which comprises Woodland Cove and possesses full authority to execute this Agreement and secure all approvals for the Development.

11. **Conflict**. If any provision of this Agreement conflicts or is inconsistent with any provisions of the Zoning Ordinance, as amended, or any current or future Township resolution, rule, or regulation, the terms and conditions of this Agreement shall control.

12. **Time Period**. Developer shall have a period of two years ("Period") from approval of the PUD Plans to complete the subsequent planning phases of the Development and obtain Final PUD Site Plan approval. The Period may be extended by the Township up to an additional two years if requested in writing by Developer prior to the expiration date. Upon expiration of the Period, the zoning shall be automatically reverted back to the Property's original zoning classification.

13. **Injunctive Relief**. In the event Developer or a successive lot owner violates the terms of the Zoning Agreement, Township, at its election, may seek immediate injunctive relief in the Livingston County Circuit Court.

14. **Amendment**. This Agreement may not be amended, modified, or terminated without the written consent of the parties.

15. **Binding**. This Agreement shall be binding on all future owners of the Property and any of the Developer's successors, assigns, transferees, or creditors and shall run with the land.

16. **No Inconsistent Use**. The Property subject to a PUD Agreement shall not be developed or used in a manner that is inconsistent with the PUD Plans and this Agreement.

17. **Approval**. Township has approved this Agreement through appropriate action by the Township Board.

18. **Recording**. Developer shall record this Agreement with the Livingston County Register of Deeds and provide a copy to the Township.

19. **Acknowledgement of Reasonable Conditions**. The parties acknowledge that the conditions imposed upon the development of the Property are reasonable conditions necessary to ensure that public services and facilities affected by the proposed land use or activity will be capable of accommodating increased service and facility loads caused by

the land use or activity, to protect the natural environment and conserve natural resources and energy, to ensure compatibility with adjacent uses of land, and to promote the use of land in a socially and economically desirable manner. Further, it is acknowledged that the conditions meet all of the requirements of Section 503 of Public Acts 110 of 2006, MCL 125.3503.

MITCH HARRIS BUILDING COMPANY, INC.

Dated: _____, 2025

/s/ _____
By: _____
Its: _____

STATE OF MICHIGAN)

_____COUNTY)

Acknowledged before me in _____ County, Michigan, on [date] by [name of officer or agent, title of officer or agent], of [name of corporation acknowledging], a [state or place of incorporation] corporation, on behalf of the corporation.

/s/ _____
[Notary public's name, as it appears on application for commission]
Notary public, State of Michigan, County of [county].
My commission expires [date].
[If acting in county other than county of commission: Acting in the County of [county]

CHARTER TOWNSHIP OF BRIGHTON

Dated: _____, 2025

/s/ _____
By: _____
Its: _____

STATE OF MICHIGAN)

_____COUNTY)

Acknowledged before me in [county] County, Michigan, on [date] by [name of officer or agent, title of officer or agent], of [name of corporation acknowledging], a [state or place of incorporation] corporation, on behalf of the corporation.

/s/ _____
[Notary public's name, as it appears on application for commission]
Notary public, State of Michigan, County of [county].
My commission expires [date].
[If acting in county other than county of commission: Acting in the County of [county].

Drafted by & when recorded return to:
Myers & Myers, PLLC
Roger L. Myers, Esq.
915 N. Michigan Avenue, Suite 200
Howell, MI 48843

EXHIBIT A

PROPERTY DESCRIPTION

EXHIBIT B

Approved PUD Plans for Woodland Cove

30 HXL

2015R-016632
RECORDED ON
05/29/2015 11:28:12 AM
SALLY REYNOLDS
REGISTER OF DEEDS
LIVINGSTON COUNTY, MI 48843
RECORDING: 16.00
REMON: 4.00
PAGES: 3

8 2 6 6 5 1 5
Tx:6115624

GRANT OF PUBLIC UTILITY EASEMENT OVER AND UNDER PRIVATE ROADS

This Grant of Easement is made this 19 day of May, 2015, by Woodland Lake Development Company, Inc. a dissolved Michigan Corporation whose last registered office was at 12302 Read Road, Fenton, Michigan 48430, referred to in this instrument as "Grantor," to the Charter Township of Brighton, of 4363 Buno Road, Brighton, Michigan 48114, referred to in this instrument as "Grantee."

Grantor is the owner of the private roads located in Woodland Lake Estates No. 3 and Woodland Lake Estates No. 4. See **Exhibits 1 and 2,** which contain the legal description of Woodland Lake Estates No. 3 and Woodland Lake Estates No. 4, respectively.

For a good and valuable consideration, the receipt of which is acknowledged, Grantor grants and conveys to Grantee, and its successors or assigns, the right to construct, alter, repair and maintain public utilities and all necessary laterals to those public utilities across and under the private roads located in Woodland Lake Estates No. 3 and Woodland Lake Estates No. 4 described in the attached Exhibits 1 and 2, together with the right to enter and depart over and across the property, insofar as this right to enter and depart is necessary to the proper use or maintenance of any other right granted in this instrument.

Dated: 5/19/2015

Iris Woods
Iris Woods
Vice President, Woodland Lake Development Company, Incorporated, a dissolved Michigan

Witnesses:

Edward Woods

S. J. SYLVESTAR

MAUREEN MILLNER
Notary Public, State of Florida
Commission # EE 878820
My comm. expires Feb. 27, 2017

State of Florida
County of PASCO

The foregoing instrument was acknowledged before me this 19 day of May 2015, by Iris Woods, President, Woodland Lake Development Company, Inc.

Notary Public
PASCO County,
My commission expires: 2/27/17

DRAFTED BY: CHARLES W. WIDMAIER (P38376) 123 BRIGHTON LAKE ROAD, STE 205 BRIGHTON, MI 48116
AFTER RECORDING RETURN TO SAME.

EXHIBIT #1

Woodland Lake Estates No. 3.

A subdivision of a part of the southwest ¼ of the of the southwest fractional ¼ of section 18, Township 2 north, range 6 east, Livingston County, Michigan

With said Plat of Woodland Lake Estates No. 3. Recorded in Liber 7 of Plats, page 19, Livingston County Records

EXHIBIT #1

EXHIBIT #2

Woodland Lake Estates No. 4.

A subdivision of a part of the southwest frl. ¼ of section 18, Township 2 north, range 6 east, Livingston County, Michigan

With said Plat of Woodland Lake Estates No. 3. Recorded in Liber 9 of Plats, pages 37 and 38, Livingston County Records

EXHIBIT #2

20700 Civic Center Drive, Suite 170 Southfield, MI 48076
Main: 877 627 3772

Colliers Engineering & Design

Memorandum

To: Mr. Mitch Harris

From: Steve Russo, PE

Date: March 10, 2025

Subject: Brighton Cove at Woodland Lake Traffic Study

Introduction

This memorandum presents the results of the Traffic Impact Study (TIS) for the proposed Cove at Woodland Lake residential development project in Brighton Township, Livingston County, Michigan. The subject site is located approximately ½ mile west of Hunter Road and approximately ¾ miles north of Hilton Road and is currently occupied by one single family residential unit. The proposed development plans would raze the existing single-family home and construct 35 to 45 single-family residential units. Site access for the development is proposed via connection to the intersection of Christine Drive and Dann Drive which provides unsignalized access to Hunter Road. Additionally, emergency only access will be provided to Vistaview Drive. The subject site is shown on **Figure 1**.

Figure 1: Site Location

Christine Drive and Dann Drive are under the jurisdiction of the Livingston County Road Commission (LCRC); whereby site access permitting will be subject to LCRC review and standards. Additionally, in accordance with Township Ordinance, a TIS has been required by the Township for site plan approval. The purpose of this TIS is to evaluate traffic operations at the existing intersections of Christine Drive & Dann Drive as well as the intersections of Hunter Road with Christine Drive and Margo Drive to determine if any improvements or modifications are necessary to facilitate site generated traffic.

This TIS has been prepared in accordance with the methodologies and practices published by the Institute of Transportation Engineers (ITE). The zoning ordinances, guidelines, and standards of Brighton Township as well as LCRC were referenced as applicable. Additionally, Colliers Engineering & Design (CED) solicited input regarding the scope of work for this study from LCRC and the Townships traffic consultant, Fleis & VandenBrink (F&V).

Roadway Data

Hunter Road is a minor collector under jurisdiction of LCRC that runs along the east side of the site in the north and south directions. Along the site frontage, Hunter Road has a posted speed limit of 40 miles per hour (mph), an Annual Average Daily Traffic (AADT) volume of 2,000 vehicles per day, and a typical two-lane cross section with one travel lane in each direction. Christine Drive, Dann Drive, and Margo Drive are all local roadways located within the Woodland Hills subdivision under jurisdiction of LCRC and have posted speed limits of 25 mph.

Traffic Volume Data

Existing weekday AM (7:00 to 9:00) and PM (4:00 to 6:00) peak hour turning movement counts were collected at the study intersections on Wednesday, February 19th, 2025. Data were collected by CED subconsultant Quality Counts during typical traffic conditions. Data were collected in 15-minute intervals to establish the current peak hour traffic volumes. Major weather events, holidays, and other local special events were avoided.

During collection of the manual intersection turning movement counts, pedestrian data and commercial truck percentages were also recorded and used in the traffic analysis. Peak hour factors (PHFs) and commercial truck percentages were calculated by approach based on the requirements of MDOT's *Electronic Traffic Control Device Guidelines*. Peak hour volumes for each individual intersection were utilized and traffic volumes along Hunter Road were balanced upward between intersections. All relevant traffic volume data are attached and the resulting 2025 baseline peak hour volumes utilized for this study are summarized on the attached **Figure 2**.

Existing Conditions

Analysis Methodologies

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

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D is considered acceptable in suburban/urban areas. The LOS measurement for unsignalized intersections is average control delay, which is quantified in terms of seconds of delay per vehicle. Control delay includes deceleration delay, stopped delay, queue move-up delay, and acceleration delay. The LOS criteria for unsignalized intersections taken from the HCM are attached.

The LOS and delay calculations are based on the procedures and methodologies outlined in the Transportation Research Board's *Highway Capacity Manual, 7th Edition* (HCM7) which sets forth nationally accepted standards regarding traffic operations and capacity analysis. Simulations of the study network were also observed using SimTraffic in order to identify potential issues related to vehicle queuing, traffic flow between intersections, and the overall study network. The existing conditions SimTraffic models were calibrated in accordance with the procedures outlined in the MDOT *Electronic Traffic Control Device Guidelines.*

Existing Traffic Conditions

Existing peak hour vehicle delays and LOS were calculated at the study intersections based on the existing lane configurations and traffic control, the existing traffic volumes shown on the attached **Figure 2**, and the methodologies presented in the HCM7. The results of the existing conditions analysis are attached and summarized in **Table 1**. The results of the existing conditions analysis indicate that all approaches and movements at the study intersections currently operate acceptably at a LOS A during both peak hours. Review of network simulations also indicates acceptable traffic operations with minimal delays and vehicle queues.

Table 1: Existing Traffic Conditions

Intersection	Control	Approach	Movement	AM Peak Hour		PM Peak Hour	
				Delay	LOS	Delay	LOS
Hunter Road & Margo Drive	STOP (Minor)	EB	Left/Right	9.4	A	9.4	A
		NB	Left	7.5	A	7.4	A
			Thru/Right	Free		Free	
		SB	Thru/Right	Free		Free	
Hunter Road & Christine Drive	STOP (Minor)	EB	Left/Right	9.3	A	9.1	A
		NB	Left	7.6	A	7.4	A
			Thru/Right	Free		Free	
		SB	Thru/Right	Free		Free	

Existing Crash Data

A crash analysis was performed along Hunter Road in the vicinity of Christine Drive and Margo Drive to determine whether any discernable crash patterns could be identified related to intersection operations. Five years of crash data (January 1, 2019, through December 31, 2023) were used in the analysis. Data and UD-10 crash reports were obtained from the *Michigan Traffic Crash Facts* (MTCF) database.

The results of the crash analysis indicate that five crashes occurred during the study period. One was an angle crash at the intersection of Hunter Road & Margo Drive in which a vehicle exiting Margo Drive was unable to stop in icy conditions and slid into the intersection, colliding with a vehicle along Hunter Road. The remaining four crashes occurred within the Woodland Hills subdivision consisting of two single vehicle crashes, a sideswipe same direction crash, and an angle

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crash. One single vehicle crash occurred when a vehicle traveling along Christine Drive slid off the roadway in icy conditions and the other single vehicle crash was the result of a vehicle backing into a mailbox. The sideswipe same direction crash occurred when a vehicle attempted to pass a FedEx delivery truck who was looking for a delivery address and struck the front end of the vehicle. The angle crash occurred at the intersection of Christine Drive & Kathleen Drive in which the driver along Kathleen Drive failed to yield at the stop sign. All crashes resulted in property damage only (PDO). Based on the frequency, type and severity of crashes, a correctable crash pattern does not exist.

No-Build Conditions

No-Build Traffic Volumes

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

In addition to background developments, an ambient growth factor is applied to existing traffic volumes to account for future projects in the study area and population increases, as well as growth in regular traffic volumes due to development projects outside the study area. Population and employment forecasts for Brighton Township from the Southeast Michigan Council of Governments (SEMCOG) indicate growths ranging from 0.42% to 0.63% to the year 2050. Therefore, a growth rate of 1.0% per year was conservatively utilized for this study. This rate was applied to the 2025 traffic volumes for a period of four years (2029 Buildout). The resulting 2029 no-build traffic volumes are summarized on the attached **Figure 2**.

No-Build Traffic Conditions

No-build peak hour vehicle delays and LOS were calculated at the study intersections based on the existing lane configurations and traffic control, the no-build traffic volumes shown on the attached **Figure 2**, and the methodologies presented in the HCM. The results of the analysis of no-build conditions are attached and summarized in **Table 2**.

Table 2: No-Build Traffic Conditions

Intersection	Control	Approach	Movement	AM Peak Hour				PM Peak Hour			
				Existing		No-Build		Existing		No-Build	
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Hunter Road & Margo Drive	STOP (Minor)	EB	Left/Right	9.4	A	9.5	A	9.4	A	9.4	A
		NB	Left	7.5	A	7.6	A	7.4	A	7.4	A
			Thru/Right	Free		Free		Free		Free	
		SB	Thru/Right	Free		Free		Free		Free	
Hunter Road & Christine Drive	STOP (Minor)	EB	Left/Right	9.3	A	9.3	A	9.1	A	9.1	A
		NB	Left	7.6	A	7.6	A	7.4	A	7.4	A
			Thru/Right	Free		Free		Free		Free	
		SB	Thru/Right	Free		Free		Free		Free	

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The results of the no-build conditions analysis indicate that all approaches and movements at the study intersections will continue to operate acceptably at a LOS A during both peak hours. Review of network simulations also continues to indicate acceptable traffic operations with minimal delays and vehicle queues.

Site Trip Generation

The proposed development plans would construct 35 to 45 single-family residential units. Site access for the development is proposed via connection to the intersection of Christine Drive and Dann Drive which provides unsignalized access to Hunter Road. Additionally, emergency only access will be provided to Vistaview Drive. For this study, the following two different development alternatives were analyzed:

1. Alternative 1 – Construction of 35 single-family residential units.
2. Alternative 2 – Construction of 45 single-family residential units.

The number of AM and PM peak hour vehicle trips that will be generated for each development alternative was forecast based on the rates and equations published by ITE in *Trip Generation, 11th Edition*. The proposed use was matched to the ITE land use category that most closely matches the proposed development. For this study, ITE Land Use *#210, Single-Family Detached Housing* was utilized and is a site that includes single-family detached homes on individual lots. For Land Use #210, both rates and equations are available, and the equations were utilized based on the guidelines outlined in the ITE *Trip Generation Handbook.* The resulting trip generation forecast for each alternative is summarized in **Table 3**.

Table 3: Site Trip Generation

Alternative	Land Use	ITE Code	Amount	Units	ADT	AM Peak Hour			PM Peak Hour		
						In	Out	Total	In	Out	Total
Alternative 1	**Single-Family Detached Housing**	210	35	D.U.	384	7	22	29	23	14	37
Alternative 2	**Single-Family Detached Housing**	210	45	D.U.	484	9	27	36	30	17	47

Site Trip Distribution

The vehicle-trips that would be generated by the proposed development for each alternative were assigned to the site driveways based on existing traffic patterns along the adjacent road network, local population densities, and ITE methodologies which indicates new trips will return to their direction of origin. Specifically, traffic patterns entering and exiting Christine Drive and Margo Drive were utilized to establish the trip distribution for the site. The resulting directional distribution for site-generated traffic is summarized in **Table 4.**

Table 4: Site Trip Distribution

To/From	Via	AM/PM
North	Hunter Road	21%
South	Hunter Road	79%
Total		**100%**

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Traffic volumes approaching from the north on Hunter Road were assumed to equally utilize Christine Drive and Margo Drive to enter the site. Traffic volumes approaching from the south were assumed to primarily (95%) utilize Margo Drive. Traffic was assumed to exit via the same roadway that was entered. The site-generated vehicle trips were assigned to the study network as shown on the attached **Figure 2** and **Figure 3** for Alternative 1 and Alternative 2, respectively. These trips were added to the 2029 no-build traffic volumes to calculate the future build traffic volumes.

Turn Lane Warrants

In order to determine the configuration of the existing intersections of Christine Drive and Margo Drive with Hunter Road, recommendations for right-turn lanes were evaluated in accordance with LCRC *Specifications and Administrative Rules Regulating Driveways, Road Approaches, Banners and Parades on and Over Highways*. LCRC does not publish warranting criteria for right-turn lanes, so the MDOT right-turn lane warrant outlined in Section 1.1.4 of the *Geometric Design Guidance* was utilized. Evaluation of the forecast site traffic volume assignments versus warranting criteria indicate that neither left-turn lane nor right-turn lane treatments are warranted at the intersections under either development alternative. The applicable warrant evaluations are attached.

Christine Drive & Dann Drive / Site Drive Traffic Control

Section 2B.04 of the *Michigan Manual on Uniform Traffic Control Devices (MMUTCD)* outlines criteria to evaluate to determine when intersection control should be considered at the intersection of two local streets. The use of YIELD or STOP signs should be considered if any of the following conditions are met:

1. *The combined vehicular, bicycle, and pedestrian volume entering the intersection from all approaches averages more than 2,000 units per day.*
2. *The ability to see conflicting traffic on an approach is not sufficient to allow a road user to stop or yield in compliance with the normal right-of-way rule if such stopping or yielding is necessary; and/or*
3. *Crash records indicate that five or more crashes that involve the failure to yield the right-of-way at the intersection under the normal right-of-way rule have been reported within a 3-year period, or that three or more such crashes have been reported within a 2-year period.*

The results of the evaluation indicate that none of the conditions are met. The combined vehicular, bicycle, and pedestrian volume is forecast to be less than 700 vehicles per day. In accordance with the AASHTO *Greenbook*, the intersection will meet the required corner clearance of 115 feet along each leg of the intersection. Since this is a new intersection, crash history is not available; however, the crash analysis results for the entirety of the Woodland Hills subdivision, show only one crash occurring within a five-year period involving failure to yield right-of-way at an intersection within the subdivision. This includes several uncontrolled T-intersections similar to the proposed intersection of Christine Drive & Dann Drive / Site Drive. Therefore, the intersection is recommended to operate as an uncontrolled intersection.

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Build Traffic Operations

Future build peak hour vehicle delays and LOS with the proposed development were calculated based on existing lane configurations and traffic control, build traffic volumes shown on the attached **Figure 2** and **Figure 3**, and HCM methodologies. SimTraffic simulations were also utilized to evaluate traffic flow and vehicle queues throughout the study network. The build conditions results are attached and summarized in **Table 5.**

Table 5: Future Build Traffic Operations

Intersection	Control	Approach	Movement	AM Peak Hour						PM Peak Hour					
				No-Build		Build - Alt 1		Build - Alt 2		No-Build		Build - Alt 1		Build - Alt 2	
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Hunter Road & Margo Drive	STOP (Minor)	EB	Left/Right	9.5	A	9.7	A	9.7	A	9.4	A	9.6	A	9.7	A
		NB	Left	7.6	A	7.6	A	7.6	A	7.4	A	7.5	A	7.5	A
			Thru/Right	Free		Free		Free		Free		Free		Free	
		SB	Thru/Right	Free		Free		Free		Free		Free		Free	
Hunter Road & Christine Drive	STOP (Minor)	EB	Left/Right	9.3	A	9.4	A	9.4	A	9.1	A	9.2	A	9.2	A
		NB	Left	7.6	A	7.6	A	7.6	A	7.4	A	7.4	A	7.4	A
			Thru/Right	Free		Free		Free		Free		Free		Free	
		SB	Thru/Right	Free		Free		Free		Free		Free		Free	
Christine Drive & Dann Drive / Site Drive	YIELD (Minor)	WB	Left/Right			8.7	A	8.7	A			8.7	A	8.7	A
		NB	Thru/Right	Free		Free		Free		Free		Free		Free	
		SB	Left			7.3	A	7.3	A			7.2	A	7.2	A
			Thru	Free		Free		Free		Free		Free		Free	

The results of the future build conditions analysis indicate that the proposed development will not have a significant impact on the adjacent road network or intersections. All approaches and movements at the intersections of Hunter Road with Christine Drive and Margo Drive will continue to operate acceptably at a LOS A during the peak hours with minor increases in delay (0.2 seconds per vehicle or less) for both development alternatives. Review of network simulations also continues to indicate acceptable traffic operations with minimal delays and vehicle queues for both development alternatives. Therefore, no improvements are recommended to accommodate the proposed development.

Additionally, traffic volumes at the study intersections were evaluated to determine the proportional increase in traffic as a result of the proposed development. The results of this evaluation are summarized in **Table 6.**

Table 6: Traffic Volume Increase Summary

Intersection	AM				PM			
	No-Build	Build	Change	% Change	No-Build	Build	Change	% Change
Hunter Road & Christine Drive	165	174	9	5.5%	194	206	12	6.2%
Hunter Road & Margo Drive	205	237	32	15.6%	255	297	42	16.5%

Conclusions

Based on the information outlined herein regarding the proposed development and resulting traffic operations, there would be no discernable impact to traffic operations on the adjacent road network

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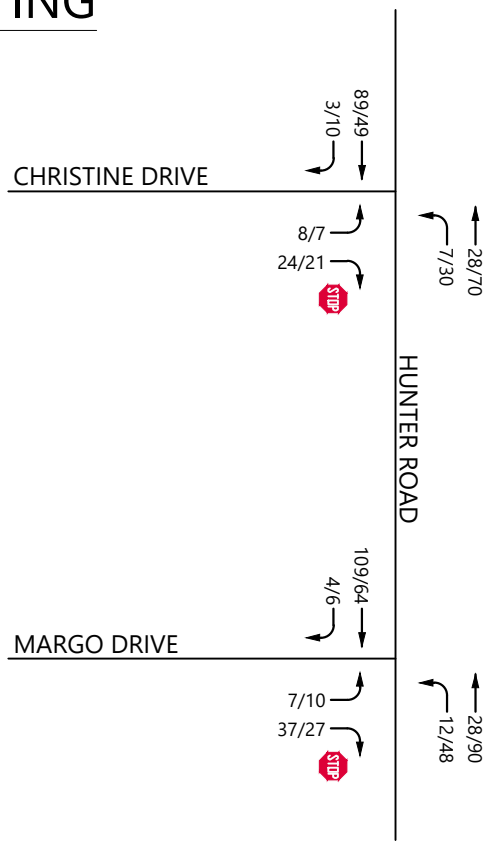
and the proposed study intersections will operate acceptably. The following conclusions of this assessment are based on the information outlined herein regarding the proposed use, forecast trip generation, and traffic operations analysis:

- The results of the existing conditions analysis indicate that all approaches and movements at the study intersections currently operate acceptably at a LOS A during the peak hours.
- An ambient traffic growth of 0.5% was applied to establish 2029 no-build traffic volumes without the proposed development.
- No-Build conditions analyses indicated that all approaches and movements at the study intersections will continue to operate at a LOS A during the peak hours.
- Neither left-turn nor right-turn treatments are warranted at the intersections of Hunter Road with Christine Drive and Margo Drive with the proposed development.
- Traffic control at the intersection of Christine Drive & Dann Drive / Site Drive is not recommended in accordance with MMUTCD standards.
- All approaches and movements at the study intersections of Hunter Road with Christine Drive and Margo Drive will continue to operate acceptably at a LOS A during the peak hours with minor increases in delay (0.2 seconds per vehicle or less).

The traffic data are attached for reference to this memorandum. Any questions related to this memorandum, analyses, and results should be addressed to CED.

Attached: Figure 2 – 3
Traffic Volume Data
Synchro HCM Calculations
Turn Lane Warrants

EXISTING



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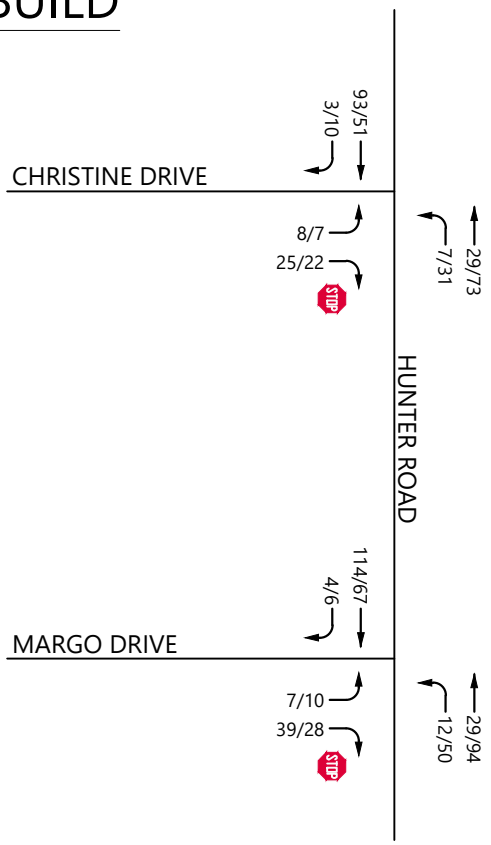

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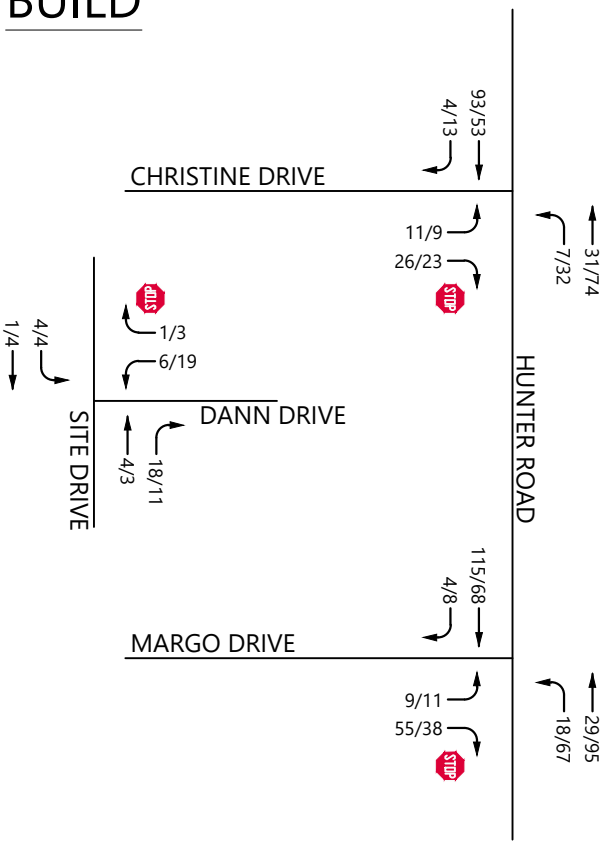
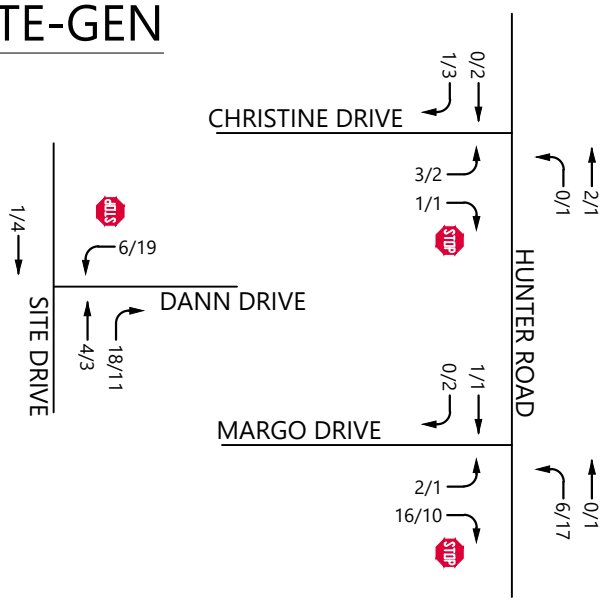


