PHASING PLAN NARRATIVE

Date: April 17, 2023

INTRODUCTION

TYC Americas is expanding its North American footprint with the addition of our Michigan Mobility Center located in Belleville, Michigan. We have regionally been associated with our Automotive Aftermarket business; however, our North American and global OEM business includes many global manufacturers that TYC is proudly delivering as a Tier 1 supplier. TYC Americas OEM customers include automotive, heavy-duty truck, bus, motorcycle, and off-road vehicle manufacturers. The Michigan Mobility Center will involve full production of LED front and rear lighting including a high level of electronics and other vertical integration, bringing advanced manufacturing technology to Michigan.

The TYC family of twelve companies has over 2800 employees globally. The Belleville facility will provide about 100 new jobs.

Our site selection is based upon our confidence in the Van Buren Township community, as well as the opportunity to conduct business in an environment that is conducive to expansion and growth. The Belleville facility will provide:

- Engineering, sales, training and continuing education for staff and customers
- Research and development laboratory
- Testing and inspecting
- Photopolymer 3D printing
- Extrusion 3D printing
- 3D powder printing
- Automated post processing for additive manufacturing
- Injection molding
- State of the art printed circuit board assemblies
- Semi-automated and fully automated assembly of LED lighting assemblies
- Complete assembly, packaging, and shipping of transportation lighting products

PURPOSE - SITE PLAN APPROVALS

Based upon our application and submittals of plans, engineering, and supporting documents, it is our request to obtain overall site plan approvals for the entire 14.8-acre site. Development of the parcel will commence upon planning commission approvals and permits awarded. Stonefield plans, Sheet C-3.3 proposes 137,983 SF light manufacturing, office, engineering research and development laboratory, and shipping/receiving. The proposed parking spaces total 262, which exceeds the required 256 spaces. Building construction is identified in three separate phases.

INTENT

By obtaining overall site plan approvals, our intent is to identify the proposed compliant use of the entire parcel and develop the parcel in cost effective manner that allows for two additional phases of construction in the future. As our business grows with our North American customers, TYC Americas is expecting the need to expand our Belleville operations by 44,031 SF as soon as 2027 (Phase 2), and another 34,814 SF by 2029 (Phase 3). Construction permits will be applied for and awarded under separate submittals for Phases 2 and 3, either individually or combined. The proposed building dimensions, use and required parking for Phases 2 and 3 will not change without planning commission approval.

PHASE 1 CONSTRUCTION - STONEFIELD PLANS SHEET C-3.1

Complete site development

- Loop road and approaches
- Main entry road and approach
- Retention pond and storm water management
- 6 EV charging locations
- Water – domestic leads for total facility including hydrants and fire suppression
- Sanitary – main lead with phase 1 connection and additional phase connectivity
- Electrical – Phase 1 with allowance for additional phase connectivity
- Gas – Phase 1 with allowance for additional phase connectivity, 2nd tap for generator
- Parking islands complete with all plantings and irrigation systems
- Finished grades and hydro seeding over phase 2 & 3 footprint and parking area
- Construct 59,138 SF for engineering research and development, office, light manufacturing, and shipping/receiving
- Phase 1 parking – 126 spaces proposed, which exceeds the required 113 spaces for this phase
- Certificate of occupancy and compliance targeted for fourth quarter of 2024

PHASE 2 CONSTRUCTION - STONEFIELD PLANS SHEET C-3.2

- Construct 44,031 SF for light manufacturing and shipping/receiving
- Total construction for Phases 1 & 2 - 103,169 SF
- Total parking for Phases 1 & 2 - 194 spaces proposed, which exceeds the required aggregate of 193 spaces

PHASE 3 CONSTRUCTION - STONEFIELD PLANS SHEET C-3.3

- Construct 34,814 SF for office and light manufacturing
- Total construction for Phases 1, 2 & 3 - 137,983 SF
- Total parking for Phases 1, 2 & 3 - 262 spaces, which exceeds the required aggregate of 256 spaces

SITE DEVELOPMENT PLANS

FOR

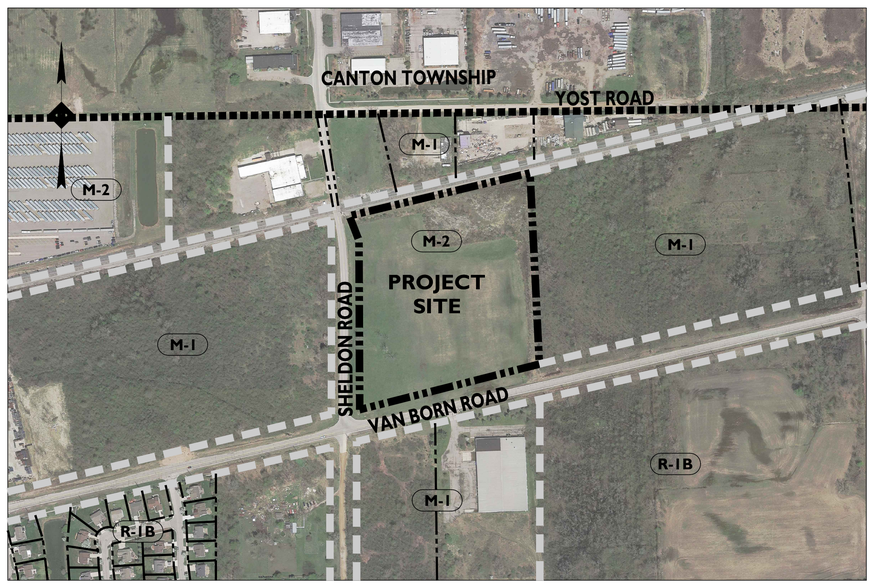
TYC AMERICAS
MICHIGAN MOBILITY CENTER
PROPOSED LIGHT MANUFACTURING & ACCESSORY OFFICES

PARCEL ID: 83-009-99-0005-000
44168 VAN BORN ROAD
VAN BUREN TOWNSHIP (BELLEVILLE), WAYNE COUNTY, MICHIGAN 48111

SOURCE: USGS ONLINE MAPS

LOCATION MAP

SCALE: 1" = 2,000'±



SOURCE: GOOGLE EARTH PRO & VAN BUREN TOWNSHIP ZONING MAP

AERIAL & ZONING MAP

SCALE: 1" = 300'±

PARCEL AREA:

646,846± SQUARE FEET = 14.84± ACRES

PROPERTY DESCRIPTION:

LAND IN THE TOWNSHIP OF VAN BUREN, WAYNE COUNTY, MI, DESCRIBED AS FOLLOWS:

PART OF THE WEST 1/2 OF THE NORTHEAST 1/4 OF SECTION 3, TOWN 3 SOUTH, RANGE 8 EAST, MICHIGAN, BEING MORE PARTICULARLY DESCRIBED AS; BEGINNING NORTH 89 DEGREES 54 MINUTES 30 SECONDS EAST 1342.52 FEET AND SOUTH 00 DEGREES 46 MINUTES 20 SECONDS EAST 278.91 FEET FROM THE NORTH 1/4 CORNER OF SECTION 3; THENCE SOUTH 78 DEGREES 38 MINUTES 00 SECONDS WEST 818.89 FEET; THENCE SOUTH 09 DEGREES 05 MINUTES 30 SECONDS EAST 100.18 FEET AND SOUTH 01 DEGREE 47 MINUTES 45 SECONDS WEST 709.16 FEET; THENCE NORTH 78 DEGREES 30 MINUTES 22 SECONDS EAST 836.82 FEET; THENCE NORTH 00 DEGREES 46 MINUTES 20 SECONDS WEST 802.31 FEET TO THE POINT OF BEGINNING.

BENCHMARKS:

SITE BENCHMARK #1
ARROW ON TOP OF HYDRANT, SOUTH SIDE OF VAN BORN, 300' ± EAST OF SHELDON RD.
ELEVATION = 681.86' (NAVD 88)

SITE BENCHMARK #2
RR SPIKE IN WEST SIDE OF UTILITY POLE. FIRST POLE SOUTH OF RR TRACKS ON EAST SIDE OF SHELDON RD.
ELEVATION = 688.48' (NAVD 88)

*** TO CONVERT FROM NAVD 88 TO NGVD 29 ADD 0.43'**

NOTES:

1. ALL CONSTRUCTION SHALL CONFORM TO THE CURRENT TOWNSHIP STANDARDS, SPECIFICATIONS, AND GENERAL CONDITIONS.
2. THE DEVELOPER IS RESPONSIBLE FOR RESOLVING ANY DRAINAGE PROBLEMS ON ADJACENT PROPERTIES WHICH ARE THE RESULT OF THE DEVELOPER'S ACTIONS.
3. CONTRACTOR TO PICK UP DEBRIS WITHIN PROPERTY LIMITS WEEKLY OR AS NEEDED
4. PAVED SURFACES, WALKWAYS, SIGNS, LIGHTING, AND OTHER STRUCTURES AND SURFACES SHALL BE MAINTAINED IN A SAFE, ATTRACTIVE CONDITION AS ORIGINALLY DESIGNED & CONSTRUCTED. PARKING LOT STRIPING AND MARKINGS SHALL BE MAINTAINED IN A CLEARLY VISIBLE CONDITION.

PERMIT STATUS TABLE

PERMIT	STATUS
TOWNSHIP SITE PLAN APPROVAL	
TOWNSHIP FIRE DEPARTMENT APPROVAL	
TOWNSHIP ENGINEERING APPROVAL	
WAYNE COUNTY SESC PERMIT	
WAYNE COUNTY RIGHT-OF-WAY PERMIT	
WAYNE COUNTY DRAIN PERMIT	
EGLE NOTICE OF COVERAGE	
EGLE WATER MAIN PERMIT	
EGLE SANITARY SEWER PERMIT	
EGLE PART 301 / 303 PERMIT	

Know what's **below**
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PLANS PREPARED BY:

STONEFIELD engineering & design

Detroit, MI · New York, NY · Boston, MA
Princeton, NJ · Tampa, FL · Rutherford, NJ
www.stonefieldeng.com

607 Shelby Suite 200, Detroit, MI 48226
Phone 248.247.1115

APPLICANT

STEVE GRAHAM
S.E GRAHAM ASSOCIATES, INC.
22526 MAPLE STREET
ST. CLAIR SHORES, MICHIGAN 48081
(586)-615-2393
SEGA87@AOL.COM

OWNER

W & W REAL PROPERTY, INC.
2800 SATURN STREET
BREA, CALIFORNIA 92821
(714)-203-0880
WNEWMAN@TYCAMERICAS.COM

PLAN REFERENCE MATERIALS:

1. **THIS PLAN SET REFERENCES THE FOLLOWING DOCUMENTS INCLUDING, BUT NOT LIMITED TO:**
   - **ALTAL/NSPS LAND TITLE SURVEY PREPARED BY KEM-TEC A GROUP OF COMPANIES DATED: 11/11/2022, REVISED: 03/28/2023**
   - **ARCHITECTURAL PLANS PREPARED BY KRIEGER KLATT ARCHITECTS DATED: 03/29/2023**
   - **GEOTECHNICAL REPORT PREPARED BY McDOWELL & ASSOCIATES DATED: 12/12/2022**
   - **AERIAL MAP OBTAINED FROM GOOGLE EARTH PRO**
   - **LOCATION MAP OBTAINED FROM USGS ONLINE MAPS**
2. **ALL REFERENCE MATERIAL LISTED ABOVE SHALL BE CONSIDERED A PART OF THIS PLAN SET AND ALL INFORMATION CONTAINED WITHIN THESE MATERIALS SHALL BE UTILIZED IN CONJUNCTION WITH THIS PLAN SET. THE CONTRACTOR IS RESPONSIBLE TO OBTAIN A COPY OF EACH REFERENCE AND REVIEW IT THOROUGHLY PRIOR TO THE START OF CONSTRUCTION.**

SHEET INDEX

DRAWING TITLE	SHEET #
COVER SHEET	C-1
DEMOLITION PLAN	C-2
SITE PLAN	C-3
GRADING PLAN	C-4
STORMWATER MANAGEMENT PLAN	C-5
UTILITY PLAN	C-6
LIGHTING PLAN	C-7
SOIL EROSION & SEDIMENT CONTROL PLAN	C-8
LANDSCAPING PLAN	C-9
LANDSCAPING TABLES	C-10
CONSTRUCTION DETAILS	C-11 TO C-13

ADDITIONAL SHEET INDEX

DRAWING TITLE	SHEET #
FIRE TRUCK TURNING EXHIBIT	EX-1.1
TRASH TRUCK TURNING EXHIBIT	EX-1.2
WB-67 TRUCK TURNING EXHIBIT	EX-1.3
ALTA/NSPS LAND SURVEY	1 OF 1
VAN BUREN TOWNSHIP MISC. DETAILS	MD-1
VAN BUREN TOWNSHIP SESC DETAILS	SE-1
VAN BUREN TOWNSHIP SANITARY SEWER DETAILS	SS-1 & SS-2
VAN BUREN TOWNSHIP STORM SEWER DETAILS	ST-1
VAN BUREN TOWNSHIP SIDEWALK DETAILS	SW-1
VAN BUREN TOWNSHIP WATER MAIN DETAILS	WM-1 & WM-2

ISSUE	DATE	BY	DESCRIPTION
3	03/29/2023	MG	REVISED FOR PRELIMINARY SITE PLAN APPROVAL
2	02/20/2023	MG	FOR PRELIMINARY SITE PLAN APPROVAL
1	02/16/2023	MG	FOR OWNER REVIEW

NOT APPROVED FOR CONSTRUCTION

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TYC AMERICAS
MICHIGAN MOBILITY CENTER
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PARCEL ID: 83-009-99-0005-000
44168 VAN BORN ROAD
VAN BUREN TOWNSHIP (BELLEVILLE)
WAYNE COUNTY, MICHIGAN 48111

STATE OF MICHIGAN
JONATHAN REID COOKSEY
ENGINEER
No. 6201069428
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

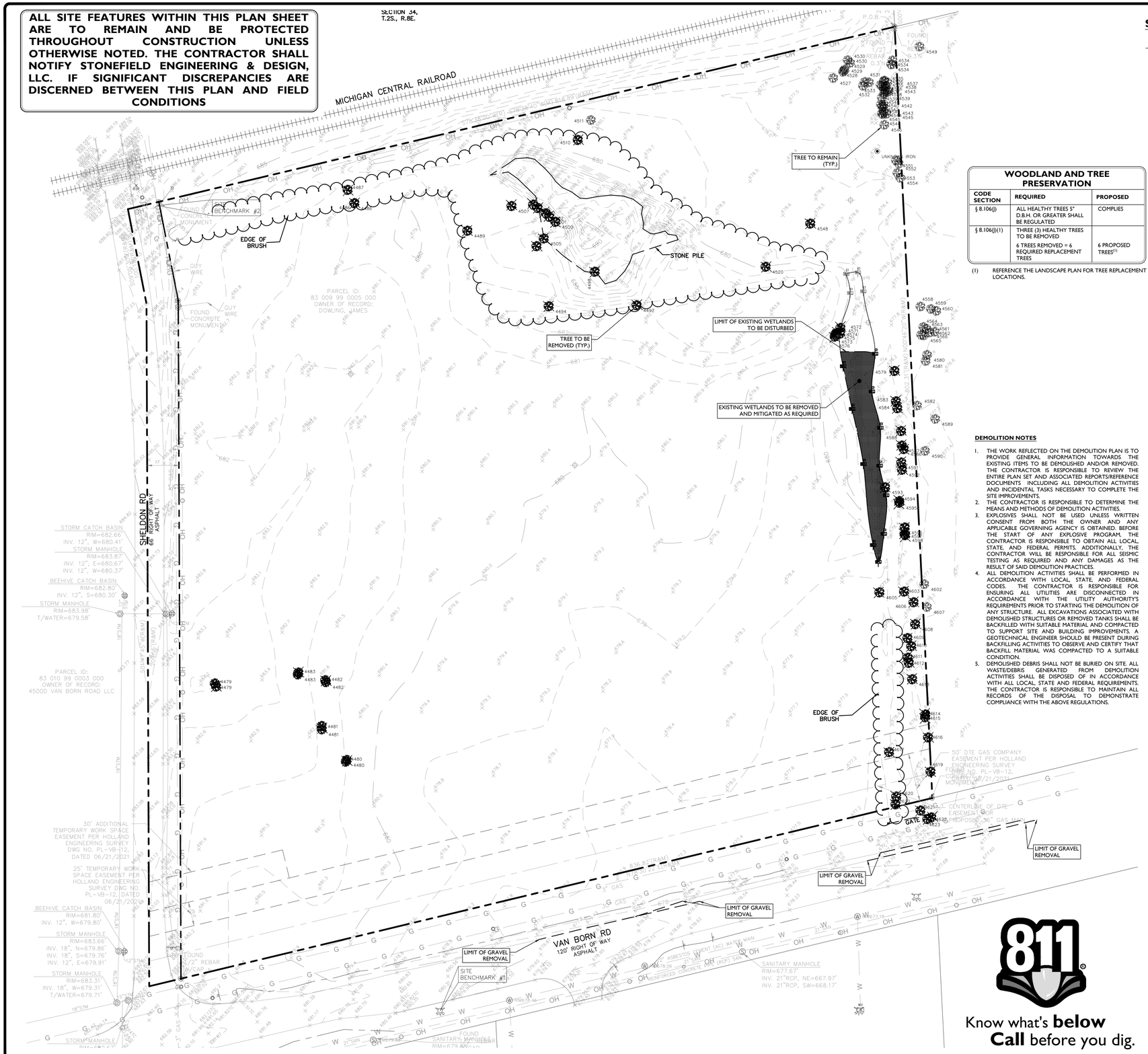
SCALE: AS SHOWN | PROJECT ID: DET-220348

TITLE: COVER SHEET

DRAWING: C-1

V:\DET\2022\DET-220348\E.E_GRAHAM & ASSOCIATES\-MIC VAN BORN ROAD & SHELDON ROAD, VAN BUREN TOWNSHIP_MICAD\DWG\DTS\DP-01-COVER.DWG

ALL SITE FEATURES WITHIN THIS PLAN SHEET ARE TO REMAIN AND BE PROTECTED THROUGHOUT CONSTRUCTION UNLESS OTHERWISE NOTED. THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. IF SIGNIFICANT DISCREPANCIES ARE DISCERNED BETWEEN THIS PLAN AND FIELD CONDITIONS



SYMBOL / DESCRIPTION

SYMBOL	DESCRIPTION
— — — — —	FEATURE TO BE REMOVED / DEMOLISHED
1000	EXISTING TREE TO REMAIN
1000	EXISTING TREE TO BE REMOVED

WOODLAND AND TREE PRESERVATION

CODE SECTION	REQUIRED	PROPOSED
§ 8.106(j)	ALL HEALTHY TREES 5" D.B.H. OR GREATER SHALL BE REGULATED	COMPLIES
§ 8.106(j)(1)	THREE (3) HEALTHY TREES TO BE REMOVED 6 TREES REMOVED = 6 REQUIRED REPLACEMENT TREES	6 PROPOSED TREES(1)

(1) REFERENCE THE LANDSCAPE PLAN FOR TREE REPLACEMENT LOCATIONS.

DEMOLITION NOTES

1. THE WORK REFLECTED ON THE DEMOLITION PLAN IS TO PROVIDE GENERAL INFORMATION TOWARDS THE EXISTING ITEMS TO BE DEMOLISHED AND/OR REMOVED. THE CONTRACTOR IS RESPONSIBLE TO REVIEW THE ENTIRE PLAN SET AND ASSOCIATED REPORTS/REFERENCE DOCUMENTS INCLUDING ALL DEMOLITION ACTIVITIES AND INCIDENTAL TASKS NECESSARY TO COMPLETE THE SITE IMPROVEMENTS.
2. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE THE MEANS AND METHODS OF DEMOLITION ACTIVITIES.
3. EXPLOSIVES SHALL NOT BE USED UNLESS WRITTEN CONSENT FROM BOTH THE OWNER AND ANY APPLICABLE GOVERNING AGENCY IS OBTAINED. BEFORE THE START OF ANY EXPLOSIVE PROGRAM, THE CONTRACTOR IS RESPONSIBLE TO OBTAIN ALL LOCAL, STATE, AND FEDERAL PERMITS. ADDITIONALLY, THE CONTRACTOR WILL BE RESPONSIBLE FOR ALL SEISMIC TESTING AS REQUIRED AND ANY DAMAGES AS THE RESULT OF SAID DEMOLITION PRACTICES.
4. ALL DEMOLITION ACTIVITIES SHALL BE PERFORMED IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL CODES. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING ALL UTILITIES ARE DISCONNECTED IN ACCORDANCE WITH THE UTILITY AUTHORITY'S REQUIREMENTS PRIOR TO STARTING THE DEMOLITION OF ANY STRUCTURE. ALL EXCAVATIONS ASSOCIATED WITH DEMOLISHED STRUCTURES OR REMOVED TANKS SHALL BE BACKFILLED WITH SUITABLE MATERIAL AND COMPACTED TO SUPPORT SITE AND BUILDING IMPROVEMENTS. A GEOTECHNICAL ENGINEER SHOULD BE PRESENT DURING BACKFILLING ACTIVITIES TO OBSERVE AND CERTIFY THAT BACKFILL MATERIAL WAS COMPACTED TO A SUITABLE CONDITION.
5. DEMOLISHED DEBRIS SHALL NOT BE BURIED ON SITE. ALL WASTE/DEBRIS GENERATED FROM DEMOLITION ACTIVITIES SHALL BE DISPOSED OF IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REQUIREMENTS. THE CONTRACTOR IS RESPONSIBLE TO MAINTAIN ALL RECORDS OF THE DISPOSAL TO DEMONSTRATE COMPLIANCE WITH THE ABOVE REGULATIONS.