SITE-GEN

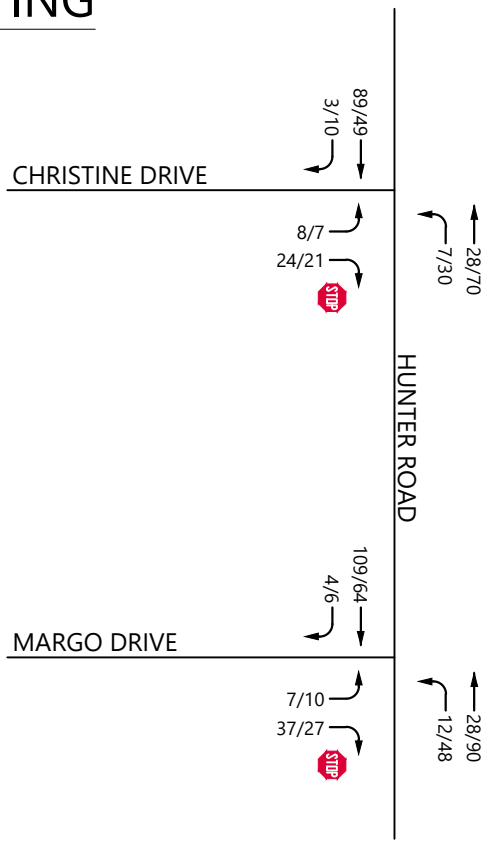


Cove at Woodland Lake Residential
Brighton Township, MI

Figure 2
Traffic Volume Summary - ALT 1

PAGE NO.	SCALE	DATE	
-	No Scale	Mar '25	Engineering & Design

EXISTING



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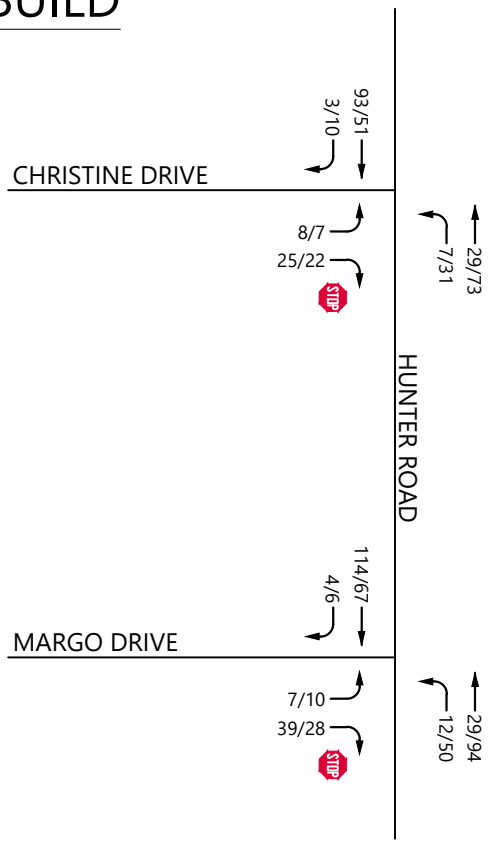
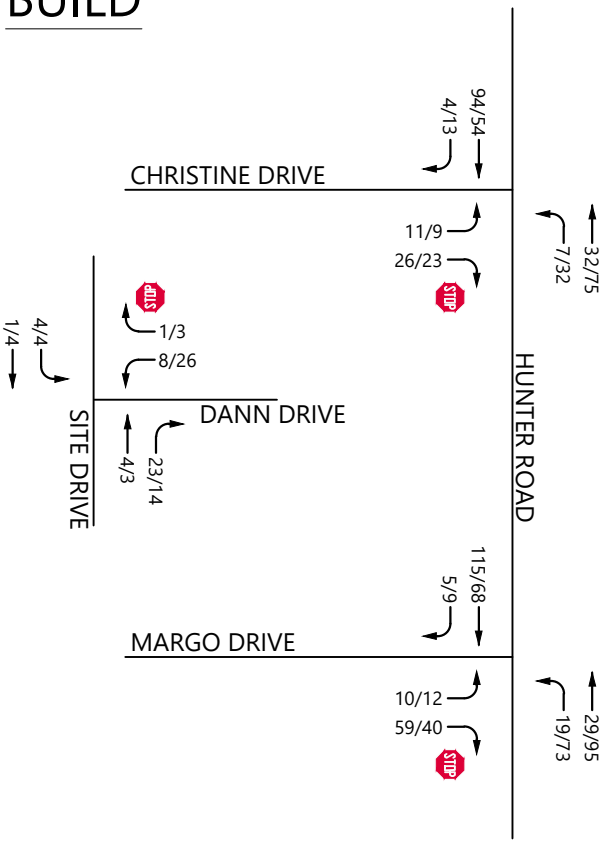
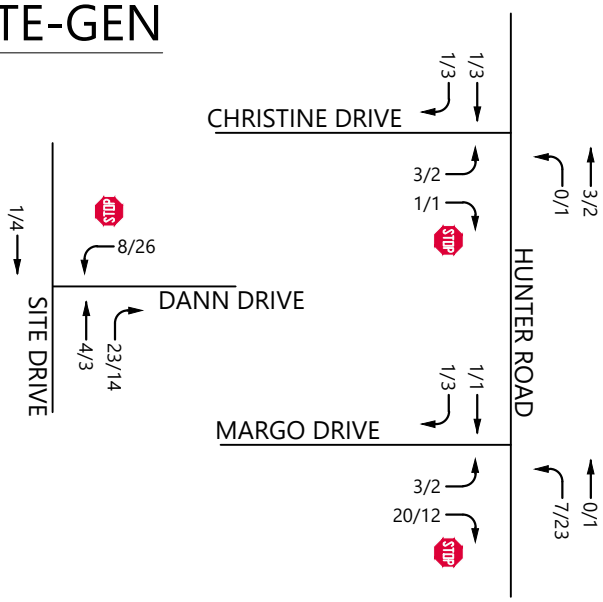


BUILD



SITE-GEN



Cove at Woodland Lake Residential
Brighton Township, MI

Figure 3
Traffic Volume Summary - ALT 2

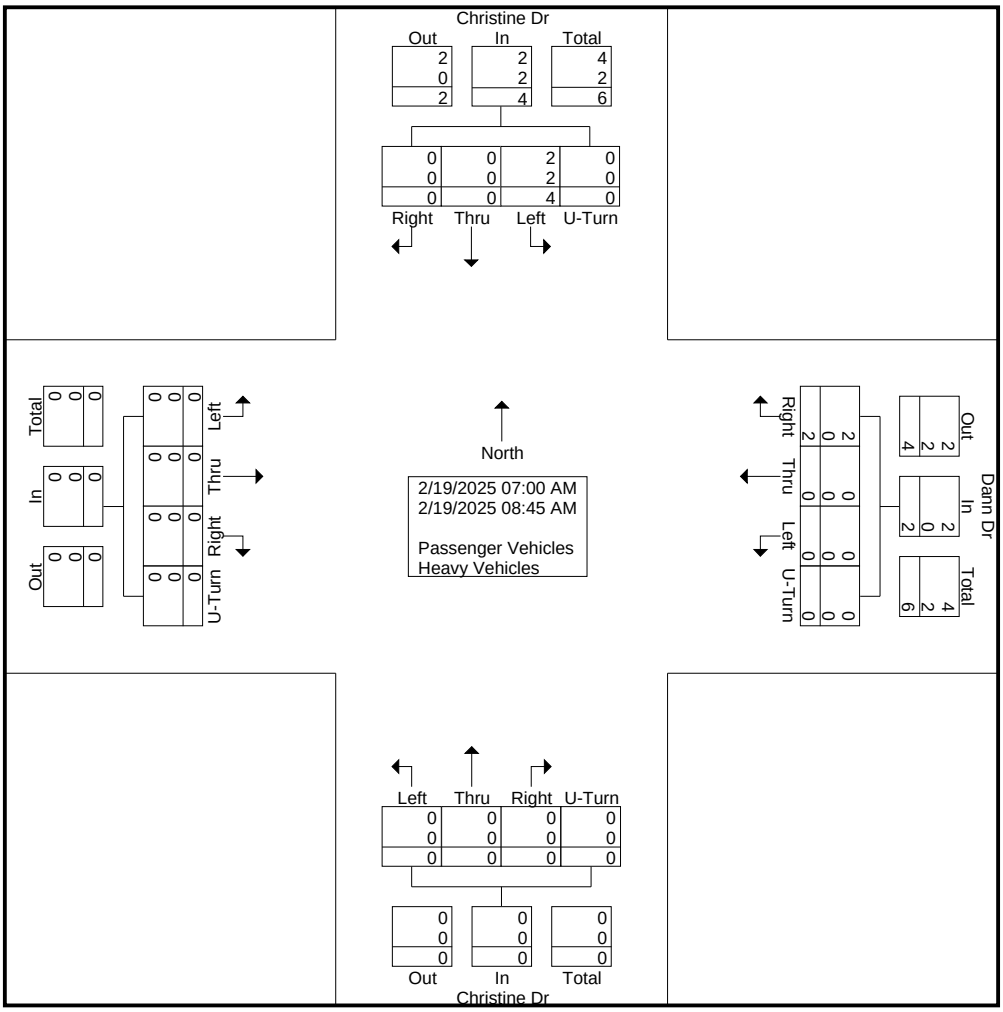
PAGE NO.	SCALE	DATE	
-	No Scale	Mar '25	Cullen Engineering & Design

TRUE DATA TO IMPROVE MOBILITY

File Name : 16923601 - Christine Dr -- Dann Dr
Site Code : 16923601
Start Date : 2/19/2025
Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles

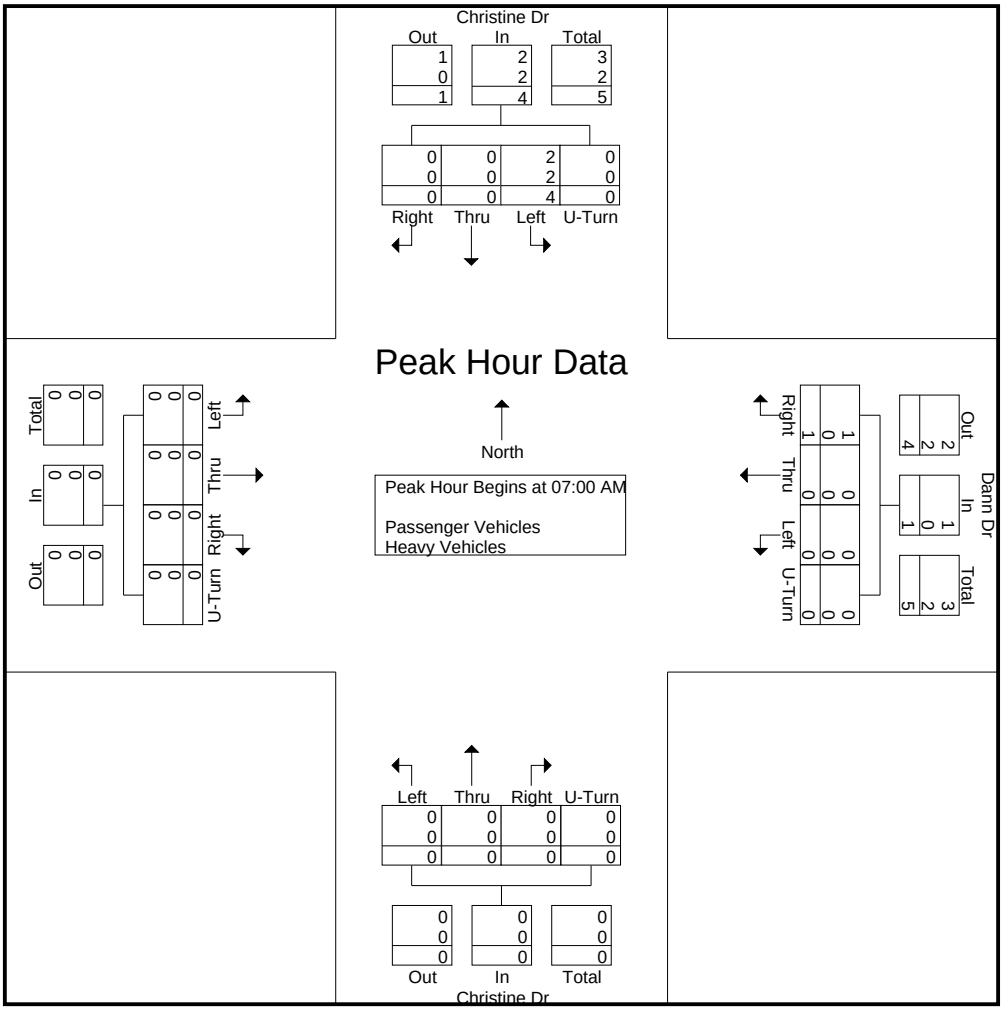
	Christine Dr Southbound					Dann Dr Westbound					Christine Dr Northbound					Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
07:00 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
07:45 AM	0	0	1	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
Total	0	0	4	0	4	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	5
08:00 AM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Grand Total	0	0	4	0	4	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	6
Apprch %	0	0	100	0		100	0	0	0		0	0	0	0		0	0	0	0		
Total %	0	0	66.7	0	66.7	33.3	0	0	0	33.3	0	0	0	0	0	0	0	0	0	0	
Passenger Vehicles	0	0	2	0	2	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	4
% Passenger Vehicles	0	0	50	0	50	100	0	0	0	100	0	0	0	0	0	0	0	0	0	0	66.7
Heavy Vehicles	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
% Heavy Vehicles	0	0	50	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33.3



TRUE DATA TO IMPROVE MOBILITY

File Name : 16923601 - Christine Dr -- Dann Dr
Site Code : 16923601
Start Date : 2/19/2025
Page No : 2

	Christine Dr Southbound					Dann Dr Westbound					Christine Dr Northbound					Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	**2**	0	**2**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**
07:45 AM	0	0	1	0	1	**1**	0	0	0	**1**	0	0	0	0	0	0	0	0	0	0	2
Total Volume	0	0	4	0	4	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	5
% App. Total	0	0	100	0		100	0	0	0		0	0	0	0		0	0	0	0		
PHF	.000	.000	.500	.000	.500	.250	.000	.000	.000	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.625
Passenger Vehicles	0	0	2	0	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3
% Passenger Vehicles	0	0	50.0	0	50.0	100	0	0	0	100	0	0	0	0	0	0	0	0	0	0	60.0
Heavy Vehicles	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
% Heavy Vehicles	0	0	50.0	0	50.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40.0

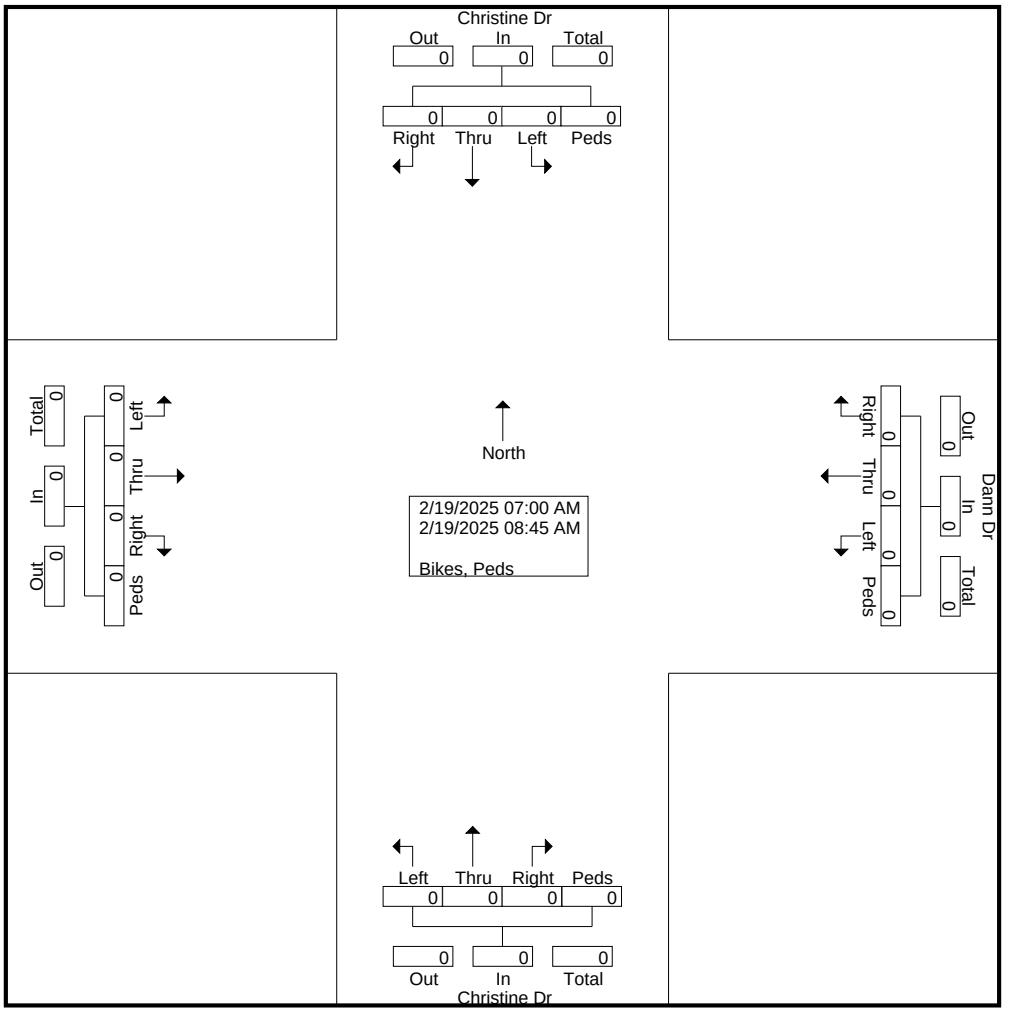


TRUE DATA TO IMPROVE MOBILITY

File Name : 16923601 - Christine Dr -- Dann Dr
Site Code : 16923601
Start Date : 2/19/2025
Page No : 1

Groups Printed- Bikes, Peds

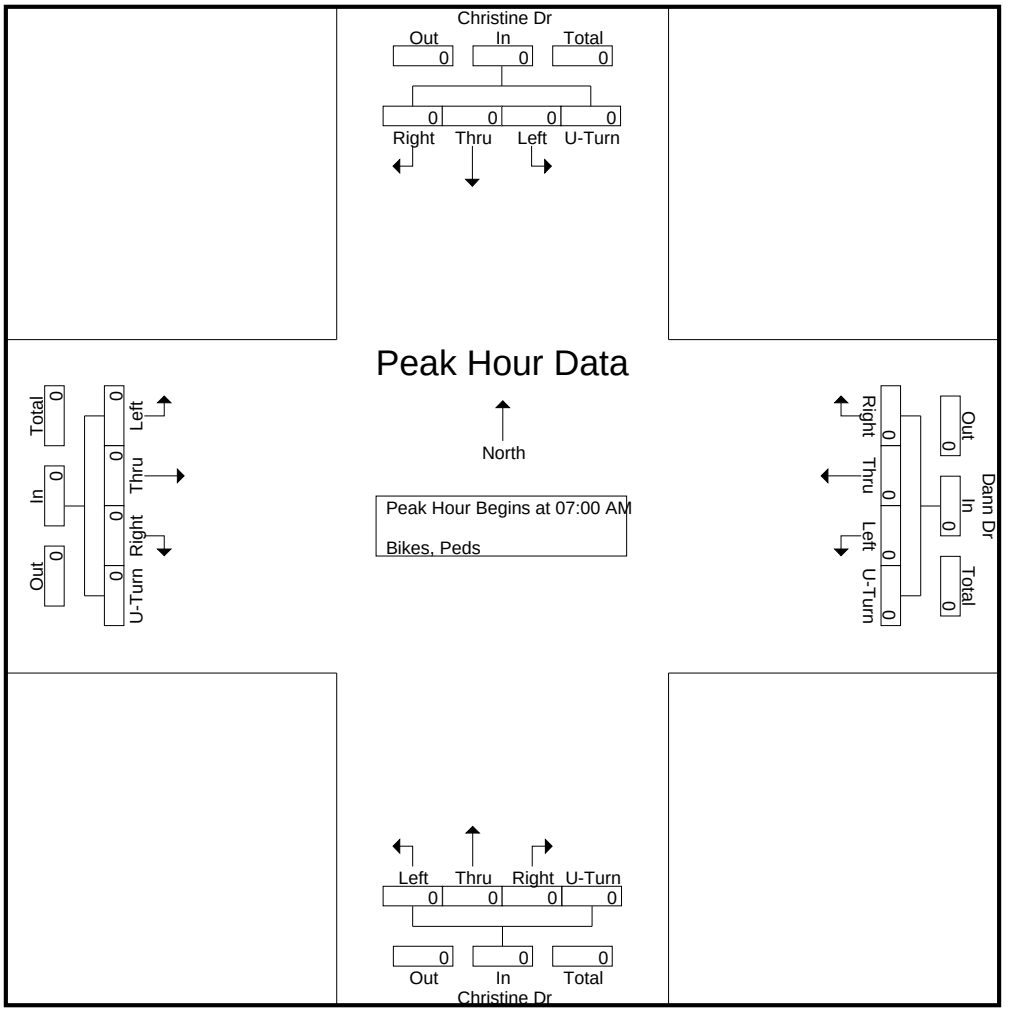
	Christine Dr Southbound					Dann Dr Westbound					Christine Dr Northbound					Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		
Total %																					



TRUE DATA TO IMPROVE MOBILITY

File Name : 16923601 - Christine Dr -- Dann Dr
Site Code : 16923601
Start Date : 2/19/2025
Page No : 2

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

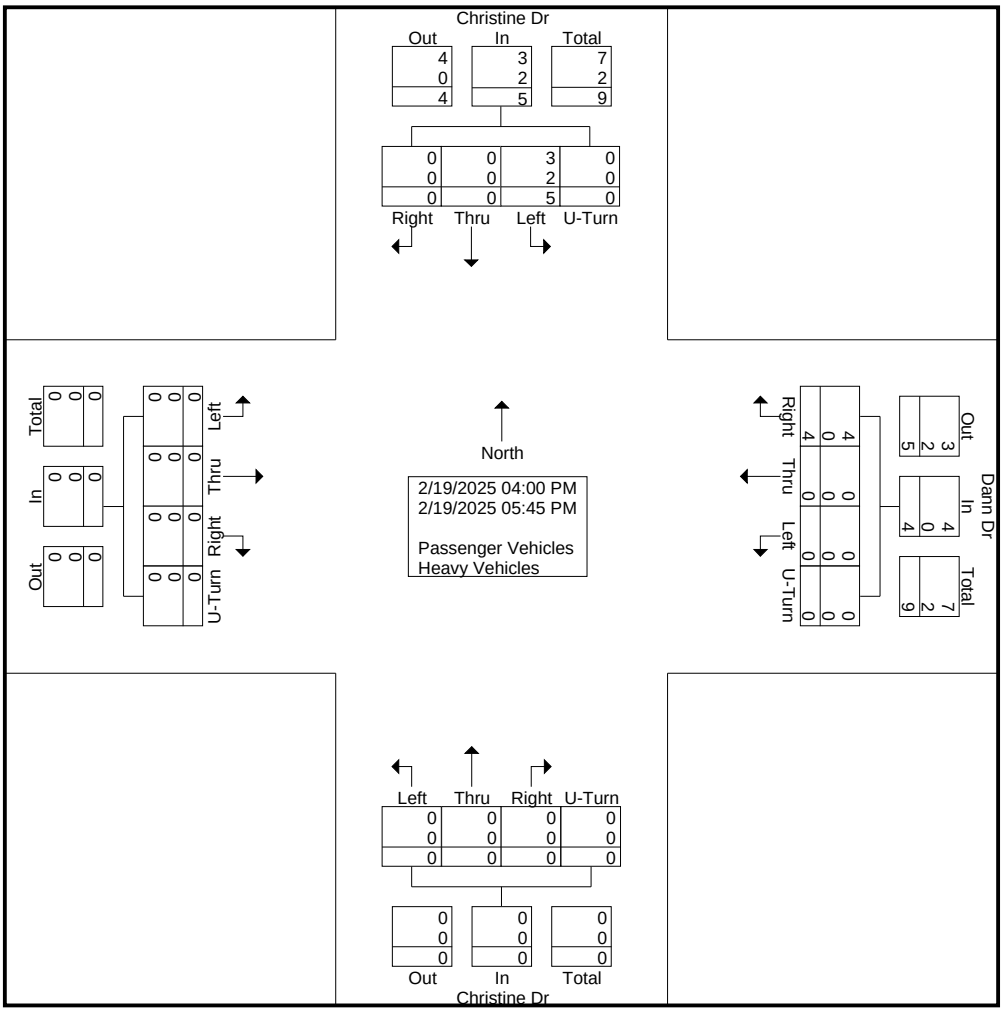


TRUE DATA TO IMPROVE MOBILITY

File Name : 16923602 - Christine Dr -- Dann Dr
Site Code : 16923602
Start Date : 2/19/2025
Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles

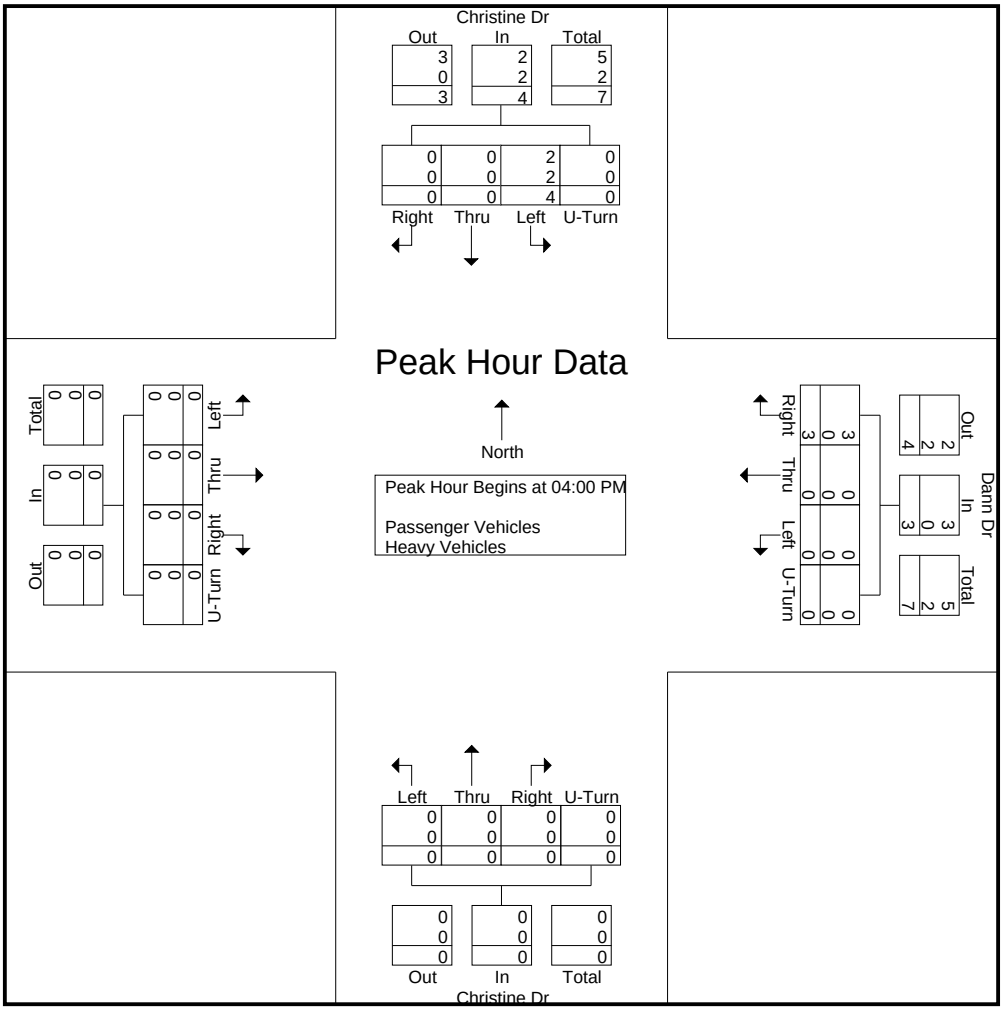
	Christine Dr Southbound					Dann Dr Westbound					Christine Dr Northbound					Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
04:00 PM	0	0	1	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
04:15 PM	0	0	2	0	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3
04:30 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
04:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	4	0	4	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	7
05:00 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	1	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
Grand Total	0	0	5	0	5	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	9
Apprch %	0	0	100	0		100	0	0	0		0	0	0	0		0	0	0	0		
Total %	0	0	55.6	0	55.6	44.4	0	0	0	44.4	0	0	0	0	0	0	0	0	0	0	
Passenger Vehicles	0	0	3	0	3	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	7
% Passenger Vehicles	0	0	60	0	60	100	0	0	0	100	0	0	0	0	0	0	0	0	0	0	77.8
Heavy Vehicles	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
% Heavy Vehicles	0	0	40	0	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22.2



TRUE DATA TO IMPROVE MOBILITY

File Name : 16923602 - Christine Dr -- Dann Dr
Site Code : 16923602
Start Date : 2/19/2025
Page No : 2

	Christine Dr Southbound					Dann Dr Westbound					Christine Dr Northbound					Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	0	1	0	1	**1**	0	0	0	**1**	0	0	0	0	0	0	0	0	0	0	2
04:15 PM	0	0	**2**	0	**2**	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	**3**
04:30 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
04:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Volume	0	0	4	0	4	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	7
% App. Total	0	0	100	0		100	0	0	0		0	0	0	0		0	0	0	0		
PHF	.000	.000	.500	.000	.500	.750	.000	.000	.000	.750	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.583
Passenger Vehicles	0	0	2	0	2	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	5
% Passenger Vehicles	0	0	50.0	0	50.0	100	0	0	0	100	0	0	0	0	0	0	0	0	0	0	71.4
Heavy Vehicles	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
% Heavy Vehicles	0	0	50.0	0	50.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28.6