Know what's **below**
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TREE INVENTORY for: Sheldon Road & Van Born Road, Northeast Corner, Van Buren Township, Michigan

Tree #	d.b.h. (inches)	Canopy Radius (feet)	Botanical Name	Common Name	Condition	Comments	(N) Not Regulated (s = size, sp = species, c = condition)	Recommendation
4479	20	20	Populus deltoides / tremuloides	Cottonwood / Aspen	good		N (sp)	To Be Removed
4480	18	18	Juglans spp.	Walnut	good			To Be Removed
4481	21	21	Populus deltoides / tremuloides	Cottonwood / Aspen	good		N (sp)	To Be Removed
4482	13	13	Juglans spp.	Walnut	good			To Be Removed
4483	16 / 2	16	Juglans spp.	Walnut	fair	- Rot in trunk		To Be Removed
4484	5	5	Fraxinus spp.	Ash	poor	- Signs of Emerald Ash Borer	N (sp, c)	To Remain
4485	5	5	Fraxinus spp.	Ash	poor	- Signs of Emerald Ash Borer	N (sp, c)	To Remain
4486	6	6	Fraxinus spp.	Ash	poor	- Signs of Emerald Ash Borer	N (sp, c)	To Be Removed
4487	6	6	Fraxinus spp.	Ash	poor	- Signs of Emerald Ash Borer	N (sp, c)	To Be Removed
4488	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4489	8	8	Populus deltoides / tremuloides	Cottonwood / Aspen	good		N (sp)	To Be Removed
4490	7	7	Populus deltoides / tremuloides	Cottonwood / Aspen	good		N (sp)	To Remain
4491	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4492	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Leaning	N (sp)	To Remain
4493	5	5	Fraxinus spp.	Ash	poor	- Signs of Emerald Ash Borer	N (sp, c)	To Remain
4494	7 / 2	7	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4495	6 / 4	6	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4496	6	6	Ulmus spp.	Elm (not Chinese or Siberian)	fair	- Contorted crown		To Remain
4497	5	5	Fraxinus spp.	Ash	poor	- Signs of Emerald Ash Borer	N (sp, c)	To Be Removed
4498	18	18	Populus deltoides / tremuloides	Cottonwood / Aspen	good		N (sp)	To Be Removed
4499	13	13	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Epicormic branching/suckers	N (sp)	To Remain
4500	8	8	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Dead branch(es)	N (sp)	To Be Removed
4501	6 / 5	6	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- "V"-shaped crotch(es)	N (sp)	To Be Removed
4502	7	7	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Dead branch(es)	N (sp)	To Be Removed
4503	7	7	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Dead branch(es)	N (sp)	To Be Removed
4504	6	6	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4505	8	8	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Dead branch(es)	N (sp)	To Be Removed
4506	6 / 6 / 3	6	Acer negundo	Boxelder	fair	- Contorted crown	N (sp)	To Remain
4507	9	9	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Contorted crown	N (sp)	To Be Removed
4508	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4509	5 / 4	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4510	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Scarred trunk	N (sp)	To Remain
4511	5 / 4 / 4	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- "V"-shaped crotch(es)	N (sp)	To Remain
4512	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	good		N (sp)	To Remain
4513	5 / 4 / ...	5	Acer saccharum	Silver Maple	fair	- "V"-shaped crotch(es)	N (sp)	To Remain
4514	10	10	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Leaning	N (sp)	To Remain
4515	8	8	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4516	5 / 2	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Contorted crown	N (sp)	To Remain
4517	6	6	Ulmus spp.	Elm (not Chinese or Siberian)	good			To Remain
4518	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4519	6 / 6	6	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- "V"-shaped crotch(es)	N (sp)	To Remain
4520	9	9	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Contorted crown	N (sp)	To Be Removed
4521	8 / 3	8	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- "V"-shaped crotch(es)	N (sp)	To Remain
4522	5 / 4 / 3 / 3 / ...	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- "V"-shaped crotch(es)	N (sp)	To Remain
4523	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4524	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4525	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Contorted crown	N (sp)	To Remain
4526	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4527	6	6	Salix alba	White Willow	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4528	6	6	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4529	6	6	Populus deltoides / tremuloides	Cottonwood / Aspen	good		N (sp)	To Remain
4530	7	7	Salix alba	White Willow	fair	- Dead branch(es)	N (sp)	To Remain
4531	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4532	6	6	Populus deltoides / tremuloides	Cottonwood / Aspen	good		N (sp)	To Remain
4533	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	good		N (sp)	To Remain
4534	32	32	Acer saccharum	Silver Maple	fair	- Grown into fence/wires	N (sp)	To Remain
4535	6 / 3 / 3	6	Acer saccharum	Silver Maple	fair	- "V"-shaped crotch(es)	N (sp)	To Remain
4536	10	10	Populus deltoides / tremuloides	Cottonwood / Aspen	good		N (sp)	To Remain
4537	6	6	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Crowded	N (sp)	To Remain
4538	11	11	Populus deltoides / tremuloides	Cottonwood / Aspen	good		N (sp)	To Remain
4539	9	9	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4540	7	—			dead		N (c)	To Remain
4541	6	6	Acer saccharum	Silver Maple	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4542	10	10	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Dead branch(es)	N (sp)	To Remain
4543	9	9	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Dead branch(es)	N (sp)	To Remain
4544	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4545	10	10	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4546	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4547	5	5	Robinia pseudoacacia	Black Locust	fair	- Dead branch(es)	N (sp)	To Remain
4548	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- "V"-shaped crotch(es)	N (sp)	To Be Removed
4549	5	5	Crataegus spp.	Hawthorn (thorned species)	fair	- Dead branch(es)		To Remain
4550	5	5	Acer negundo	Boxelder	fair	- Rot in trunk	N (sp)	To Remain
4551	5	5	Prunus serotina	Black Cherry	fair	- Rot in trunk		To Remain
4552	5 / 5 / 5 / ...	5	Crataegus spp.	Hawthorn (thorned species)	fair	- Rot in trunk		To Remain
4553	5 / 5 / ...	5	Rhamnus cathartica	Common Buckthorn	fair	- Contorted crown	N (sp)	To Remain
4554	12	12	Acer saccharum	Silver Maple	good		N (sp)	To Remain
4555	6	6	Rhamnus cathartica	Common Buckthorn	fair	- Contorted crown	N (sp)	To Remain
4556	7	7	Robinia pseudoacacia	Black Locust	fair	- Dead branch(es)	N (sp)	To Remain
4557	7	7	Robinia pseudoacacia	Black Locust	fair	- Dead branch(es)	N (sp)	To Remain
4558	7 / 4 / 4 / 3 / ...	7	Acer saccharum	Silver Maple	poor	- Larger trunk(s) dead & substa	N (s, sp, c)	To Remain
4559	32 / 22	32	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Rot in trunk	N (sp)	To Remain
4560	13	13	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4561	12	12	Populus deltoides / tremuloides	Cottonwood / Aspen	poor	- Canker(s)/gall(s) & rot throug	N (sp, c)	To Remain
4562	17 / 13	17	Populus deltoides / tremuloides	Cottonwood / Aspen	poor	- Extensive rot/hollow @ crotc	N (sp, c)	To Remain
4563	10	10	Populus deltoides / tremuloides	Cottonwood / Aspen	poor	- 50% or more dead	N (sp, c)	To Remain
4564	20	20	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Rot in trunk	N (sp)	To Remain
4565	10	5	Populus deltoides / tremuloides	Cottonwood / Aspen	poor	- 75% or more dead	N (sp, c)	To Remain
4566	26	26	Populus deltoides / tremuloides	Cottonwood / Aspen	poor	- Extensive rot & dead branche	N (sp, c)	To Remain
4567	6	6	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Crowded	N (sp)	To Remain
4568	6	6	Quercus spp.	Oak (white family)	good			To Remain
4569	6	6	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4570	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	good		N (sp)	To Be Removed
4571	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4572	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4573	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4574	6	6	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4575	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4576	6	6	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4577	8	8	Populus deltoides / tremuloides	Cottonwood / Aspen	good		N (sp)	To Remain
4578	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4579	7	7	Populus deltoides / tremuloides	Cottonwood / Aspen	good		N (sp)	To Be Removed
4580	8 / 6 / 4 / 4	8	Acer saccharum	Silver Maple	poor	- Larger trunk(s) dead & substa	N (sp, c)	To Remain
4581	30	30	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Rot in trunk	N (sp)	To Remain
4582	11	11	Quercus spp.	Oak (red family)	good			To Remain
4583	6	6	Populus deltoides / tremuloides	Cottonwood / Aspen	good		N (sp)	To Be Removed
4584	8	8	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Dead branch(es)	N (sp)	To Be Removed
4585	5	5	Salix alba	White Willow	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4586	6	6	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4587	7 / 4	7	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- "V"-shaped crotch(es)	N (sp)	To Be Removed
4588	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4589	8	8	Quercus spp.	Oak (red family)	good			To Remain
4590	6 / ...	6	Rhamnus cathartica	Common Buckthorn	poor	- Split(ting) apart	N (sp, c)	To Remain
4591	6	6	Populus deltoides / tremuloides	Cottonwood / Aspen	good		N (sp)	To Be Removed
4592	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4593	6	6	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4594	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Dead branch(es)	N (sp)	To Be Removed
4595	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Dead branch(es)	N (sp)	To Be Removed
4596	8	8	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Contorted crown	N (sp)	To Be Removed
4597	7	7	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4598	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4599	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4600	8	8	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Dead branch(es)	N (sp)	To Remain
4601	5	5	Ulmus spp.	Elm (not Chinese or Siberian)	good			To Remain
4602	17	17	Ulmus spp.	Elm (not Chinese or Siberian)	good			To Remain
4603	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Scarred trunk	N (sp)	To Be Removed
4604	6	6	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Remain
4605	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4606	7	7	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4607	8	8	Ulmus spp.	Elm (not Chinese or Siberian)	fair	- Contorted crown		To Remain
4608	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4609	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4610	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4611	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Contorted crown	N (sp)	To Be Removed
4612	8	8	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Contorted crown	N (sp)	To Be Removed
4613	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4614	9 / 5	9	Malus spp.	Apple / Crabapple	fair	- Contorted crown		To Be Removed
4615	7 / 7	7	Malus spp.	Apple / Crabapple	fair	- Contorted crown		To Be Removed
4616	5	5	Ulmus spp.	Elm (not Chinese or Siberian)	fair	- Contorted crown		To Be Removed
4617	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4618	8	8	Ulmus spp.	Elm (not Chinese or Siberian)	fair	- "V"-shaped crotch(es)		To Remain
4619	6	6	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4620	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed
4621	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Contorted crown	N (sp)	To Be Removed
4622	6	6	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Contorted crown	N (sp)	To Be Removed
4623	5	5	Populus deltoides / tremuloides	Cottonwood / Aspen	fair	- Bent/crooked/bowed leader	N (sp)	To Be Removed

50' 0' 50' 100'
GRAPHIC SCALE IN FEET
1" = 50'

ISSUE	DATE	BY	DESCRIPTION
3	03/29/2023	MG	REVISED FOR PRELIMINARY SITE PLAN APPROVAL
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NOT APPROVED FOR CONSTRUCTION

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Phone 248.247.1115

SITE DEVELOPMENT PLANS

TYC AMERICAS
MICHIGAN MOBILITY CENTER
PROPOSED LIGHT MANUFACTURING & ACCESSORY OFFICES

PARCEL ID: 83-009-99-0005-000
44168 VAN BORN ROAD
VAN BUREN TOWNSHIP (BELLEVILLE)
WAYNE COUNTY, MICHIGAN 48111

STATE OF MICHIGAN · JONATHAN REID COOKSEY · ENGINEER · No. 61409428 · LICENSED PROFESSIONAL ENGINEER

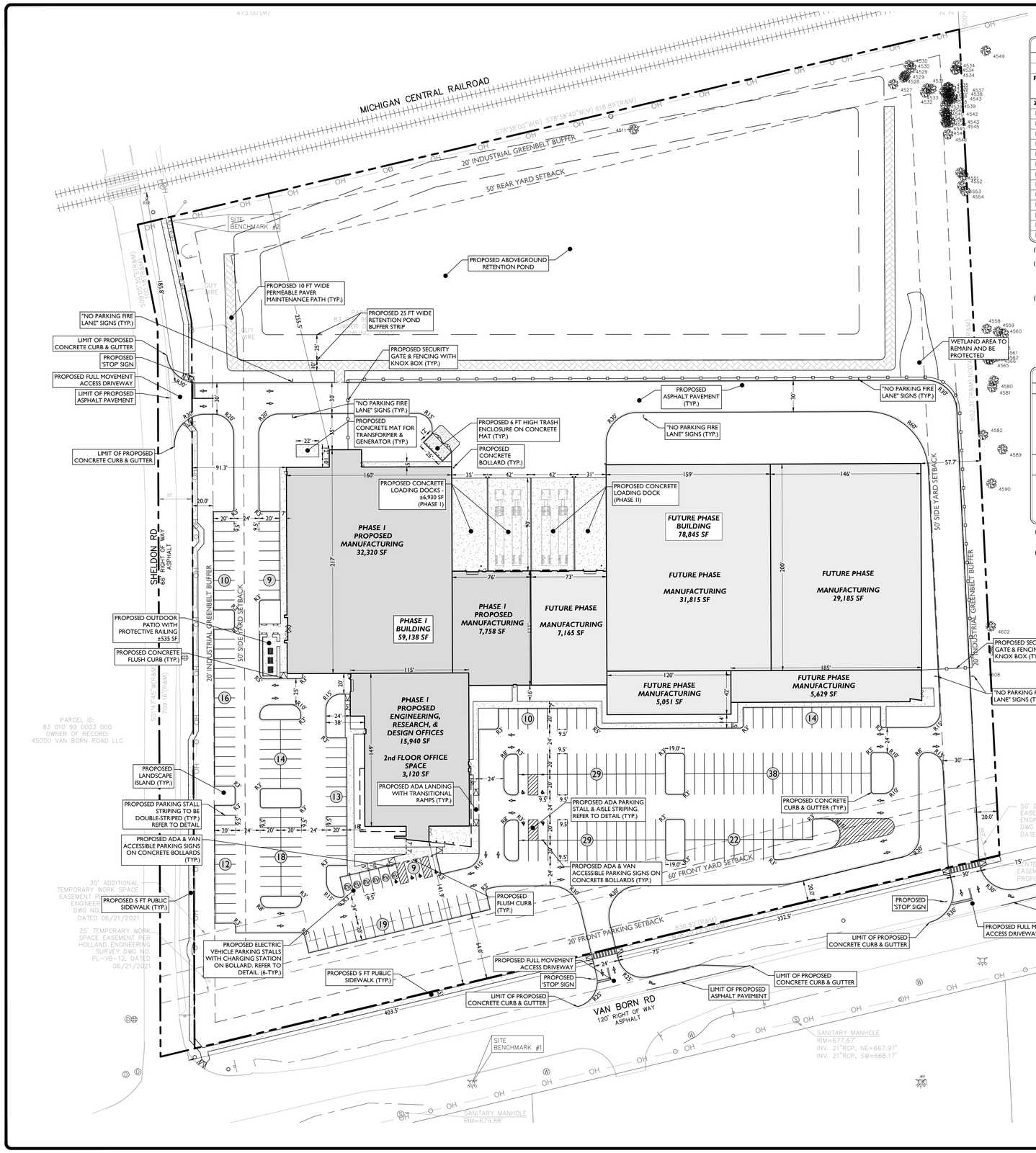
STONEFIELD engineering & design

SCALE: 1" = 50' | PROJECT ID: DET-220348

TITLE: **DEMOLITION PLAN**

DRAWING: **C-2**

V:\DET\2022\DET-220348\E-E_GRAHAM & ASSOCIATES-MEC VAN BORN ROAD & SHELDON ROAD, VAN BUREN TOWNSHIP, MI\CAD\PLOT\DEMO.DWG



LAND USE AND ZONING

PARCEL ID: 83-009-99-0005-000

GENERAL INDUSTRIAL DISTRICT (M-2)

PROPOSED USE

LIGHT MANUFACTURING & ACCESSORY OFFICES — PERMITTED USE

ZONING REQUIREMENT	REQUIRED	PROPOSED
MINIMUM LOT AREA	N/A	14.24 AC(*) (620,149 SF)
MINIMUM LOT WIDTH	N/A	836.82 FT
MINIMUM LOT DEPTH	N/A	802.31 FT
MAXIMUM BUILDING COVERAGE	35% (217,052 SF)	22.2% (137,983 SF)
MAXIMUM BUILDING HEIGHT(1)	40 FT (4 STORIES)	29.0 FT
MINIMUM FRONT YARD SETBACK	60 FT	141.9 FT
MINIMUM SIDE YARD SETBACK (ONE)	50 FT	57.7 FT
MINIMUM SIDE YARD SETBACK (BOTH)	100 FT	149.0 FT
MINIMUM REAR YARD SETBACK	50 FT	255.5 FT
FRONT YARD PARKING SETBACK	20 FT	20.0 FT
INDUSTRIAL GREENBELT BUFFER (2)	20 FT	20.0 FT
DRIVEWAY SPACING	300 FT	332.5 FT
INTERSECTION SPACING	250 FT	403.5 FT

(*) EXCLUDES RIGHT-OF-WAY.

(1) §4.102(5): BUILDINGS OF GREATER THAN THE MAXIMUM HEIGHT ALLOWED MAY BE ALLOWED IN THE M-2 DISTRICT PROVIDED FRONT, SIDE AND REAR YARDS ARE INCREASED BY ONE (1) FOOT FOR EACH ADDITIONAL FOOT OF BUILDING HEIGHT THAT EXCEEDS THE MAXIMUM HEIGHT ALLOWED.

(2) §10.103.E.b : 20 FT WIDE BUFFER, WITH ONE TREE PER 20 FT OR A 6 FT MASONRY WALL

OFF-STREET PARKING REQUIREMENTS

CODE SECTION	REQUIRED	PROPOSED
§ 9.102(E)(1)	LIGHT MANUFACTURING & ACCESSORY OFFICES:	262 SPACES
	5 SPACES, PLUS 1 SPACE PER 550 SF	
	OR 1 SPACE PER EMPLOYEE	
PHASE 1	(59,138 SF)(1 SPACE / 550 SF) = 108 SPACES	
FUTURE PHASE	(78,845 SF)(1 SPACE / 550 SF) = 144 SPACES	
	TOTAL : 5 + 108 + 144 = **257 SPACES**	
§ 9.104(B)	90° PARKING: (2)	9.5 FT X 20 FT
	9.5 FT x 20 FT WITH 24 FT AISLE	W/ 24 FT AISLE
§ 9.105	OFF-STREET LOADING (COMMERCIAL):	PHASE 1
	10 FT X 50 FT LOADING AREA	6,930 SF (77 FT X 90 FT)
	OVER 50,000 SF: 3 LOADING SPACES + 1 SPACE FOR EACH 50,000 SF IN EXCESS OF 50,000 SF	PHASE 2 6,570 SF (73 FT X 90 FT)
	137,983 SF = 5 LOADING AREAS (2,500 SF LOADING)	

(1) § 9.101(Q): WHEN DETERMINING THE REQUIRED NUMBER OF PARKING SPACES, ANY FRACTION UP TO AND INCLUDING 1/2 SHALL BE DISREGARDED

(2) § 9.104(B)(E): STALL DEPTH CAN BE REDUCED BY 2 FT WHERE PARKING ABUTS AN 8 FT SIDEWALK OR SODDED AREA

SYMBOL	DESCRIPTION
	PROPERTY LINE
	SETBACK LINE
	PROPOSED CURB & GUTTER
	PROPOSED FLUSH CURB
	PROPOSED SIGNS / BOLLARDS
	PROPOSED BUILDING
	PROPOSED CONCRETE
	PROPOSED SECURITY GATE & FENCING
	PROPOSED BUILDING DOORS
EV	PROPOSED ELECTRIC VEHICLE PARKING
	PROPOSED ELECTRIC CHARGING STATION

GENERAL NOTES

1. THE CONTRACTOR SHALL VERIFY AND FAMILIARIZE THEMSELVES WITH THE EXISTING SITE CONDITIONS AND THE PROPOSED SCOPE OF WORK (INCLUDING DIMENSIONS, LAYOUT, ETC.) PRIOR TO INITIATING THE IMPROVEMENTS IDENTIFIED WITHIN THESE DOCUMENTS. SHOULD ANY DISCREPANCY BE FOUND BETWEEN THE EXISTING SITE CONDITIONS AND THE PROPOSED WORK THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. PRIOR TO THE START OF CONSTRUCTION.
2. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND ENSURE THAT ALL REQUIRED APPROVALS HAVE BEEN OBTAINED PRIOR TO THE START OF CONSTRUCTION. COPIES OF ALL REQUIRED PERMITS AND APPROVALS SHALL BE KEPT ON SITE AT ALL TIMES DURING CONSTRUCTION.
3. ALL CONTRACTORS WILL, TO THE FULLEST EXTENT PERMITTED BY LAW, INDEMNIFY AND HOLD HARMLESS STONEFIELD ENGINEERING & DESIGN, LLC. AND IT'S SUB-CONSULTANTS FROM AND AGAINST ANY DAMAGES AND LIABILITIES INCLUDING ATTORNEY'S FEES ARISING OUT OF CLAIMS BY EMPLOYEES OF THE CONTRACTOR IN ADDITION TO CLAIMS CONNECTED TO THE PROJECT AS A RESULT OF NOT CARRYING THE PROPER INSURANCE FOR WORKERS COMPENSATION, LIABILITY INSURANCE, AND LIMITS OF COMMERCIAL GENERAL LIABILITY INSURANCE.
4. THE CONTRACTOR SHALL NOT DEVIATE FROM THE PROPOSED IMPROVEMENTS IDENTIFIED WITHIN THIS PLAN SET UNLESS APPROVAL IS PROVIDED IN WRITING BY STONEFIELD ENGINEERING & DESIGN, LLC.
5. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE THE MEANS AND METHODS OF CONSTRUCTION.
6. THE CONTRACTOR SHALL NOT PERFORM ANY WORK OR CAUSE DISTURBANCE ON A PRIVATE PROPERTY NOT CONTROLLED BY THE PERSON OR ENTITY WHO HAS AUTHORIZED THE WORK WITHOUT PRIOR WRITTEN CONSENT FROM THE OWNER OF THE PRIVATE PROPERTY.
7. THE CONTRACTOR IS RESPONSIBLE TO RESTORE ANY DAMAGED OR UNDERMINED STRUCTURE OR SITE FEATURE THAT IS IDENTIFIED TO REMAIN ON THE PLAN SET. ALL REPAIRS SHALL USE NEW MATERIALS TO RESTORE THE FEATURE TO ITS EXISTING CONDITION AT THE CONTRACTORS EXPENSE.
8. CONTRACTOR IS RESPONSIBLE TO PROVIDE THE APPROPRIATE SHOP DRAWINGS, PRODUCT DATA, AND OTHER REQUIRED SUBMITTALS FOR REVIEW. STONEFIELD ENGINEERING & DESIGN, LLC. WILL REVIEW THE SUBMITTALS IN ACCORDANCE WITH THE DESIGN INTENT AS REFLECTED WITHIN THE PLAN SET.
9. THE CONTRACTOR IS RESPONSIBLE FOR TRAFFIC CONTROL IN ACCORDANCE WITH MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION.
10. THE CONTRACTOR IS REQUIRED TO PERFORM ALL WORK IN THE PUBLIC RIGHT-OF-WAY IN ACCORDANCE WITH THE APPROPRIATE GOVERNING AUTHORITY AND SHALL BE RESPONSIBLE FOR THE PROCUREMENT OF STREET OPENING PERMITS.
11. THE CONTRACTOR IS REQUIRED TO RETAIN AN OSHA CERTIFIED SAFETY INSPECTOR TO BE PRESENT ON SITE AT ALL TIMES DURING CONSTRUCTION & DEMOLITION ACTIVITIES.
12. SHOULD AN EMPLOYEE OF STONEFIELD ENGINEERING & DESIGN, LLC. BE PRESENT ON SITE AT ANY TIME DURING CONSTRUCTION, IT DOES NOT RELIEVE THE CONTRACTOR OF ANY OF THE RESPONSIBILITIES AND REQUIREMENTS LISTED IN THE NOTES WITHIN THIS PLAN SET.

50' 0' 50' 100'

GRAPHIC SCALE IN FEET
1" = 50'

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SITE DEVELOPMENT PLANS

TYC AMERICAS
MICHIGAN MOBILITY CENTER

PROPOSED LIGHT MANUFACTURING & ACCESSORY OFFICES

PARCEL ID: 83-009-99-0005-000
44168 VAN BORN ROAD
VAN BUREN TOWNSHIP, (BELLEVILLE)
WAYNE COUNTY, MICHIGAN 48111

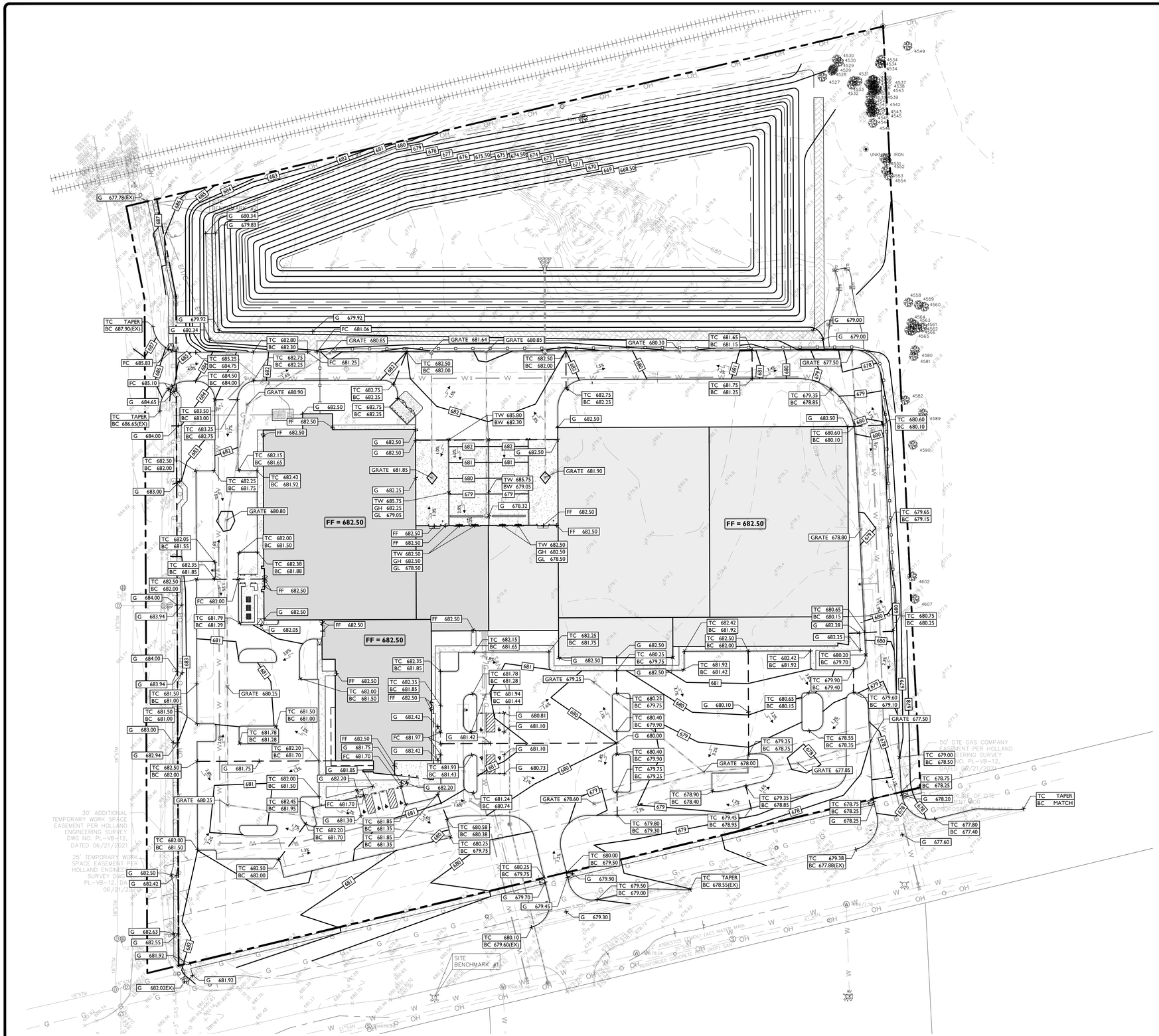
STATE OF MICHIGAN — JONATHAN RED COOKSEY — ENGINEER — No. 6201046428 — LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: 1" = 50' | PROJECT ID: DET-220348

TITLE: SITE PLAN

DRAWING: **C-3**



SYMBOL / DESCRIPTION

SYMBOL	DESCRIPTION
	PROPERTY LINE
100	PROPOSED GRADING CONTOUR
RIDGELINE	PROPOSED GRADING RIDGELINE
	PROPOSED DIRECTION OF DRAINAGE FLOW
G 100.00	PROPOSED GRADE SPOT SHOT
TC 100.50 / BC 100.00	PROPOSED TOP OF CURB / BOTTOM OF CURB SPOT SHOT
FC 100.00	PROPOSED FLUSH CURB SPOT SHOT
DC 100.12 / BC 100.00	PROPOSED DEPRESSED CURB / BOTTOM OF CURB SPOT SHOT
TW 102.00 / BW 100.00	PROPOSED TOP OF WALL / BOTTOM OF WALL SPOT SHOT

GRADING NOTES

1. ALL SOIL AND MATERIAL REMOVED FROM THE SITE SHALL BE DISPOSED OF IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REQUIREMENTS. ANY GROUNDWATER DE-WATERING PRACTICES SHALL BE PERFORMED UNDER THE SUPERVISION OF A QUALIFIED PROFESSIONAL. THE CONTRACTOR IS REQUIRED TO OBTAIN ALL NECESSARY PERMITS FOR THE DISCHARGE OF DE-WATERED GROUNDWATER. ALL SOIL IMPORTED TO THE SITE SHALL BE CERTIFIED CLEAN FILL. CONTRACTOR SHALL MAINTAIN RECORDS OF ALL FILL MATERIALS BROUGHT TO THE SITE.
2. THE CONTRACTOR IS REQUIRED TO PROVIDE TEMPORARY AND/OR PERMANENT SHORING WHERE REQUIRED DURING EXCAVATION ACTIVITIES, INCLUDING BUT NOT LIMITED TO UTILITY TRENCHES, TO ENSURE THE STRUCTURAL INTEGRITY OF NEARBY STRUCTURES AND STABILITY OF THE SURROUNDING SOILS.
3. PROPOSED TOP OF CURB ELEVATIONS ARE GENERALLY 4 INCHES TO 7 INCHES ABOVE EXISTING GRADES UNLESS OTHERWISE NOTED. THE CONTRACTOR WILL SUPPLY ALL STAKEOUT CURB GRADE SHEETS TO STONEFIELD ENGINEERING & DESIGN, LLC FOR REVIEW AND APPROVAL PRIOR TO POURING CURBS.
4. THE CONTRACTOR IS RESPONSIBLE TO SET ALL PROPOSED UTILITY COVERS AND RESET ALL EXISTING UTILITY COVERS WITHIN THE PROJECT LIMITS TO PROPOSED GRADE IN ACCORDANCE WITH ANY APPLICABLE MUNICIPAL, COUNTY, STATE AND/OR UTILITY AUTHORITY REGULATIONS.
5. MINIMUM SLOPE REQUIREMENTS TO PREVENT PONDING SHALL BE AS FOLLOWS:
   - CURB GUTTER: 0.50%
   - CONCRETE SURFACES: 1.00%
   - ASPHALT SURFACES: 1.00%
6. A MINIMUM SLOPE OF 1.00% SHALL BE PROVIDED AWAY FROM ALL BUILDINGS. THE CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE FROM THE BUILDING IS ACHIEVED AND SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. IF THIS CONDITION CANNOT BE MET.
7. FOR PROJECTS WHERE BASEMENTS ARE PROPOSED, THE DEVELOPER IS RESPONSIBLE TO DETERMINE THE DEPTH TO GROUNDWATER AT THE LOCATION OF THE PROPOSED STRUCTURE. IF GROUNDWATER IS ENCOUNTERED WITHIN THE BASEMENT AREA, SPECIAL CONSTRUCTION METHODS SHALL BE UTILIZED AND REVIEWED/APPROVED BY THE CONSTRUCTION CODE OFFICIAL. IF SUMP PUMPS ARE UTILIZED, ALL DISCHARGES SHALL BE CONNECTED DIRECTLY TO THE PUBLIC STORM SEWER SYSTEM WITH APPROVAL FROM THE GOVERNING STORM SEWER SYSTEM AUTHORITY.

ADA NOTES

1. THE CONTRACTOR SHALL MAINTAIN A MAXIMUM 2.00% SLOPE IN ANY DIRECTION WITHIN THE ADA PARKING SPACES AND ACCESS AISLES.
2. THE CONTRACTOR SHALL PROVIDE COMPLIANT SIGNAGE AT ALL ADA PARKING AREAS IN ACCORDANCE WITH STATE GUIDELINES.
3. THE CONTRACTOR SHALL MAINTAIN A MAXIMUM 5.00% RUNNING SLOPE AND A MAXIMUM OF 2.00% CROSS SLOPE ALONG WALKWAYS WITHIN THE ACCESSIBLE PATH OF TRAVEL (SEE THE SITE PLAN FOR THE LOCATION OF THE ACCESSIBLE PATH). THE CONTRACTOR IS RESPONSIBLE TO ENSURE THE ACCESSIBLE PATH OF TRAVEL IS 36 INCHES WIDE OR GREATER UNLESS INDICATED OTHERWISE WITHIN THE PLAN SET.
4. THE CONTRACTOR SHALL MAINTAIN A MAXIMUM 2.00% SLOPE IN ANY DIRECTION AT ALL LANDINGS. LANDINGS INCLUDE, BUT ARE NOT LIMITED TO, THE TOP AND BOTTOM OF AN ACCESSIBLE RAMP, AT ACCESSIBLE BUILDING ENTRANCES, AT AN AREA IN FRONT OF A WALK-UP ATM, AND AT TURNING SPACES ALONG THE ACCESSIBLE PATH OF TRAVEL. THE LANDING AREA SHALL HAVE A MINIMUM CLEAR AREA OF 60 INCHES BY 60 INCHES UNLESS INDICATED OTHERWISE WITHIN THE PLAN SET.
5. THE CONTRACTOR SHALL MAINTAIN A MAXIMUM 8.33% RUNNING SLOPE AND A MAXIMUM 2.00% CROSS SLOPE ON ANY CURB RAMPS ALONG THE ACCESSIBLE PATH OF TRAVEL. WHERE PROVIDED, CURB RAMP FLARES SHALL NOT HAVE A SLOPE GREATER THAN 10.00% IF A LANDING AREA IS PROVIDED AT THE TOP OF THE RAMP. FOR ALTERATIONS, A CURB RAMP FLARES SHALL NOT HAVE A SLOPE GREATER THAN 8.33% IF A LANDING AREA IS NOT PROVIDED AT THE TOP OF THE RAMP. CURBS RAMPS SHALL NOT RISE MORE THAN 6 INCHES IN ELEVATION WITHOUT A HANDRAIL. THE CLEAR WIDTH OF A CURB RAMP SHALL BE NO LESS THAN 36 INCHES WIDE.
6. ACCESSIBLE RAMPS WITH A RISE GREATER THAN 6 INCHES SHALL CONTAIN COMPLIANT HANDRAILS ON BOTH SIDES OF THE RAMP AND SHALL NOT RISE MORE THAN 30" IN ELEVATION WITHOUT A LANDING AREA IN BETWEEN RAMP RUNS. LANDING AREAS SHALL ALSO BE PROVIDED AT THE TOP AND BOTTOM OF THE RAMP.
7. A SLIP RESISTANT SURFACE SHALL BE CONSTRUCTED ALONG THE ACCESSIBLE PATH AND WITHIN ADA PARKING AREAS.
8. THE CONTRACTOR SHALL ENSURE A MAXIMUM OF ¼ INCHES VERTICAL CHANGE IN LEVEL ALONG THE ACCESSIBLE PATH. WHERE A CHANGE IN LEVEL BETWEEN ¼ INCHES AND ½ INCHES EXISTS, CONTRACTOR SHALL ENSURE THAT THE TOP ¼ INCH CHANGE IN LEVEL IS BEVELED WITH A SLOPE NOT STEEPER THAN 1 UNIT VERTICAL AND 2 UNITS HORIZONTAL (2:1 SLOPE).
9. THE CONTRACTOR SHALL ENSURE THAT ANY OPENINGS (GAPS OR HORIZONTAL SEPARATION) ALONG THE ACCESSIBLE PATH SHALL NOT ALLOW PASSAGE OF A SPHERE GREATER THAN ½ INCH.

50' 0' 50' 100'
GRAPHIC SCALE IN FEET
1" = 50'

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WAYNE COUNTY, MICHIGAN 48111

STATE OF MICHIGAN
JONATHAN REID COOKSEY
ENGINEER
No. 69428
MICHIGAN LICENSE NO. 69428
LICENSED PROFESSIONAL ENGINEER

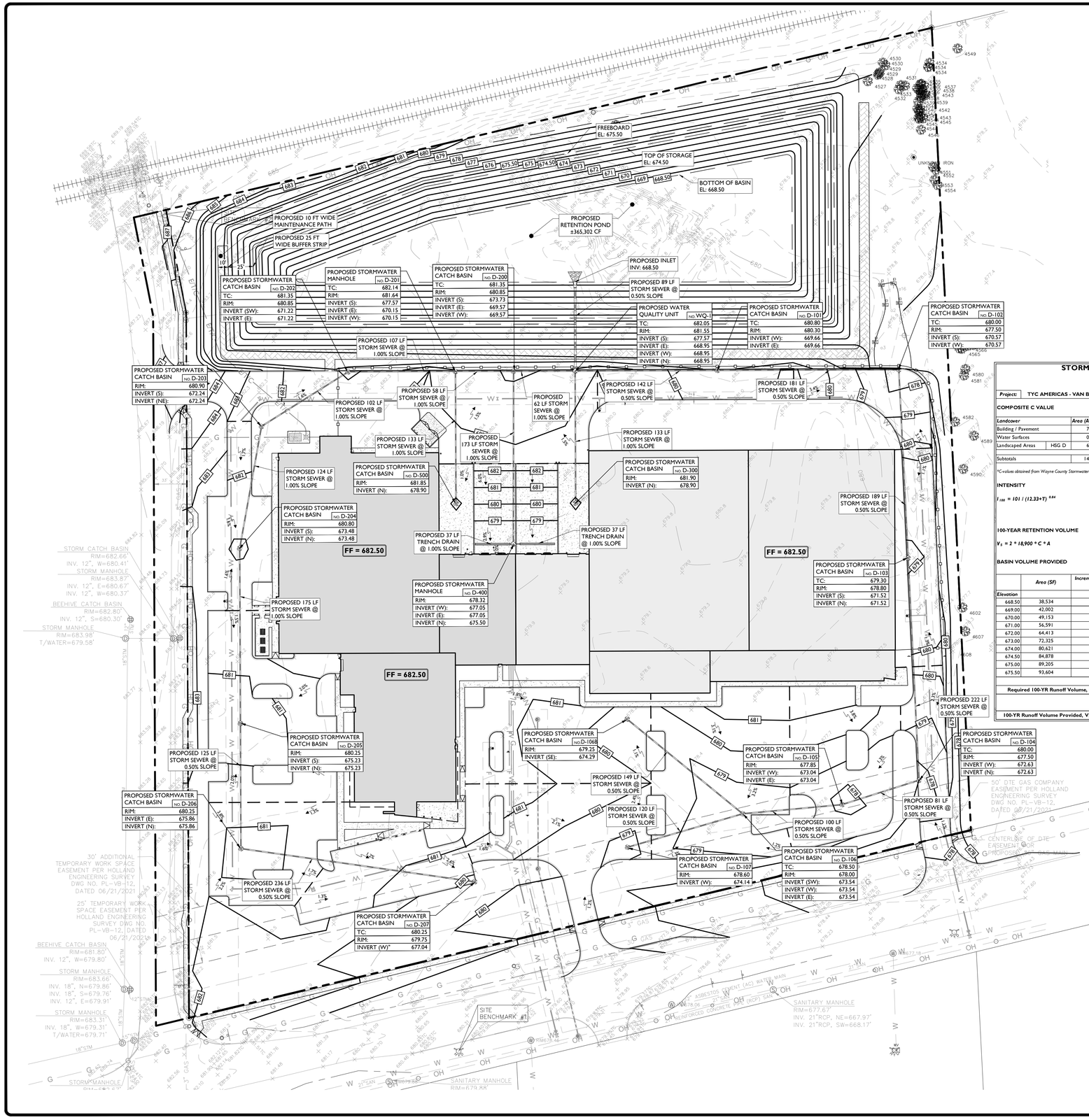
STONEFIELD engineering & design

SCALE: 1" = 50'
PROJECT ID: DET-220348

TITLE:
GRADING PLAN

DRAWING:
C-4

V:\DET\2022\DET-220348 E. GRAHAM & ASSOCIATES MEC VAN BORN ROAD & SHELLDON ROAD, VAN BUREN TOWNSHIP, MI\CADD\PLOT\DP-04-GRAD.DWG



SYMBOL / DESCRIPTION

SYMBOL	DESCRIPTION
	PROPERTY LINE
100	PROPOSED GRADING CONTOUR
RIDGELINE	PROPOSED GRADING RIDGELINE
	PROPOSED STORMWATER STRUCTURES
	PROPOSED STORMWATER PIPING
	PROPOSED TRENCH DRAIN

STORMWATER MANAGEMENT CALCULATIONS

(Based on Wayne County Stormwater Management Regulations)

Project: TYC AMERICAS - VAN BUREN TWP. **Designer:** MG **Date:** 03/29/23

COMPOSITE C VALUE

Landcover		Area (AC)	Area (SF)		C-Value*		Weighted Value
Building / Pavement		7.41	322,591	x	0.95	=	306,461
Water Surfaces		0.00	0	x	1.00	=	0
Landscaped Areas	HSG D	6.83	297,557	x	0.30	=	89,267
Subtotals		14.24	620,148				395,729

C-values obtained from Wayne County Stormwater Standards Manual

Composite C Value, C: 0.64

INTENSITY

$I_{100} = 101 / (12.33+T)^{0.84}$

I_{100c}: 7.43 *IN/HR*

T: 10.0 *MINS*

100-YEAR RETENTION VOLUME

$V_R = 2 * 18{,}900 * C * A$

100-YR Runoff Volume, V_C: 344,412.77 *CF*

BASIN VOLUME PROVIDED

Elevation	Area (SF)	Incremental Volumes (CF)	Total Volume (CF)	
668.50	38,534	0	0	Bottom of Basin
669.00	42,002	20,134	20,134	
670.00	49,153	45,578	65,712	
671.00	56,591	52,872	118,584	
672.00	64,413	60,502	179,086	
673.00	72,325	68,369	247,455	
674.00	80,621	76,473	323,928	
674.50	84,878	41,375	365,302	Top of Storage
675.00	89,205	43,521	408,823	
675.50	93,604	45,702	454,525	Freeboard Elevation

Required 100-YR Runoff Volume, V_C: 344,413 *CF*

Required Volume Elevation: 674.25 *FT*

100-YR Runoff Volume Provided, V_{100}: 365,302 *CF*

DRAINAGE AND UTILITY NOTES

1. THE CONTRACTOR TO PERFORM A TEST PIT PRIOR TO CONSTRUCTION (RECOMMEND 30 DAYS PRIOR) AT LOCATIONS OF EXISTING UTILITY CROSSINGS FOR STORMWATER IMPROVEMENTS. SHOULD A CONFLICT EXIST, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. IN WRITING.
2. CONTRACTOR SHALL START CONSTRUCTION OF STORM LINES AT THE LOWEST INVERT AND WORK UP-GRADIENT.
3. THE CONTRACTOR IS REQUIRED TO CALL THE APPROPRIATE AUTHORITY FOR NOTICE OF CONSTRUCTION/EXCAVATION AND UTILITY MARK OUT PRIOR TO THE START OF CONSTRUCTION IN ACCORDANCE WITH STATE LAW. CONTRACTOR IS REQUIRED TO CONFIRM THE HORIZONTAL AND VERTICAL LOCATION OF UTILITIES IN THE FIELD. SHOULD A DISCREPANCY EXIST BETWEEN THE FIELD LOCATION OF A UTILITY AND THE LOCATION SHOWN ON THE PLAN SET OR SURVEY, THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. IMMEDIATELY IN WRITING.
4. THE CONTRACTOR IS RESPONSIBLE TO MAINTAIN A RECORD OF THE AS-BUILT LOCATIONS OF ALL PROPOSED UNDERGROUND INFRASTRUCTURE. THE CONTRACTOR SHALL NOTE ANY DISCREPANCIES BETWEEN THE AS-BUILT LOCATIONS AND THE LOCATIONS DEPICTED WITHIN THE PLAN SET. THIS RECORD SHALL BE PROVIDED TO THE OWNER FOLLOWING COMPLETION OF WORK.