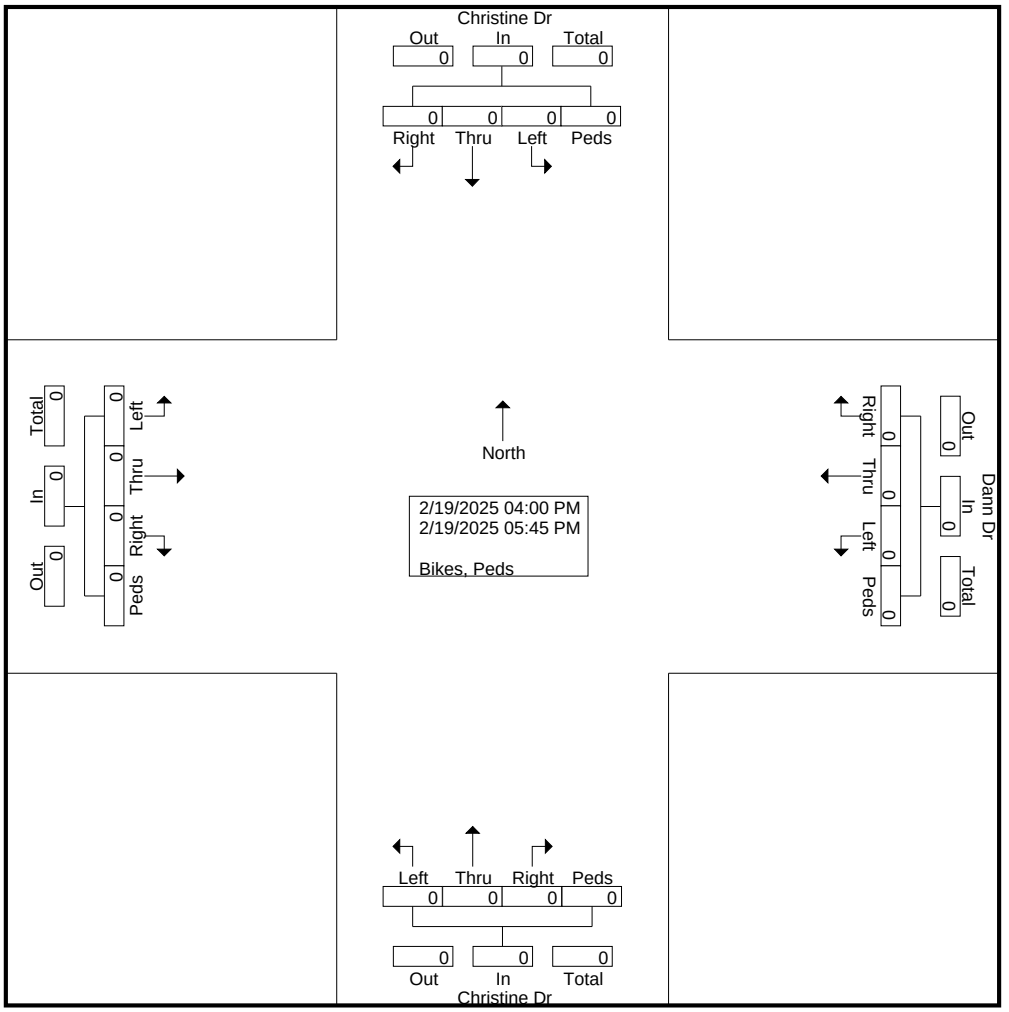


TRUE DATA TO IMPROVE MOBILITY

File Name : 16923602 - Christine Dr -- Dann Dr
Site Code : 16923602
Start Date : 2/19/2025
Page No : 1

Groups Printed- Bikes, Peds

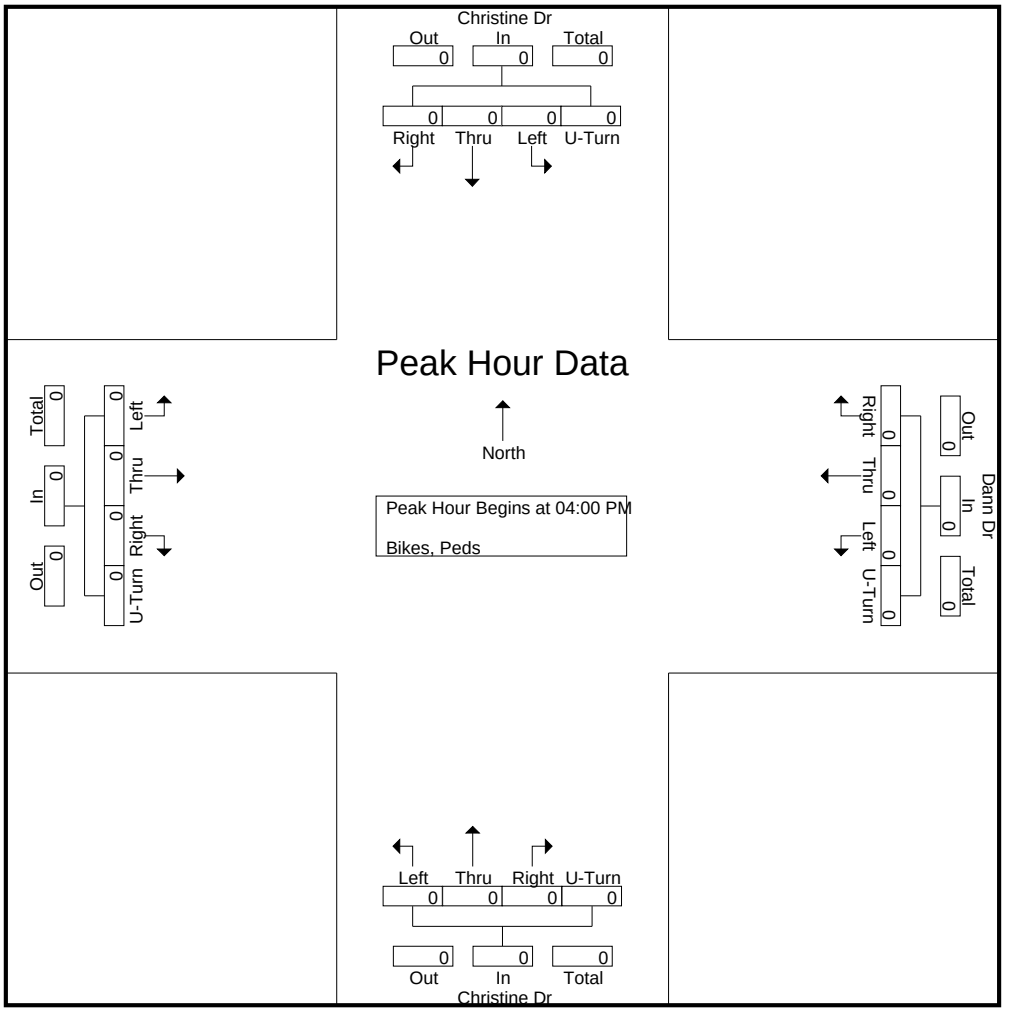
	Christine Dr Southbound					Dann Dr Westbound					Christine Dr Northbound					Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		
Total %																					



TRUE DATA TO IMPROVE MOBILITY

File Name : 16923602 - Christine Dr -- Dann Dr
Site Code : 16923602
Start Date : 2/19/2025
Page No : 2

	Christine Dr Southbound					Dann Dr Westbound					Christine Dr Northbound					Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

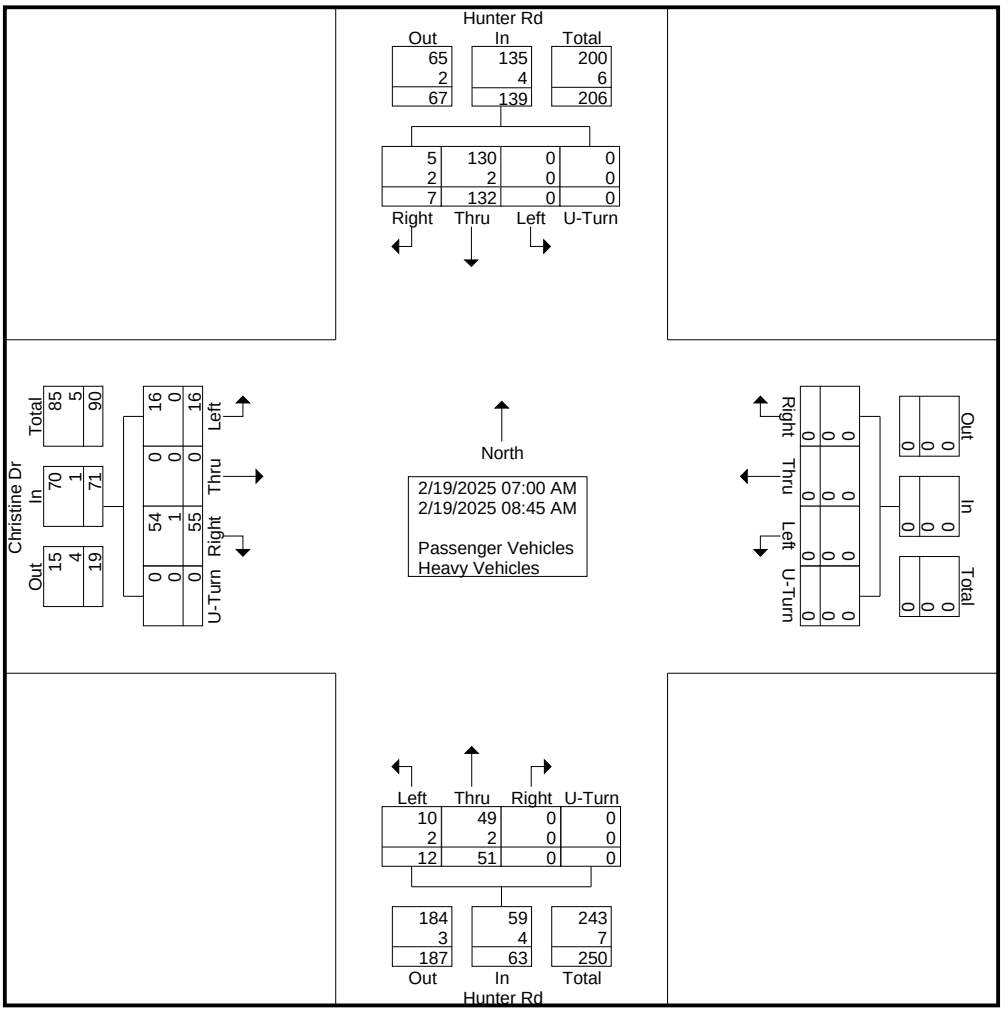


TRUE DATA TO IMPROVE MOBILITY

File Name : 16923603 - Hunter Rd -- Christine Dr
Site Code : 16923603
Start Date : 2/19/2025
Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles

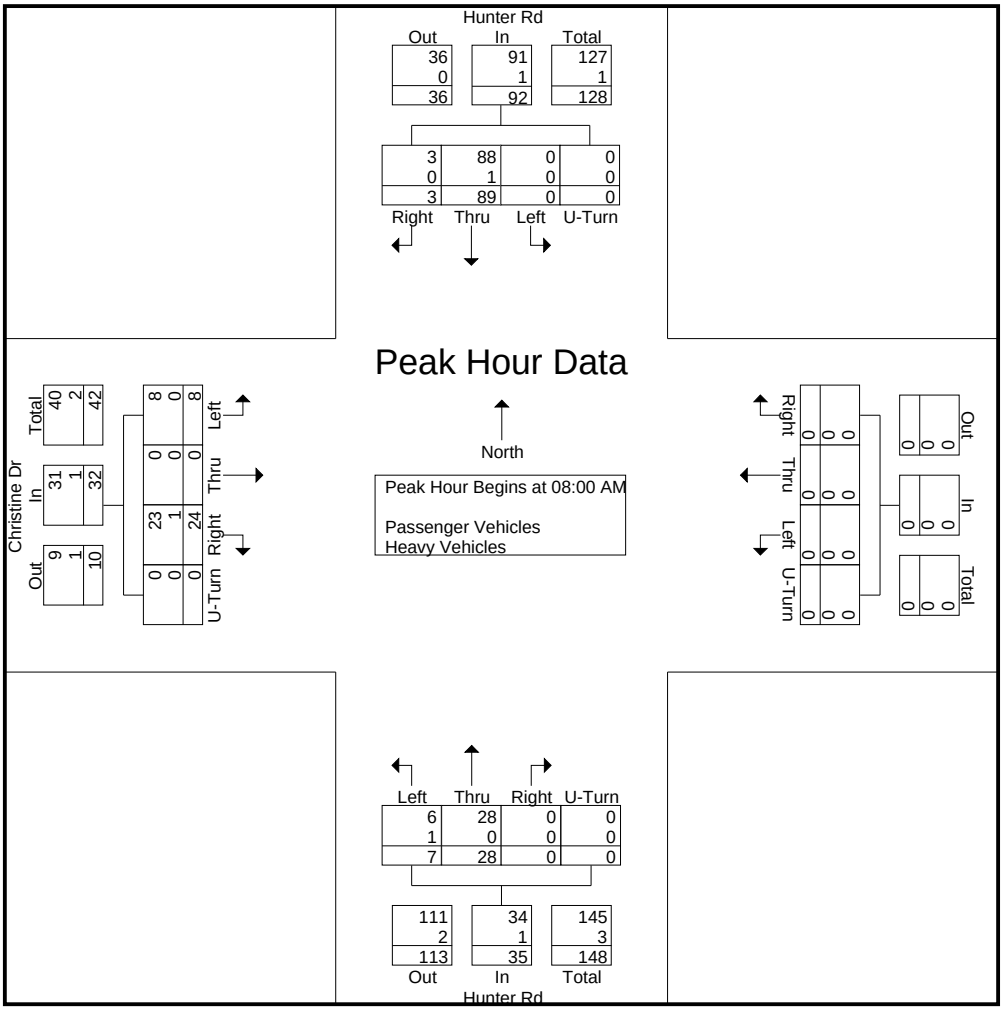
	Hunter Rd Southbound					Westbound					Hunter Rd Northbound					Christine Dr Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
07:00 AM	1	11	0	0	12	0	0	0	0	0	0	2	0	0	2	7	0	4	0	11	25
07:15 AM	1	12	0	0	13	0	0	0	0	0	0	2	2	0	4	8	0	0	0	8	25
07:30 AM	1	10	0	0	11	0	0	0	0	0	0	9	0	0	9	6	0	3	0	9	29
07:45 AM	1	10	0	0	11	0	0	0	0	0	0	10	3	0	13	10	0	1	0	11	35
Total	4	43	0	0	47	0	0	0	0	0	0	23	5	0	28	31	0	8	0	39	114
08:00 AM	0	17	0	0	17	0	0	0	0	0	0	7	1	0	8	4	0	3	0	7	32
08:15 AM	1	30	0	0	31	0	0	0	0	0	0	10	3	0	13	10	0	3	0	13	57
08:30 AM	1	16	0	0	17	0	0	0	0	0	0	3	1	0	4	4	0	1	0	5	26
08:45 AM	1	26	0	0	27	0	0	0	0	0	0	8	2	0	10	6	0	1	0	7	44
Total	3	89	0	0	92	0	0	0	0	0	0	28	7	0	35	24	0	8	0	32	159
Grand Total	7	132	0	0	139	0	0	0	0	0	0	51	12	0	63	55	0	16	0	71	273
Apprch %	5	95	0	0		0	0	0	0		0	81	19	0		77.5	0	22.5	0		
Total %	2.6	48.4	0	0	50.9	0	0	0	0	0	0	18.7	4.4	0	23.1	20.1	0	5.9	0	26	
Passenger Vehicles	5	130	0	0	135	0	0	0	0	0	0	49	10	0	59	54	0	16	0	70	264
% Passenger Vehicles	71.4	98.5	0	0	97.1	0	0	0	0	0	0	96.1	83.3	0	93.7	98.2	0	100	0	98.6	96.7
Heavy Vehicles	2	2	0	0	4	0	0	0	0	0	0	2	2	0	4	1	0	0	0	1	9
% Heavy Vehicles	28.6	1.5	0	0	2.9	0	0	0	0	0	0	3.9	16.7	0	6.3	1.8	0	0	0	1.4	3.3



TRUE DATA TO IMPROVE MOBILITY

File Name : 16923603 - Hunter Rd -- Christine Dr
Site Code : 16923603
Start Date : 2/19/2025
Page No : 2

	Hunter Rd Southbound					Westbound					Hunter Rd Northbound					Christine Dr Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	17	0	0	17	0	0	0	0	0	0	7	1	0	8	4	0	**3**	0	7	32
08:15 AM	**1**	**30**	0	0	**31**	0	0	0	0	0	0	**10**	**3**	0	**13**	**10**	0	3	0	**13**	**57**
08:30 AM	1	16	0	0	17	0	0	0	0	0	0	3	1	0	4	4	0	1	0	5	26
08:45 AM	1	26	0	0	27	0	0	0	0	0	0	8	2	0	10	6	0	1	0	7	44
Total Volume	3	89	0	0	92	0	0	0	0	0	0	28	7	0	35	24	0	8	0	32	159
% App. Total	3.3	96.7	0	0		0	0	0	0		0	80	20	0		75	0	25	0		
PHF	.750	.742	.000	.000	.742	.000	.000	.000	.000	.000	.000	.700	.583	.000	.673	.600	.000	.667	.000	.615	.697
Passenger Vehicles	3	88	0	0	91	0	0	0	0	0	0	28	6	0	34	23	0	8	0	31	156
% Passenger Vehicles	100	98.9	0	0	98.9	0	0	0	0	0	0	100	85.7	0	97.1	95.8	0	100	0	96.9	98.1
Heavy Vehicles	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	1	0	0	0	1	3
% Heavy Vehicles	0	1.1	0	0	1.1	0	0	0	0	0	0	0	14.3	0	2.9	4.2	0	0	0	3.1	1.9

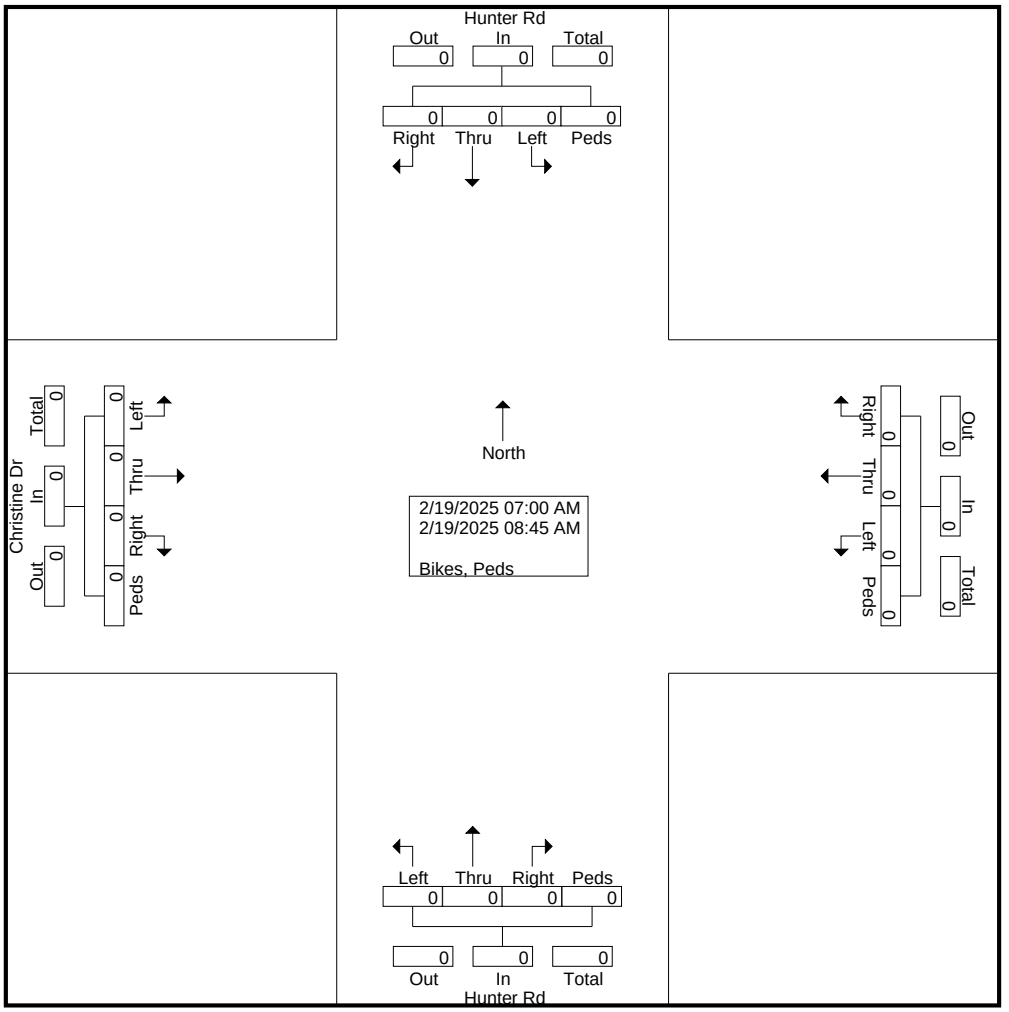


TRUE DATA TO IMPROVE MOBILITY

File Name : 16923603 - Hunter Rd -- Christine Dr
Site Code : 16923603
Start Date : 2/19/2025
Page No : 1

Groups Printed- Bikes, Peds

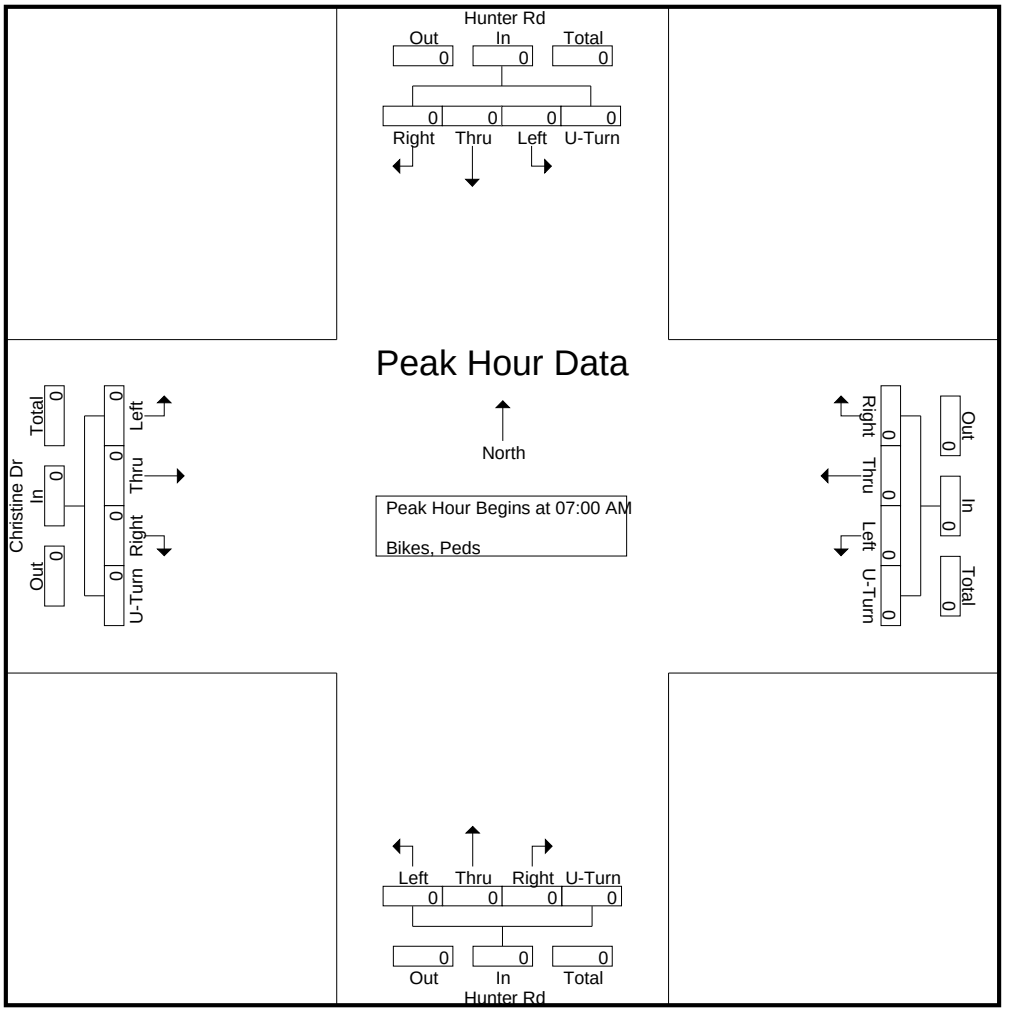
	Hunter Rd Southbound					Westbound					Hunter Rd Northbound					Christine Dr Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		
Total %																					



TRUE DATA TO IMPROVE MOBILITY

File Name : 16923603 - Hunter Rd -- Christine Dr
Site Code : 16923603
Start Date : 2/19/2025
Page No : 2

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

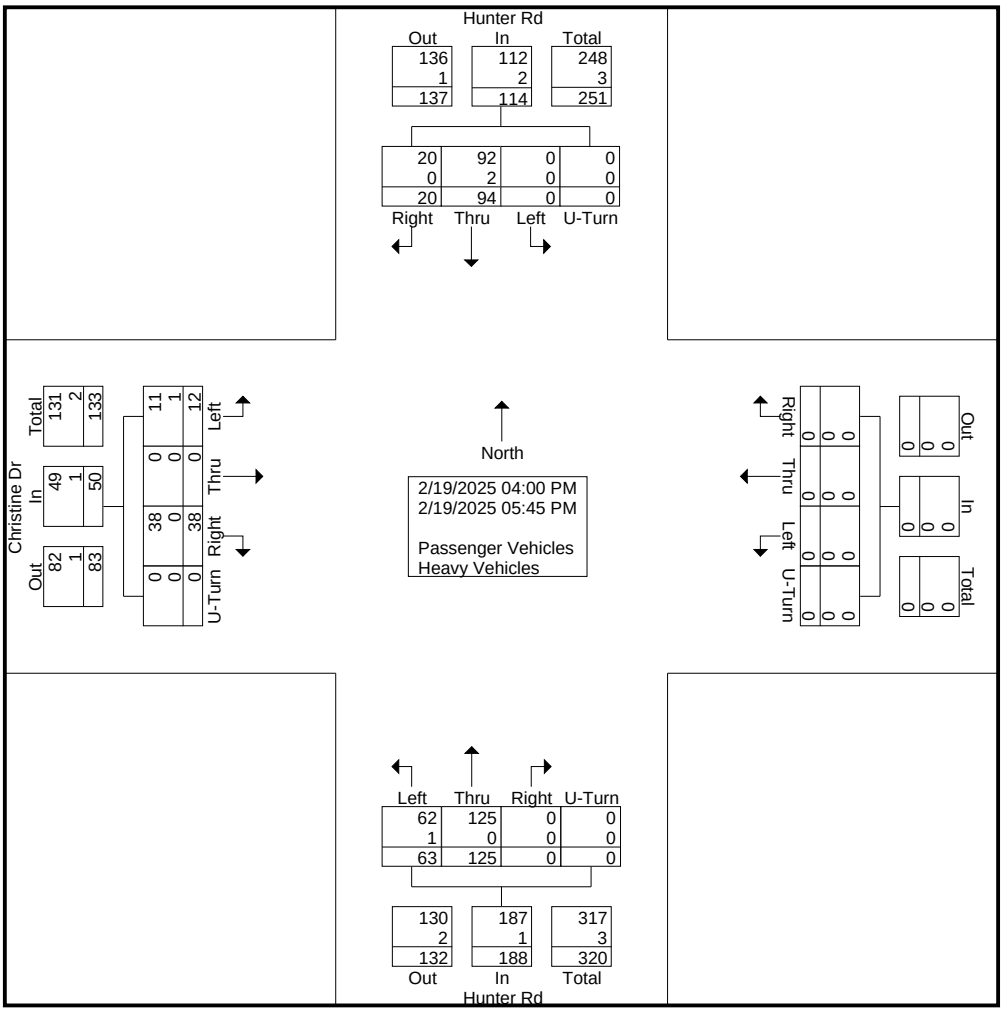


TRUE DATA TO IMPROVE MOBILITY

File Name : 16923604 - Hunter Rd -- Christine Dr
Site Code : 16923604
Start Date : 2/19/2025
Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles

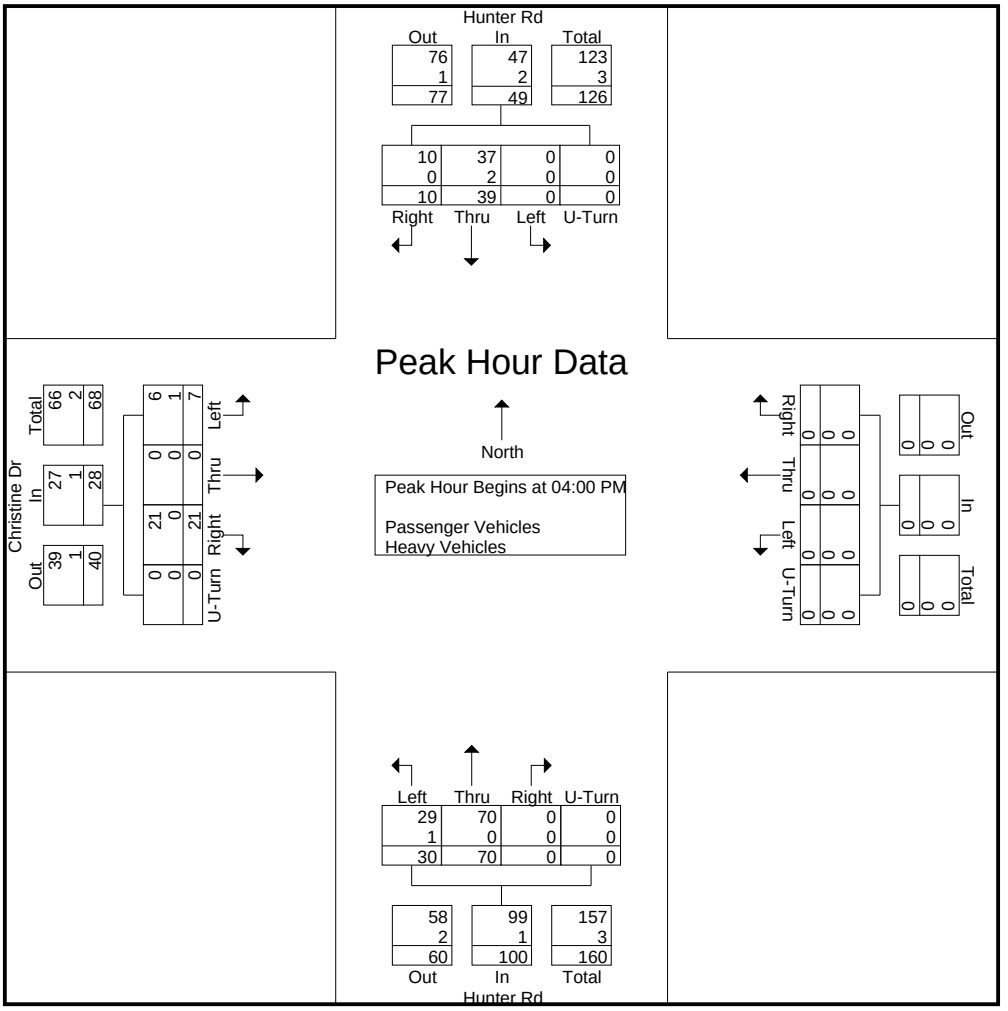
	Hunter Rd Southbound					Westbound					Hunter Rd Northbound					Christine Dr Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
04:00 PM	0	7	0	0	7	0	0	0	0	0	0	23	7	0	30	3	0	2	0	5	42
04:15 PM	4	11	0	0	15	0	0	0	0	0	0	18	8	0	26	6	0	1	0	7	48
04:30 PM	2	13	0	0	15	0	0	0	0	0	0	16	6	0	22	5	0	3	0	8	45
04:45 PM	4	8	0	0	12	0	0	0	0	0	0	13	9	0	22	7	0	1	0	8	42
Total	10	39	0	0	49	0	0	0	0	0	0	70	30	0	100	21	0	7	0	28	177
05:00 PM	2	13	0	0	15	0	0	0	0	0	0	10	7	0	17	5	0	1	0	6	38
05:15 PM	3	15	0	0	18	0	0	0	0	0	0	18	4	0	22	4	0	0	0	4	44
05:30 PM	3	14	0	0	17	0	0	0	0	0	0	13	10	0	23	2	0	3	0	5	45
05:45 PM	2	13	0	0	15	0	0	0	0	0	0	14	12	0	26	6	0	1	0	7	48
Total	10	55	0	0	65	0	0	0	0	0	0	55	33	0	88	17	0	5	0	22	175
Grand Total	20	94	0	0	114	0	0	0	0	0	0	125	63	0	188	38	0	12	0	50	352
Apprch %	17.5	82.5	0	0		0	0	0	0		0	66.5	33.5	0		76	0	24	0		
Total %	5.7	26.7	0	0	32.4	0	0	0	0	0	0	35.5	17.9	0	53.4	10.8	0	3.4	0	14.2	
Passenger Vehicles	20	92	0	0	112	0	0	0	0	0	0	125	62	0	187	38	0	11	0	49	348
% Passenger Vehicles	100	97.9	0	0	98.2	0	0	0	0	0	0	100	98.4	0	99.5	100	0	91.7	0	98	98.9
Heavy Vehicles	0	2	0	0	2	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	4
% Heavy Vehicles	0	2.1	0	0	1.8	0	0	0	0	0	0	0	1.6	0	0.5	0	0	8.3	0	2	1.1



TRUE DATA TO IMPROVE MOBILITY

File Name : 16923604 - Hunter Rd -- Christine Dr
Site Code : 16923604
Start Date : 2/19/2025
Page No : 2

	Hunter Rd Southbound					Westbound					Hunter Rd Northbound					Christine Dr Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	7	0	0	7	0	0	0	0	0	0	**23**	7	0	**30**	3	0	2	0	5	42
04:15 PM	**4**	11	0	0	**15**	0	0	0	0	0	0	18	8	0	26	6	0	1	0	7	**48**
04:30 PM	2	**13**	0	0	15	0	0	0	0	0	0	16	6	0	22	5	0	**3**	0	**8**	45
04:45 PM	4	8	0	0	12	0	0	0	0	0	0	13	**9**	0	22	**7**	0	1	0	8	42
Total Volume	10	39	0	0	49	0	0	0	0	0	0	70	30	0	100	21	0	7	0	28	177
% App. Total	20.4	79.6	0	0		0	0	0	0		0	70	30	0		75	0	25	0		
PHF	.625	.750	.000	.000	.817	.000	.000	.000	.000	.000	.000	.761	.833	.000	.833	.750	.000	.583	.000	.875	.922
Passenger Vehicles	10	37	0	0	47	0	0	0	0	0	0	70	29	0	99	21	0	6	0	27	173
% Passenger Vehicles	100	94.9	0	0	95.9	0	0	0	0	0	0	100	96.7	0	99.0	100	0	85.7	0	96.4	97.7
Heavy Vehicles	0	2	0	0	2	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	4
% Heavy Vehicles	0	5.1	0	0	4.1	0	0	0	0	0	0	0	3.3	0	1.0	0	0	14.3	0	3.6	2.3

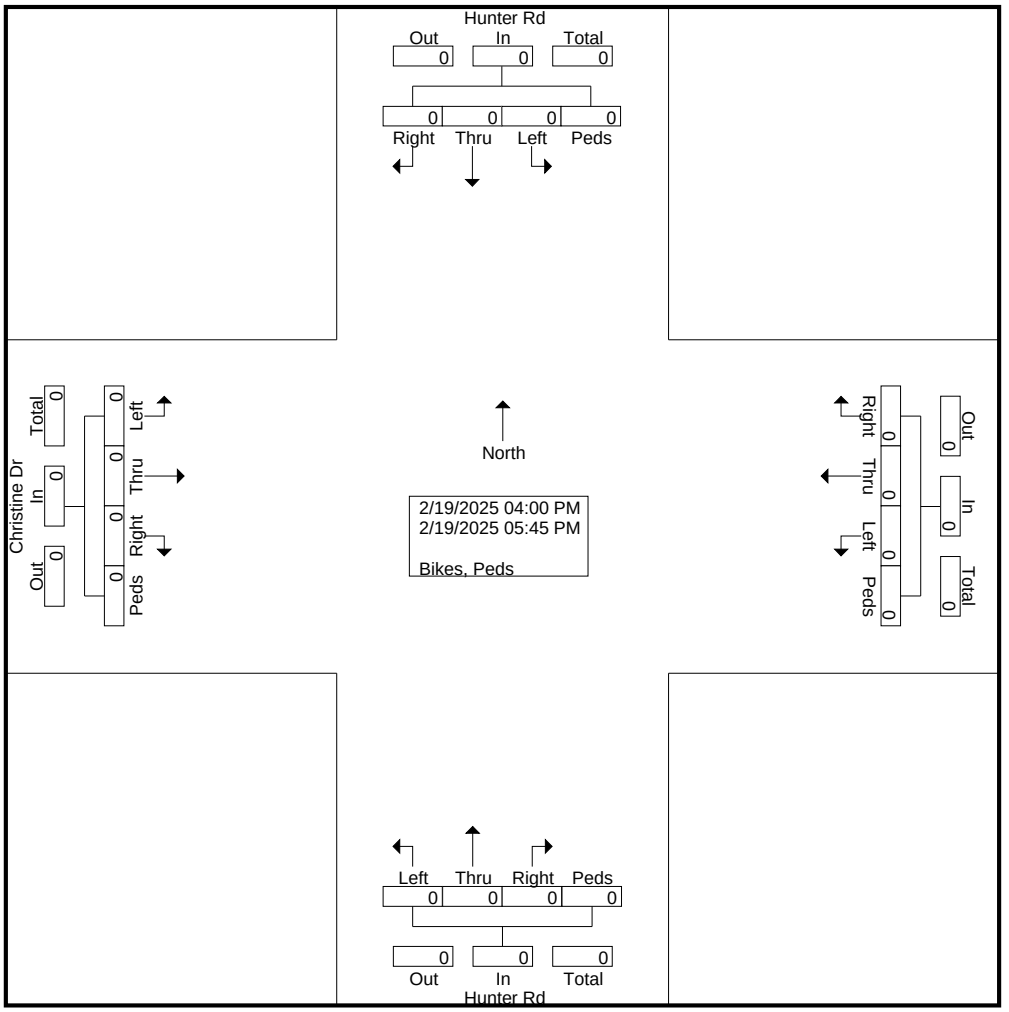


TRUE DATA TO IMPROVE MOBILITY

File Name : 16923604 - Hunter Rd -- Christine Dr
Site Code : 16923604
Start Date : 2/19/2025
Page No : 1

Groups Printed- Bikes, Peds

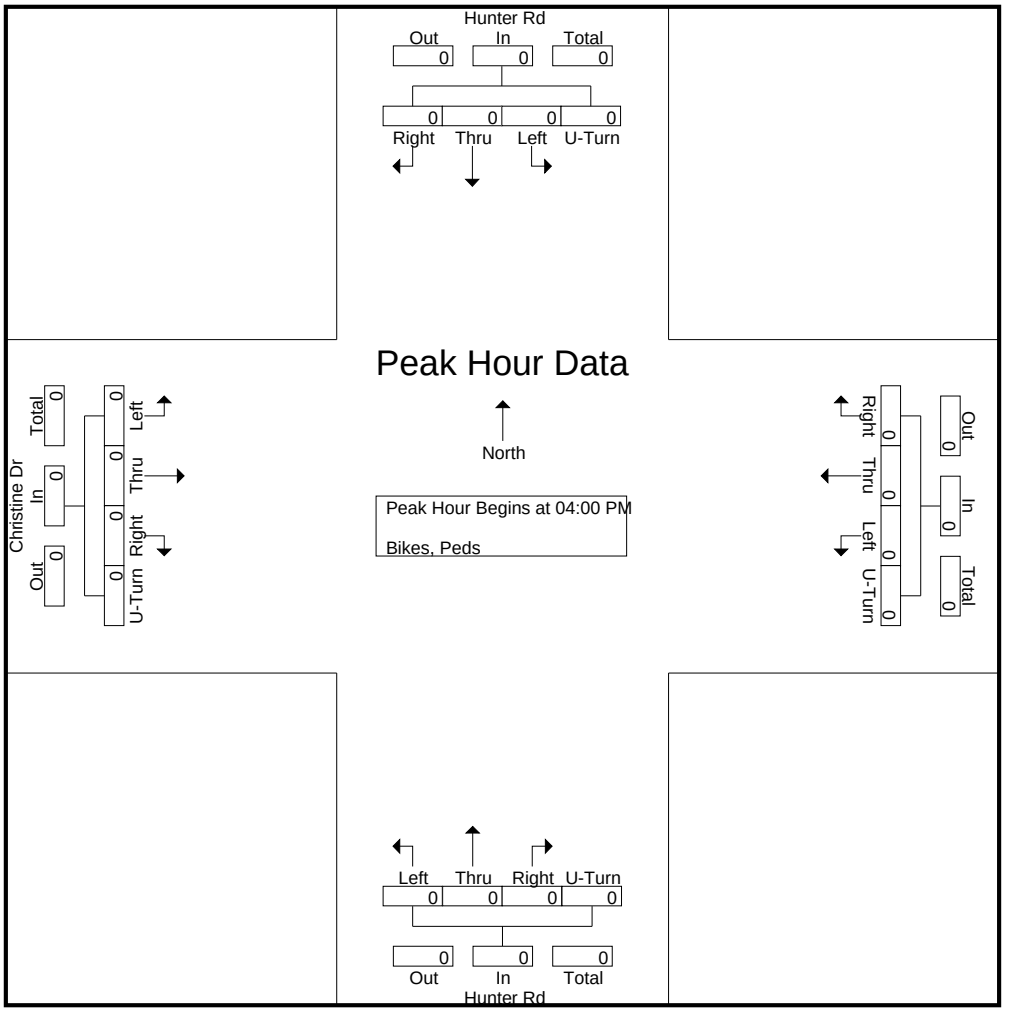
	Hunter Rd Southbound					Westbound					Hunter Rd Northbound					Christine Dr Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		
Total %																					



TRUE DATA TO IMPROVE MOBILITY

File Name : 16923604 - Hunter Rd -- Christine Dr
Site Code : 16923604
Start Date : 2/19/2025
Page No : 2

	Hunter Rd Southbound					Westbound					Hunter Rd Northbound					Christine Dr Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

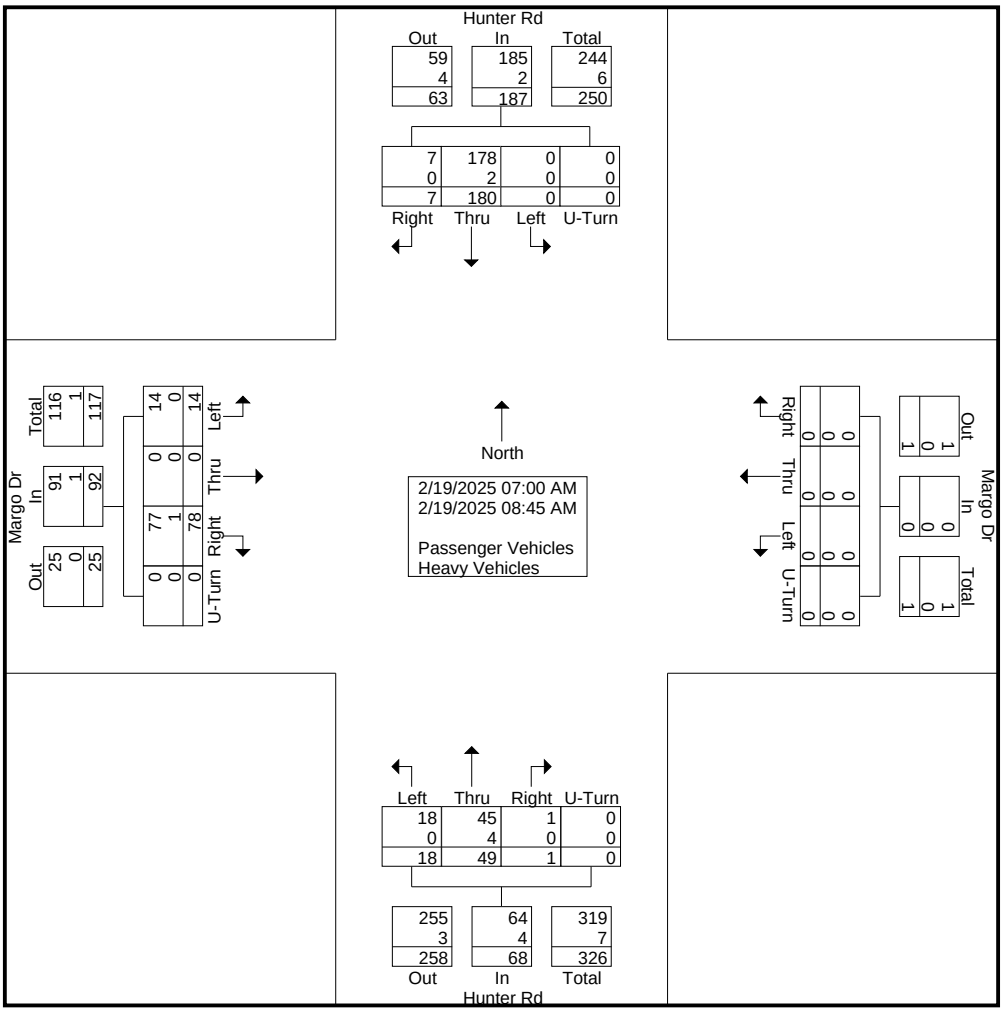


TRUE DATA TO IMPROVE MOBILITY

File Name : 16923605 - Hunter Rd -- Margo Dr
Site Code : 16923605
Start Date : 2/19/2025
Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles

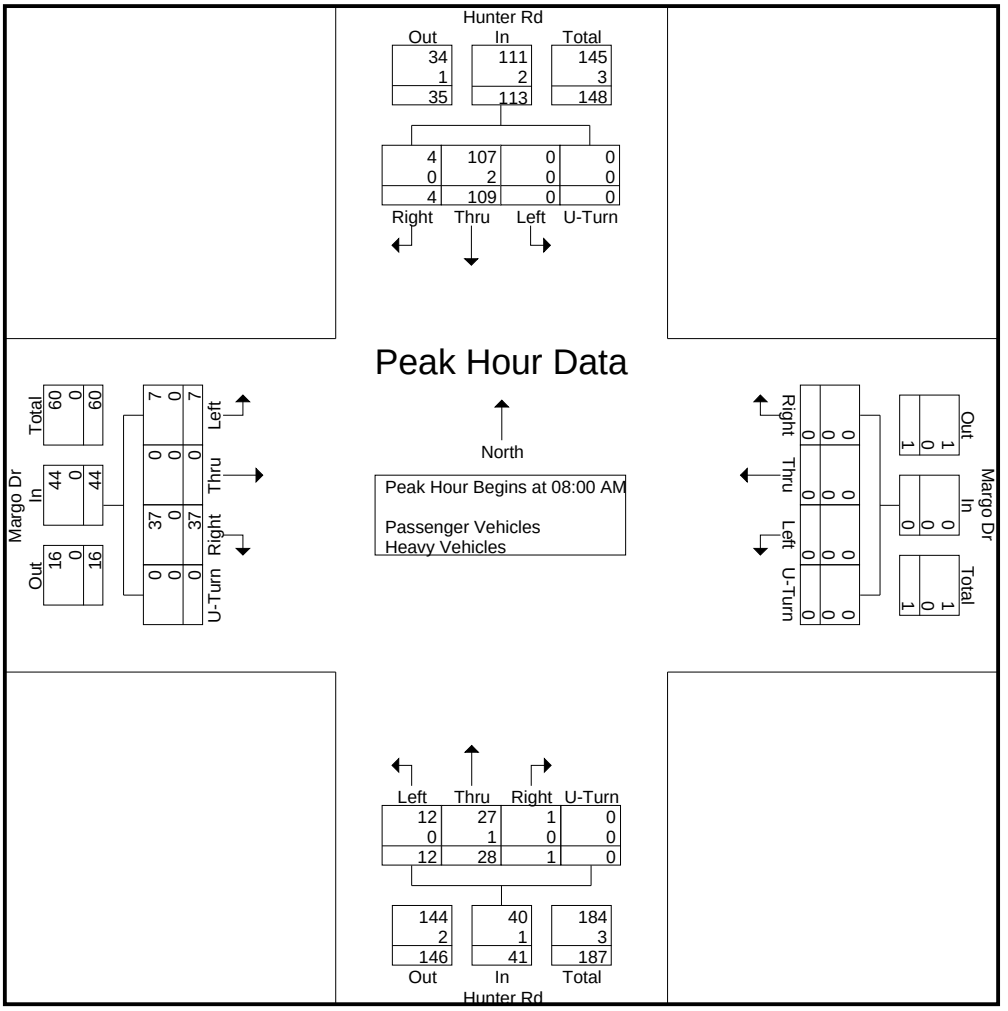
	Hunter Rd Southbound					Margo Dr Westbound					Hunter Rd Northbound					Margo Dr Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
07:00 AM	1	17	0	0	18	0	0	0	0	0	0	2	0	0	2	15	0	0	0	15	35
07:15 AM	0	20	0	0	20	0	0	0	0	0	0	3	1	0	4	10	0	1	0	11	35
07:30 AM	1	15	0	0	16	0	0	0	0	0	0	7	3	0	10	7	0	2	0	9	35
07:45 AM	1	19	0	0	20	0	0	0	0	0	0	9	2	0	11	9	0	4	0	13	44
Total	3	71	0	0	74	0	0	0	0	0	0	21	6	0	27	41	0	7	0	48	149
08:00 AM	3	18	0	0	21	0	0	0	0	0	0	8	2	0	10	6	0	0	0	6	37
08:15 AM	0	40	0	0	40	0	0	0	0	0	0	9	3	0	12	11	0	4	0	15	67
08:30 AM	0	20	0	0	20	0	0	0	0	0	0	4	2	0	6	8	0	0	0	8	34
08:45 AM	1	31	0	0	32	0	0	0	0	0	1	7	5	0	13	12	0	3	0	15	60
Total	4	109	0	0	113	0	0	0	0	0	1	28	12	0	41	37	0	7	0	44	198
Grand Total	7	180	0	0	187	0	0	0	0	0	1	49	18	0	68	78	0	14	0	92	347
Apprch %	3.7	96.3	0	0		0	0	0	0		1.5	72.1	26.5	0		84.8	0	15.2	0		
Total %	2	51.9	0	0	53.9	0	0	0	0	0	0.3	14.1	5.2	0	19.6	22.5	0	4	0	26.5	
Passenger Vehicles	7	178	0	0	185	0	0	0	0	0	1	45	18	0	64	77	0	14	0	91	340
% Passenger Vehicles	100	98.9	0	0	98.9	0	0	0	0	0	100	91.8	100	0	94.1	98.7	0	100	0	98.9	98
Heavy Vehicles	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	1	0	0	0	1	7
% Heavy Vehicles	0	1.1	0	0	1.1	0	0	0	0	0	0	8.2	0	0	5.9	1.3	0	0	0	1.1	2



TRUE DATA TO IMPROVE MOBILITY

File Name : 16923605 - Hunter Rd -- Margo Dr
Site Code : 16923605
Start Date : 2/19/2025
Page No : 2

	Hunter Rd Southbound					Margo Dr Westbound					Hunter Rd Northbound					Margo Dr Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	**3**	18	0	0	21	0	0	0	0	0	0	8	2	0	10	6	0	0	0	6	37
08:15 AM	0	**40**	0	0	**40**	0	0	0	0	0	0	**9**	3	0	12	11	0	**4**	0	**15**	**67**
08:30 AM	0	20	0	0	20	0	0	0	0	0	0	4	2	0	6	8	0	0	0	8	34
08:45 AM	1	31	0	0	32	0	0	0	0	0	**1**	7	**5**	0	**13**	**12**	0	3	0	15	60
Total Volume	4	109	0	0	113	0	0	0	0	0	1	28	12	0	41	37	0	7	0	44	198
% App. Total	3.5	96.5	0	0		0	0	0	0		2.4	68.3	29.3	0		84.1	0	15.9	0		
PHF	.333	.681	.000	.000	.706	.000	.000	.000	.000	.000	.250	.778	.600	.000	.788	.771	.000	.438	.000	.733	.739
Passenger Vehicles	4	107	0	0	111	0	0	0	0	0	1	27	12	0	40	37	0	7	0	44	195
% Passenger Vehicles	100	98.2	0	0	98.2	0	0	0	0	0	100	96.4	100	0	97.6	100	0	100	0	100	98.5
Heavy Vehicles	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
% Heavy Vehicles	0	1.8	0	0	1.8	0	0	0	0	0	0	3.6	0	0	2.4	0	0	0	0	0	1.5

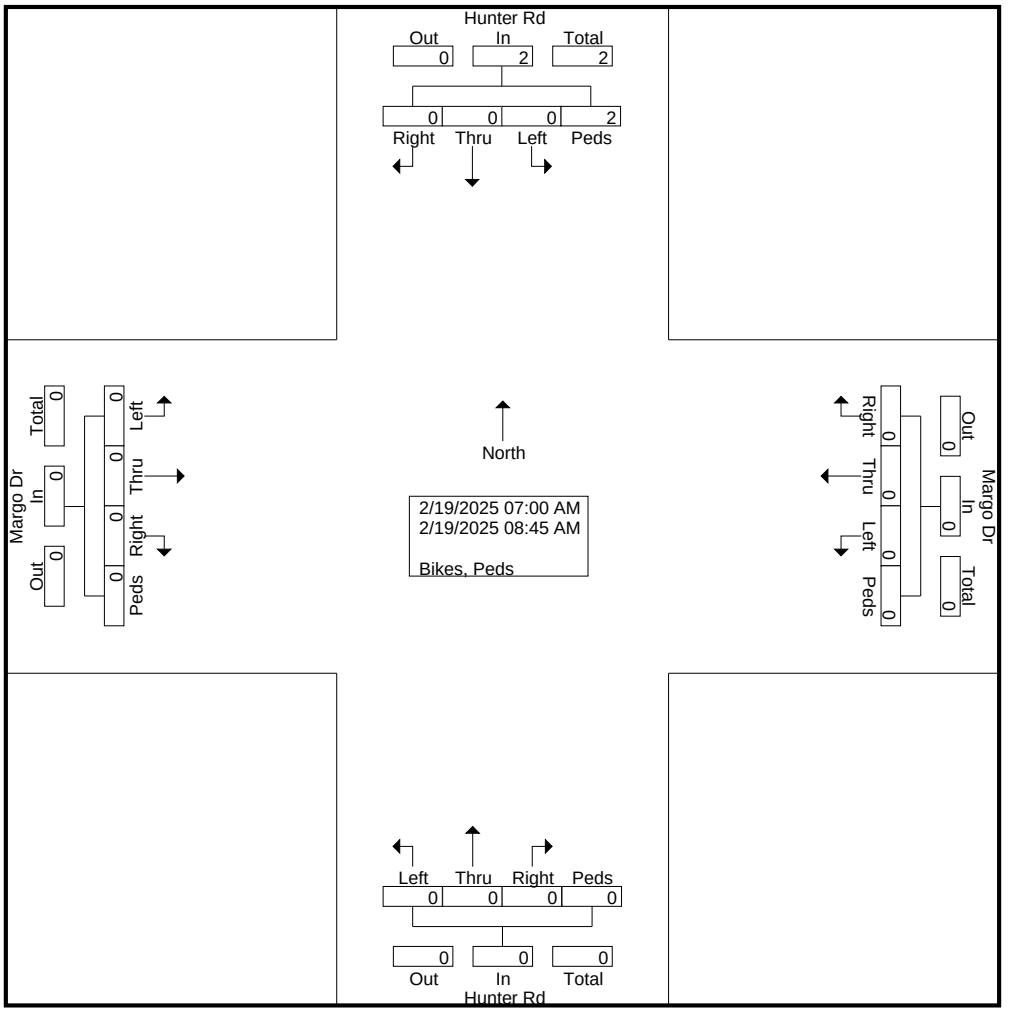


TRUE DATA TO IMPROVE MOBILITY

File Name : 16923605 - Hunter Rd -- Margo Dr
Site Code : 16923605
Start Date : 2/19/2025
Page No : 1

Groups Printed- Bikes, Peds

	Hunter Rd Southbound					Margo Dr Westbound					Hunter Rd Northbound					Margo Dr Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Grand Total	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Apprch %	0	0	0	100		0	0	0	0		0	0	0	0		0	0	0	0		
Total %	0	0	0	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	



TRUE DATA TO IMPROVE MOBILITY

File Name : 16923605 - Hunter Rd -- Margo Dr
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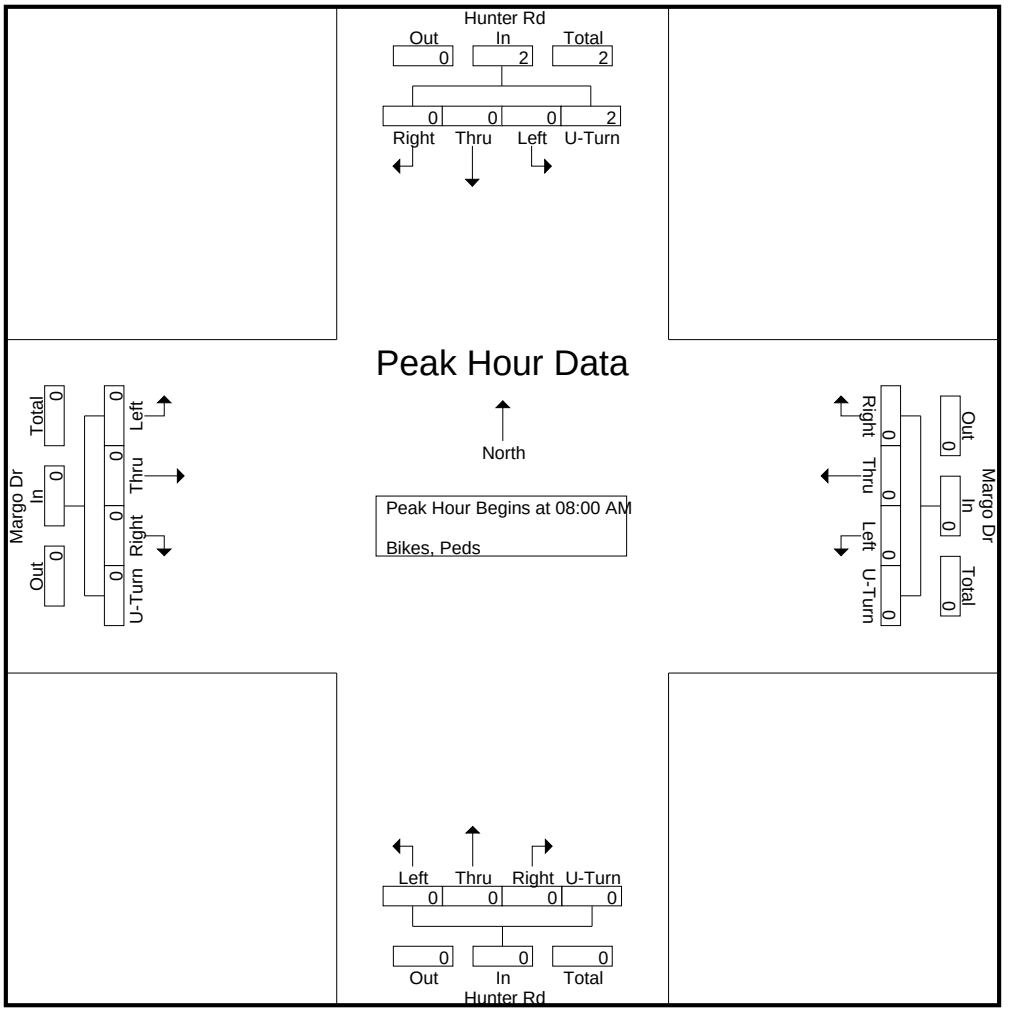
	Hunter Rd Southbound					Margo Dr Westbound					Hunter Rd Northbound					Margo Dr Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	**2**	**2**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**
Total Volume	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
% App. Total	0	0	0	100		0	0	0	0		0	0	0	0		0	0	0	0		
PHF	.000	.000	.000	.250	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250