EXCAVATION, SOIL PREPARATION, AND DEWATERING NOTES

1. THE CONTRACTOR IS REQUIRED TO REVIEW THE REFERENCED GEOTECHNICAL DOCUMENTS PRIOR TO CONSTRUCTION. THESE DOCUMENTS SHALL BE CONSIDERED A PART OF THE PLAN SET.
2. THE CONTRACTOR IS REQUIRED TO PREPARE SUBGRADE SOILS BENEATH ALL PROPOSED IMPROVEMENTS AND BACKFILL ALL EXCAVATIONS IN ACCORDANCE WITH RECOMMENDATIONS BY THE GEOTECHNICAL ENGINEER OF RECORD.
3. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING SHORING FOR ALL EXCAVATIONS AS REQUIRED. CONTRACTOR SHALL HAVE THE SHORING DESIGN PREPARED BY A QUALIFIED PROFESSIONAL. SHORING DESIGNS SHALL BE SUBMITTED TO STONEFIELD ENGINEERING & DESIGN, LLC. AND THE OWNER PRIOR TO THE START OF CONSTRUCTION.
4. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ALL OPEN EXCAVATIONS ARE PERFORMED AND PROTECTED IN ACCORDANCE WITH THE LATEST OSHA REGULATIONS.
5. THE CONTRACTOR IS RESPONSIBLE FOR ANY DEWATERING DESIGN AND OPERATIONS, AS REQUIRED, TO CONSTRUCT THE PROPOSED IMPROVEMENTS. THE CONTRACTOR SHALL OBTAIN ANY REQUIRED PERMITS FOR DEWATERING OPERATIONS AND GROUNDWATER DISPOSAL.

STORMWATER INFILTRATION BMP CONSTRUCTION NOTES

1. PRIOR TO THE START OF CONSTRUCTION, ANY AREA DESIGNATED TO BE USED FOR AN INFILTRATION BMP (E.G. BASIN, BIORETENTION AREA, ETC.) SHALL BE FENCED OFF AND SHALL NOT BE UTILIZED AS STORAGE FOR CONSTRUCTION EQUIPMENT OR AS A STOCKPILE AREA FOR CONSTRUCTION MATERIALS. NO ACTIVITY SHALL BE PERMITTED WITHIN THE INFILTRATION BASIN AREA UNLESS RELATED TO THE CONSTRUCTION OF THE INFILTRATION BASIN. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY ALL SUBCONTRACTORS OF BASIN AREA RESTRICTIONS.
2. THE CONTRACTOR SHALL MAKE EVERY EFFORT, WHERE PRACTICAL, TO AVOID SUBGRADE SOIL COMPACTION IN THE AREAS DESIGNATED TO BE USED FOR AN INFILTRATION BMP.
3. ALL EXCAVATION WITHIN THE LIMITS OF ANY INFILTRATION BMP SHALL BE PERFORMED WITH THE LIGHTEST PRACTICAL EXCAVATION EQUIPMENT. ALL EXCAVATION EQUIPMENT SHALL BE PLACED OUTSIDE THE LIMITS OF THE BASIN WHERE FEASIBLE. THE USE OF LIGHT-WEIGHT, RUBBER-TIRED EQUIPMENT (LESS THAN 8 PSI APPLIED TO THE GROUND SURFACE) IS RECOMMENDED WITHIN THE BASIN LIMITS.
4. THE SEQUENCE OF SITE CONSTRUCTION SHALL BE COORDINATED WITH BASIN CONSTRUCTION TO ADHERE TO SEQUENCING LIMITATIONS.
5. DURING THE FINAL GRADING OF AN INFILTRATION BASIN, THE BOTTOM OF THE BASIN SHALL BE DEEPLY TILLED WITH A ROTARY TILLER OR DISC HARROW AND THEN SMOOTHED OUT WITH A LEVELING DRAW OR EQUIVALENT GRADING EQUIPMENT. ALL GRADING EQUIPMENT SHALL BE LOCATED OUTSIDE OF THE BASIN BOTTOM WHERE FEASIBLE.
6. FOLLOWING CONSTRUCTION OF AN INFILTRATION BASIN, SOIL INFILTRATION TESTING BY A LICENSED GEOTECHNICAL ENGINEER IS REQUIRED TO CERTIFY COMPLIANCE WITH THE DESIGN INFILTRATION RATES IN ACCORDANCE WITH APPENDIX E OF THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION'S BEST MANAGEMENT PRACTICES MANUAL, LATEST EDITION. IF THE FIELD INFILTRATION RATES ARE LOWER THAN THE RATE USED DURING DESIGN, THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. IN WRITING IMMEDIATELY TO DETERMINE THE APPROPRIATE COURSE OF ACTION.
7. THE CONTRACTOR SHALL NOTIFY THE MUNICIPALITY TO DETERMINE IF WITNESS TESTING IS REQUIRED DURING INFILTRATION BASIN EXCAVATION AND/OR SOIL INFILTRATION TESTING.

STORMWATER UNDERGROUND BMP CONSTRUCTION NOTES

1. THE CONTRACTOR SHALL INSTALL AND BACKFILL THE UNDERGROUND BMP IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
2. UNDERGROUND BASINS SHALL UTILIZE A STONE BACKFILL WITH A MINIMUM VOID RATIO OF 40%.
3. NO CONSTRUCTION LOADING OVER UNDERGROUND BASINS IS PERMITTED UNTIL BACKFILL IS COMPLETE PER THE MANUFACTURER'S SPECIFICATIONS. NO VEHICLES SHALL BE STAGED OR OPERATE FROM A FIXED POSITION OVER THE BASIN.

50' 0' 50' 100'

GRAPHIC SCALE IN FEET
1" = 50'

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2	02/20/2023	MG	FOR PRELIMINARY SITE PLAN APPROVAL
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www.stonefieldeng.com
607 Shelby Suite 200, Detroit, MI 48226
Phone 248.247.1115

SITE DEVELOPMENT PLANS

TYC AMERICAS
MICHIGAN MOBILITY CENTER

PROPOSED LIGHT MANUFACTURING & ACCESSORY OFFICES

PARCEL ID: 82-009-99-0005-000
44165 VAN BORN ROAD
VAN BUREN TOWNSHIP, (BELLEVILLE)
WAYNE COUNTY, MICHIGAN 48111

STATE OF MICHIGAN · JONATHAN REED COOKSEY · ENGINEER · No. 6201069428 · LICENSED PROFESSIONAL ENGINEER

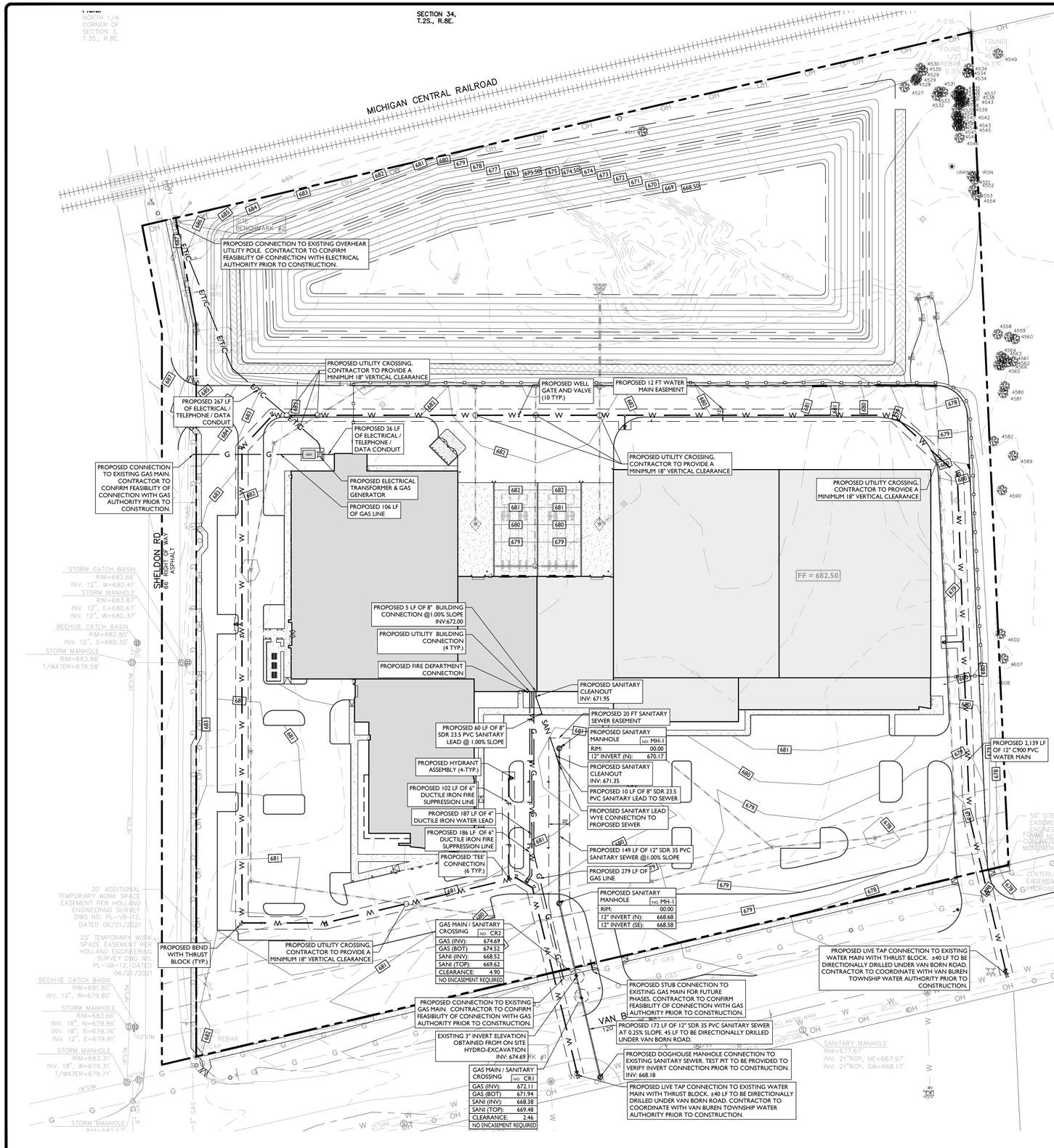
STONEFIELD engineering & design

SCALE: 1" = 50' PROJECT ID: DET-220348

TITLE: STORMWATER MANAGEMENT PLAN

DRAWING: C-5

I:\DET\2022\DET-220348 EL GRAHAM & ASSOCIATES-MEC VAN BORN ROAD & SHELDON ROAD, VAN BUREN TOWNSHIP, MI\CADD\PLOT\DGN\C-05-STMWTR.DWG



SYMBOL	DESCRIPTION
	PROPERTY LINE
SAN	PROPOSED SANITARY LATERAL
W	PROPOSED DOMESTIC WATER SERVICE
E/T/C	PROPOSED ELECTRICAL/DATA CONDUITS
G	PROPOSED GAS LINE
	PROPOSED VALVE
	PROPOSED WATER TEE / BEND
	PROPOSED FIRE HYDRANT
	PROPOSED FIRE DIRECT CONNECTION (FDC)
S	PROPOSED SANITARY MANHOLE / CLEANOUT
T	PROPOSED TRANSFORMER WITH BOLLARDS

DRAINAGE AND UTILITY NOTES

1. THE CONTRACTOR IS REQUIRED TO CALL THE APPROPRIATE AUTHORITY FOR NOTICE OF CONSTRUCTION/EXCAVATION AND UTILITY MARK OUT PRIOR TO THE START OF CONSTRUCTION IN ACCORDANCE WITH STATE LAW. CONTRACTOR IS REQUIRED TO CONFIRM THE HORIZONTAL AND VERTICAL LOCATION OF UTILITIES IN THE FIELD. SHOULD A DISCREPANCY EXIST BETWEEN THE FIELD LOCATION OF A UTILITY AND THE LOCATION SHOWN ON THE PLAN SET OR SURVEY, THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. IMMEDIATELY IN WRITING.
2. THE CONTRACTOR IS RESPONSIBLE TO PROTECT AND MAINTAIN IN OPERATION ALL UTILITIES NOT DESIGNATED TO BE REMOVED.
3. THE CONTRACTOR IS RESPONSIBLE FOR REPAIRING ANY DAMAGE TO ANY EXISTING UTILITY IDENTIFIED TO REMAIN WITHIN THE LIMITS OF THE PROPOSED WORK DURING CONSTRUCTION.
4. A MINIMUM HORIZONTAL SEPARATION OF 10 FEET IS REQUIRED BETWEEN ANY SANITARY SEWER SERVICE AND ANY WATER LINES. IF THIS SEPARATION CANNOT BE PROVIDED, A CONCRETE ENCASEMENT SHALL BE UTILIZED FOR THE SANITARY SEWER SERVICE AS APPROVED BY STONEFIELD ENGINEERING & DESIGN, LLC.
5. ALL WATER LINES SHALL BE VERTICALLY SEPARATED ABOVE SANITARY SEWER LINES BY A MINIMUM DISTANCE OF 18 INCHES. IF THIS SEPARATION CANNOT BE PROVIDED, A CONCRETE ENCASEMENT SHALL BE UTILIZED FOR THE SANITARY SEWER SERVICE AS APPROVED BY STONEFIELD ENGINEERING & DESIGN, LLC.
6. THE CONTRACTOR TO PERFORM A TEST PIT PRIOR TO CONSTRUCTION (RECOMMEND 30 DAYS PRIOR) AT LOCATIONS OF EXISTING UTILITY CROSSINGS FOR WATER AND SANITARY SEWER CONNECTION IMPROVEMENTS. SHOULD A CONFLICT EXIST, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. IN WRITING.
7. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING GAS, ELECTRIC AND TELECOMMUNICATION CONNECTIONS WITH THE APPROPRIATE GOVERNING AUTHORITY.
8. CONTRACTOR SHALL START CONSTRUCTION OF ANY GRAVITY SEWER AT THE LOWEST INVERT AND WORK UP-GRADIENT.
9. THE CONTRACTOR IS RESPONSIBLE TO MAINTAIN A RECORD SET OF PLANS REFLECTING THE LOCATION OF EXISTING UTILITIES THAT HAVE BEEN CAPPED, ABANDONED, OR RELOCATED BASED ON THE DEMOLITION/REMOVAL ACTIVITIES REQUIRED IN THIS PLAN SET. THIS DOCUMENT SHALL BE PROVIDED TO THE OWNER FOLLOWING COMPLETION OF WORK.
10. THE CONTRACTOR IS RESPONSIBLE TO MAINTAIN A RECORD OF THE AS-BUILT LOCATIONS OF ALL PROPOSED UNDERGROUND INFRASTRUCTURE. THE CONTRACTOR SHALL NOTE ANY DISCREPANCIES BETWEEN THE AS-BUILT LOCATIONS AND THE LOCATIONS DEPICTED WITHIN THE PLAN SET. THIS RECORD SHALL BE PROVIDED TO THE OWNER FOLLOWING COMPLETION OF WORK.

50' 0' 50' 100'
GRAPHIC SCALE IN FEET
1" = 50'

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SITE DEVELOPMENT PLANS

TYC AMERICAS
MICHIGAN MOBILITY CENTER

PROPOSED LIGHT MANUFACTURING & ACCESSORY OFFICES

PARCEL ID: 82-009-99-0005-000
44168 VAN BORN ROAD
VAN BUREN TOWNSHIP (BELLEVILLE)
WAYNE COUNTY, MICHIGAN 48111

STATE OF MICHIGAN
JONATHAN REID COOKSEY
ENGINEER
No. 6201069428
LICENSE EXPIRATION DATE 09/30/2023
PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: 1" = 50' PROJECT ID: DET-220348

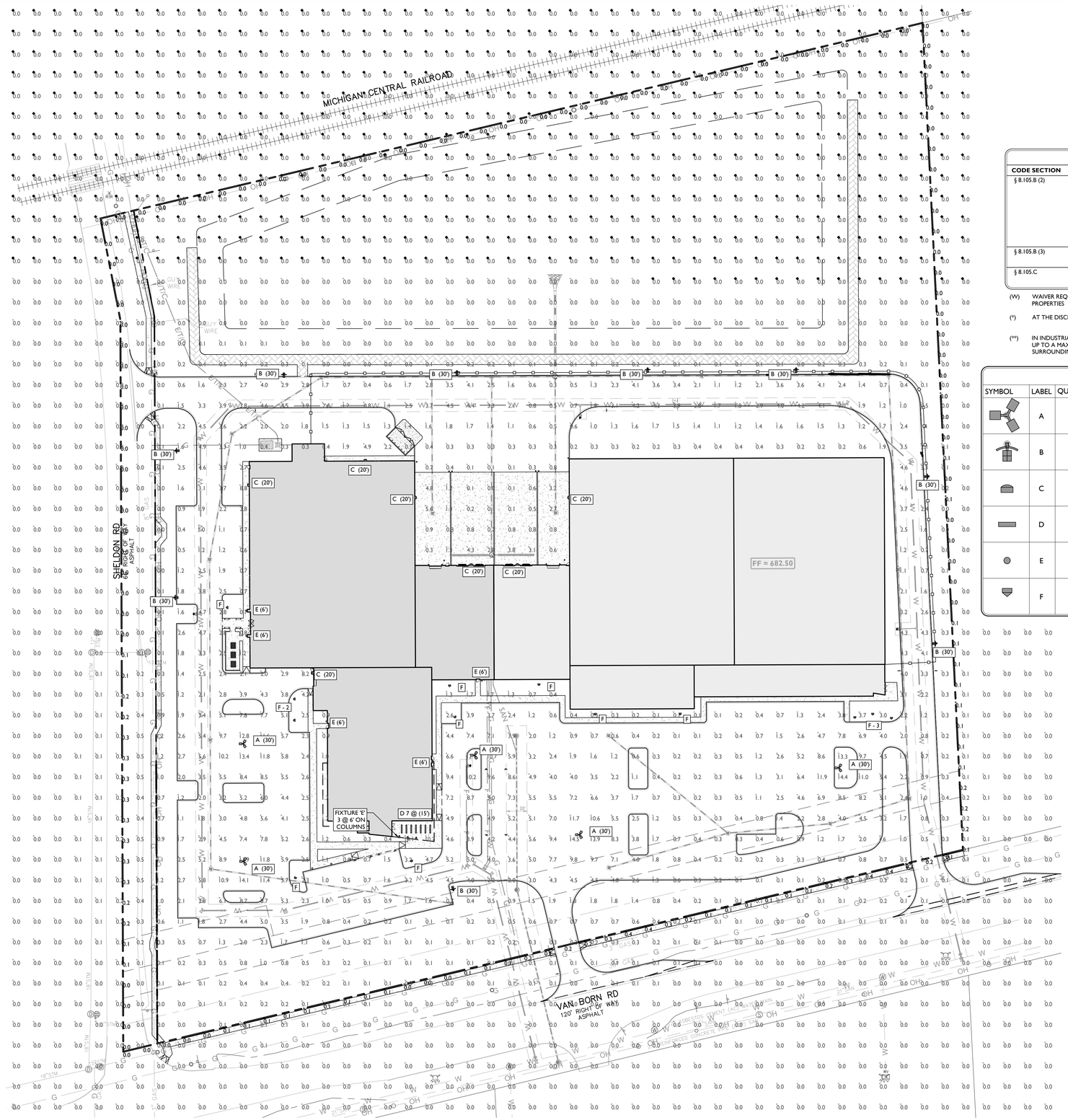
TITLE:

UTILITY PLAN

DRAWING:

C-6

V:\DET\2022\DET-220348\E-E_GRAHAM & ASSOCIATES-MEC VAN BORN ROAD & SHELDON ROAD, VAN BUREN TOWNSHIP MI\CADD\CD\SDP-06-UTIL.DWG