TRUE DATA TO IMPROVE MOBILITY

File Name : 16923606 - Hunter Rd -- Margo Dr
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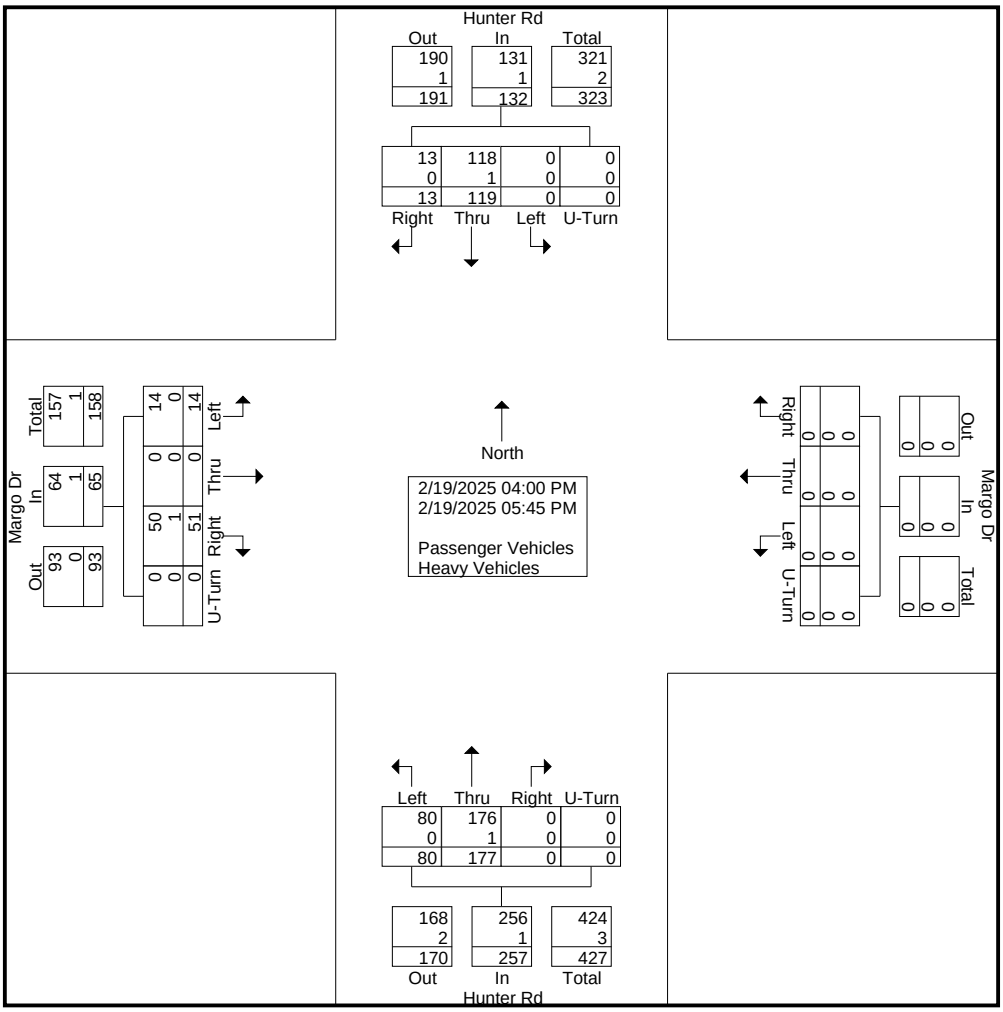
Groups Printed- Passenger Vehicles - Heavy Vehicles

	Hunter Rd Southbound					Margo Dr Westbound					Hunter Rd Northbound					Margo Dr Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
04:00 PM	2	8	0	0	10	0	0	0	0	0	0	29	11	0	40	4	0	1	0	5	55
04:15 PM	2	15	0	0	17	0	0	0	0	0	0	26	5	0	31	7	0	0	0	7	55
04:30 PM	0	18	0	0	18	0	0	0	0	0	0	21	12	0	33	6	0	1	0	7	58
04:45 PM	1	14	0	0	15	0	0	0	0	0	0	20	14	0	34	9	0	2	0	11	60
Total	5	55	0	0	60	0	0	0	0	0	0	96	42	0	138	26	0	4	0	30	228
05:00 PM	3	15	0	0	18	0	0	0	0	0	0	17	11	0	28	2	0	1	0	3	49
05:15 PM	2	17	0	0	19	0	0	0	0	0	0	16	11	0	27	10	0	6	0	16	62
05:30 PM	2	14	0	0	16	0	0	0	0	0	0	21	10	0	31	7	0	2	0	9	56
05:45 PM	1	18	0	0	19	0	0	0	0	0	0	27	6	0	33	6	0	1	0	7	59
Total	8	64	0	0	72	0	0	0	0	0	0	81	38	0	119	25	0	10	0	35	226
Grand Total	13	119	0	0	132	0	0	0	0	0	0	177	80	0	257	51	0	14	0	65	454
Apprch %	9.8	90.2	0	0		0	0	0	0		0	68.9	31.1	0		78.5	0	21.5	0		
Total %	2.9	26.2	0	0	29.1	0	0	0	0	0	0	39	17.6	0	56.6	11.2	0	3.1	0	14.3	
Passenger Vehicles	13	118	0	0	131	0	0	0	0	0	0	176	80	0	256	50	0	14	0	64	451
% Passenger Vehicles	100	99.2	0	0	99.2	0	0	0	0	0	0	99.4	100	0	99.6	98	0	100	0	98.5	99.3
Heavy Vehicles	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	3
% Heavy Vehicles	0	0.8	0	0	0.8	0	0	0	0	0	0	0.6	0	0	0.4	2	0	0	0	1.5	0.7



TRUE DATA TO IMPROVE MOBILITY

File Name : 16923606 - Hunter Rd -- Margo Dr
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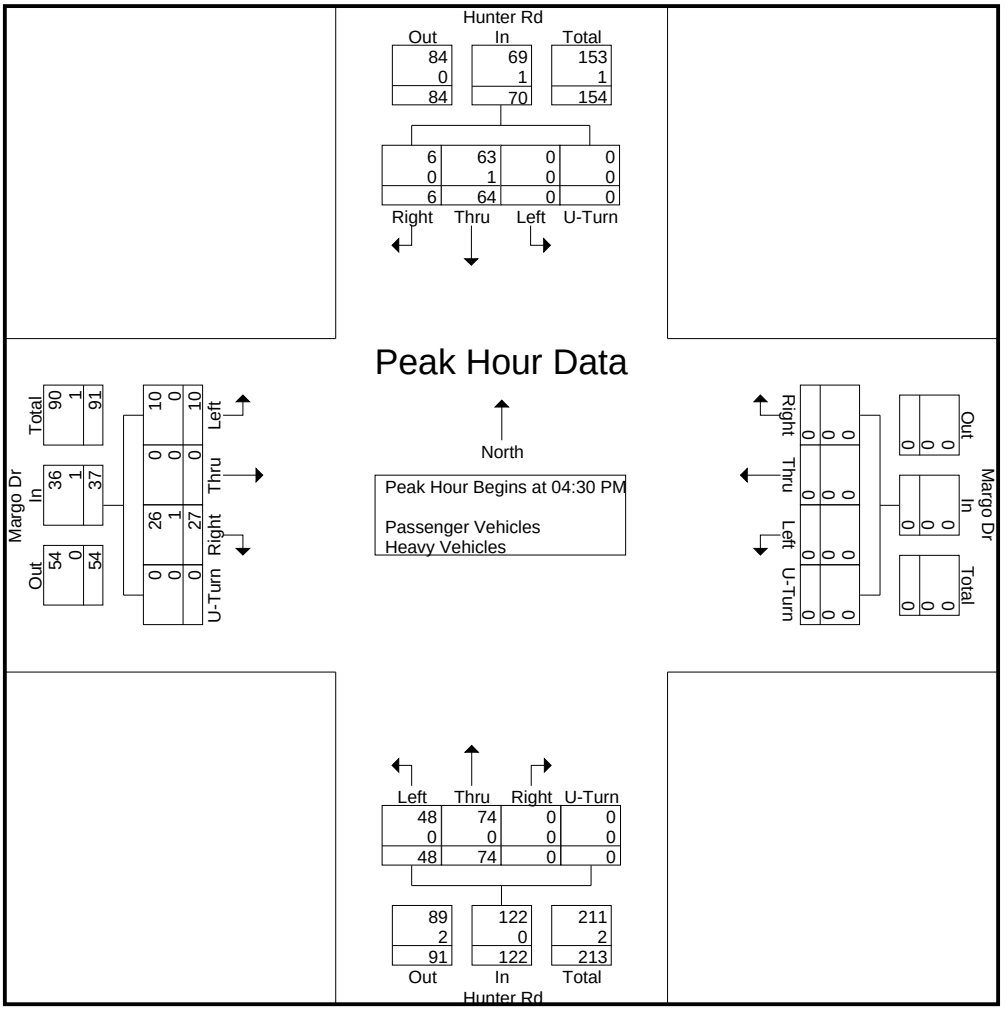
	Hunter Rd Southbound					Margo Dr Westbound					Hunter Rd Northbound					Margo Dr Eastbound					
Start Time	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	0	**18**	0	0	18	0	0	0	0	0	0	**21**	12	0	33	6	0	1	0	7	58
04:45 PM	1	14	0	0	15	0	0	0	0	0	0	20	**14**	0	**34**	9	0	2	0	11	60
05:00 PM	**3**	15	0	0	18	0	0	0	0	0	0	17	11	0	28	2	0	1	0	3	49
05:15 PM	2	17	0	0	**19**	0	0	0	0	0	0	16	11	0	27	**10**	0	**6**	0	**16**	**62**
Total Volume	6	64	0	0	70	0	0	0	0	0	0	74	48	0	122	27	0	10	0	37	229
% App. Total	8.6	91.4	0	0		0	0	0	0		0	60.7	39.3	0		73	0	27	0		
PHF	.500	.889	.000	.000	.921	.000	.000	.000	.000	.000	.000	.881	.857	.000	.897	.675	.000	.417	.000	.578	.923
Passenger Vehicles	6	63	0	0	69	0	0	0	0	0	0	74	48	0	122	26	0	10	0	36	227
% Passenger Vehicles	100	98.4	0	0	98.6	0	0	0	0	0	0	100	100	0	100	96.3	0	100	0	97.3	99.1
Heavy Vehicles	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
% Heavy Vehicles	0	1.6	0	0	1.4	0	0	0	0	0	0	0	0	0	0	3.7	0	0	0	2.7	0.9



TRUE DATA TO IMPROVE MOBILITY

File Name : 16923606 - Hunter Rd -- Margo Dr
Site Code : 16923606
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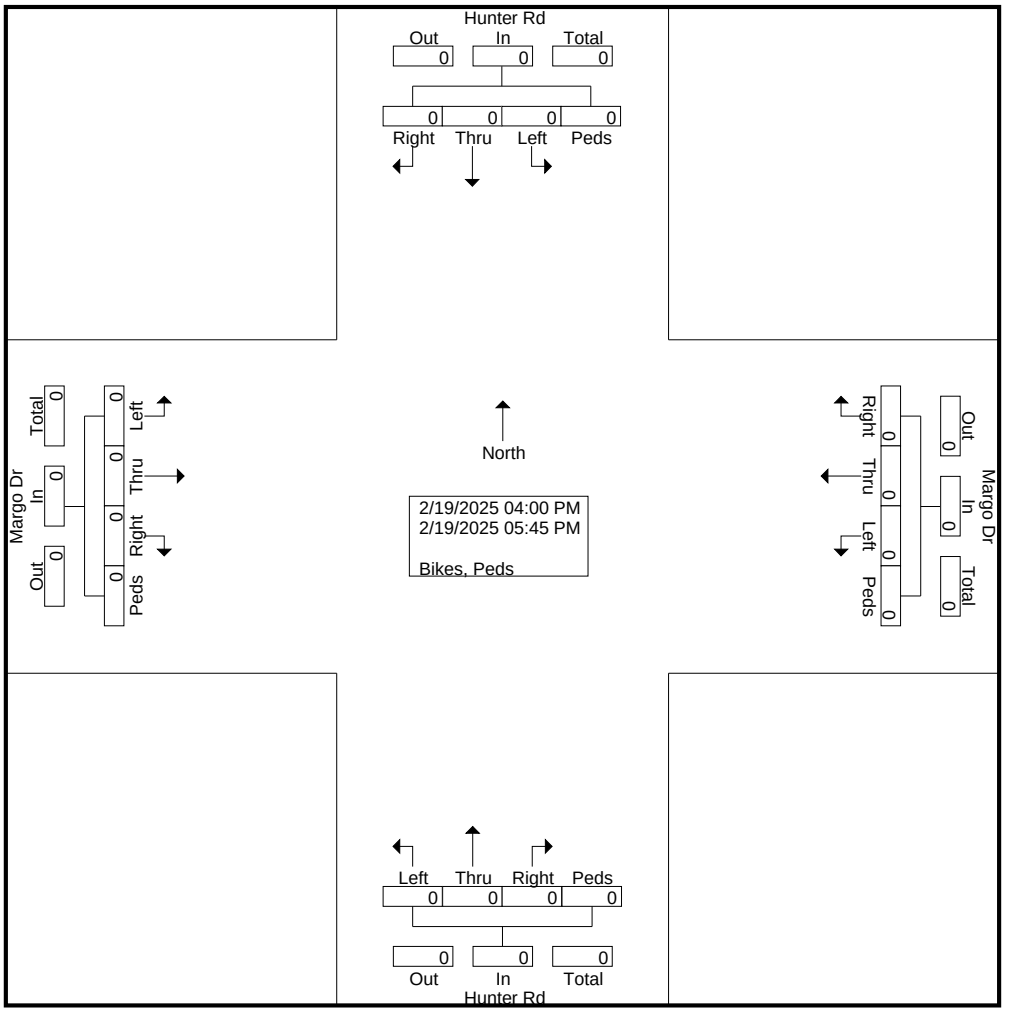
Groups Printed- Bikes, Peds

	Hunter Rd Southbound					Margo Dr Westbound					Hunter Rd Northbound					Margo Dr Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		
Total %																					



TRUE DATA TO IMPROVE MOBILITY

File Name : 16923606 - Hunter Rd -- Margo Dr
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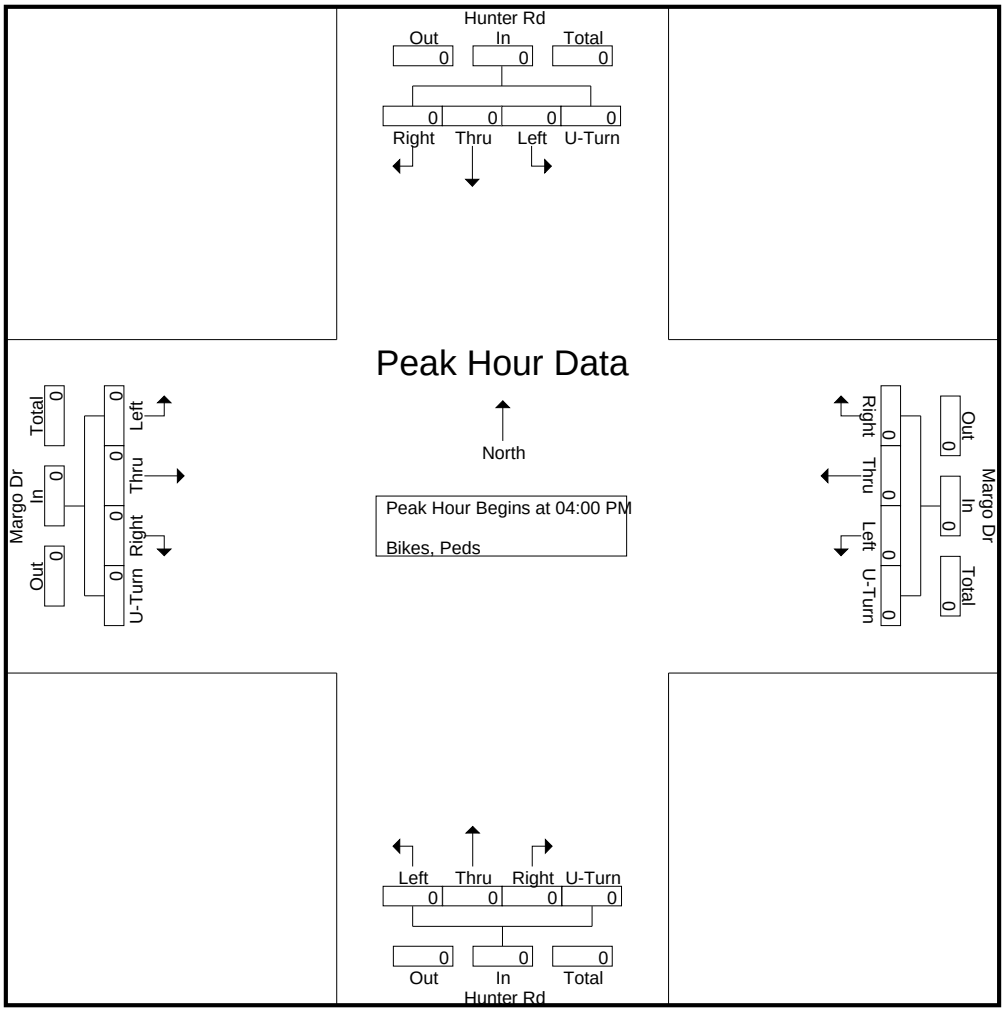
	Hunter Rd Southbound					Margo Dr Westbound					Hunter Rd Northbound					Margo Dr Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000



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

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

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

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

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

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	7	37	12	28	109	4
Future Vol, veh/h	7	37	12	28	109	4
Conflicting Peds, #/hr	2	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	73	73	79	79	71	71
Heavy Vehicles, %	0	0	0	4	2	0
Mvmt Flow	10	51	15	35	154	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	224	156	159	0	-	0
Stage 1	156	-	-	-	-	-
Stage 2	68	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	768	895	1433	-	-	-
Stage 1	877	-	-	-	-	-
Stage 2	960	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	760	895	1433	-	-	-
Mov Cap-2 Maneuver	760	-	-	-	-	-
Stage 1	867	-	-	-	-	-
Stage 2	960	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	9.45	2.26	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	540	-	870	-	-
HCM Lane V/C Ratio	0.011	-	0.069	-	-
HCM Ctrl Dly (s/v)	7.5	0	9.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	24	7	28	89	3
Future Vol, veh/h	8	24	7	28	89	3
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	62	62	67	67	74	74
Heavy Vehicles, %	0	4	14	0	1	0
Mvmt Flow	13	39	10	42	120	4

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	185	122	124	0	-	0
Stage 1	122	-	-	-	-	-
Stage 2	63	-	-	-	-	-
Critical Hdwy	6.4	6.24	4.24	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	2.326	-	-	-
Pot Cap-1 Maneuver	809	923	1391	-	-	-
Stage 1	908	-	-	-	-	-
Stage 2	965	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	803	923	1391	-	-	-
Mov Cap-2 Maneuver	803	-	-	-	-	-
Stage 1	901	-	-	-	-	-
Stage 2	965	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	9.29	1.52	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	360	-	890	-	-
HCM Lane V/C Ratio	0.008	-	0.058	-	-
HCM Ctrl Dly (s/v)	7.6	0	9.3	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	10	27	48	90	64	6
Future Vol, veh/h	10	27	48	90	64	6
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	60	60	90	90	92	92
Heavy Vehicles, %	0	4	0	0	2	0
Mvmt Flow	17	45	53	100	70	7

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	279	73	76	0	-	0
Stage 1	73	-	-	-	-	-
Stage 2	207	-	-	-	-	-
Critical Hdwy	6.4	6.24	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	2.2	-	-	-
Pot Cap-1 Maneuver	715	984	1536	-	-	-
Stage 1	955	-	-	-	-	-
Stage 2	833	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	688	984	1536	-	-	-
Mov Cap-2 Maneuver	688	-	-	-	-	-
Stage 1	920	-	-	-	-	-
Stage 2	833	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	9.39	2.58	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	626	-	881	-	-
HCM Lane V/C Ratio	0.035	-	0.07	-	-
HCM Ctrl Dly (s/v)	7.4	0	9.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	7	21	30	70	49	10
Future Vol, veh/h	7	21	30	70	49	10
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	88	88	83	83	82	82
Heavy Vehicles, %	14	0	3	0	5	0
Mvmt Flow	8	24	36	84	60	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	222	66	72	0	-	0
Stage 1	66	-	-	-	-	-
Stage 2	157	-	-	-	-	-
Critical Hdwy	6.54	6.2	4.13	-	-	-
Critical Hdwy Stg 1	5.54	-	-	-	-	-
Critical Hdwy Stg 2	5.54	-	-	-	-	-
Follow-up Hdwy	3.626	3.3	2.227	-	-	-
Pot Cap-1 Maneuver	740	1004	1522	-	-	-
Stage 1	927	-	-	-	-	-
Stage 2	843	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	721	1004	1522	-	-	-
Mov Cap-2 Maneuver	721	-	-	-	-	-
Stage 1	904	-	-	-	-	-
Stage 2	843	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	9.08	2.23	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	540	-	914	-	-
HCM Lane V/C Ratio	0.024	-	0.035	-	-
HCM Ctrl Dly (s/v)	7.4	0	9.1	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

1: Hunter Road & Margo Drive Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Vehicles Exited	7	37	13	29	101	5	192
Hourly Exit Rate	7	37	13	29	101	5	192
Input Volume	7	37	12	28	110	4	198
% of Volume	100	101	108	103	92	133	97

2: Hunter Road & Christine Drive Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Vehicles Exited	7	20	4	34	86	4	155
Hourly Exit Rate	7	20	4	34	86	4	155
Input Volume	8	24	7	30	89	3	161
% of Volume	90	83	57	113	96	123	96

Total Network Performance

Vehicles Exited	206
Hourly Exit Rate	206
Input Volume	566
% of Volume	36

Intersection: 1: Hunter Road & Margo Drive

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	54	23
Average Queue (ft)	23	1
95th Queue (ft)	47	11
Link Distance (ft)	615	908
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Hunter Road & Christine Drive

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	60	21
Average Queue (ft)	20	1
95th Queue (ft)	49	12
Link Distance (ft)	611	343
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

1: Hunter Road & Margo Drive Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Vehicles Exited	10	28	52	96	61	7	254
Hourly Exit Rate	10	28	52	96	61	7	254
Input Volume	10	27	48	90	66	6	248
% of Volume	98	104	109	106	92	112	102

2: Hunter Road & Christine Drive Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Vehicles Exited	5	20	32	77	45	10	189
Hourly Exit Rate	5	20	32	77	45	10	189
Input Volume	7	21	30	72	49	10	189
% of Volume	69	95	107	107	92	103	100

Total Network Performance

Vehicles Exited	274
Hourly Exit Rate	274
Input Volume	698
% of Volume	39

Intersection: 1: Hunter Road & Margo Drive

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	53	33
Average Queue (ft)	23	3
95th Queue (ft)	51	17
Link Distance (ft)	615	908
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Hunter Road & Christine Drive

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	44	47	4
Average Queue (ft)	17	2	0
95th Queue (ft)	43	18	3
Link Distance (ft)	611	343	1152
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	7	39	12	29	114	4
Future Vol, veh/h	7	39	12	29	114	4
Conflicting Peds, #/hr	2	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	73	73	79	79	71	71
Heavy Vehicles, %	0	0	0	4	2	0
Mvmt Flow	10	53	15	37	161	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	232	163	166	0	-	0
Stage 1	163	-	-	-	-	-
Stage 2	69	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	760	887	1424	-	-	-
Stage 1	871	-	-	-	-	-
Stage 2	959	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	752	887	1424	-	-	-
Mov Cap-2 Maneuver	752	-	-	-	-	-
Stage 1	861	-	-	-	-	-
Stage 2	959	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	9.5	2.21	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	527	-	863	-	-
HCM Lane V/C Ratio	0.011	-	0.073	-	-
HCM Ctrl Dly (s/v)	7.6	0	9.5	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	25	7	29	93	3
Future Vol, veh/h	8	25	7	29	93	3
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	62	62	67	67	74	74
Heavy Vehicles, %	0	4	14	0	1	0
Mvmt Flow	13	40	10	43	126	4

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	192	128	130	0	-	0
Stage 1	128	-	-	-	-	-
Stage 2	64	-	-	-	-	-
Critical Hdwy	6.4	6.24	4.24	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	2.326	-	-	-
Pot Cap-1 Maneuver	802	917	1385	-	-	-
Stage 1	903	-	-	-	-	-
Stage 2	964	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	795	917	1385	-	-	-
Mov Cap-2 Maneuver	795	-	-	-	-	-
Stage 1	896	-	-	-	-	-
Stage 2	964	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	9.33	1.48	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	350	-	884	-	-
HCM Lane V/C Ratio	0.008	-	0.06	-	-
HCM Ctrl Dly (s/v)	7.6	0	9.3	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	10	28	50	94	67	6
Future Vol, veh/h	10	28	50	94	67	6
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	60	60	90	90	92	92
Heavy Vehicles, %	0	4	0	0	2	0
Mvmt Flow	17	47	56	104	73	7

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	292	76	79	0	-	0
Stage 1	76	-	-	-	-	-
Stage 2	216	-	-	-	-	-
Critical Hdwy	6.4	6.24	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	2.2	-	-	-
Pot Cap-1 Maneuver	703	980	1532	-	-	-
Stage 1	952	-	-	-	-	-
Stage 2	825	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	676	980	1532	-	-	-
Mov Cap-2 Maneuver	676	-	-	-	-	-
Stage 1	915	-	-	-	-	-
Stage 2	825	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	9.43	2.58	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	625	-	876	-	-
HCM Lane V/C Ratio	0.036	-	0.072	-	-
HCM Ctrl Dly (s/v)	7.4	0	9.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	7	22	31	73	51	10
Future Vol, veh/h	7	22	31	73	51	10
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	88	88	83	83	82	82
Heavy Vehicles, %	14	0	3	0	5	0
Mvmt Flow	8	25	37	88	62	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	231	68	74	0	-	0
Stage 1	68	-	-	-	-	-
Stage 2	163	-	-	-	-	-
Critical Hdwy	6.54	6.2	4.13	-	-	-
Critical Hdwy Stg 1	5.54	-	-	-	-	-
Critical Hdwy Stg 2	5.54	-	-	-	-	-
Follow-up Hdwy	3.626	3.3	2.227	-	-	-
Pot Cap-1 Maneuver	731	1001	1519	-	-	-
Stage 1	925	-	-	-	-	-
Stage 2	838	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	713	1001	1519	-	-	-
Mov Cap-2 Maneuver	713	-	-	-	-	-
Stage 1	901	-	-	-	-	-
Stage 2	838	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	9.1	2.21	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	537	-	912	-	-
HCM Lane V/C Ratio	0.025	-	0.036	-	-
HCM Ctrl Dly (s/v)	7.4	0	9.1	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Intersection: 1: Hunter Road & Margo Drive

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	54	28
Average Queue (ft)	24	2
95th Queue (ft)	47	14
Link Distance (ft)	615	908
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Hunter Road & Christine Drive

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	59	26
Average Queue (ft)	21	1
95th Queue (ft)	50	14
Link Distance (ft)	611	343
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Intersection: 1: Hunter Road & Margo Drive

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	53	28
Average Queue (ft)	22	3
95th Queue (ft)	50	16
Link Distance (ft)	615	908
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Hunter Road & Christine Drive

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	44	38	4
Average Queue (ft)	18	2	0
95th Queue (ft)	44	19	3
Link Distance (ft)	611	343	1152
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	55	18	29	115	4
Future Vol, veh/h	9	55	18	29	115	4
Conflicting Peds, #/hr	2	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	73	73	79	79	71	71
Heavy Vehicles, %	0	0	0	4	2	0
Mvmt Flow	12	75	23	37	162	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	249	165	168	0	-	0
Stage 1	165	-	-	-	-	-
Stage 2	84	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	744	885	1422	-	-	-
Stage 1	869	-	-	-	-	-
Stage 2	944	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	732	885	1422	-	-	-
Mov Cap-2 Maneuver	732	-	-	-	-	-
Stage 1	855	-	-	-	-	-
Stage 2	944	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	9.66	2.9	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	689	-	860	-	-
HCM Lane V/C Ratio	0.016	-	0.102	-	-
HCM Ctrl Dly (s/v)	7.6	0	9.7	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.3	-	-

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	26	7	31	93	4
Future Vol, veh/h	11	26	7	31	93	4
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	62	62	67	67	74	74
Heavy Vehicles, %	0	4	14	0	1	0
Mvmt Flow	18	42	10	46	126	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	196	128	131	0	-	0
Stage 1	128	-	-	-	-	-
Stage 2	67	-	-	-	-	-
Critical Hdwy	6.4	6.24	4.24	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	2.326	-	-	-
Pot Cap-1 Maneuver	798	916	1383	-	-	-
Stage 1	902	-	-	-	-	-
Stage 2	961	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	792	916	1383	-	-	-
Mov Cap-2 Maneuver	792	-	-	-	-	-
Stage 1	895	-	-	-	-	-
Stage 2	961	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	9.41	1.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	332	-	875	-	-
HCM Lane V/C Ratio	0.008	-	0.068	-	-
HCM Ctrl Dly (s/v)	7.6	0	9.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	2.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	6	1	4	18	4	1
Future Vol, veh/h	6	1	4	18	4	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	9	1	6	26	6	1

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	31	19	0	0	31	0
Stage 1	19	-	-	-	-	-
Stage 2	13	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	988	1066	-	-	1594	-
Stage 1	1009	-	-	-	-	-
Stage 2	1015	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	984	1066	-	-	1594	-
Mov Cap-2 Maneuver	984	-	-	-	-	-
Stage 1	1009	-	-	-	-	-
Stage 2	1012	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	8.66	0	5.81
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	995	1440	-
HCM Lane V/C Ratio	-	-	0.01	0.004	-
HCM Ctrl Dly (s/v)	-	-	8.7	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	38	67	95	68	8
Future Vol, veh/h	11	38	67	95	68	8
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	60	60	90	90	92	92
Heavy Vehicles, %	0	4	0	0	2	0
Mvmt Flow	18	63	74	106	74	9

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	333	78	83	0	-	0
Stage 1	78	-	-	-	-	-
Stage 2	254	-	-	-	-	-
Critical Hdwy	6.4	6.24	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	2.2	-	-	-
Pot Cap-1 Maneuver	666	977	1527	-	-	-
Stage 1	950	-	-	-	-	-
Stage 2	793	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	632	977	1527	-	-	-
Mov Cap-2 Maneuver	632	-	-	-	-	-
Stage 1	901	-	-	-	-	-
Stage 2	793	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	9.57	3.09	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	744	-	870	-	-
HCM Lane V/C Ratio	0.049	-	0.094	-	-
HCM Ctrl Dly (s/v)	7.5	0	9.6	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.2	-	0.3	-	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	23	32	74	53	13
Future Vol, veh/h	9	23	32	74	53	13
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	88	88	83	83	82	82
Heavy Vehicles, %	14	0	3	0	5	0
Mvmt Flow	10	26	39	89	65	16

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	239	73	80	0	-	0
Stage 1	73	-	-	-	-	-
Stage 2	166	-	-	-	-	-
Critical Hdwy	6.54	6.2	4.13	-	-	-
Critical Hdwy Stg 1	5.54	-	-	-	-	-
Critical Hdwy Stg 2	5.54	-	-	-	-	-
Follow-up Hdwy	3.626	3.3	2.227	-	-	-
Pot Cap-1 Maneuver	724	995	1511	-	-	-
Stage 1	921	-	-	-	-	-
Stage 2	835	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	704	995	1511	-	-	-
Mov Cap-2 Maneuver	704	-	-	-	-	-
Stage 1	896	-	-	-	-	-
Stage 2	835	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	9.21	2.25	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	543	-	892	-	-
HCM Lane V/C Ratio	0.026	-	0.041	-	-
HCM Ctrl Dly (s/v)	7.4	0	9.2	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Intersection	
Int Delay, s/veh	5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	19	3	3	11	4	4
Future Vol, veh/h	19	3	3	11	4	4
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	82	82	82	82	82	82
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	23	4	4	13	5	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	25	10	0	0	17	0
Stage 1	10	-	-	-	-	-
Stage 2	15	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	996	1077	-	-	1613	-
Stage 1	1018	-	-	-	-	-
Stage 2	1013	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	993	1077	-	-	1613	-
Mov Cap-2 Maneuver	993	-	-	-	-	-
Stage 1	1018	-	-	-	-	-
Stage 2	1010	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	8.69	0	3.62
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1004	900	-
HCM Lane V/C Ratio	-	-	0.027	0.003	-
HCM Ctrl Dly (s/v)	-	-	8.7	7.2	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection: 1: Hunter Road & Margo Drive

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	55	33
Average Queue (ft)	28	2
95th Queue (ft)	52	17
Link Distance (ft)	615	908
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Hunter Road & Christine Drive

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	88	6
Average Queue (ft)	24	0
95th Queue (ft)	59	4
Link Distance (ft)	611	343
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Site Drive/Christine Drive & Dann Drive

Movement	WB
Directions Served	LR
Maximum Queue (ft)	31
Average Queue (ft)	5
95th Queue (ft)	25
Link Distance (ft)	280
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 0

Intersection: 1: Hunter Road & Margo Drive

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	67	34
Average Queue (ft)	26	5
95th Queue (ft)	55	24
Link Distance (ft)	615	908
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Hunter Road & Christine Drive

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	62	22
Average Queue (ft)	24	1
95th Queue (ft)	52	11
Link Distance (ft)	611	343
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Site Drive/Christine Drive & Dann Drive

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	41	12
Average Queue (ft)	17	1
95th Queue (ft)	44	8
Link Distance (ft)	280	271
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	10	59	19	29	115	5
Future Vol, veh/h	10	59	19	29	115	5
Conflicting Peds, #/hr	2	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	73	73	79	79	71	71
Heavy Vehicles, %	0	0	0	4	2	0
Mvmt Flow	14	81	24	37	162	7

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	252	165	169	0	-	0
Stage 1	165	-	-	-	-	-
Stage 2	87	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	741	884	1421	-	-	-
Stage 1	869	-	-	-	-	-
Stage 2	942	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	728	884	1421	-	-	-
Mov Cap-2 Maneuver	728	-	-	-	-	-
Stage 1	854	-	-	-	-	-
Stage 2	942	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	9.72	3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	713	-	857	-	-
HCM Lane V/C Ratio	0.017	-	0.11	-	-
HCM Ctrl Dly (s/v)	7.6	0	9.7	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	26	7	32	94	4
Future Vol, veh/h	11	26	7	32	94	4
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	62	62	67	67	74	74
Heavy Vehicles, %	0	4	14	0	1	0
Mvmt Flow	18	42	10	48	127	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	198	130	132	0	-	0
Stage 1	130	-	-	-	-	-
Stage 2	69	-	-	-	-	-
Critical Hdwy	6.4	6.24	4.24	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	2.326	-	-	-
Pot Cap-1 Maneuver	795	915	1382	-	-	-
Stage 1	901	-	-	-	-	-
Stage 2	959	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	789	915	1382	-	-	-
Mov Cap-2 Maneuver	789	-	-	-	-	-
Stage 1	894	-	-	-	-	-
Stage 2	959	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	9.43	1.37	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	323	-	873	-	-
HCM Lane V/C Ratio	0.008	-	0.068	-	-
HCM Ctrl Dly (s/v)	7.6	0	9.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	2.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	1	4	23	4	1
Future Vol, veh/h	8	1	4	23	4	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	11	1	6	33	6	1

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	35	22	0	0	39	0
Stage 1	22	-	-	-	-	-
Stage 2	13	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	983	1061	-	-	1585	-
Stage 1	1006	-	-	-	-	-
Stage 2	1015	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	980	1061	-	-	1585	-
Mov Cap-2 Maneuver	980	-	-	-	-	-
Stage 1	1006	-	-	-	-	-
Stage 2	1012	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	8.69	0	5.82
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	988	1440	-
HCM Lane V/C Ratio	-	-	0.013	0.004	-
HCM Ctrl Dly (s/v)	-	-	8.7	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	40	73	95	68	9
Future Vol, veh/h	12	40	73	95	68	9
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	60	60	90	90	92	92
Heavy Vehicles, %	0	4	0	0	2	0
Mvmt Flow	20	67	81	106	74	10

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	347	79	84	0	-	0
Stage 1	79	-	-	-	-	-
Stage 2	268	-	-	-	-	-
Critical Hdwy	6.4	6.24	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.336	2.2	-	-	-
Pot Cap-1 Maneuver	654	976	1526	-	-	-
Stage 1	949	-	-	-	-	-
Stage 2	782	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	617	976	1526	-	-	-
Mov Cap-2 Maneuver	617	-	-	-	-	-
Stage 1	896	-	-	-	-	-
Stage 2	782	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	9.65	3.26	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	782	-	861	-	-
HCM Lane V/C Ratio	0.053	-	0.101	-	-
HCM Ctrl Dly (s/v)	7.5	0	9.7	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.2	-	0.3	-	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	23	32	75	54	13
Future Vol, veh/h	9	23	32	75	54	13
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	88	88	83	83	82	82
Heavy Vehicles, %	14	0	3	0	5	0
Mvmt Flow	10	26	39	90	66	16

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	241	74	82	0	-	0
Stage 1	74	-	-	-	-	-
Stage 2	167	-	-	-	-	-
Critical Hdwy	6.54	6.2	4.13	-	-	-
Critical Hdwy Stg 1	5.54	-	-	-	-	-
Critical Hdwy Stg 2	5.54	-	-	-	-	-
Follow-up Hdwy	3.626	3.3	2.227	-	-	-
Pot Cap-1 Maneuver	721	994	1509	-	-	-
Stage 1	920	-	-	-	-	-
Stage 2	834	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	702	994	1509	-	-	-
Mov Cap-2 Maneuver	702	-	-	-	-	-
Stage 1	895	-	-	-	-	-
Stage 2	834	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	9.22	2.23	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	538	-	890	-	-
HCM Lane V/C Ratio	0.026	-	0.041	-	-
HCM Ctrl Dly (s/v)	7.4	0	9.2	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Intersection	
Int Delay, s/veh	5.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	26	3	3	14	4	4
Future Vol, veh/h	26	3	3	14	4	4
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	82	82	82	82	82	82
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	32	4	4	17	5	5

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	27	12	0	0	21	0
Stage 1	12	-	-	-	-	-
Stage 2	15	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	994	1074	-	-	1608	-
Stage 1	1016	-	-	-	-	-
Stage 2	1013	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	990	1074	-	-	1608	-
Mov Cap-2 Maneuver	990	-	-	-	-	-
Stage 1	1016	-	-	-	-	-
Stage 2	1010	-	-	-	-	-

Approach	WB	NB	SB
HCM Ctrl Dly, s/v	8.74	0	3.62
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	999	900	-
HCM Lane V/C Ratio	-	-	0.035	0.003	-
HCM Ctrl Dly (s/v)	-	-	8.7	7.2	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection: 1: Hunter Road & Margo Drive

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	50	28
Average Queue (ft)	29	2
95th Queue (ft)	52	14
Link Distance (ft)	615	908
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Hunter Road & Christine Drive

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	80	15
Average Queue (ft)	24	1
95th Queue (ft)	56	9
Link Distance (ft)	611	343
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Site Drive/Christine Drive & Dann Drive

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	32	6
Average Queue (ft)	8	0
95th Queue (ft)	30	4
Link Distance (ft)	280	271
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Intersection: 1: Hunter Road & Margo Drive

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	58	40
Average Queue (ft)	26	6
95th Queue (ft)	53	28
Link Distance (ft)	615	908
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 2: Hunter Road & Christine Drive

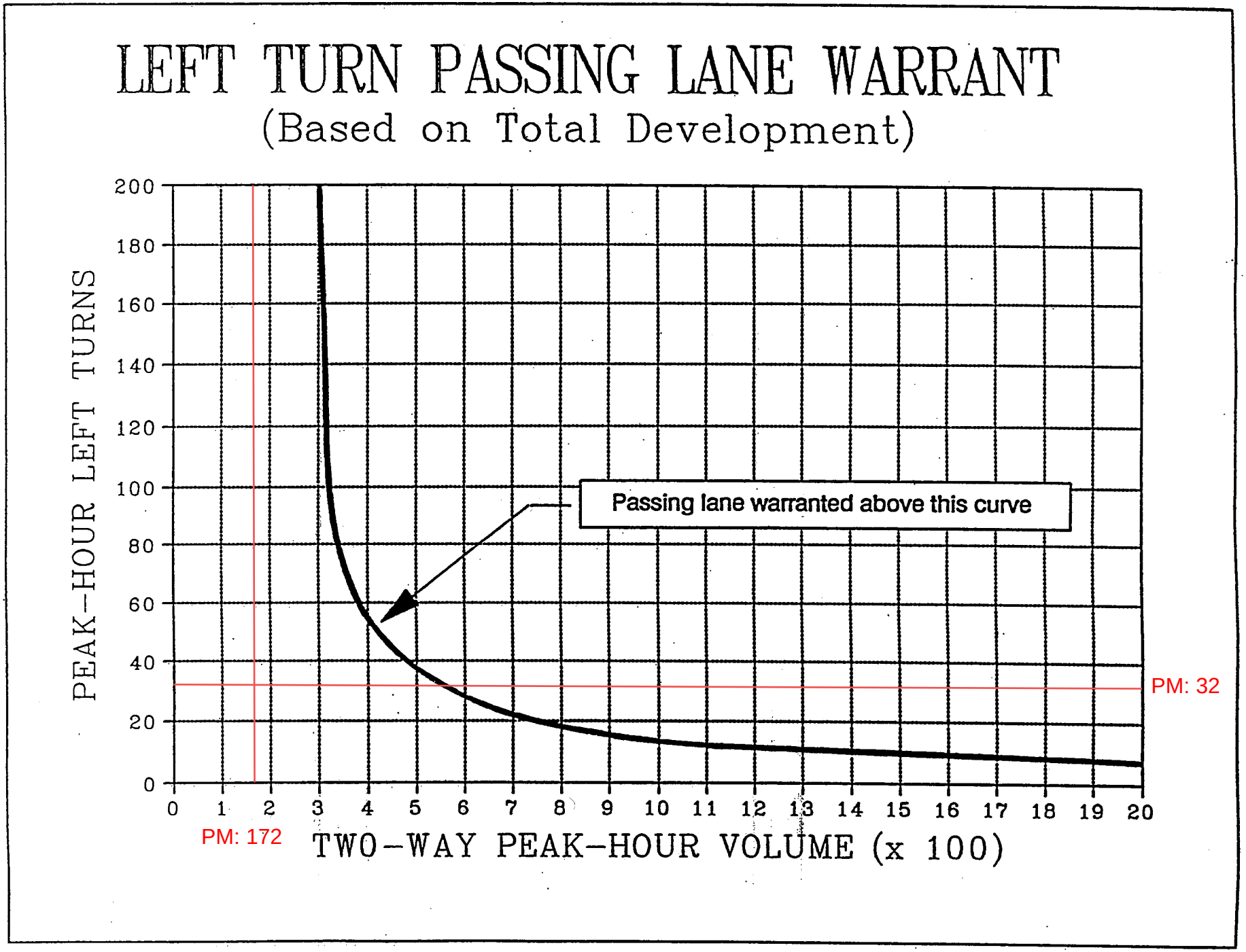
Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	69	33
Average Queue (ft)	23	3
95th Queue (ft)	54	17
Link Distance (ft)	611	343
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Site Drive/Christine Drive & Dann Drive

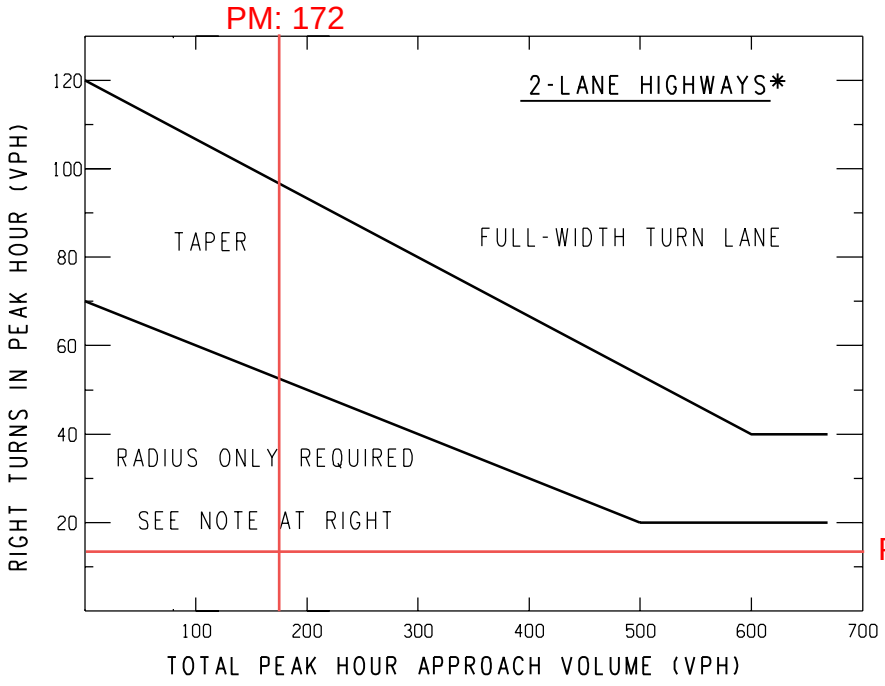
Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	45	6
Average Queue (ft)	20	0
95th Queue (ft)	47	6
Link Distance (ft)	280	271
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

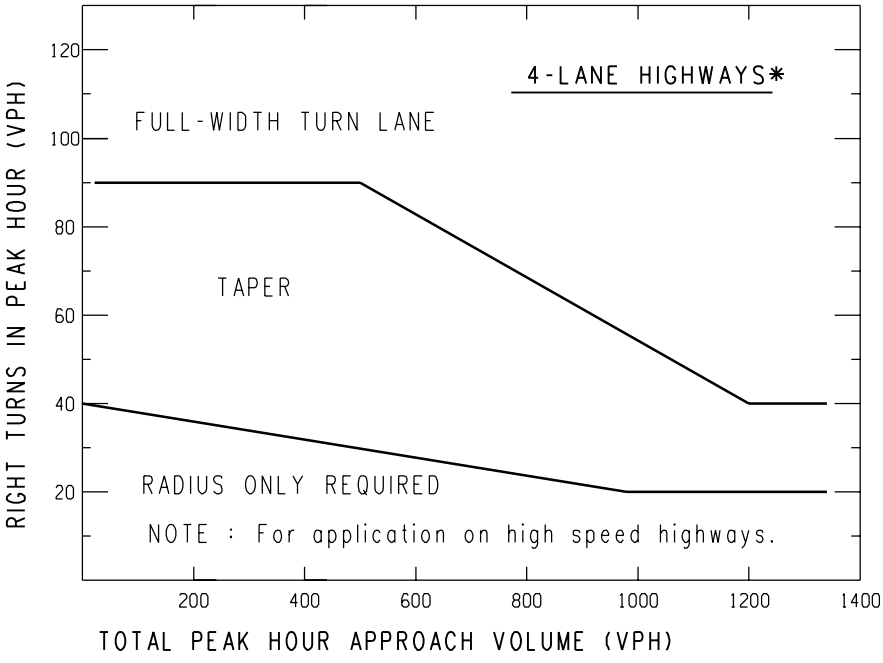

LEFT TURN PASSING LANE WARRANT
(Based on Total Development)
PEAK-HOUR LEFT TURNS
200
180
160
140
120
100
80
60
40
20
0
Passing lane warranted above this curve
PM: 32
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
PM: 172
TWO-WAY PEAK-HOUR VOLUME (x 100)

HUNTER ROAD & CHRISTINE DRIVE RIGHT-TURN LANE WARRANT - ALTERNATIVE 1



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

Adjust peak hour right turns = Peak hour right turns - 20



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

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

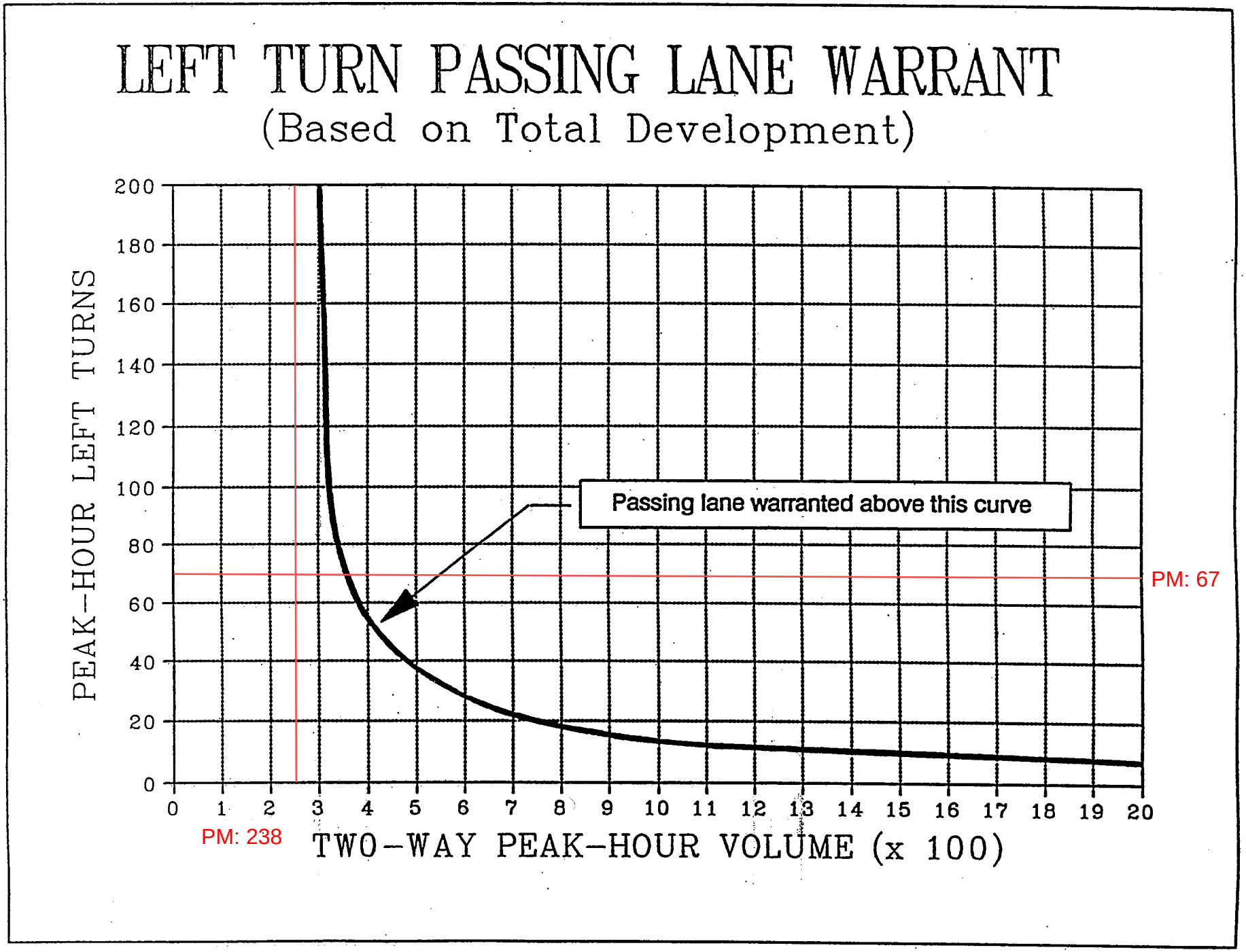
Solution:
Figure indicates that the intersection of 300 vph and 100 vph is located above the upper trend line; thus, a right-turn lane may be recommended.

MDOT Michigan Department of Transportation

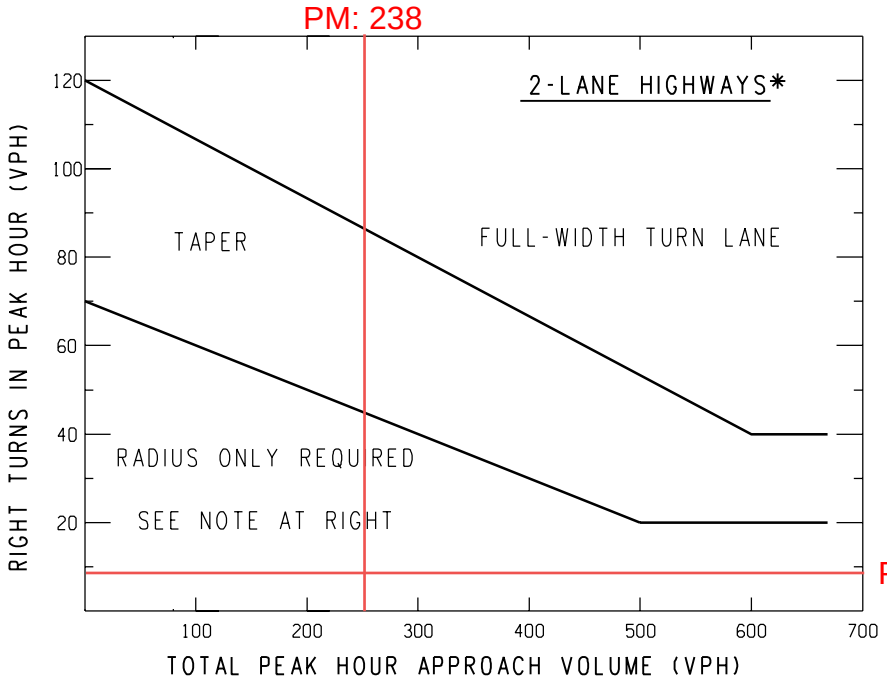
TRAFFIC AND SAFETY NOTE

TRAFFIC VOLUME GUIDELINES FOR RIGHT-TURN LANES AND TAPERS

DRAWN BY: MTS	08/05/2004	604A	SHEET 2 OF 2
CHECKED BY: JAT	PLAN DATE:		
FILE: K:/DGN/ts notes/Note604A tsn.dgn		REV. 08/05/2004	

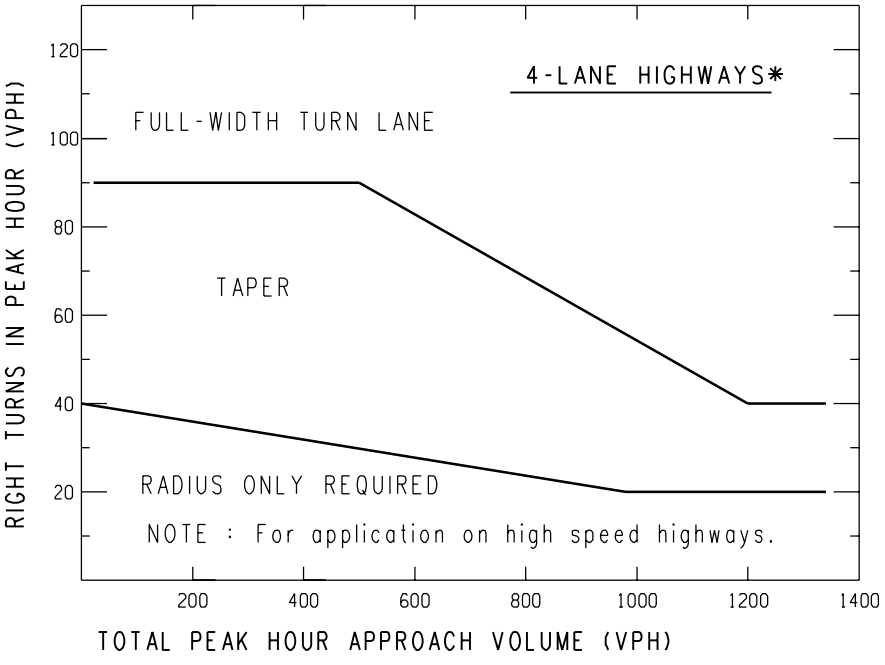

LEFT TURN PASSING LANE WARRANT
(Based on Total Development)
PEAK-HOUR LEFT TURNS
200
180
160
140
120
100
80
60
40
20
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
TWO-WAY PEAK-HOUR VOLUME (x 100)
Passing lane warranted above this curve
PM: 67
PM: 238

HUNTER ROAD & MARGO DRIVE RIGHT-TURN LANE WARRANT - ALTERNATIVE 2



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

Adjust peak hour right turns = Peak hour right turns - 20



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

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

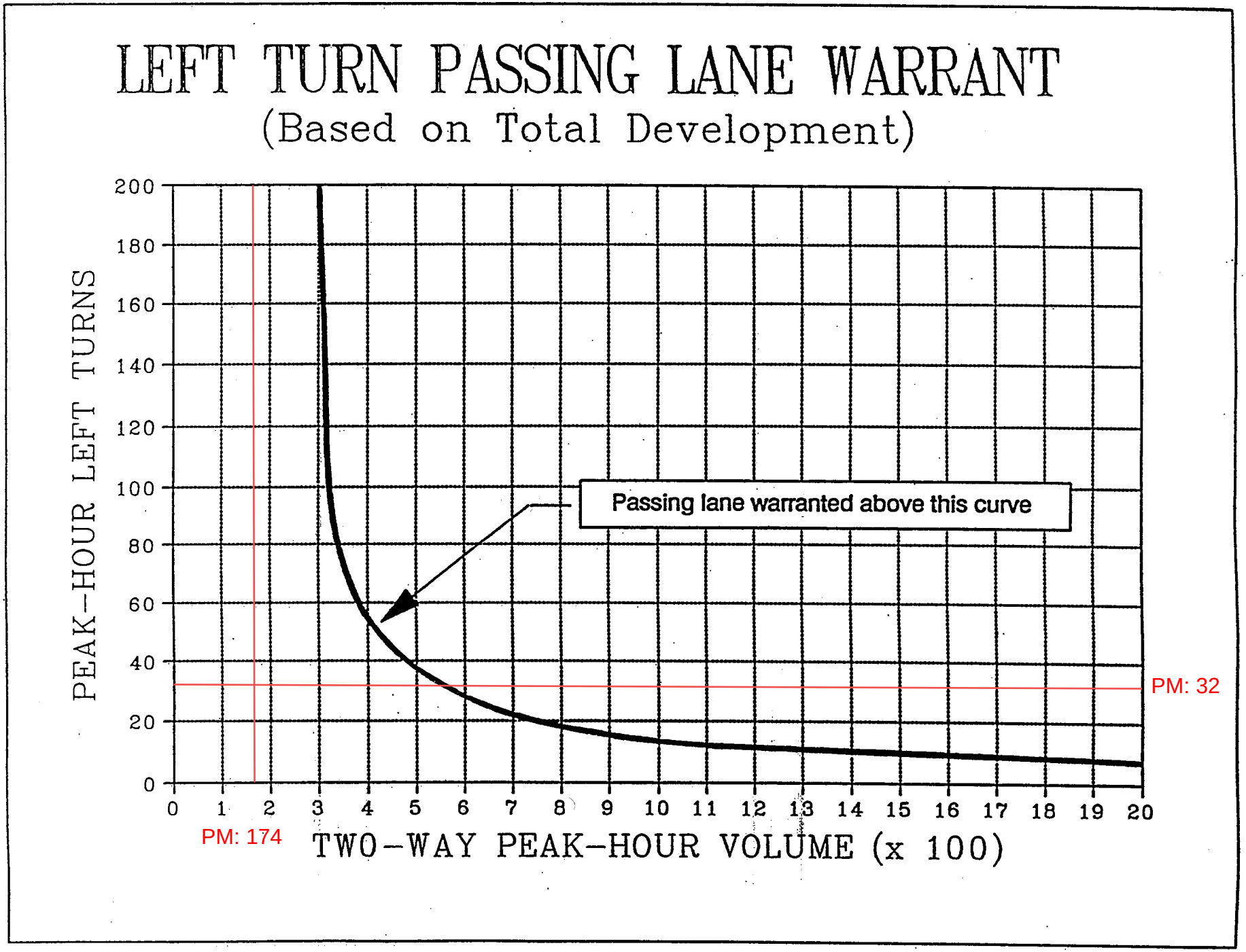
Solution:
Figure indicates that the intersection of 300 vph and 100 vph is located above the upper trend line; thus, a right-turn lane may be recommended.