LIGHTING REQUIREMENTS

CODE SECTION	REQUIRED	PROPOSED
§ 8.105.B (2)	MAXIMUM ILLUMINATION AVERAGE:	
	OFF-STREET PARKING AREA: 1.0 FC	> 1.0 FC (W)
	OFF-STREET LOADING AREA: 1.0 FC	> 1.0 FC (W)
	SIDEWALK: 1.0 FC	> 1.0 FC (W)
	BUILDING ENTRANCE (FREQUENT USE): 5.0 FC	> 5.0 FC (W)
	BUILDING ENTRANCE (INFREQUENT USE): 1.0 FC	1.0 FC
	OTHER AREAS: 20.0 FC *	14.5 FC
§ 8.105.B (3)	LIGHT TRESPASS: 0.5 FC AT PROPERTY LINE MEASURED AT 5 FT	0.4 FC
§ 8.105.C	HEIGHT: 25 FT (35 FT **)	30 FT

(W) WAIVER REQUESTED FOR THE INDUSTRIAL USE & THERE IS NO SPILLOVER ONTO ADJACENT PROPERTIES

(*) AT THE DISCRETION OF THE PLANNING DIRECTOR

(**) IN INDUSTRIAL DISTRICTS THE PLANNING COMMISSION MAY APPROVE LIGHTING FIXTURES UP TO A MAXIMUM HEIGHT OF 35 FT IF IT HAS NO ADVERSE IMPACT ON THE SURROUNDING LAND USES

SYMBOL	DESCRIPTION
A (XX')	PROPOSED LIGHTING FIXTURE (MOUNTING HEIGHT)
+X.X	PROPOSED LIGHTING INTENSITY (FOOTCANDLES)

PROPOSED LUMINAIRE SCHEDULE

SYMBOL	LABEL	QUANTITY	SECURITY LIGHTING	DISTRIBUTION	LLF	MANUFACTURER	IES FILE
	A	5	LSI MIRADA MEDIUM AREA LIGHT - 3 @ 120 DEG 4000 K	TYPE FT	0.9	LSI	MRM-LED-36L-SIL-FT-40-70CRI
	B	9	LSI MIRADA MEDIUM AREA LIGHT - HSS 4000 K	TYPE 3	0.9	LSI	MRM-LED-36L-SIL-FT-40-70CRI-IL
	C	7	LSI SLIM WALL PACK (WPSLL) 4000 K	TYPE FT	0.9	LSI	WPSLL-08L-50
	D	7	SEEM 6 LED WET LOCATION WALKWAY LIGHT 3500 K	TYPE FT	0.9	FOCAL POINT	FSM6L-FL-625LF-35K--UNV--WH-4FT
	E	8	LED WALL SCONCE 3500 K	TYPE FT	0.9	BEGA	66516_BEGA_IES
	F	13	FAT BOY LANDSCAPING SPOTLIGHT 3000 K	TYPE FT	0.9	VOLT	MR16-30-27-60 BS #3

GENERAL LIGHTING NOTES

1. THE LIGHTING LEVELS DEPICTED WITHIN THE PLAN SET ARE CALCULATED UTILIZING DATA OBTAINED FROM THE LISTED MANUFACTURER. ACTUAL ILLUMINATION LEVELS AND PERFORMANCE OF ANY PROPOSED LIGHTING FIXTURE MAY VARY DUE TO UNCONTROLLABLE VARIABLES SUCH ARE WEATHER, VOLTAGE SUPPLY, LAMP TOLERANCE, EQUIPMENT SERVICE LIFE AND OTHER VARIABLE FIELD CONDITIONS.
2. WHERE APPLICABLE, THE EXISTING LIGHT LEVELS DEPICTED WITHIN THE PLAN SET SHALL BE CONSIDERED APPROXIMATE. THE EXISTING LIGHT LEVELS ARE BASED ON FIELD OBSERVATIONS AND THE MANUFACTURER'S DATA OF THE ASSUMED OR MOST SIMILAR LIGHTING FIXTURE MODEL.
3. UNLESS NOTED ELSEWHERE WITHIN THIS PLAN SET, THE LIGHT LOSS FACTORS USED IN THE LIGHTING ANALYSIS ARE AS FOLLOWS:
   - LIGHT EMITTING DIODES (LED): 0.90
   - HIGH PRESSURE SODIUM: 0.72
   - METAL HALIDE: 0.72
4. THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. IN WRITING, PRIOR TO THE START OF CONSTRUCTION, OF ANY PROPOSED LIGHTING LOCATIONS THAT CONFLICT WITH EXISTING/ PROPOSED DRAINAGE, UTILITY, OR OTHER IMPROVEMENTS.
5. THE CONTRACTOR IS RESPONSIBLE TO PREPARE A WIRING PLAN AND PROVIDE ELECTRIC SERVICE TO ALL PROPOSED LIGHTING FIXTURES. THE CONTRACTOR IS REQUIRED TO PREPARE AN AS-BUILT PLAN OF WIRING AND PROVIDE COPIES TO THE OWNER AND STONEFIELD ENGINEERING & DESIGN, LLC.

50' 0' 50' 100'

GRAPHIC SCALE IN FEET
1" = 50'

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SITE DEVELOPMENT PLANS

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PROPOSED LIGHT MANUFACTURING & ACCESSORY OFFICES

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VAN BUREN TOWNSHIP (BELLEVILLE)
WAYNE COUNTY, MICHIGAN 48111

STATE OF MICHIGAN
JONATHAN REID COOKSEY
ENGINEER
No. 6201058426
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE:	1" = 50'	PROJECT ID: DET-220348

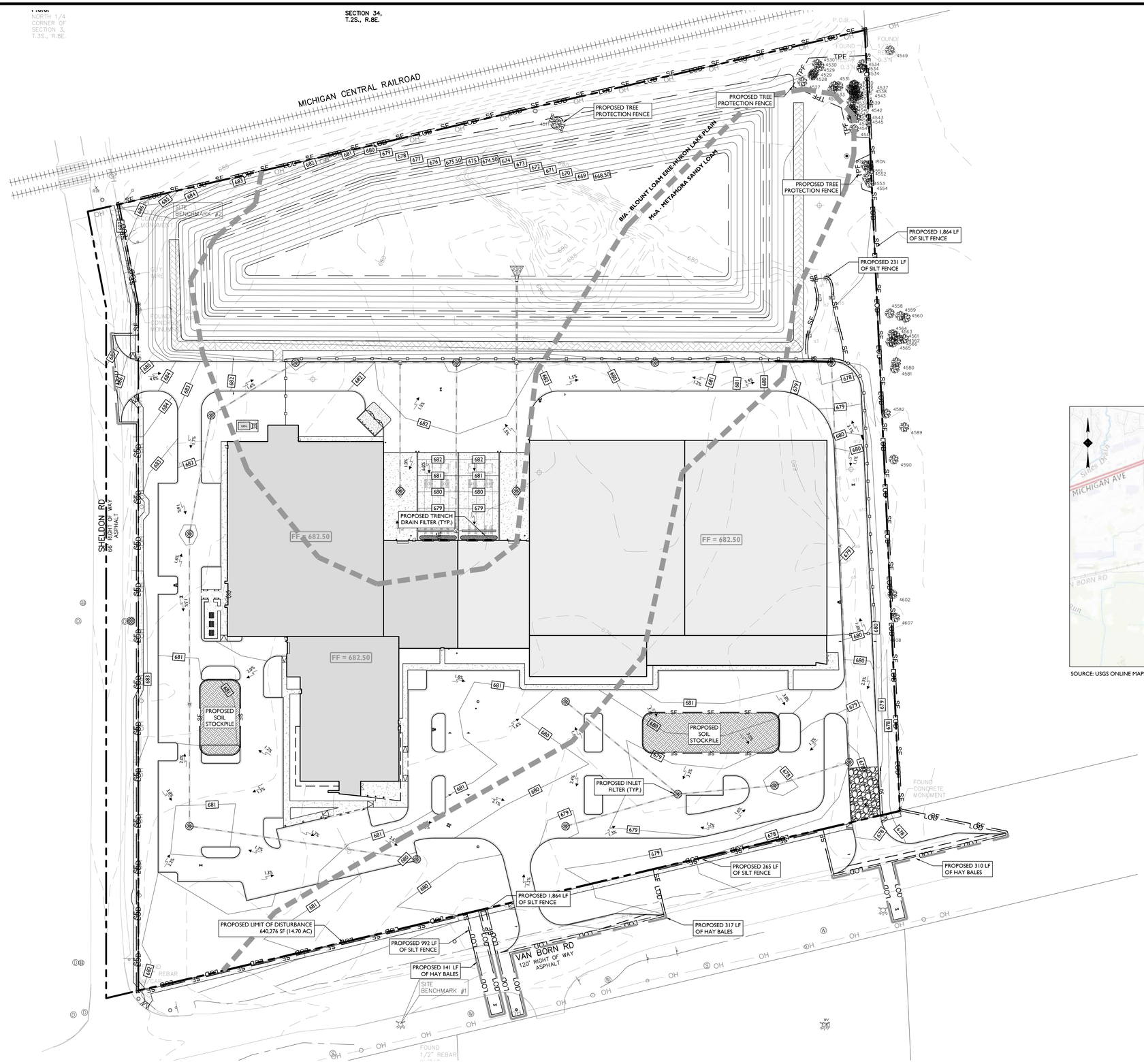
TITLE:

LIGHTING PLAN

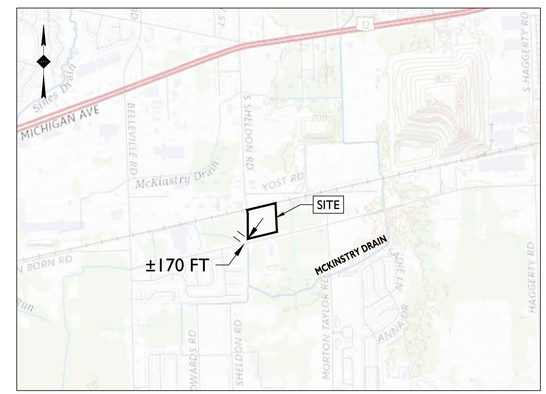
DRAWING:

C-7

V:\DET\2022\DET-220348 E. GRAHAM & ASSOCIATES INC- VAN BORN ROAD & SHELDON ROAD, VAN BUREN TOWNSHIP- MI\CADD\PLOT\SDP-01-LIGHT.DWG



SYMBOL	DESCRIPTION
	PROPERTY BOUNDARY
	ADJACENT PROPERTY BOUNDARY
LOD	PROPOSED LIMIT OF DISTURBANCE
SF	PROPOSED SILT FENCE
TPF	PROPOSED TREE PROTECTION FENCE
	PROPOSED HAY BALES
	PROPOSED STOCKPILE & EQUIPMENT STORAGE
	PROPOSED STABILIZED CONSTRUCTION ENTRANCE
	PROPOSED INLET PROTECTION FILTER



SOURCE: USGS ONLINE MAPS

LOCATION MAP

SCALE: 1" = 2,000'±

SOIL EROSION AND SEDIMENT CONTROL NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR SOIL EROSION AND SEDIMENT CONTROL IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REQUIREMENTS.
2. THE CONTRACTOR IS RESPONSIBLE FOR DUST CONTROL IN COMPLIANCE WITH LOCAL, STATE, AND FEDERAL AIR QUALITY STANDARDS.
3. THE CONTRACTOR IS RESPONSIBLE TO INSPECT ALL SOIL EROSION AND SEDIMENT CONTROL MEASURES WEEKLY AND AFTER A PRECIPITATION EVENT GREATER THAN 1 INCH. THE CONTRACTOR SHALL MAINTAIN AN INSPECTION LOG ON SITE AND DOCUMENT CORRECTIVE ACTION TAKEN THROUGHOUT THE COURSE OF CONSTRUCTION AS REQUIRED.

SOIL CHARACTERISTICS CHART

TYPE OF SOIL	BLOUNT LOAM, ERIE-HURON LAKE PLAIN (BIA)
PERCENT OF SITE COVERAGE	58.1%
HYDROLOGIC SOIL GROUP	D
DEPTH TO RESTRICTIVE LAYER	19 TO 49 INCHES
SOIL PERMEABILITY	0.00 TO 0.01 IN / HR
DEPTH TO WATER TABLE	6 TO 12 INCHES

SOIL CHARACTERISTICS CHART

TYPE OF SOIL	METAMORA SANDY LOAM (MeA)
PERCENT OF SITE COVERAGE	41.9%
HYDROLOGIC SOIL GROUP	C/D
DEPTH TO RESTRICTIVE LAYER	MORE THAN 80 INCHES
SOIL PERMEABILITY	0.20 TO 0.57 IN / HR
DEPTH TO WATER TABLE	12 TO 24 INCHES

50' 0' 50' 100'

GRAPHIC SCALE IN FEET
1" = 50'

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WAYNE COUNTY, MICHIGAN 48111

STATE OF MICHIGAN
JONATHAN REID COOREY
ENGINEER
No. 42109428
MICHIGAN LICENSED PROFESSIONAL ENGINEER

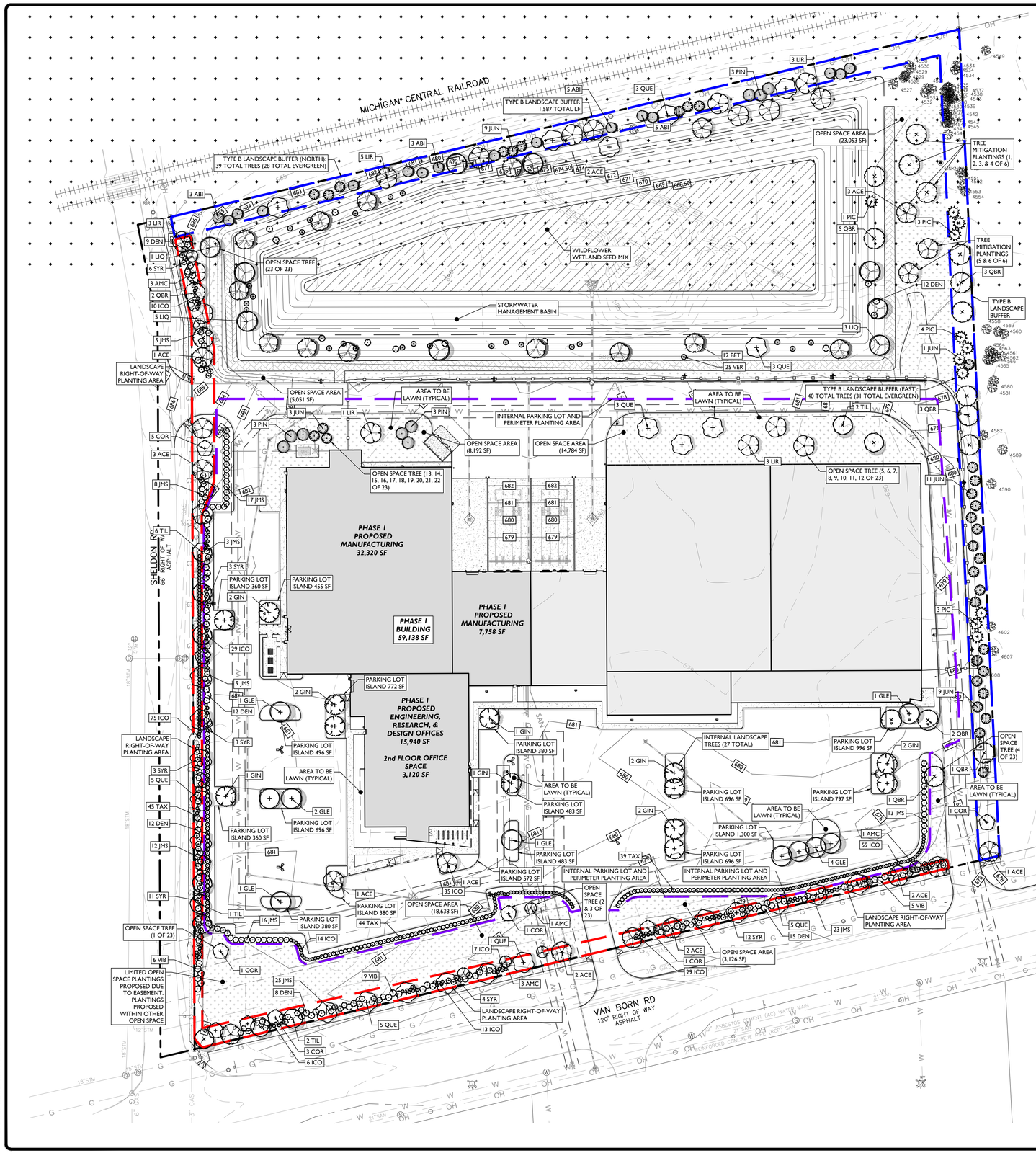
STONEFIELD engineering & design

SCALE: 1" = 50' | PROJECT ID: DET-220348

TITLE: SOIL EROSION & SEDIMENT CONTROL PLAN

DRAWING: C-8

V:\DET\2022\DET-220348 E. GRAHAM & ASSOCIATES INC. VAN BORN ROAD & SHELDON ROAD, VAN BUREN TOWNSHIP MICHIGAN\PLOT\SOIL-08 SEC.DWG



SYMBOL	DESCRIPTION
	PROPOSED LANDSCAPE BUFFER AREA
	PROPOSED FRONTAGE PLANTING
	PROPOSED INTERNAL PARKING LOT AND PERIMETER PARKING LOT PLANTING AREA
	PROPOSED OPEN SPACE AREA

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

OWNER AGREES TO SEASONAL MAINTENANCE PROGRAM AND WILL REPLACE ALL DISEASED, DEAD OR DAMAGED PLANTS, REPLENISH MULCH, CONTROL WEEDS, FERTILIZE, AND PRUNE BEGINNING UPON COMPLETION OF CONSTRUCTION OF LANDSCAPING.

IRRIGATION NOTE:

IRRIGATION CONTRACTOR TO PROVIDE A DESIGN FOR AN IRRIGATION SYSTEM SEPARATING PLANTING BEDS FROM LAWN AREA. PRIOR TO CONSTRUCTION, DESIGN IS TO BE SUBMITTED TO THE PROJECT LANDSCAPE DESIGNER FOR REVIEW AND APPROVAL. WHERE POSSIBLE, DRIP IRRIGATION AND OTHER WATER CONSERVATION TECHNIQUES SUCH AS RAIN SENSORS SHALL BE IMPLEMENTED. CONTRACTOR TO VERIFY MAXIMUM ON SITE DYNAMIC WATER PRESSURE AVAILABLE MEASURED IN PSI. PRESSURE REDUCING DEVICES OR BOOSTER PUMPS SHALL BE PROVIDED TO MEET SYSTEM PRESSURE REQUIREMENTS. DESIGN TO SHOW ALL VALVES, PIPING, HEADS, BACKFLOW PREVENTION, METERS, CONTROLLERS, AND SLEEVES WITHIN HARDSCAPE AREAS.

LANDSCAPING NOTES

1. THE CONTRACTOR SHALL RESTORE ALL DISTURBED GRASS AND LANDSCAPED AREAS TO MATCH EXISTING CONDITIONS UNLESS INDICATED OTHERWISE WITHIN THE PLAN SET.
2. THE CONTRACTOR SHALL RESTORE ALL DISTURBED LAWN AREAS WITH A MINIMUM 4 INCH LAYER OF TOPSOIL AND SEED.
3. THE CONTRACTOR SHALL RESTORE MULCH AREAS WITH A MINIMUM 3 INCH LAYER OF MULCH .
4. THE MAXIMUM SLOPE ALLOWABLE IN LANDSCAPE RESTORATION AREAS SHALL BE 3 FEET HORIZONTAL TO 1 FOOT VERTICAL (3:1 SLOPE) UNLESS INDICATED OTHERWISE WITHIN THE PLAN SET.
5. THE CONTRACTOR IS REQUIRED TO LOCATE ALL SPRINKLER HEADS IN AREA OF LANDSCAPING DISTURBANCE PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL RELOCATE SPRINKLER HEADS AND LINES IN ACCORDANCE WITH OWNER'S DIRECTION WITHIN AREAS OF DISTURBANCE.
6. THE CONTRACTOR SHALL ENSURE THAT ALL DISTURBED LANDSCAPED AREAS ARE GRADED TO MEET FLUSH AT THE ELEVATION OF WALKWAYS AND TOP OF CURB ELEVATIONS EXCEPT UNLESS INDICATED OTHERWISE WITHIN THE PLAN SET. NO ABRUPT CHANGES IN GRADE ARE PERMITTED IN DISTURBED LANDSCAPING AREAS.
7. THE LANDSCAPE CONTRACTOR SHALL GUARANTEE ALL PLANT MATERIAL FOR A PERIOD OF TWO YEARS (2 YRS.) FROM APPROVAL OF LANDSCAPE INSTALLATION BY THE PROJECT LANDSCAPE DESIGNER, MUNICIPAL OFFICIAL, OR OWNER/OWNER'S REPRESENTATIVE. THIS SHALL APPLY TO ALL PLANTINGS INCLUDING STORMWATER BASIN PLANTINGS.

50' 0' 50' 100'
GRAPHIC SCALE IN FEET
1" = 50'

ISSUE	DATE	BY	DESCRIPTION
3	03/29/2023	MG	REVISED FOR PRELIMINARY SITE PLAN APPROVAL
2	02/20/2023	MG	FOR PRELIMINARY SITE PLAN APPROVAL
1	02/16/2023	MG	FOR OWNER REVIEW

NOT APPROVED FOR CONSTRUCTION

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Phone 248.247.1115

SITE DEVELOPMENT PLANS

TYC AMERICAS
MICHIGAN MOBILITY CENTER
PROPOSED LIGHT MANUFACTURING & ACCESSORY OFFICES

PARCEL ID: 83-000-99-0005-000
44168 VAN BORN ROAD
VAN BUREN TOWNSHIP (BELLEVILLE)
WAYNE COUNTY, MICHIGAN 48111

STATE OF MICHIGAN
JONATHAN REED COOKSEY
ENGINEER
No. 47031
LICENSED PROFESSIONAL ENGINEER
MICHIGAN LICENSE NO. 47031 LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE:	1" = 50'	PROJECT ID: DET-220348

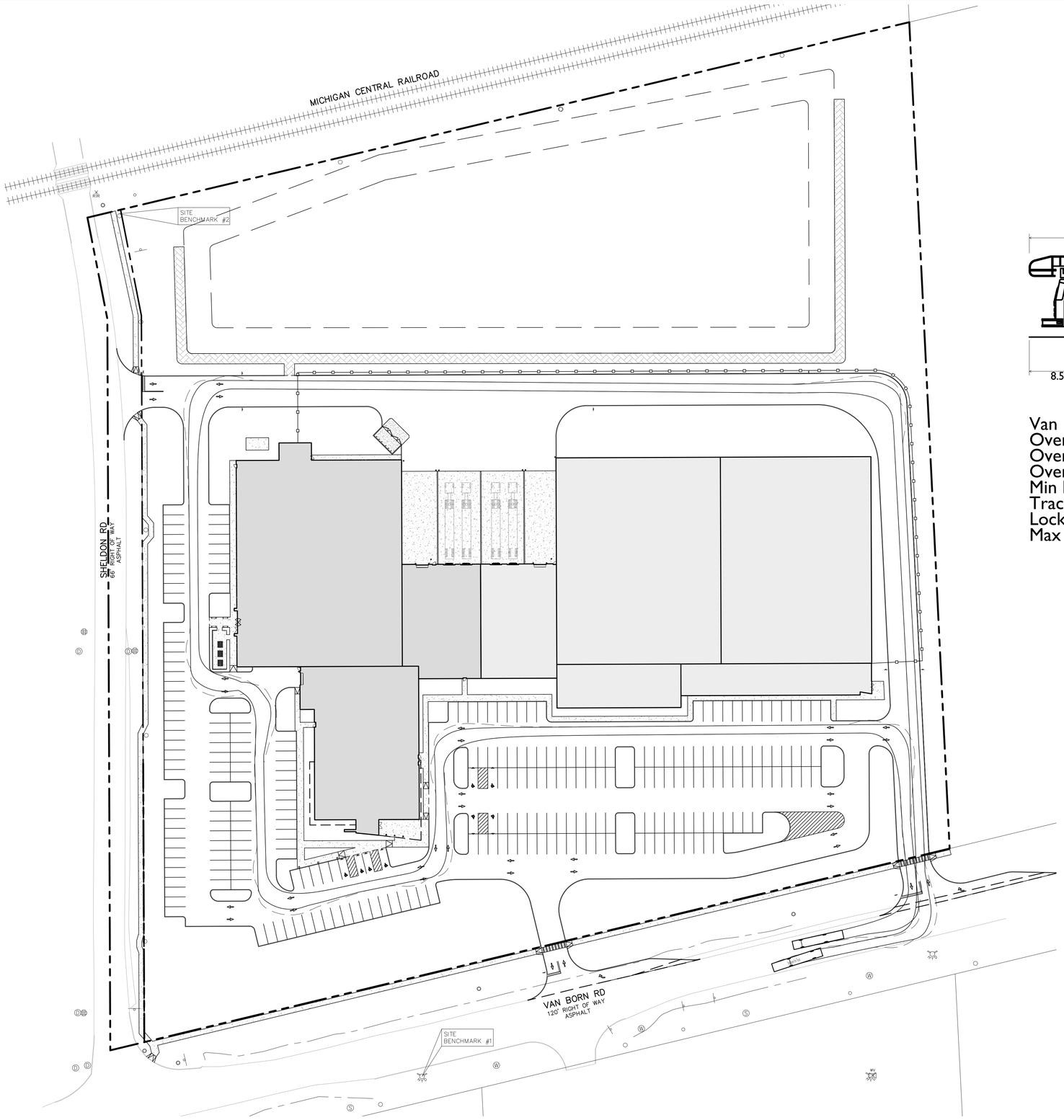
TITLE:

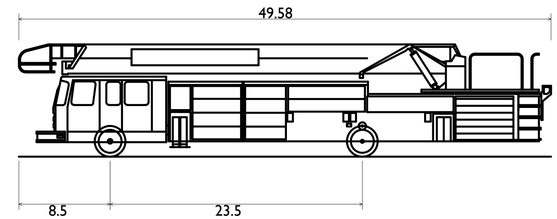
LANDSCAPING PLAN

DRAWING:

C-9

V:\DET\2022\DET-220348 E. GRAHAM & ASSOCIATES INC. VAN BORN ROAD & SHELDON ROAD, VAN BUREN TOWNSHIP, MI\CADD\PLOT\DSP-PP-15-LANDSTYLE





Van Buren Fire Truck	
Overall Length	49.580ft
Overall Width	8.167ft
Overall Body Height	12.000ft
Min Body Ground Clearance	0.891ft
Track Width	8.167ft
Lock-to-lock time	4.00s
Max Wheel Angle	45.00°

50' 0' 50' 100'
GRAPHIC SCALE IN FEET
1" = 50'

ISSUE	DATE	BY	DESCRIPTION
3	03/29/2023	MG	REVISED FOR PRELIMINARY SITE PLAN APPROVAL
2	02/20/2023	MG	FOR PRELIMINARY SITE PLAN APPROVAL
1	02/16/2023	MG	FOR OWNER REVIEW

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SITE DEVELOPMENT PLANS

TYC AMERICAS
MICHIGAN MOBILITY CENTER
PROPOSED LIGHT MANUFACTURING & ACCESSORY OFFICES

PARCEL ID: 03-009-99-0005-000
44165 VAN BORN ROAD
VAN BUREN TOWNSHIP (BELLEVILLE)
WAYNE COUNTY, MICHIGAN 48111

MICHIGAN LICENSE No. 6201069428
LICENSED PROFESSIONAL ENGINEER

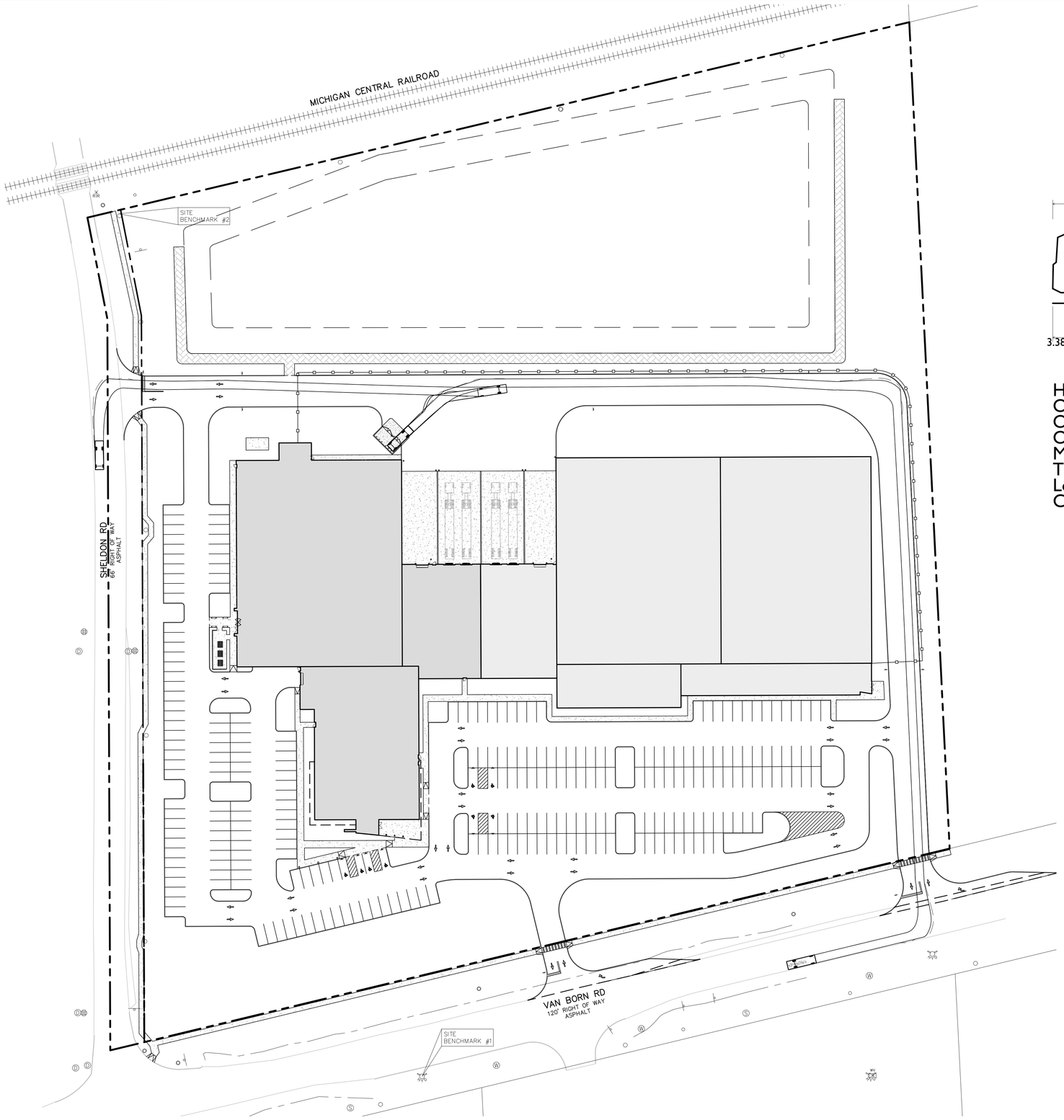
STONEFIELD engineering & design

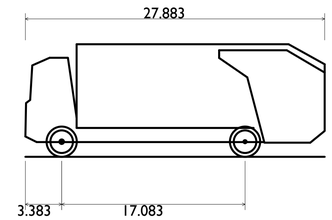
SCALE: 1" = 50' | PROJECT ID: DET-220348

TITLE:
FIRE TRUCK TURNING EXHIBIT

DRAWING:
EX-1.1

V:\DET\2022\DET-220348 E. GRAHAM & ASSOCIATES INC. VAN BORN ROAD & SHELDON ROAD, VAN BUREN TOWNSHIP MICHIGAN\DWG\PRELIMINARY\TRUCKS\01-TRUCK.DWG





Hino 338 M + Wayne Royal GT14 Refuse Truck

Overall Length	27.883ft
Overall Width	8.042ft
Overall Body Height	10.488ft
Min Body Ground Clearance	1.318ft
Track Width	8.042ft
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	27.400ft

50' 0' 50' 100'

GRAPHIC SCALE IN FEET
1" = 50'

ISSUE	DATE	BY	DESCRIPTION
3	03/29/2023	MG	REVISED FOR PRELIMINARY SITE PLAN APPROVAL
2	02/20/2023	MG	FOR PRELIMINARY SITE PLAN APPROVAL
1	02/16/2023	MG	FOR OWNER REVIEW

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SITE DEVELOPMENT PLANS

TYC AMERICAS
MICHIGAN MOBILITY CENTER

PROPOSED LIGHT MANUFACTURING & ACCESSORY OFFICES

PARCEL ID: 03-009-99-0005-000
44165 VAN BORN ROAD
VAN BUREN TOWNSHIP (BELLEVILLE)
WAYNE COUNTY, MICHIGAN 48111

MICHIGAN LICENSE No. 6201069428
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: 1" = 50' | PROJECT ID: DET-220348

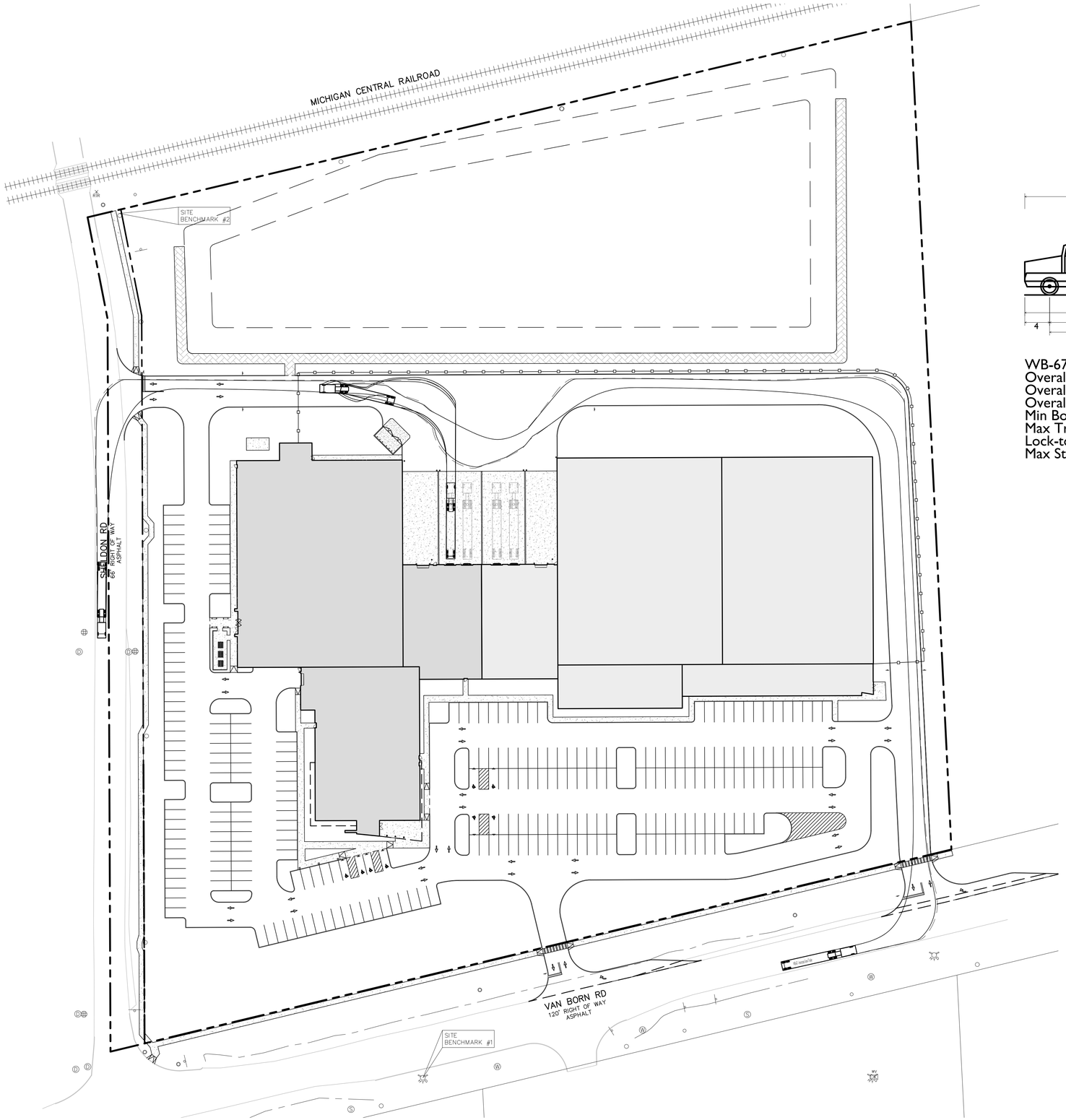
TITLE:

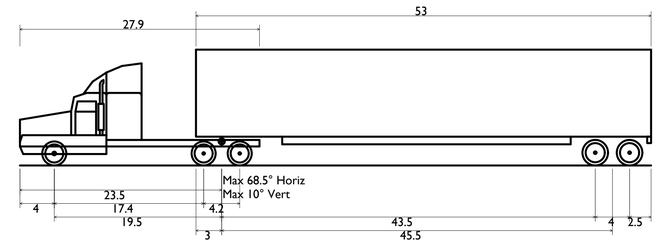
TRASH TRUCK TURNING EXHIBIT

DRAWING:

EX-1.2

V:\DET\2022\DET-220348 E. GRAHAM & ASSOCIATES INC. VAN BORN ROAD & SHELDON ROAD, VAN BUREN TOWNSHIP MICHIGAN\SHEET\TRUCKS\01-TRUCK.DWG





WB-67 - Interstate Semi-Trailer

Overall Length	73.501ft
Overall Width	8.500ft
Overall Body Height	13.500ft
Min Body Ground Clearance	1.334ft
Max Track Width	8.500ft
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	28.40°

50' 0' 50' 100'

GRAPHIC SCALE IN FEET
1" = 50'

ISSUE	DATE	BY	DESCRIPTION
3	03/29/2023	MG	REVISED FOR PRELIMINARY SITE PLAN APPROVAL
2	02/20/2023	MG	FOR PRELIMINARY SITE PLAN APPROVAL
1	02/16/2023	MG	FOR OWNER REVIEW

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SITE DEVELOPMENT PLANS

TYC AMERICAS
MICHIGAN MOBILITY CENTER
PROPOSED LIGHT MANUFACTURING & ACCESSORY OFFICES

PARCEL ID: 02-009-99-0005-000
44165 VAN BORN ROAD
VAN BUREN TOWNSHIP (BELLEVILLE)
WAYNE COUNTY, MICHIGAN 48111

MICHIGAN LICENSE No. 6201069428
LICENSED PROFESSIONAL ENGINEER

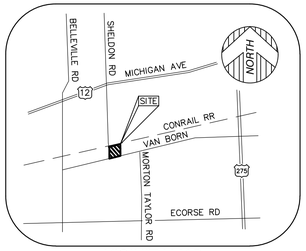
STONEFIELD engineering & design

SCALE: 1" = 50' | PROJECT ID: DET-220348

TITLE:
WB-67 TRUCK TURNING EXHIBIT

DRAWING:
EX-1.3

V:\DET\2022\DET-220348 S.E. GRAHAM & ASSOCIATES INC- VAN BORN ROAD & SHELDON ROAD, VAN BUREN TOWNSHIP, MI\CAD\DWG\SITE\TRUCK\EX-01-TRUCK.DWG



VICINITY MAP
(NOT TO SCALE)

PARKING
NO PARKING STALLS ON SITE

PARCEL AREA
646,846± SQUARE FEET = 14.84± ACRES

BASIS OF BEARING
NORTH 89°54'30" EAST, BEING THE NORTH LINE OF SECTION 3, AS DESCRIBED.

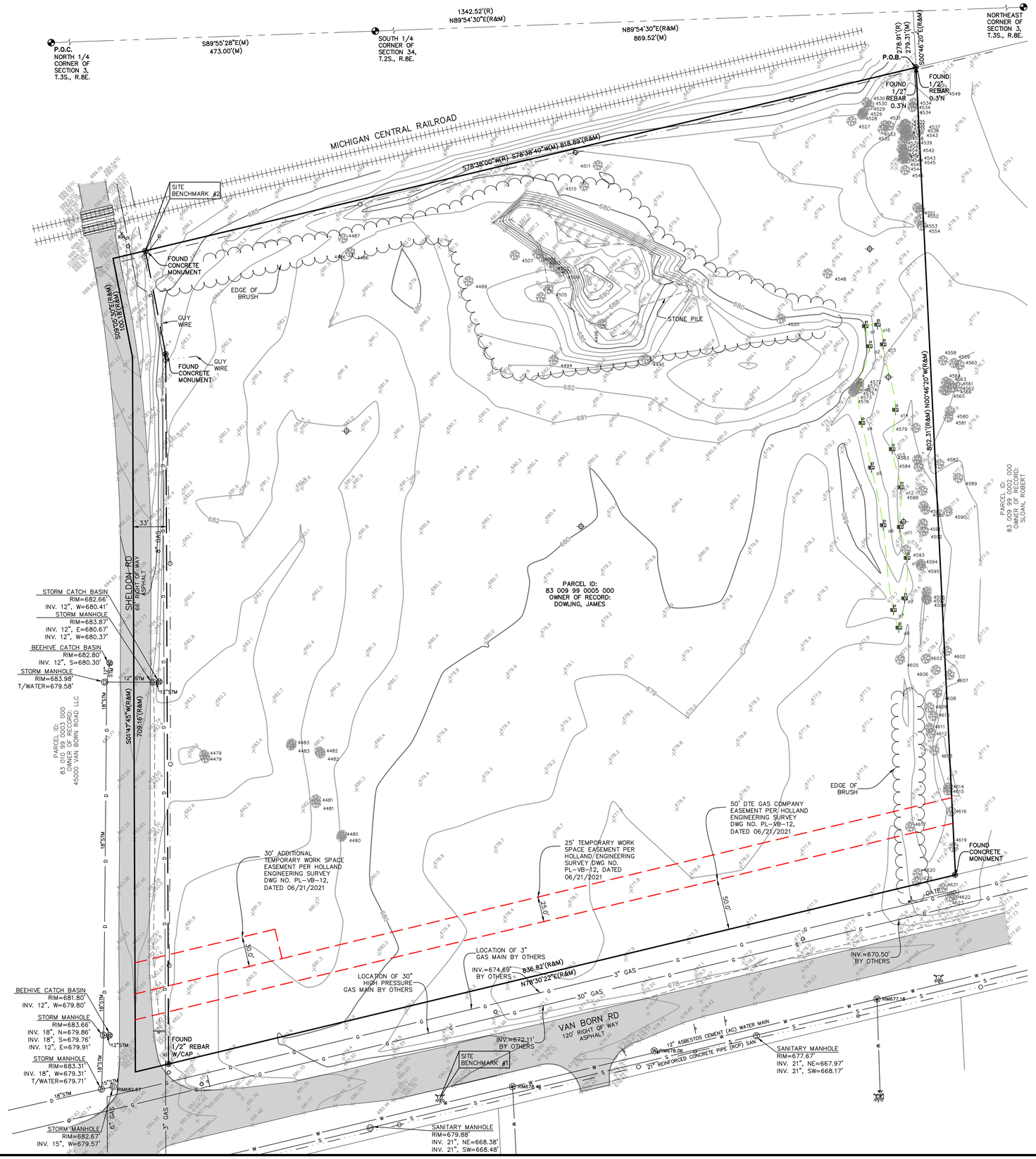
BENCHMARK
SITE BENCHMARK #1
ARROW ON TOP OF HYDRANT, SOUTH SIDE OF VAN BORN, 300' ± EAST OF SHELDON RD.
ELEVATION = 681.86' (NAVD 88)

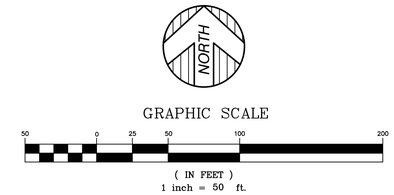
SITE BENCHMARK #2
RR SPIKE IN WEST SIDE OF UTILITY POLE. FIRST POLE SOUTH OF RR TRACKS ON EAST SIDE OF SHELDON RD.
ELEVATION = 688.48' (NAVD 88)

* TO CONVERT FROM NAVD 88 TO NGVD 29 ADD 0.43'

SURVEYOR'S NOTE
THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES OTHER THAN THE STRUCTURE INVENTORY SHOWN HEREON.