MDOT Michigan Department of Transportation

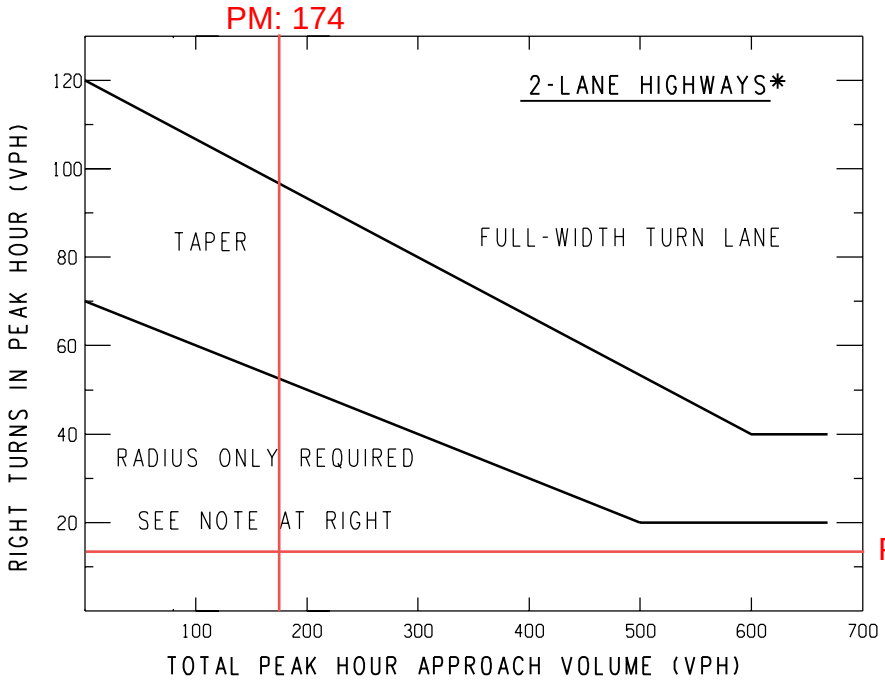
TRAFFIC AND SAFETY NOTE

TRAFFIC VOLUME GUIDELINES FOR RIGHT-TURN LANES AND TAPERS

DRAWN BY: MTS	08/05/2004	604A	SHEET 2 OF 2
CHECKED BY: JAT	PLAN DATE:		
FILE: K:/DGN/ts notes/Note604A tsn.dgn		REV. 08/05/2004	


LEFT TURN PASSING LANE WARRANT
(Based on Total Development)
PEAK-HOUR LEFT TURNS
200
180
160
140
120
100
80
60
40
20
0
Passing lane warranted above this curve
PM: 32
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
PM: 174
TWO-WAY PEAK-HOUR VOLUME (x 100)

HUNTER ROAD & CHRISTINE DRIVE RIGHT-TURN LANE WARRANT - ALTERNATIVE 2



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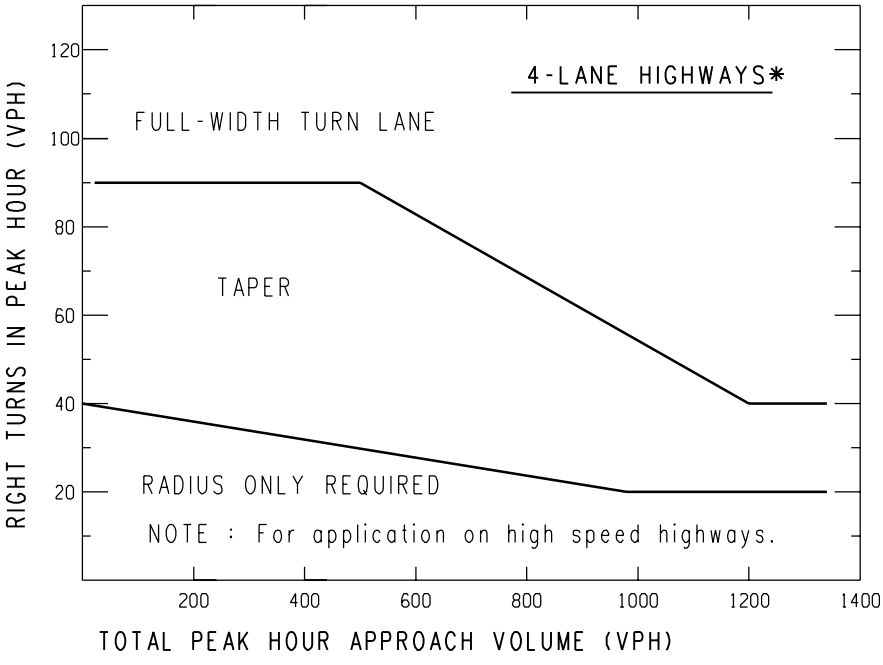

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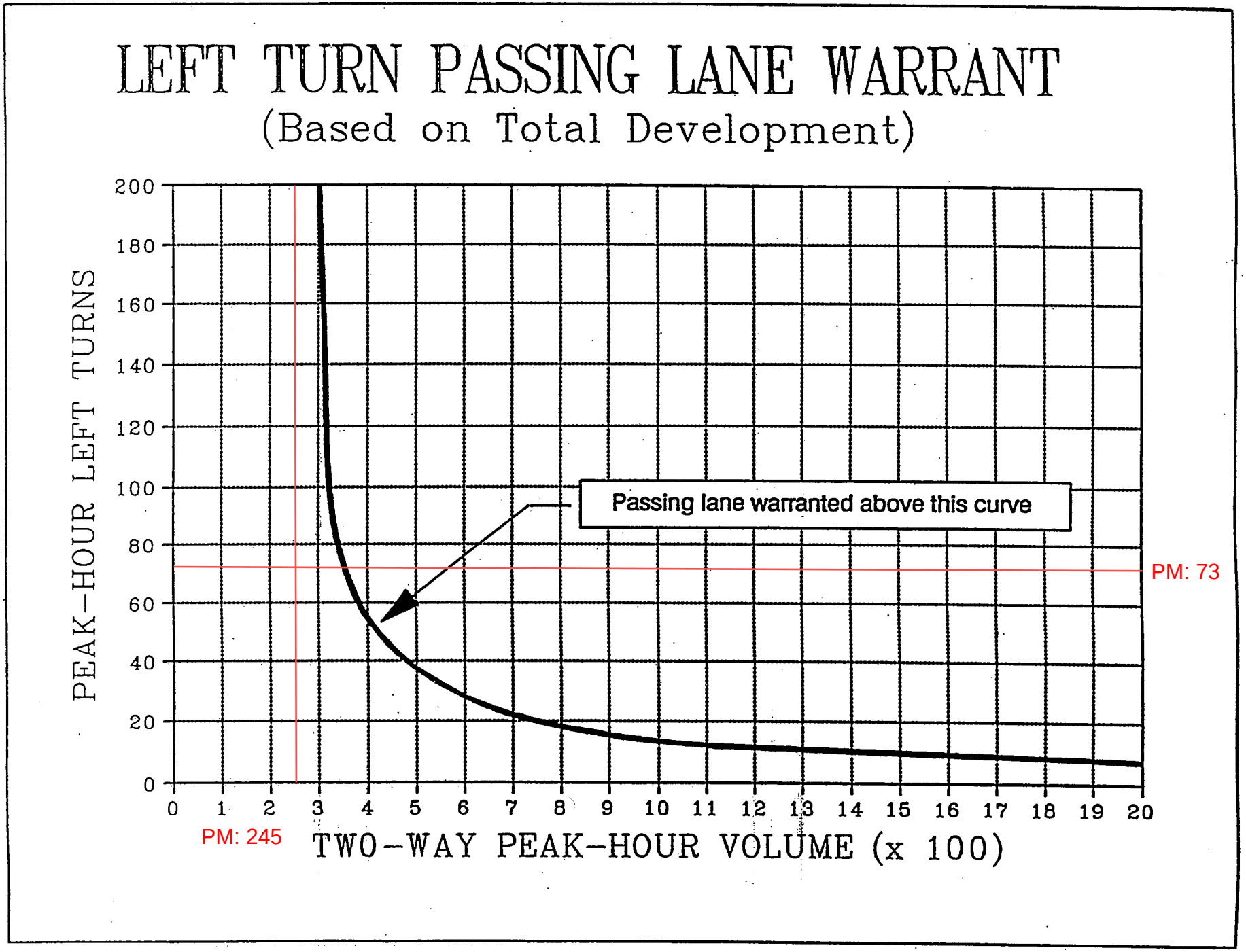
MDOT Michigan Department of Transportation

TRAFFIC AND SAFETY NOTE

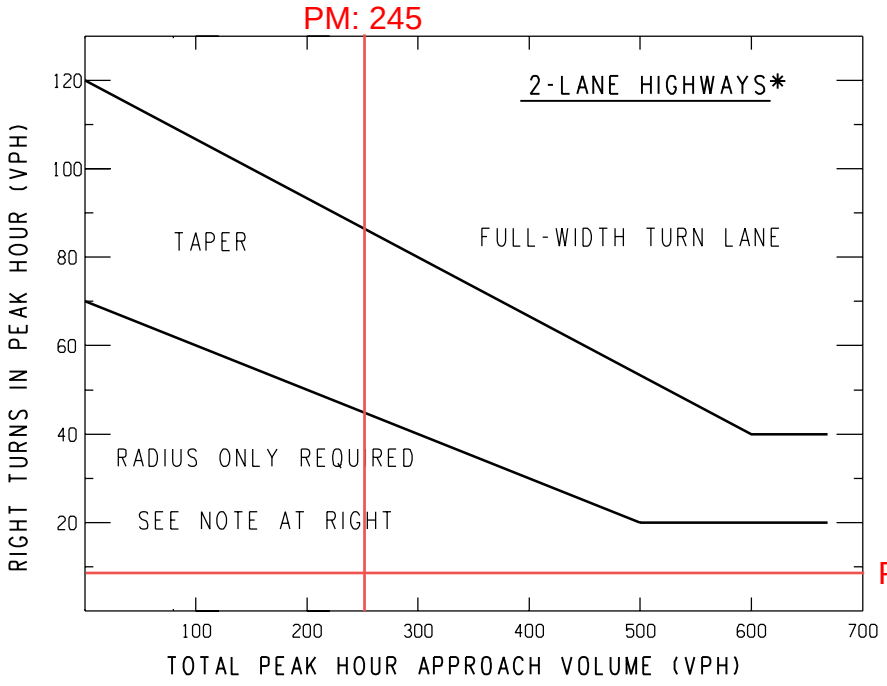
TRAFFIC VOLUME GUIDELINES FOR RIGHT-TURN LANES AND TAPERS

DRAWN BY: MTS	08/05/2004	604A	SHEET 2 OF 2
CHECKED BY: JAT	PLAN DATE:		
FILE: K:/DGN/ts notes/Note604A tsn.dgn		REV. 08/05/2004	

HUNTER ROAD & MARGO DRIVE LEFT-TURN LANE WARRANT - ALTERNATIVE 2



HUNTER ROAD & MARGO DRIVE RIGHT-TURN LANE WARRANT - ALTERNATIVE 2



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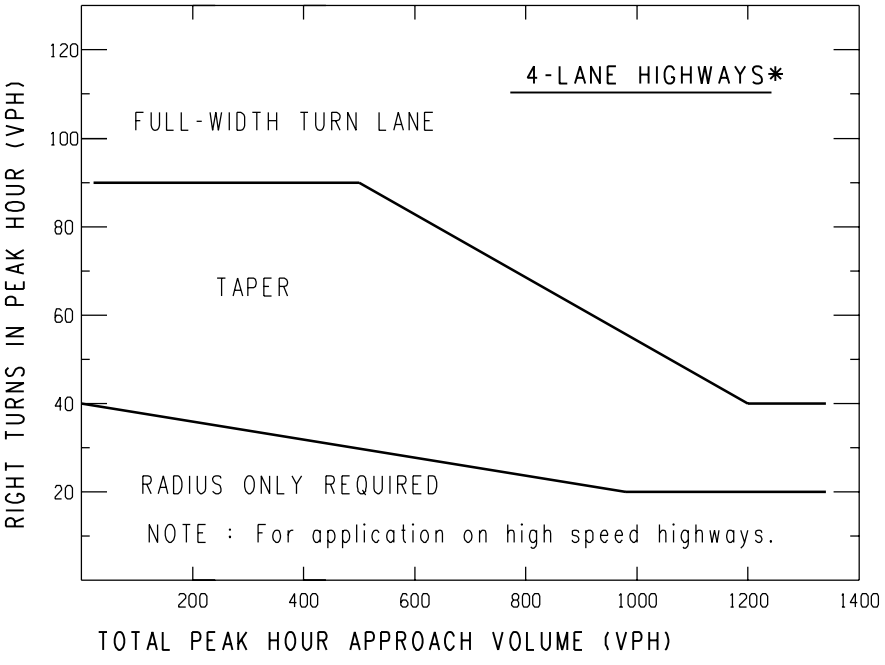

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MDOT Michigan Department of Transportation

TRAFFIC AND SAFETY NOTE

TRAFFIC VOLUME GUIDELINES FOR RIGHT-TURN LANES AND TAPERS

DRAWN BY: MTS	08/05/2004	604A	SHEET 2 OF 2
CHECKED BY: JAT	PLAN DATE:		
FILE: K:/DGN/ts notes/Note604A tsn.dgn		REV. 08/05/2004	

City of Brighton
WATER DIVISION

May 14, 2025

Mitch Harris Building Co. Inc
211 N 1st St.
Brighton, MI 48116

Subject: The Cove and The Ridge at Woodland Lake

Mitch Harris,

At the request of the City of Brighton, Tetra Tech has completed an evaluation of the water system's capacity to accommodate the additional 16 housing units located outside of the current master plan in Brighton Township, as requested by Boss Engineering and Mitch Harris (see attached map).

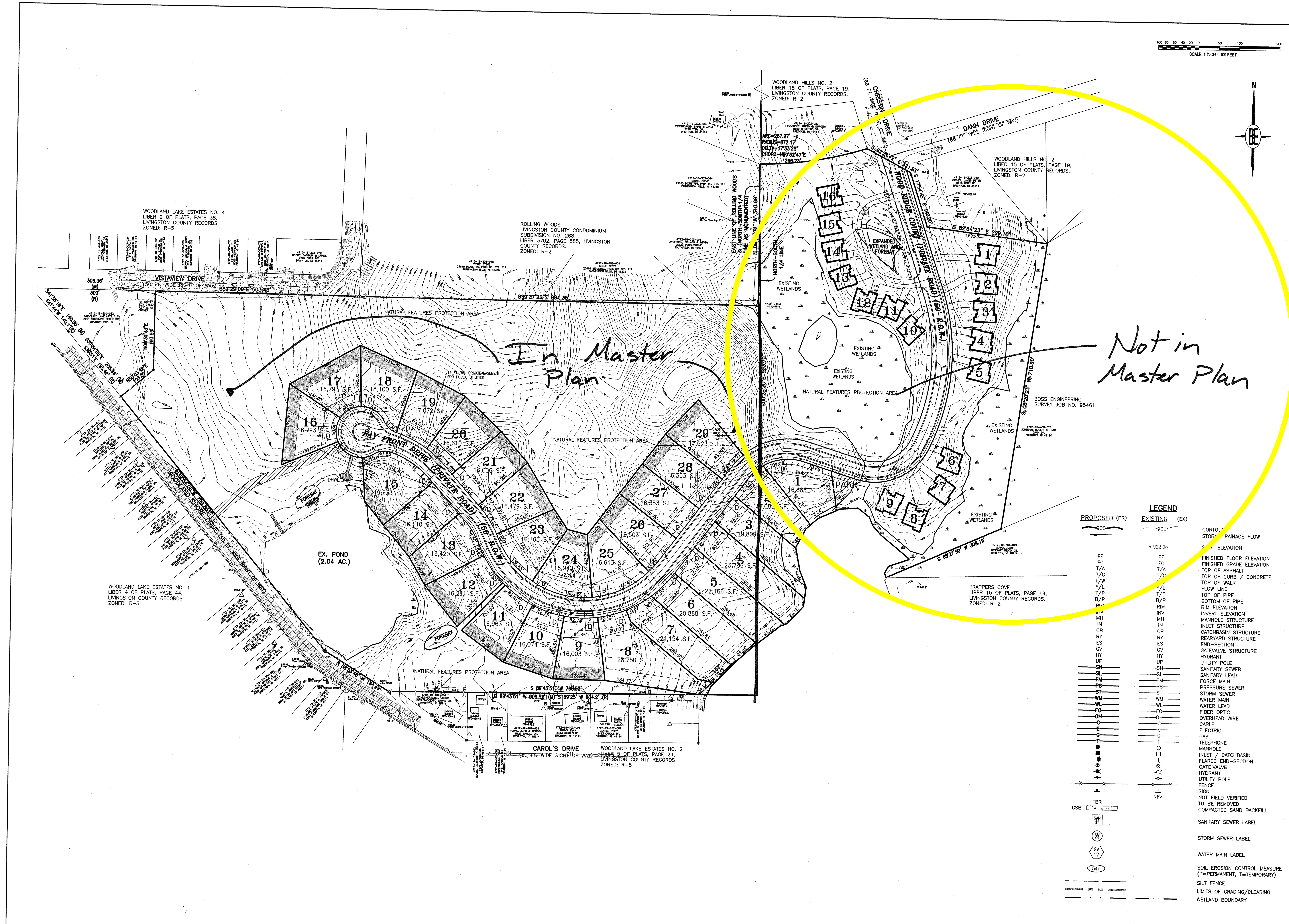
Based on the model results, the existing water system has sufficient capacity to support expansion of the water system and the increased demand associated with the proposed development.

As the project progresses, please ensure that all construction plans for the watermain improvements comply with the City of Brighton Engineering Standards and are submitted for review and approval.

We look forward to working with you on this project.

Respectfully Submitted,

Josh Bradley
Water Treatment Plant Superintendent
City of Brighton



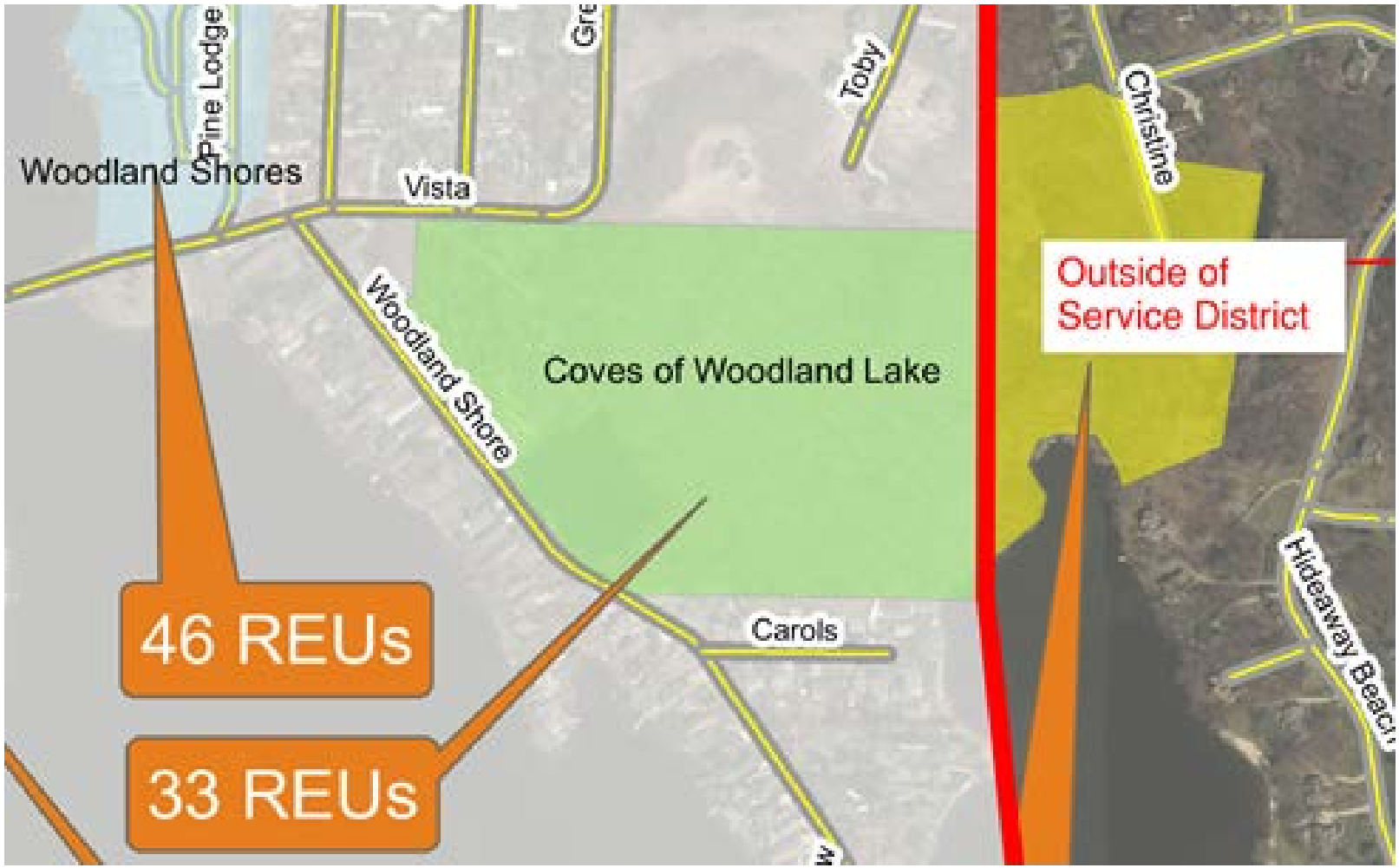
BOSS ENGINEERING
ENGINEERS • SURVEYORS • PLANNERS
LANDSCAPE ARCHITECTS
3121 E. GRAND RIVER AVE.
HOWELL, MI 48843
(800) 246-6733 FAX (517) 548-1670

PROJECT
THE COVE AND THE RIDGE AT WOODLAND LAKE

PREPARED FOR
CCMG FIVE, LLC / NORTHRIDGE CHURCH
3121 E. GRAND RIVER AVE.
HOWELL, MI 48843
517-546-4836

TITLE
OPEN SPACE PLAN - 45 LOT LAYOUT

DESIGNED BY:	ST
DRAWN BY:	ST
CHECKED BY:	
SCALE	1" = 100'
JOB NO.	06403
DATE	10-19-2023
SHEET NO.	1


Pine Lodge
Woodland Shores
Vista
Toby
Christine
Outside of
Service District
Woodland Shore
Coves of Woodland Lake
Carols
Hideaway Beach
46 REUs
33 REUs

Date: October 16, 2025

To: Charter Township of Brighton Planning Commission

From: Kelly Mathews

Subject: **PUD Rezoning for the Cove at Woodland Lake**
Sheets dated 10/14/25

Location: 42.8 acres in the R-2 zoning designation, east of Woodland Shore, north of Carols Drive, south of Christine and Dann, and west of Hunter on Woodland Lake

Request: Residential PUD (Planned Unit Development)

Zoning: R-2 (Residential Single Family)

Tax ID#: 12-18-300-011 & 12-18-400-027

Applicant: Mitch Harris Building Co.

The application for rezoning from R-2 (Residential Single Family) to Residential PUD (Planned Unit Development) submitted by Mitch Harris Building Company has been reviewed. This report is based on a review of the application materials, a site visit, and a comparison to applicable standards. In making a recommendation on this request, the Planning Commission should apply appropriate standards in consideration of the review, additional comments from the applicant, and any new information raised at the meeting. A correction needs to be made to the cover sheet that states the number of lots proposed on a private road is 40 with a deviation of 16.

LOCATION AND DESCRIPTION

The subject site is located east of Woodland Shore, north of Carols Drive, south of Christine and Dann, and west of Hunter on Woodland Lake. The property is located in an area designated as a natural features protection area on the map so the project needs to be reviewed under *Article 10* of the Zoning Ordinance. The developer has prepared a general environmental assessment of the property which is required in *Sec. 10-04* of the Zoning Ordinance. The conceptual site plan is approved as part of the rezoning; the developer would be bound to that conceptual plan.

PROCESS

The applicant is proposing a residential planned unit development (PUD). The applicant has provided a parallel plan under the underlying R-2 zoning district and has provided the proposed PUD development plan. The PUD allows both the Township and developer flexibility in zoning to allow for innovative design that would not be permitted under conventional zoning requirements which is what this developer is proposing through this PUD proposal.

The applicant plans on developing thirty-two (32) single family lots and eight (8) detached

condominiums. Eight (8) waterfront lots are proposed on the single-family side and two (2) detached condominium units on the lake. After the PUD rezoning, the applicant will follow the procedures for condominium developments in accordance with *Article 20*. The plan shall be reviewed as follows:

Step	Action	Approval
1. Planning Commission Public Hearing on PUD Rezoning & Conceptual Site Plan	Planning Commission public hearing & review	Recommendation to Township Board
2. County Review of PUD Rezoning	Livingston County Planning Commission review	Recommendation to Township Board
3. Township Board PUD Rezoning & Conceptual Site Plan Approval	Township Board review	Township Board
4. Planning Commission Preliminary Condominium Site Plan & Final PUD Rezoning Review	Planning Commission review	Recommendation to Township Board
5. Township Board Preliminary Condominium Site Plan & Final PUD Rezoning Review	Township Board review	Township Board
6. Construction Plan Review	Township staff and consultant review	Township Planner
7. Final Condominium Review	Township staff and consultant review	Township Planner

PUD ELIGIBILITY

The Zoning Ordinance requires that the applicant must demonstrate that the site qualifies for a PUD. Based on *Section 12-02*, the site is eligible for PUD approval as follows.

1. **Demonstrated Benefit.** The PUD ordinance requires fifty (50%) percent open space for residential PUD's; a calculation has been provided which is 58.9%. The proposed open space is mainly consisting of preserving the large wooded areas. A five (5) ft. concrete sidewalk is being proposed on one side of the private roadway, Bay Front Drive, as required by the zoning ordinance. The roadway is proposed as fifty (50) ft. R.O.W. instead of the required sixty-six (66) ft. R.O.W. with twenty-eight (28) ft. roadways.