LEGEND
- FOUND MONUMENT (AS NOTED)
- FOUND SECTION CORNER (AS NOTED)
- (R&M) RECORD AND MEASURED DIMENSION
- (R) RECORD DIMENSION
- (M) MEASURED DIMENSION
- 0.00 GROUND ELEVATION
- UTILITY POLE
- GAS LINE MARKER
- SANITARY MANHOLE
- WATER VALVE
- FIRE HYDRANT
- UNKNOWN MANHOLE
- RAIL ROAD CROSSING SIGNAL
- ROUND CATCH BASIN
- STORM DRAIN MANHOLE
- WATER GATE MANHOLE
- WETLAND FLAG
- FENCE POST
- SINGLE POST SIGN
- DOUBLE POST SIGN
- SOIL BORING
- HANDICAP PARKING
- DECIDUOUS TREE (AS NOTED)
- PARCEL BOUNDARY LINE
- ADJOINER PARCEL LINE
- SECTION LINE
- RIGHT-OF-WAY
- CONCRETE CURB
- EDGE OF ASPHALT (ASPH.)
- EDGE OF GRAVEL
- R/R TRACK
- FENCE (AS NOTED)
- TREE / BRUSH LINE (AS NOTED)
- OVERHEAD UTILITY LINE
- GAS LINE
- SANITARY LINE
- WATER LINE
- MINOR CONTOUR LINE
- MAJOR CONTOUR LINE
- ASPHALT





PROPERTY DESCRIPTION
LAND IN THE TOWNSHIP OF VAN BUREN, WAYNE COUNTY, MI, DESCRIBED AS FOLLOWS:

PART OF THE WEST 1/2 OF THE NORTHEAST 1/4 OF SECTION 3, TOWN 3 SOUTH, RANGE 8 EAST, MICHIGAN, BEING MORE PARTICULARLY DESCRIBED AS; BEGINNING NORTH 89 DEGREES 54 MINUTES 30 SECONDS EAST 1342.52 FEET AND SOUTH 00 DEGREES 46 MINUTES 20 SECONDS EAST 278.91 FEET FROM THE NORTH 1/4 CORNER OF SECTION 3; THENCE SOUTH 78 DEGREES 38 MINUTES 00 SECONDS WEST 818.89 FEET; THENCE SOUTH 09 DEGREES 05 MINUTES 30 SECONDS EAST 100.18 FEET AND SOUTH 01 DEGREE 47 MINUTES 45 SECONDS WEST 709.16 FEET; THENCE NORTH 78 DEGREES 30 MINUTES 22 SECONDS EAST 836.82 FEET; THENCE NORTH 00 DEGREES 46 MINUTES 20 SECONDS WEST 802.31 FEET TO THE POINT OF BEGINNING.

TITLE REPORT NOTE
ONLY THOSE EXCEPTIONS CONTAINED WITHIN THE FIRST AMERICAN TITLE INSURANCE COMPANY COMMITMENT No. NCS-1151326-MICH, DATED SEPTEMBER 13, 2022, AND RELISTED BELOW WERE CONSIDERED FOR THIS SURVEY. NO OTHER RECORDS RESEARCH WAS PERFORMED BY THE CERTIFYING SURVEYOR.

7. THE TERMS, PROVISIONS AND EASEMENT(S) CONTAINED IN THE DOCUMENT ENTITLED "EASEMENT DEED BY COURT ORDER IN SETTLEMENT OF LANDOWNER ACTION" RECORDED APRIL 9, 2013 AS LIBER 50710, PAGE 1017 OF OFFICIAL RECORDS. (BLANKET EASEMENT, SEE DOCUMENT FOR TERMS AND CONDITIONS) (APPEARS TO COVER RAIL ROAD RIGHT OF WAY)

FLOOD NOTE
SUBJECT PARCEL LIES WITHIN:

OTHER AREA (ZONE X): AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN.

AS SHOWN ON FLOOD INSURANCE RATE MAP: MAP NUMBER 26163C0215E, DATED 2/2/2012, PUBLISHED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY.

SURVEYOR'S CERTIFICATION
TO FIRST AMERICAN TITLE INSURANCE COMPANY NATIONAL COMMERCIAL SERVICES; AND W & W REAL PROPERTY, INC., A CALIFORNIA CORPORATION:

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 2, 3, 4, 5, 7A, 8, 9, 11A, AND 11B OF TABLE A, THEREOF. THE FIELD WORK WAS COMPLETED ON 11/10/22.

DATE OF PLAT OR MAP: 11/11/22

DRAFT

ANTHONY T. SYCKO, JR., P.S.
PROFESSIONAL SURVEYOR
MICHIGAN LICENSE NO. 47976
22556 GRATIOT AVE., EASTPOINTE, MI 48021
TSycko@kemtec-survey.com

KEM-TEC
PROFESSIONAL ENGINEERING, SURVEYING & ENVIRONMENTAL SERVICES
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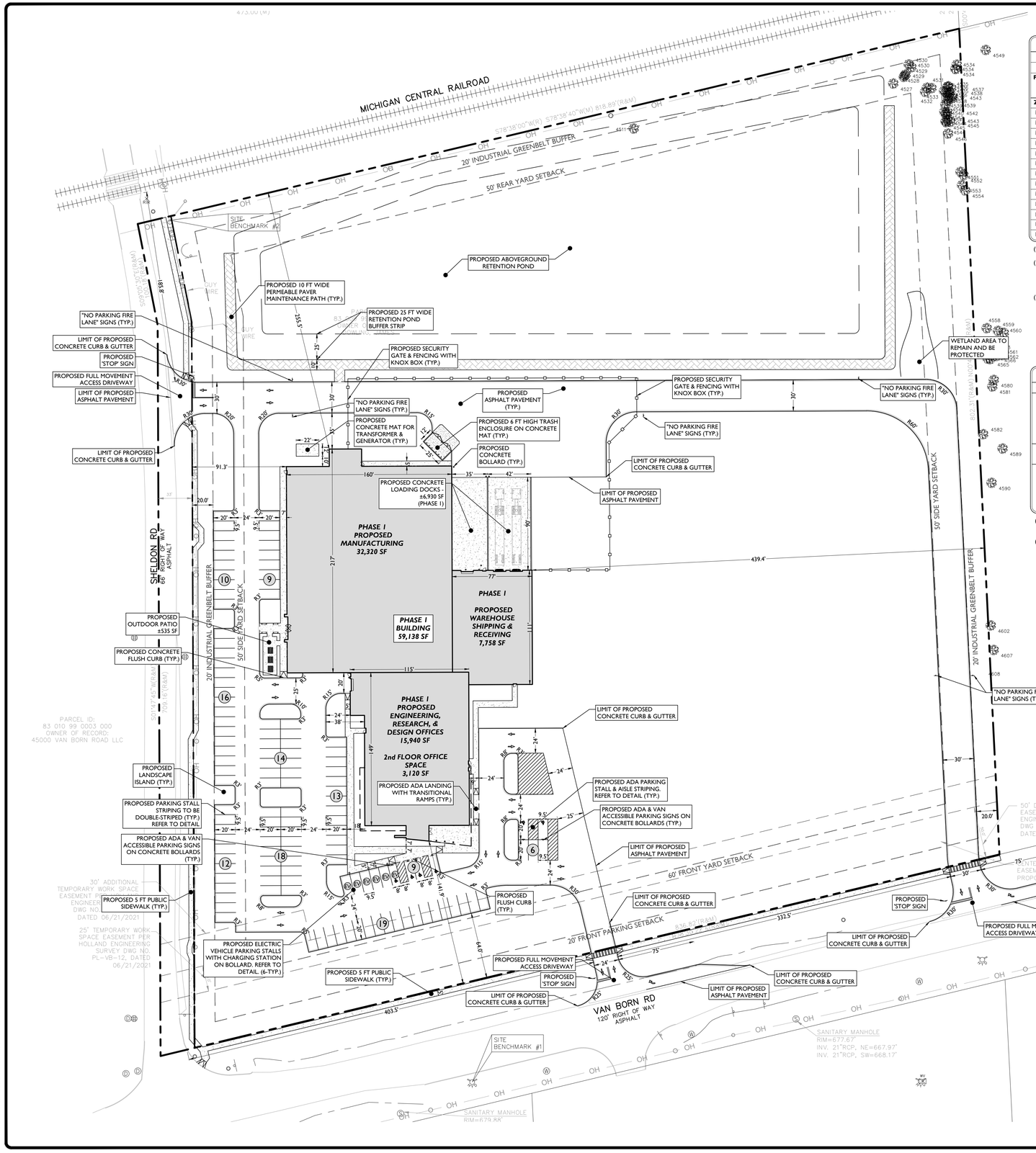
Grand Blanc (888) 694.0001
www.kemtecgroupofcompanies.com

ALTA / NSPS LAND TITLE SURVEY
PREPARED FOR: STONEFIELD ENGINEERING AND DESIGN
VAN BORN RD, BELLEVILLE, MICHIGAN,
PART OF SECTION 3,
TOWN 3 SOUTH, RANGE 8 EAST

REVISION	DATE	BY	DESCRIPTION
4	03/28/23	ATS	REVISED BENCHMARK NOTE, SANITARY AND WATER LABELS
3	02/14/23	MRJ	ADDED GAS INFO. BY OTHERS
2	02/09/23	JDM	UPDATED UTILITIES
1	01/20/23	MRJ	UPDATED UTILITIES

DRAWN BY:	JO	11/11/22
CHECKED BY:	ATS	11/11/22
DATE:	NOVEMBER 11, 2022	
PROJECT NO.	22-03136	SCALE: 1" = 50'

1



LAND USE AND ZONING

PARCEL ID: 83-009-99-0005-000

GENERAL INDUSTRIAL DISTRICT (M-2)

PROPOSED USE		
LIGHT MANUFACTURING & ACCESSORY OFFICES	PERMITTED USE	
ZONING REQUIREMENT	**REQUIRED**	**PROPOSED**
MINIMUM LOT AREA	N/A	14.24 AC(*) (620,149 SF)
MINIMUM LOT WIDTH	N/A	836.82 FT
MINIMUM LOT DEPTH	N/A	802.31 FT
MAXIMUM BUILDING COVERAGE	35% (217,052 SF)	9.5% (59,138 SF)
MAXIMUM BUILDING HEIGHT(1)	40 FT (4 STORIES)	29.0 FT
MINIMUM FRONT YARD SETBACK	60 FT	141.9 FT
MINIMUM SIDE YARD SETBACK (ONE)	50 FT	91.3 FT
MINIMUM SIDE YARD SETBACK (BOTH)	100 FT	530.7 FT
MINIMUM REAR YARD SETBACK	50 FT	255.5 FT
FRONT YARD PARKING SETBACK	20 FT	64.0 FT
INDUSTRIAL GREENBELT BUFFER (2)	20 FT	20.0 FT
DRIVEWAY SPACING	300 FT	332.5 FT
INTERSECTION SPACING	250 FT	403.5 FT

(*) EXCLUDES RIGHT-OF-WAY.

(1) §4.102(5): BUILDINGS OF GREATER THAN THE MAXIMUM HEIGHT ALLOWED MAY BE ALLOWED IN THE M-2 DISTRICT PROVIDED FRONT, SIDE AND REAR YARDS ARE INCREASED BY ONE (1) FOOT FOR EACH ADDITIONAL FOOT OF BUILDING HEIGHT THAT EXCEEDS THE MAXIMUM HEIGHT ALLOWED.

(2) §10.103.E.b : 20 FT WIDE BUFFER, WITH ONE TREE PER 20 FT OR A 6 FT MASONRY WALL

OFF-STREET PARKING REQUIREMENTS

CODE SECTION	REQUIRED	PROPOSED
§ 9.102(E)(1)	LIGHT MANUFACTURING & ACCESSORY OFFICES:	126 SPACES
	5 SPACES, PLUS 1 SPACE PER 550 SF	
	OR 1 SPACE PER EMPLOYEE	
PHASE 1	(59,138 SF)(1 SPACE / 550 SF) = 108 SPACES	
	TOTAL : 5 + 108 = **113 SPACES**	
§ 9.104(B)	90° PARKING: (2)	9.5 FT X 20 FT
	9.5 FT x 20 FT WITH 24 FT AISLE	W/ 24 FT AISLE
§ 9.105	OFF-STREET LOADING (COMMERCIAL):	PHASE 1
	10 FT X 50 FT LOADING AREA	6,930 SF (77 FT X 90 FT)
	OVER 50,000 SF: 3 LOADING SPACES + 1 SPACE FOR EACH 50,000 SF IN EXCESS OF 50,000 SF	
	59,138 SF = 3 LOADING AREAS (1,500 SF LOADING)	

(1) § 9.101(Q): WHEN DETERMINING THE REQUIRED NUMBER OF PARKING SPACES, ANY FRACTION UP TO AND INCLUDING 1/2 SHALL BE DISREGARDED

(2) § 9.104(B)(E): STALL DEPTH CAN BE REDUCED BY 2 FT WHERE PARKING ABUTS AN 8 FT SIDEWALK OR SODDED AREA

SYMBOL	DESCRIPTION
	PROPERTY LINE
	SETBACK LINE
	PROPOSED CURB & GUTTER
	PROPOSED FLUSH CURB
	PROPOSED SIGNS / BOLLARDS
	PROPOSED BUILDING
	PROPOSED CONCRETE
	PROPOSED SECURITY GATE & FENCING
	PROPOSED BUILDING DOORS
EV	PROPOSED ELECTRIC VEHICLE PARKING
	PROPOSED ELECTRIC CHARGING STATION

GENERAL NOTES

1. THE CONTRACTOR SHALL VERIFY AND FAMILIARIZE THEMSELVES WITH THE EXISTING SITE CONDITIONS AND THE PROPOSED SCOPE OF WORK (INCLUDING DIMENSIONS, LAYOUT, ETC.) PRIOR TO INITIATING THE IMPROVEMENTS IDENTIFIED WITHIN THESE DOCUMENTS. SHOULD ANY DISCREPANCY BE FOUND BETWEEN THE EXISTING SITE CONDITIONS AND THE PROPOSED WORK THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. PRIOR TO THE START OF CONSTRUCTION.
2. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND ENSURE THAT ALL REQUIRED APPROVALS HAVE BEEN OBTAINED PRIOR TO THE START OF CONSTRUCTION. COPIES OF ALL REQUIRED PERMITS AND APPROVALS SHALL BE KEPT ON SITE AT ALL TIMES DURING CONSTRUCTION.
3. ALL CONTRACTORS WILL TO THE FULLEST EXTENT PERMITTED BY LAW, INDEMNIFY AND HOLD HARMLESS STONEFIELD ENGINEERING & DESIGN, LLC. AND IT'S SUB-CONSULTANTS FROM AND AGAINST ANY DAMAGES AND LIABILITIES INCLUDING ATTORNEY'S FEES ARISING OUT OF CLAIMS BY EMPLOYEES OF THE CONTRACTOR IN ADDITION TO CLAIMS CONNECTED TO THE PROJECT AS A RESULT OF NOT CARRYING THE PROPER INSURANCE FOR WORKERS COMPENSATION, LIABILITY INSURANCE, AND LIMITS OF COMMERCIAL GENERAL LIABILITY INSURANCE.
4. THE CONTRACTOR SHALL NOT DEVIATE FROM THE PROPOSED IMPROVEMENTS IDENTIFIED WITHIN THIS PLAN SET UNLESS APPROVAL IS PROVIDED IN WRITING BY STONEFIELD ENGINEERING & DESIGN, LLC.
5. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE THE MEANS AND METHODS OF CONSTRUCTION.
6. THE CONTRACTOR SHALL NOT PERFORM ANY WORK OR CAUSE DISTURBANCE ON A PRIVATE PROPERTY NOT CONTROLLED BY THE PERSON OR ENTITY WHO HAS AUTHORIZED THE WORK WITHOUT PRIOR WRITTEN CONSENT FROM THE OWNER OF THE PRIVATE PROPERTY.
7. THE CONTRACTOR IS RESPONSIBLE TO RESTORE ANY DAMAGED OR UNDERMINED STRUCTURE OR SITE FEATURE THAT IS IDENTIFIED TO REMAIN ON THE PLAN SET. ALL REPAIRS SHALL USE NEW MATERIALS TO RESTORE THE FEATURE TO ITS EXISTING CONDITION AT THE CONTRACTORS EXPENSE.
8. CONTRACTOR IS RESPONSIBLE TO PROVIDE THE APPROPRIATE SHOP DRAWINGS, PRODUCT DATA, AND OTHER REQUIRED SUBMITTALS FOR REVIEW. STONEFIELD ENGINEERING & DESIGN, LLC. WILL REVIEW THE SUBMITTALS IN ACCORDANCE WITH THE DESIGN INTENT AS REFLECTED WITHIN THE PLAN SET.
9. THE CONTRACTOR IS RESPONSIBLE FOR TRAFFIC CONTROL IN ACCORDANCE WITH MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION.
10. THE CONTRACTOR IS REQUIRED TO PERFORM ALL WORK IN THE PUBLIC RIGHT-OF-WAY IN ACCORDANCE WITH THE APPROPRIATE GOVERNING AUTHORITY AND SHALL BE RESPONSIBLE FOR THE PROCUREMENT OF STREET OPENING PERMITS.
11. THE CONTRACTOR IS REQUIRED TO RETAIN AN OSHA CERTIFIED SAFETY INSPECTOR TO BE PRESENT ON SITE AT ALL TIMES DURING CONSTRUCTION & DEMOLITION ACTIVITIES.
12. SHOULD AN EMPLOYEE OF STONEFIELD ENGINEERING & DESIGN, LLC. BE PRESENT ON SITE AT ANY TIME DURING CONSTRUCTION, IT DOES NOT RELIEVE THE CONTRACTOR OF ANY OF THE RESPONSIBILITIES AND REQUIREMENTS LISTED IN THE NOTES WITHIN THIS PLAN SET.