   The site is currently very wooded, is designated as a natural features area, and has steep and varying slopes. The developer plans to preserve many of the trees in the development; especially on the northerly side of the property. A buffer area (wooded area) will also be preserved on the southerly side. Additionally, there are quite a few wetland areas on the site which are regulated by EGLE. The proposal is to utilize one of the natural wet areas (pond) as a retention basin and create two (2) retention basins/forebays for the single-family lot side and an expanded wetlands and forebay area for the detached condominium side. *Article 10, Natural Features Overlay*, requires natural feature buffer areas of one hundred (100) ft.

which can be reduced to twenty-five (25) ft. if allowed by the Planning Commission. A minimum fifty (50) ft. setback from the wetlands is proposed and 100 ft. from the lake on the single-family side and fifty (50) ft. on the detached condominium side.

2. **Availability and Capacity of Public Services.** The homes will be served by public sewer and a planned extension of public water.

3. **Compatibility with the Master Plan.** This project is located in the low-density residential area of the master plan which is typically the R-1 and R-2 zoning districts. These areas are designated for single-family residences, located between the rural residential and more urbanized areas of the Township. This designation encompasses the majority of land planned for future residential use, and generally includes areas that do not have access to municipal water and sewer. Many areas have already been developed where fewer environmental constraints are found. However, the land immediately surrounding many of the lakes is designated for residential land uses. These areas will need to be monitored to ensure the environmental integrity is maintained and water quality remains satisfactory. The primary type of development within this classification is expected to be single-family residences on lots that are roughly one acre in size.

   The proposal is for thirty-two (32) lots of a minimum size of 16,000 sq. ft. The proposed setbacks are twenty-five (25) ft. front yard, thirty (30) ft. rear yard, and ten (10) ft. side yards. Setbacks from all wetlands must be a minimum of twenty-five (25) ft. The other part of the development is eight (8) detached condominiums.

   The lot sizes required in the R-2 zoning district are approximately 40,000 sq. ft. (.91 acre). The lot widths required in the R-2 district are 160 ft. The lot coverage in the R-2 district is fifteen (15%) percent. The setbacks required in the R-2 zoning district are thirty-five (35) ft. front yard, twelve (12) ft. side yard, thirty-five (35) ft. rear yard, and twenty-five (25) ft. minimum with the average of 300 ft. along the lake required for the natural feature setback (Woodland Lake). The parallel plan for the R-2 zoning district meets all Zoning Ordinance requirements.

4. **Compatibility with the Planned Development Intent.** The proposed plan allows for innovation in land use planning, coordinated development, protects significant natural features, and includes a sidewalk along one side of the roadways as required by the zoning ordinance. Other amenities could be considered to provide additional benefits for the project.

5. **Development Impact.** The site is surrounded by single-family homes.

6. **Unified Control of Property.** The site must be developed as one project/owner.

EXISTING LAND USE, ZONING, AND FUTURE LAND USE

The following table gives an overview of the existing uses and zoning, in addition to the future land use indicated in the Master Plan, for the subject site and surrounding parcels.

	Existing Land Use	Zoning	Master Plan
Subject Site	Vacant	R-2	Low Density Residential
North	Single Family Homes	R-5 & R-2	Medium Density Residential and Low Density Residential
South	Single Family Homes	R-5	Medium Density Residential
East	Single Family Homes	R-2	Low Density Residential
West	Single Family Homes	R-5	Medium Density Residential

PERMITTED USES

The following table gives an overview of both principal permitted uses and permitted uses after special approval in the existing R-2 zoning district.

Principal Uses Permitted R-2
1. Single Family Dwellings 2. Farms 3. Adult Foster Care Home (1-6 adults) 4. Foster Family Home (1-4 children 24 hrs.) 5. Foster Family Group Home (5-6 children 24 hrs.) 6. Family Day Care Home (1-6 children <24 hrs.) 7. Parks & Public Recreation Facilities 8. Essential Public Services 9. Governmental Administrative Offices 10. Libraries 11. Police and Fire Stations 12. Schools, Primary including Charter, Montessori
Permitted Uses after Special Approval R-2
1. Adult Foster Care Small Group Home (7-12 adults) 2. Group Day Care Home (7-12 children <24 hrs.) 3. Airports & Related Uses 4. Cemeteries (Public Only) 5. Golf Courses 6. Swimming Pool Clubs & Recreation Clubs 7. Churches, Temples, & Other Places of Worship or Public Assembly 8. Essential Public Service/Utility Buildings

PROPOSED USE

The applicant has indicated that the proposed use for the approximately 42.8 acres to be rezoned

from R-2 to PUD would be for thirty-two (32) lots of a minimum size of 16,000 sq. ft. Additionally, eight (8) detached condominiums are proposed. A total of forty (40) homes are proposed. One private road is proposed for access to the site which connects into N. Christine and Dann Drives, which are public roads. Per *Sec. 16-08*, a five (5) ft. concrete sidewalk is required along one side of the internal private road which is being proposed.

The applicant has proposed a twenty-eight (28) ft. wide road within a fifty (50) ft. private road R.O.W. Additionally, there is an approximately twenty (20) ft. wide ingress/egress easement shown off of Bayfront Drive extending into Vista View Drive for emergency access. The Planning Commission and Township Board will have to discuss this proposal for a private road with a smaller R.O.W. and road width. If this is acceptable, that will become part of the planned unit development agreement. The proposal is for eight (8) lakefront lots and two (2) detached condominium lakefront units.

The applicant has depicted a parallel plan for the R-2 zoning district depicting thirty-one (31) lots; it depicts natural buffer areas of less than the one hundred (100) ft. requirement per *Article 10*; however, the Planning Commission can approve a smaller natural buffer area. The lot sizes required in the R-2 zoning district are approximately 40,000 sq. ft. (.91 acre) lots. The lot widths required in the R-2 district are 160 ft. The lot coverage in the R-2 district is fifteen (15%) percent. The setbacks required in the R-2 zoning district are thirty-five (35) ft. front yard, twelve (12) ft. side yard, thirty-five (35) ft. rear yard, and twenty-five (25) ft. minimum with the average of 300 ft. along the lake required for the natural feature setback (Woodland Lake). The proposal is for thirty-two (32) lots of a minimum size of 16,000 sq. ft. and eight (8) detached condominiums. The developer has depicted the open space calculations regarding the open space. As depicted on the conceptual plan, most of the site will remain undisturbed and will be protected through a conservation easement.

Most of the property is designated as natural features on the Natural Features Protection Area map. As part of the site plan review, the applicant has to comply with the requirements outlined in *Article 10* of the Zoning Ordinance which includes an environmental impact assessment which has been conducted. Additionally, many wetlands are located on the property which is assumed to be under EGLE's jurisdiction. The applicant has provided a general environmental assessment.

A ten percent (10%) density bonus may be allowed for developing under a PUD; an additional ten percent (10%) may be allowed for connecting into the sewer system; and another ten percent (10%) may be allowed for connecting into the water system. Assuming a thirty percent (30%) increase over the thirty-one (31) units allowable under the R-2 zoning would be forty (40) units.

DISCUSSION

The rezoning request was reviewed based on the review considerations listed in *Section 23-10* of the Zoning Ordinance and the Charter Township of Brighton Master Plan.

1. **Consistency with the goals, policies, and future land use map of the Brighton**

Township Master Plan including any sub area or corridor studies. If conditions have changed since the last Master Plan was adopted, the consistency with recent development trends in the area.

This project is located in the low-density residential area of the future land use map which is typically the R-1 and R-2 zoning districts. These areas are designated for single-family residences, located between the rural residential and more urbanized areas of the Township. This designation encompasses the majority of land planned for future residential use, and generally includes areas that do not have access to municipal water and sewer. Many areas have already been developed where fewer environmental constraints are found. However, the land immediately surrounding many of the lakes is designated for residential land uses. These areas will need to be monitored to ensure the environmental integrity is maintained and water quality remains satisfactory. The primary type of development within this classification is expected to be single-family residences on lots that are roughly one acre in size.

2. **Compatibility of the site's physical, geological, hydrological and other environmental features with the potential uses permitted in the proposed zoning district.**

Evidence has not been provided that the site could not develop under the current R-2 zoning designation. However, the developer has a proposal for a denser development but keeping many of the natural features of the site preserved.

Since the applicant is proposing the project as a PUD, the Township will have much more control of the entire site and the preservation of natural features on the site. The conceptual plan depicts forty (40) units. Since this is proposed to be a PUD rezoning, the proposed conceptual site plan and the preservation of the natural features would be what the Township would attain as part of the rezoning since the site plan will become the contract for the site, along with the planned unit development agreement. At this time, we only have a conceptual plan but the entire site plan and all details of the site would be reviewed as part of the subsequent steps in the site plan process.

3. **Compatibility of all of the potential uses allowed in the proposed zoning district with surrounding uses and zoning in terms of land suitability, impacts on the environment, density, nature of use, traffic impacts, aesthetics, infrastructure and potential impact on property values.**

The types of uses permitted within the single-family residential districts are mainly the same; the difference is in density. The applicant has depicted how many units could be developed in the R-2 designation. The soils in the area are part of the Fox-Boyer-Oshtemo Association which includes steep or hilly, well drained, moderately coarse to coarse textured soils on moraines.

4. **The capacity of Township infrastructure, utilities, and services is sufficient to**

accommodate the uses permitted in the requested district without compromising the health, safety and welfare of the Township.

Township sewer and public water are proposed. The capacity of the Township's sewer can accommodate the uses in both the current R-2 (Residential Single Family) district and the proposed PUD. The water capacity has been confirmed by the City of Brighton and the water service agreement area will be revised.

5. **The apparent demand for the types of uses permitted in the requested zoning district in the Township in relation to the amount of land in the Township currently zoned to accommodate the demand.**

All of the properties to the north, south, east, and west of the site are developed for single family residential uses of varying sizes. This property is located in a Natural Features Protection Area as designated on the Charter Township of Brighton's Map. As part of the site plan review, the applicant will have to comply with the requirements outlined in *Article 10* of the Zoning Ordinance including an environmental impact assessment. The applicant has provided a general environmental impact assessment. The applicant has proposed lot sizes that he feels are consistent with the neighboring properties. Fairly large buffer areas will be provided along the perimeter of the site which will help shield the views from neighboring properties. The applicant has submitted a traffic impact study (TIS) depicting the traffic from the proposed development. The Township Engineer has reviewed and commented on the TIS.

6. **If a rezoning is reasonable given the above criteria, a determination shall be made that the requested rezoning is more appropriate than another zoning district.**

The proposed PUD rezoning offers a benefit to the Township in terms of open space and protection of natural resources for the Township because the site plan becomes the contract for the site.

SITE PLAN DISCUSSION

The site plan submittal is being reviewed in accordance with *Article 12*, which describes the information and standards for Residential PUD's and PUD rezoning and conceptual plan submission requirements, therefore, the following comments are submitted for the residential portion of the site.

1. **Submittal Requirements.** The following items are requested to be submitted in accordance with *Section 12-11(a)* and *(b).* A parallel plan which depicts the natural features on the site is required to determine how many residential units could be developed under the existing R-2 zoning district to determine the density for the site.

    a. Conceptual plan at a minimum scale of one-inch equals one hundred feet (1"=100'). (Met).

b. Proposed road names, right-of-way widths and public walkway widths. Walkways are required on one side of each road and can also be provided through the open space area per *Sec. 16-08*. (Met).

c. Indication of the proposed sewage, water supply, and storm drainage system. A depiction of the water extension to the site must be provided. Conceptual plans were provided for the utilities. (Met).

d. Explanation of proposed development phases. (Met).

e. Conceptual grading plans. (Met).

f. Conceptual landscaping plan per *Section 14-02(i)* and listed in *Sec. 12-08(d)(1)*; both proposed and existing trees to be removed and remain should be depicted on the plan. (Met).

g. Details on proposed roads and walking paths. Concrete sidewalks as required along one side of the internal roads and must be five (5) ft. in width. Details for the sidewalk have been provided. (Met).

h. Details on proposed utilities. Conceptual utility plans have been shown. (Met).

i. A planned unit development (PUD) agreement must be proposed which includes any requested modifications from the Zoning Ordinance regarding the proposed PUD. (Met).

2. **Density and Dimensional Requirements**. Residential Open Space PUD's allow for modifications to the dimensional standards contained in the existing zoning district, R-2, and the proposed PUD designation, provided natural features are preserved and additional amenities are provided in return. The planned unit development agreement must outline all of the modifications to the dimensional standards contained in the proposed PUD if the benefits acceptable to the Township are proposed. Modifications must be approved by the Planning Commission and Township Board and reflected in the PUD Agreement. The following table lists the Township's requirements for the R-2 Zoning District and what has been proposed.

	Existing R-2	**Proposed PUD**
Individual Lot Sizes	40,000 s.f. (.091 acre)	Min. 16,000 s.f.
Lot Width	160	Shown on plan; 80 ft. min.

	Existing R-2	Proposed PUD
Natural Features Setback	50 ft. from wetland 100 ft. from lake	50 ft. from wetland 50 ft. from lake from detached condominium and 100 ft. from single family home
Front Yard Setback	35	25
Rear Yard Setback	35	30
Side Yard Setback	12	10
Lot Coverage	15	40

The applicant needs to provide the Township benefits in order to realize modifications to the zoning requirements. The above requests are in addition to requests to reduce the width of the road right-of-way (R.O.W.), reduce the width of the pavement for the proposed private road, length of road, maximum number of lots on a private road with a single point of access, and reduced setbacks to the lake from the detached condominiums.

3. **Open Space**. A minimum of fifty (50%) percent of the site shall be dedicated as open space in a Residential PUD. The percentage and acreage of open space must be designated on the site plan (58.9% is depicted on the site plan) and in the PUD agreement and state that the wooded area will be held in a conservation easement and will, therefore, never be disturbed.

RECOMMENDATION

It is recommended that the Planning Commission recommend approval to the Township Board contingent upon any outstanding issues being handled administratively.

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

November 3, 2025

Via email: planner@brightontwp.com

Kelly Mathews, Planner
Charter Township of Brighton
4363 Buno Road
Brighton, MI 48114

RE: Proposed The Cove at Woodland Lake
Preliminary PUD Site Plan & Parallel Plan Review #4
F&V Project No. 871250

Dear Kelly:

We have completed an engineering review of the Preliminary PUD Site Plan, revised dated October 14, 2025, for the proposed The Cove at Woodland Lake, a 40-unit residential condominium. Since our last review, the proposed number of units has been reduced from 45 to 40. Based on our review, we offer the following comments and recommendations for your consideration.

Parallel Plan:

1. The open space plan results in five (5) additional riparian units.
2. Per Sec. 12-04 of the zoning ordinance, the Planning Commission shall review the design of the parallel plan and determine the number of lots that could be feasibly constructed following the parallel design. We offer the following observations for the commissioner's consideration:
    a. The Parallel Plan (Conventional R-2 Site Plan) has been revised from the previous submittals. The proposed private road wetland crossing has been relocated to the narrowest point of the wetland in the same location as the open space plan. Space for storm water management and the feasibility of grading on each unit, on a preliminary level, have also been considered. We feel that the revised parallel plan more accurately represents the number of units that could be feasibly constructed, which resulted in a decrease from 35 units to 31 units.
    b. In addition to the Conventual R-2 Site Plan, a Conventional R-2 Grading Plan and Storm Water Details have been included in this set. This level of detail goes beyond what is typically required and is provided for Preliminary PUD Site Plan Approval. At this preliminary level, retention is being proposed as part of the storm water management plan to reduce storm water runoff discharge to Woodland Lake.

Preliminary PUD Site Plan:

1. The decrease from 35 units to 31 units on the conventual R-2 parallel plan yielded a decrease on the PUD plan from 45 units to 40 units, based on the maximum density bonus of 30%.
2. Additional detail related to the proposed storm water management has been included and a stormwater narrative has been provided on Sheet 6. The storm water management system will be designed to the requirements of the Livingston County Drain Commissioner and Brighton Township with the primary goal of pre-treatment of all storm water runoff and minimizing discharges to Woodland Lake.

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a. Two sedimentation basins will treat storm water runoff from most of the on-site drainage area before discharging to a retention basin. The retention basin will infiltrate water into the soils and have no direct outlet connection to Woodland Lake. Infiltration tests to confirm the permeability of the existing soils will be conducted.

b. A sedimentation basin in the northeast area of the site will treat storm water runoff from this area before discharging into the existing on-site wetlands, which will provide additional treatment and storage.

c. The storm water runoff from the area near the wetland road crossing in the vicinity of Units 1, 6, and 7 will be pretreated by a mechanical structure before discharging to the existing on-site wetlands.

3. Infiltration tests are required during final design to confirm the permeability of the existing soils.
4. Direct maintenance access to the forebays for heavy equipment shall be considered.
5. The proposed storm sewer and its corresponding inverts connecting Forebay B to the Retention Basin is recommended to be shown in the Retention Basin Cross Section on Sheet 10 for clarification of how this system will function. The depiction of Forebay B's spillway into the Retention Basin should also be revised as this forebay is proposed to overflow into the existing pond.
6. With this project being within the Township's natural features protection area, we note that the majority of the existing natural drainage area from this site to the 2.1± acre pond in the southwest corner is proposed to be intercepted for storm water pre-treatment and retention to minimize discharges to Woodland Lake, helping to maintain water quality. As a result of the decrease in the contributing surface runoff area, the water surface area and elevation of this pond may be impacted.

Repeated comments from previous reviews:

7. The development property is within the Township's sewer service area. The proposed connection is to a manhole on the gravity sanitary sewer along Vistaview Drive. A sanitary sewer capacity evaluation will need to be completed as part of future submittals, but service to this development appears feasible for the purpose of PUD consideration and approval.
8. Preliminary approval of the proposed private road connection to Dann Dr / N Christine Dr should be obtained from the Livingston County Road Commission.
9. Additional grading, stormwater management calcs, and storm sewer design review will be completed upon final site plan and construction plan submittal. The design shall be in accordance with the Livingston County Drain Commissioner's Procedures and Design Criteria for Stormwater Management Systems. The use of the natural features in the storm water management plan shall consider their storage capacity and an overflow route.

Traffic Impact Study:

Traffic Study Impact (TIS) comments were provided on our previous Preliminary PUD Site Plan Reviews. There are no additional comments related to this revised submittal, other than that the traffic-related impacts presented in the study would be anticipated to be reduced with the reduction of five (5) proposed units.

If you have any questions or need any additional information, please contact us at (810) 743-9120 or via e-mail at grose@fveng.com.

Sincerely,

FLEIS & VANDENBRINK

Geric L. Rose, PE, PS
Regional Manager | Associate

Cc (via email): Mitch Harris, Applicant (mharris@mitchharris.net)
Scott Tousignant, PE, Boss Engineering (scottt@bosseng.com)
Kim Hiller, Livingston County Road Commission
Ken Recker, PE, Chief Deputy Drain Commissioner, Livingston County
Mitch Dempsey, Environmental Projects Manager, Livingston County
Jim Rowell, Building Official, Livingston County
Richard Boisvert, CFPS Fire Marshal, Brighton Area Fire Authority
Brian Vick, Township Manager
Dan Cabage, F&V

BRIGHTON AREA FIRE AUTHORITY

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

October 27, 2025

Kelly Mathews, Planner
Charter Township of Brighton
Building and Planning
4363 Buno Road
Brighton, MI 48114

RE: Cove at Woodland Lake PUD
Dann Dr. & N. Christine Dr.
Site Plan Review

Dear Kelly:

The Brighton Area Fire Department has reviewed the above-mentioned site plan. The plans were received for review on October 16, 2025 and the drawings are October 14, 2025. The project is based on the proposed redevelopment of a two-parcel (29.48 & 12 acres) wooded area as a new residential development of up to 45 units. The plan review is based on the requirements of the International Fire Code (IFC) 2024 edition.

All previous comments have been addressed in the most recent construction plan review.

Additional comments will be provided during the remaining plan review process.

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

Cordially,

Rick Boisvert, CFPS
Fire Marshal

cc: Geric Rose-Fleis & Vandenbrink (grose@fveng.com)
Daniel Cabage-Fleis & Vandenbrink (dcabage@fveng.com)

Archived: Monday, November 3, 2025 8:06:10 AM
From: John Boland
Mail received time: Sat, 1 Nov 2025 17:12:34
Sent: Saturday, November 1, 2025 1:12:35 PM
To: Planner Manager
Cc: Cheryl Wasilewski cc: Tim Agnello Bill Loughead Doug Mancini Tim Happ Stan Lawrence Russ Ward John Guidobono Jim Kahut Doug Taylor Katie Tierney Lorrie Haydon Stuart Meyers Anita's Comcast
Subject: Woodland Lake OWL presentation responses, regarding PUD deviation
Importance: Normal
Sensitivity: None
Attachments:
PlanningResponseOc25.docx

Hi Kelly.
Thank you for allowing me to present to your planning board. Please review the attached file for responses to questions that your panel had for us.
In addition, I have submitted a proposal that has been reviewed by the OWL team. The intent is to give an approach for achieving what can be built in this area, based on what other states have done in similar situations and similar to what was done for Woodland Bluffs. If the Land Division act applies here, this would handle the 13 residences readily and safely. If the act doesn't apply, it could be used as a framework, with Environmental Engineering assistance, for how to establish the best approach to protect our lake's water quality and still move forward with development.

Thank you
John

This Letter is in response to Questions and clarifications from the Brighton Township planning committee, after presentations of our Woodland Lake Water Quality concerns as they relate to the proposed PUD.

Bullet points from presentation and discussion:

- Woodland Lake's conductivity across the lake has increased significantly in recent years. Conductivity is a measure of contamination in a lake (Nutrients, chemicals)
- From 1994-2012, the average conductivity around the lake was 482 microsiemens. From 2012-2024, the average conductivity was 948 Microsiemens, double prior period
- Since 2017, water clarity at master station 6 has gone from 10.6 feet to 5.1 feet in 2021. During the same time, the conductivity readings from Grand River, Hacker Road and Ore Creek inlet were excessively high. We showed that the loss in water clarity was directly related to the conductivity from the road drains. R**2=0.57.
- Many inland lakes across Michigan, Wisconsin, Minnesota and Indiana are seeing the same phenomenon, per discussions with USGS, EGLE, DNR and lake owners associations. **Overbuilding around our lakes and to drains that go into our lakes has created excessive nutrient and contamination runoff that exceeds the lake's capacity to filter it**.
- **The replacement of forests, vegetation and wetlands with significantly impervious surfaces is the largest cause of the overloading of our lakes with nutrients and contaminants. (EGLE, USGS,etc). Woodland Lake data supports this premise**
- Limnologist and university studies on the subject recommend that any development along an inland lake or stream **should be designed for 10% total impervious cover**. **Total impervious cover includes all building roofs, roadways, driveways, patios and walkways for a project**. Based on these studies, Minnesota law now requires anything between 10 and 15% impervious must have environmental engineering to absorb the additional runoff. These can be in the form of 35 foot+ buffer zones, impermeable detention ponds, etc.
- Significant effort must be taken to ensure that the lakes are **protected throughout all phases** of development, from initial deforestation, grading, roadways, through build and after move-in.
- The **proposed PUD would drive 45-50% impervious** surface cover for the land in question. R2 requirements allow 15% impervious surface cover per acre of land. This is not adequate as it does not include the roadways, which are a huge issue for contamination.
- One potential approach for R2 would be similar to the approach taken at the Bluffs of Woodland Lake. By leaving a large natural vegetation/wetland buffer, design to be approved by environmental engineers, and engineering impermeable detention systems and pumpouts for all build phases, there may be a way to protect R2 from overly polluting our lake.
- **The PUD is far too impervious** and would be irresponsible to allow. There is up to an **80-foot grade from the upper areas** of the land being considered running down **to our lake** that is currently being filtered with vegetation and wetlands. This **situation would be very similar to the area feeding the Grand River (Genoa) drain**. (50% impervious surface, 80+ feet gradient to lake, but this new potential build area has a steeper gradient than Grand River Drain. Grand River Drain has approximately 70 acres of runoff, versus 40+ acres for the new development area.)

Backup data and board question responses:

Questions and responses below:

1.) **Are there any grants that are available to help us mitigate the excessive nutrients that are coming into our lake?**

OWL had discussions in July of this year with EGLE to understand if there is any financial help available. They were not aware of any and had been asked the same question by several lake management teams across Michigan and around the country.

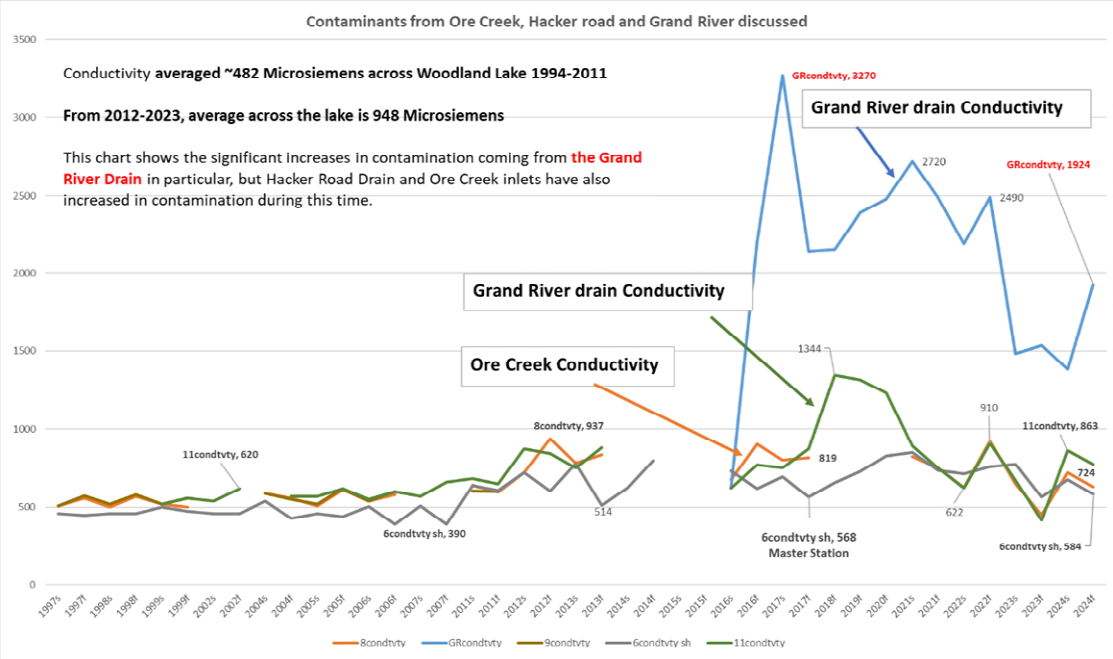
Owl is working with State Representative Tom Barrett, per reference received from Kelly. We will see if Tom can help us with any sort of financial assistance information. As discussed in the planning presentation, if Timber Char doesn't work, the next step for us (along with many lakes) will cost us in the $Millions. We are **hopeful** that at the current levels of contamination, Timber char might have a chance to get us into balance. In discussions with other lakes in Michigan, it is too early to understand the Timber Char capabilities. Adding more filtration bags in 2026 to see if we can enhance our minimal improvements to date.

2.) **We were asked for the percentage of flows and contamination coming from the Ore Creek and Hacker Road areas, flowing under the bridge, as compared to the rest of the Woodland Lake struggles.**

Per David Jude in his 2024 report, "Inputs from Ore Creek of substances do not appear to propagate past the northern part of Woodland Lake and remain confined to the area north of the bridge, except during severe rain events." The contamination North of the Bridge becomes absorbed by wetland plants in and around that portion of the lake. We are also seeing a slight reduction in the amount of contaminants from the North due to some commercial activity reduction. He adds "The huge wetland area that Ore Creek runs through is buffering the effects of the input of nutrients (including P) to Woodland Lake during most years."

However, the total amount of contaminants flowing into Woodland Lake (Station 6), is excessive, significantly from the Grand River Drain, but with heavy rains, in part from Hacker, Ore Creek and the 34 other drains entering into our lake currently. There are not enough plants to absorb the input of contaminants. Per Limnologist, the highly impervious surfaces around the main lake, south of the Bridge, allow too much runoff from land, roads, parking lots, patios and roofing. Higher vehicular traffic adds to the contamination around the lake.

Below Chart shows conductivity across the lake (shown as gray line, Master station 6) has been at elevated levels since 2012, **problematic since 2018**. This is consistent with the timing of increased conductivity from the drains around the lake, per multiple sources, likely the result of more impervious surfaces feeding into these drains.



Planning Committee did a nice job of insuring the Bluffs of Woodland Lake and Trappers Cove Wetlands were protected 25 years ago

Bluffs built up high with plenty of wetland and vegetation to take care of runoff from the neighborhood

The **only other remaining large area of wetlands and vegetation** left around the main portion of the lake **to take up nutrients** is where the new Mitch Harris Development is proposed

The Below picture shows inlay of one of the prior proposals with a topo map laid on top.

This would be R2 designated building, but add retention ponds for 100 year rain capacity, that would overflow, after settling through the vegetation below on the way to the lake. R2 allows 15% impervious cover on each acre, but doesn't include the roads or retaining walls. This proposal would be for 15% total Impervious cover over the entire build area. Something like this might be OK with appropriate environmental engineering support. Build areas are noted in purple grid, which aligns with 45 feet above the lake's surface..

If the Land Division Act is viable here, it would fit the 13 units allowed. If the act is not legally viable, the below could be used with an Environmental Engineering Firm to define how many residences could be built in a safe manner relative to protecting our lake.

Just trying to offer **an approach to getting to resolution**. I will be out of the country for the 11/10 meeting but would be willing to discuss if it makes sense in the future.

PUD would yield 45-50% impervious surfaces. **New developments** need to be designed to **10% impervious surfaces,** including all roadways, drives, roofing, etc. **Up to maximum 15% would require Environmental engineering** to mitigate runoff into lake. (Significant buffer zones, detention systems, etc.) Minnesota law basis