50' 0' 50' 100'
GRAPHIC SCALE IN FEET
1" = 50'

ISSUE	DATE	BY	DESCRIPTION
4	04/14/2023	MG	REVISED FOR SUPPLEMENTAL PHASING SITE PLANS
3	03/29/2023	MG	REVISED FOR PRELIMINARY SITE PLAN APPROVAL
2	02/20/2023	MG	FOR PRELIMINARY SITE PLAN APPROVAL
1	02/16/2023	MG	FOR OWNER REVIEW

NOT APPROVED FOR CONSTRUCTION

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Princeton, NJ · Tampa, FL · Rutherford, NJ
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SITE DEVELOPMENT PLANS

TYC AMERICAS
MICHIGAN MOBILITY CENTER

PROPOSED LIGHT MANUFACTURING & ACCESSORY OFFICES

PARCEL ID: 83-009-99-0005-000
44168 VAN BORN ROAD
VAN BUREN TOWNSHIP (BELLEVILLE)
WAYNE COUNTY, MICHIGAN 48111

MICHIGAN LICENSE No. 6201069428
LICENSED PROFESSIONAL ENGINEER

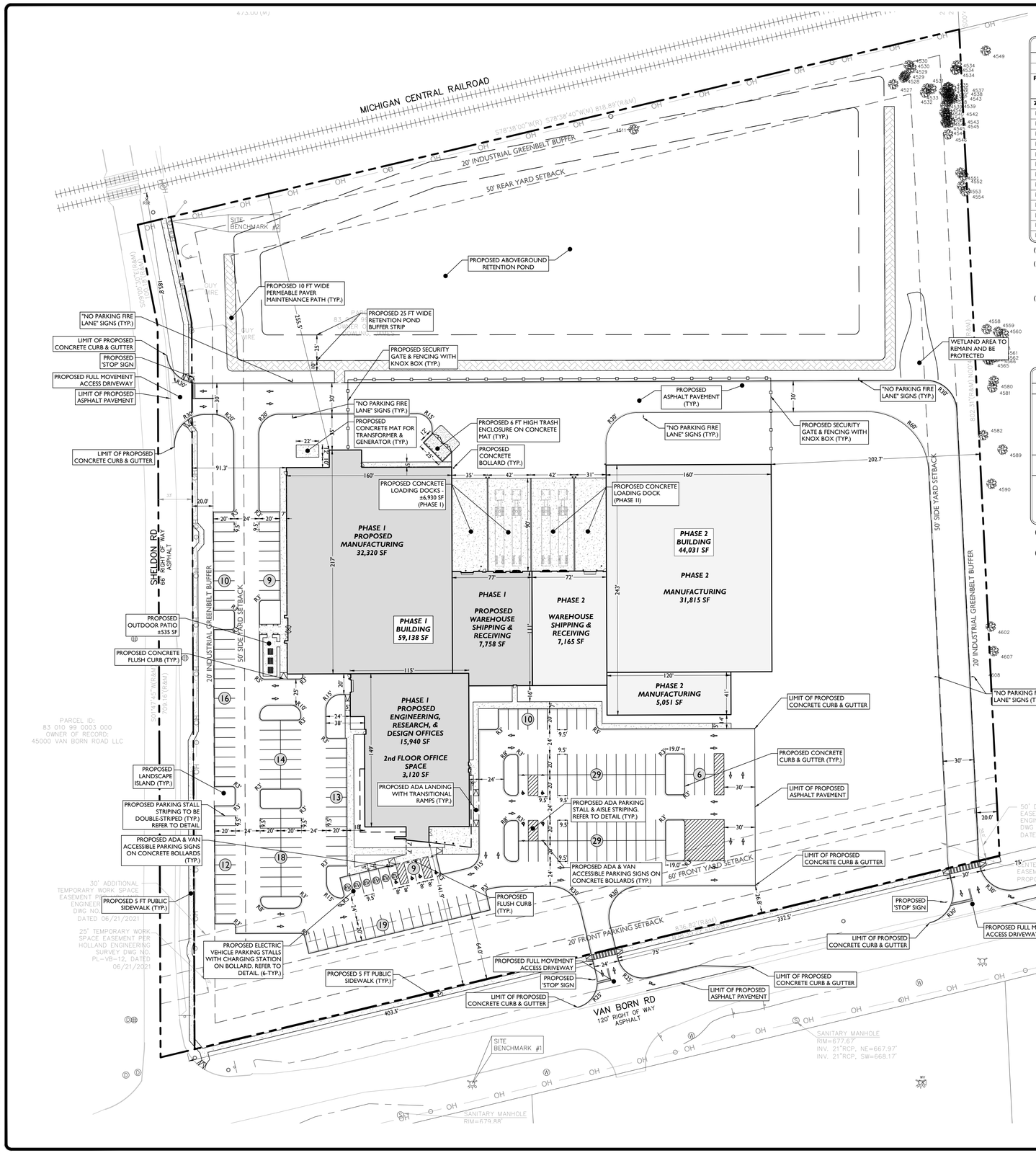
STONEFIELD engineering & design

SCALE: 1" = 50' | PROJECT ID: DET-220348

TITLE: SITE PLAN (PHASE I)

DRAWING: C-3.1

V:\DET\2022\DET-220348 E. GRAHAM & ASSOCIATES, INC VAN BORN ROAD & SHELDON ROAD, VAN BUREN TOWNSHIP, MICHIGAN\CAD\PLAN SET\SDP-01\SITE.DWG



LAND USE AND ZONING

PARCEL ID: 83-009-99-0005-000

GENERAL INDUSTRIAL DISTRICT (M-2)

PROPOSED USE		
LIGHT MANUFACTURING & ACCESSORY OFFICES	PERMITTED USE	
ZONING REQUIREMENT	**REQUIRED**	**PROPOSED**
MINIMUM LOT AREA	N/A	14.24 AC(*) (620,149 SF)
MINIMUM LOT WIDTH	N/A	836.82 FT
MINIMUM LOT DEPTH	N/A	802.31 FT
MAXIMUM BUILDING COVERAGE	35% (217,052 SF)	16.6% (103,169 SF)
MAXIMUM BUILDING HEIGHT(1)	40 FT (4 STORIES)	29.0 FT
MINIMUM FRONT YARD SETBACK	60 FT	141.9 FT
MINIMUM SIDE YARD SETBACK (ONE)	50 FT	91.3 FT
MINIMUM SIDE YARD SETBACK (BOTH)	100 FT	294.0 FT
MINIMUM REAR YARD SETBACK	50 FT	255.5 FT
FRONT YARD PARKING SETBACK	20 FT	26.8 FT
INDUSTRIAL GREENBELT BUFFER (2)	20 FT	20.0 FT
DRIVEWAY SPACING	300 FT	332.5 FT
INTERSECTION SPACING	250 FT	403.5 FT

(*) EXCLUDES RIGHT-OF-WAY.

(1) §4.102(5): BUILDINGS OF GREATER THAN THE MAXIMUM HEIGHT ALLOWED MAY BE ALLOWED IN THE M-2 DISTRICT PROVIDED FRONT, SIDE AND REAR YARDS ARE INCREASED BY ONE (1) FOOT FOR EACH ADDITIONAL FOOT OF BUILDING HEIGHT THAT EXCEEDS THE MAXIMUM HEIGHT ALLOWED.

(2) §10.103.E.b : 20 FT WIDE BUFFER, WITH ONE TREE PER 20 FT OR A 6 FT MASONRY WALL

OFF-STREET PARKING REQUIREMENTS

CODE SECTION	REQUIRED	PROPOSED
§ 9.102(E)(1)	LIGHT MANUFACTURING & ACCESSORY OFFICES:	194 SPACES
	5 SPACES, PLUS 1 SPACE PER 550 SF	
	OR 1 SPACE PER EMPLOYEE	
PHASE 1	(59,138 SF)(1 SPACE / 550 SF) = 108 SPACES	
PHASE 2	(44,031 SF)(1 SPACE / 550 SF) = 80 SPACES	
	TOTAL : 5 + 108 + 80 = **193 SPACES**	
§ 9.104(B)	90° PARKING: (2)	9.5 FT X 20 FT
	9.5 FT x 20 FT WITH 24 FT AISLE	W/ 24 FT AISLE
§ 9.105	OFF-STREET LOADING (COMMERCIAL):	PHASE 1
	10 FT X 50 FT LOADING AREA	6,930 SF (77 FT X 90 FT)
	OVER 50,000 SF: 3 LOADING SPACES + 1 SPACE FOR EACH 50,000 SF IN EXCESS OF 50,000 SF	PHASE 2 6,570 SF (73 FT X 90 FT)
	103,169 SF = 4 LOADING AREAS (2,000 SF LOADING)	

(1) § 9.101(Q): WHEN DETERMINING THE REQUIRED NUMBER OF PARKING SPACES, ANY FRACTION UP TO AND INCLUDING 1/2 SHALL BE DISREGARDED

(2) § 9.104(B)(E): STALL DEPTH CAN BE REDUCED BY 2 FT WHERE PARKING ABUTS AN 8 FT SIDEWALK OR SODDED AREA

SYMBOL	DESCRIPTION
	PROPERTY LINE
	SETBACK LINE
	PROPOSED CURB & GUTTER
	PROPOSED FLUSH CURB
	PROPOSED SIGNS / BOLLARDS
	PROPOSED BUILDING
	PROPOSED CONCRETE
	PROPOSED SECURITY GATE & FENCING
	PROPOSED BUILDING DOORS
EV	PROPOSED ELECTRIC VEHICLE PARKING
	PROPOSED ELECTRIC CHARGING STATION
	PROPOSED PHASE 2 & 3 BUILDING

GENERAL NOTES

1. THE CONTRACTOR SHALL VERIFY AND FAMILIARIZE THEMSELVES WITH THE EXISTING SITE CONDITIONS AND THE PROPOSED SCOPE OF WORK (INCLUDING DIMENSIONS, LAYOUT, ETC.) PRIOR TO INITIATING THE IMPROVEMENTS IDENTIFIED WITHIN THESE DOCUMENTS. SHOULD ANY DISCREPANCY BE FOUND BETWEEN THE EXISTING SITE CONDITIONS AND THE PROPOSED WORK THE CONTRACTOR SHALL NOTIFY STONEFIELD ENGINEERING & DESIGN, LLC. PRIOR TO THE START OF CONSTRUCTION.
2. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND ENSURE THAT ALL REQUIRED APPROVALS HAVE BEEN OBTAINED PRIOR TO THE START OF CONSTRUCTION. COPIES OF ALL REQUIRED PERMITS AND APPROVALS SHALL BE KEPT ON SITE AT ALL TIMES DURING CONSTRUCTION.
3. ALL CONTRACTORS WILL, TO THE FULLEST EXTENT PERMITTED BY LAW, INDEMNIFY AND HOLD HARMLESS STONEFIELD ENGINEERING & DESIGN, LLC. AND IT'S SUB-CONSULTANTS FROM AND AGAINST ANY DAMAGES AND LIABILITIES INCLUDING ATTORNEY'S FEES ARISING OUT OF CLAIMS BY EMPLOYEES OF THE CONTRACTOR IN ADDITION TO CLAIMS CONNECTED TO THE PROJECT AS A RESULT OF NOT CARRYING THE PROPER INSURANCE FOR WORKERS COMPENSATION, LIABILITY INSURANCE, AND LIMITS OF COMMERCIAL GENERAL LIABILITY INSURANCE.
4. THE CONTRACTOR SHALL NOT DEVIATE FROM THE PROPOSED IMPROVEMENTS IDENTIFIED WITHIN THIS PLAN SET UNLESS APPROVAL IS PROVIDED IN WRITING BY STONEFIELD ENGINEERING & DESIGN, LLC.
5. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE THE MEANS AND METHODS OF CONSTRUCTION.
6. THE CONTRACTOR SHALL NOT PERFORM ANY WORK OR CAUSE DISTURBANCE ON A PRIVATE PROPERTY NOT CONTROLLED BY THE PERSON OR ENTITY WHO HAS AUTHORIZED THE WORK WITHOUT PRIOR WRITTEN CONSENT FROM THE OWNER OF THE PRIVATE PROPERTY.
7. THE CONTRACTOR IS RESPONSIBLE TO RESTORE ANY DAMAGED OR UNDERMINED STRUCTURE OR SITE FEATURE THAT IS IDENTIFIED TO REMAIN ON THE PLAN SET. ALL REPAIRS SHALL USE NEW MATERIALS TO RESTORE THE FEATURE TO ITS EXISTING CONDITION AT THE CONTRACTORS EXPENSE.
8. CONTRACTOR IS RESPONSIBLE TO PROVIDE THE APPROPRIATE SHOP DRAWINGS, PRODUCT DATA, AND OTHER REQUIRED SUBMITTALS FOR REVIEW. STONEFIELD ENGINEERING & DESIGN, LLC. WILL REVIEW THE SUBMITTALS IN ACCORDANCE WITH THE DESIGN INTENT AS REFLECTED WITHIN THE PLAN SET.
9. THE CONTRACTOR IS RESPONSIBLE FOR TRAFFIC CONTROL IN ACCORDANCE WITH MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION.
10. THE CONTRACTOR IS REQUIRED TO PERFORM ALL WORK IN THE PUBLIC RIGHT-OF-WAY IN ACCORDANCE WITH THE APPROPRIATE GOVERNING AUTHORITY AND SHALL BE RESPONSIBLE FOR THE PROCUREMENT OF STREET OPENING PERMITS.
11. THE CONTRACTOR IS REQUIRED TO RETAIN AN OSHA CERTIFIED SAFETY INSPECTOR TO BE PRESENT ON SITE AT ALL TIMES DURING CONSTRUCTION & DEMOLITION ACTIVITIES.
12. SHOULD AN EMPLOYEE OF STONEFIELD ENGINEERING & DESIGN, LLC. BE PRESENT ON SITE AT ANY TIME DURING CONSTRUCTION, IT DOES NOT RELIEVE THE CONTRACTOR OF ANY OF THE RESPONSIBILITIES AND REQUIREMENTS LISTED IN THE NOTES WITHIN THIS PLAN SET.

50' 0' 50' 100'
GRAPHIC SCALE IN FEET
1" = 50'

ISSUE	DATE	BY	DESCRIPTION
4	04/14/2023	MG	REVISED FOR SUPPLEMENTAL PHASING SITE PLANS
3	03/29/2023	MG	REVISED FOR PRELIMINARY SITE PLAN APPROVAL
2	02/20/2023	MG	FOR PRELIMINARY SITE PLAN APPROVAL
1	02/16/2023	MG	FOR OWNER REVIEW

NOT APPROVED FOR CONSTRUCTION

STONEFIELD engineering & design
Detroit, MI · New York, NY · Boston, MA
Princeton, NJ · Tampa, FL · Rutherford, NJ
www.stonefieldeng.com
607 Shelby Suite 200, Detroit, MI 48226
Phone 248.247.1115

SITE DEVELOPMENT PLANS

TYC AMERICAS
MICHIGAN MOBILITY CENTER
PROPOSED LIGHT MANUFACTURING & ACCESSORY OFFICES

PARCEL ID: 83-009-99-0005-000
44165 VAN BORN ROAD
VAN BUREN TOWNSHIP (BELLEVILLE)
WAYNE COUNTY, MICHIGAN 48111

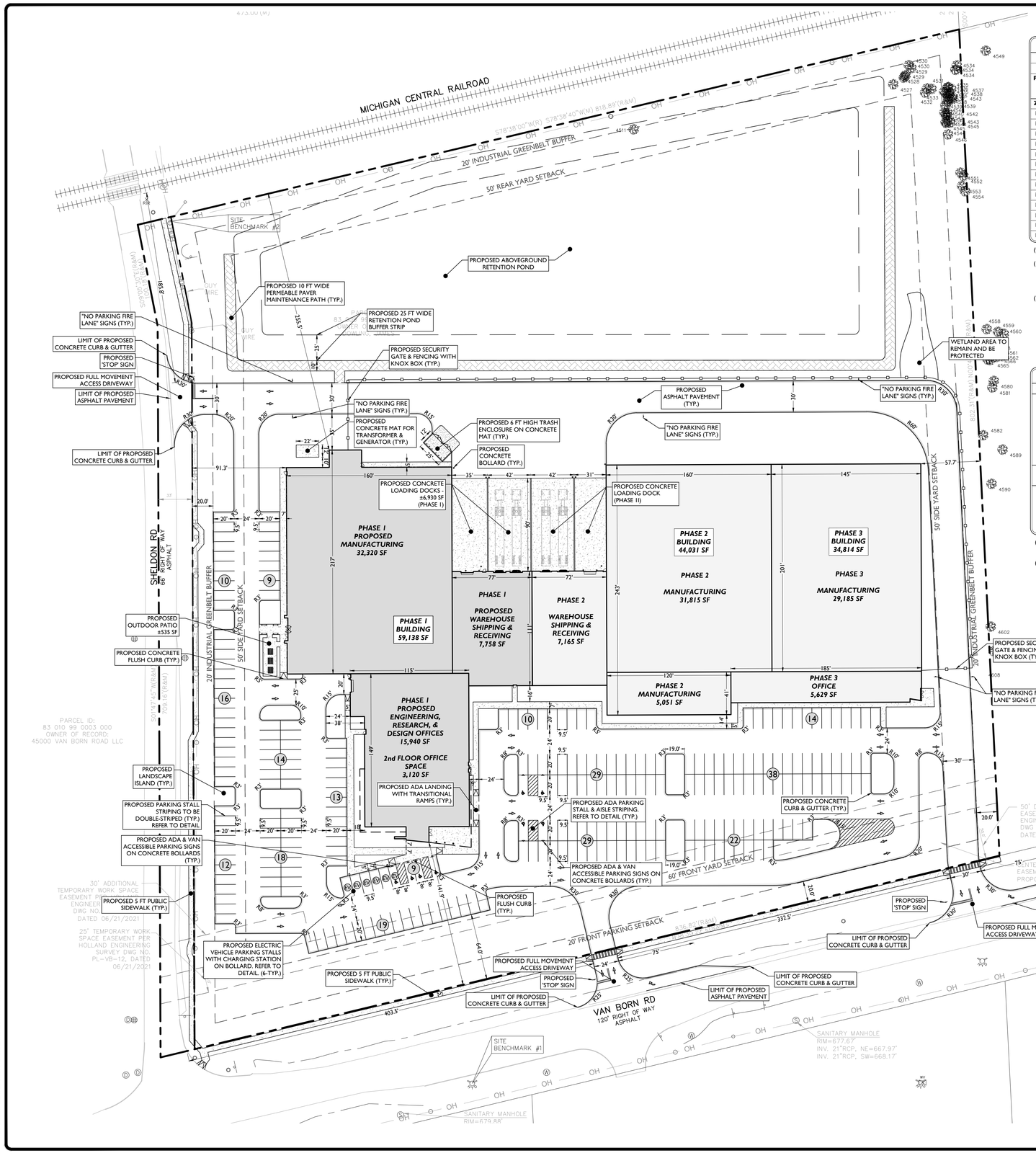
MICHIGAN LICENSE No. 6201069428
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: 1" = 50' | PROJECT ID: DET-220348

TITLE: SITE PLAN (PHASE II)

DRAWING: C-3.2



LAND USE AND ZONING

PARCEL ID: 83-009-99-0005-000

GENERAL INDUSTRIAL DISTRICT (M-2)

PROPOSED USE		
LIGHT MANUFACTURING & ACCESSORY OFFICES	PERMITTED USE	
ZONING REQUIREMENT	**REQUIRED**	**PROPOSED**
MINIMUM LOT AREA	N/A	14.24 AC* (620,149 SF)
MINIMUM LOT WIDTH	N/A	836.82 FT
MINIMUM LOT DEPTH	N/A	802.31 FT
MAXIMUM BUILDING COVERAGE	35% (217,052 SF)	22.2% (137,983 SF)
MAXIMUM BUILDING HEIGHT(1)	40 FT (4 STORIES)	29.0 FT
MINIMUM FRONT YARD SETBACK	60 FT	141.9 FT
MINIMUM SIDE YARD SETBACK (ONE)	50 FT	57.7 FT
MINIMUM SIDE YARD SETBACK (BOTH)	100 FT	149.0 FT
MINIMUM REAR YARD SETBACK	50 FT	255.5 FT
FRONT YARD PARKING SETBACK	20 FT	20.0 FT
INDUSTRIAL GREENBELT BUFFER (2)	20 FT	20.0 FT
DRIVEWAY SPACING	300 FT	332.5 FT
INTERSECTION SPACING	250 FT	403.5 FT

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(2) §10.103.E.b : 20 FT WIDE BUFFER, WITH ONE TREE PER 20 FT OR A 6 FT MASONRY WALL

OFF-STREET PARKING REQUIREMENTS

CODE SECTION	**REQUIRED**	**PROPOSED**
§ 9.102(E)(1)	LIGHT MANUFACTURING & ACCESSORY OFFICES:	262 SPACES
	5 SPACES, PLUS 1 SPACE PER 550 SF	
	OR 1 SPACE PER EMPLOYEE	
PHASE 1	(59,138 SF)(1 SPACE / 550 SF) = 108 SPACES	
PHASE 2	(44,031 SF)(1 SPACE / 550 SF) = 80 SPACES	
PHASE 3	(34,814 SF)(1 SPACE / 550 SF) = 63 SPACES	
	TOTAL : 5 + 108 + 80 + 63 = **256 SPACES**	
§ 9.104(B)	90° PARKING: (2)	9.5 FT X 20 FT
	9.5 FT x 20 FT WITH 24 FT AISLE	W/ 24 FT AISLE
§ 9.105	OFF-STREET LOADING (COMMERCIAL):	PHASE 1
	10 FT X 50 FT LOADING AREA	6,930 SF (77 FT X 90 FT)
	OVER 50,000 SF: 3 LOADING SPACES + 1 SPACE FOR EACH 50,000 SF IN EXCESS OF 50,000 SF	PHASE 2 & 3 6,570 SF (73 FT X 90 FT)
	137,983 SF = 5 LOADING AREAS (2,500 SF LOADING)	

(1) § 9.101(Q): WHEN DETERMINING THE REQUIRED NUMBER OF PARKING SPACES, ANY FRACTION UP TO AND INCLUDING 1/2 SHALL BE DISREGARDED

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SYMBOL	**DESCRIPTION**
	PROPERTY LINE
	SETBACK LINE
	PROPOSED CURB & GUTTER
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50' 0' 50' 100'
GRAPHIC SCALE IN FEET
1" = 50'

ISSUE	DATE	BY	DESCRIPTION
4	04/14/2023	MG	REVISED FOR SUPPLEMENTAL PHASING SITE PLANS
3	03/29/2023	MG	REVISED FOR PRELIMINARY SITE PLAN APPROVAL
2	02/20/2023	MG	FOR PRELIMINARY SITE PLAN APPROVAL
1	02/16/2023	MG	FOR OWNER REVIEW

NOT APPROVED FOR CONSTRUCTION

STONEFIELD engineering & design
Detroit, MI · New York, NY · Boston, MA
Princeton, NJ · Tampa, FL · Rutherford, NJ
www.stonefieldeng.com
607 Shelby Suite 200, Detroit, MI 48226
Phone 248.247.1115

SITE DEVELOPMENT PLANS

TYC AMERICAS
MICHIGAN MOBILITY CENTER
PROPOSED LIGHT MANUFACTURING & ACCESSORY OFFICES

PARCEL ID: 83-009-99-0005-000
44165 VAN BORN ROAD
VAN BUREN TOWNSHIP (BELLEVILLE)
WAYNE COUNTY, MICHIGAN 48111

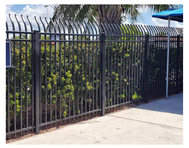
MICHIGAN LICENSE No. 6201069428
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: 1" = 50' | PROJECT ID: DET-220348

TITLE: **SITE PLAN (OVERALL)**

DRAWING: **C-3.3**



3 Rail Security Fence

MAKE: Alumi-Guard
MODEL: 3 Rail, Security Fence, 72" High, 6' Wide Panels

Fuse Backless Bench

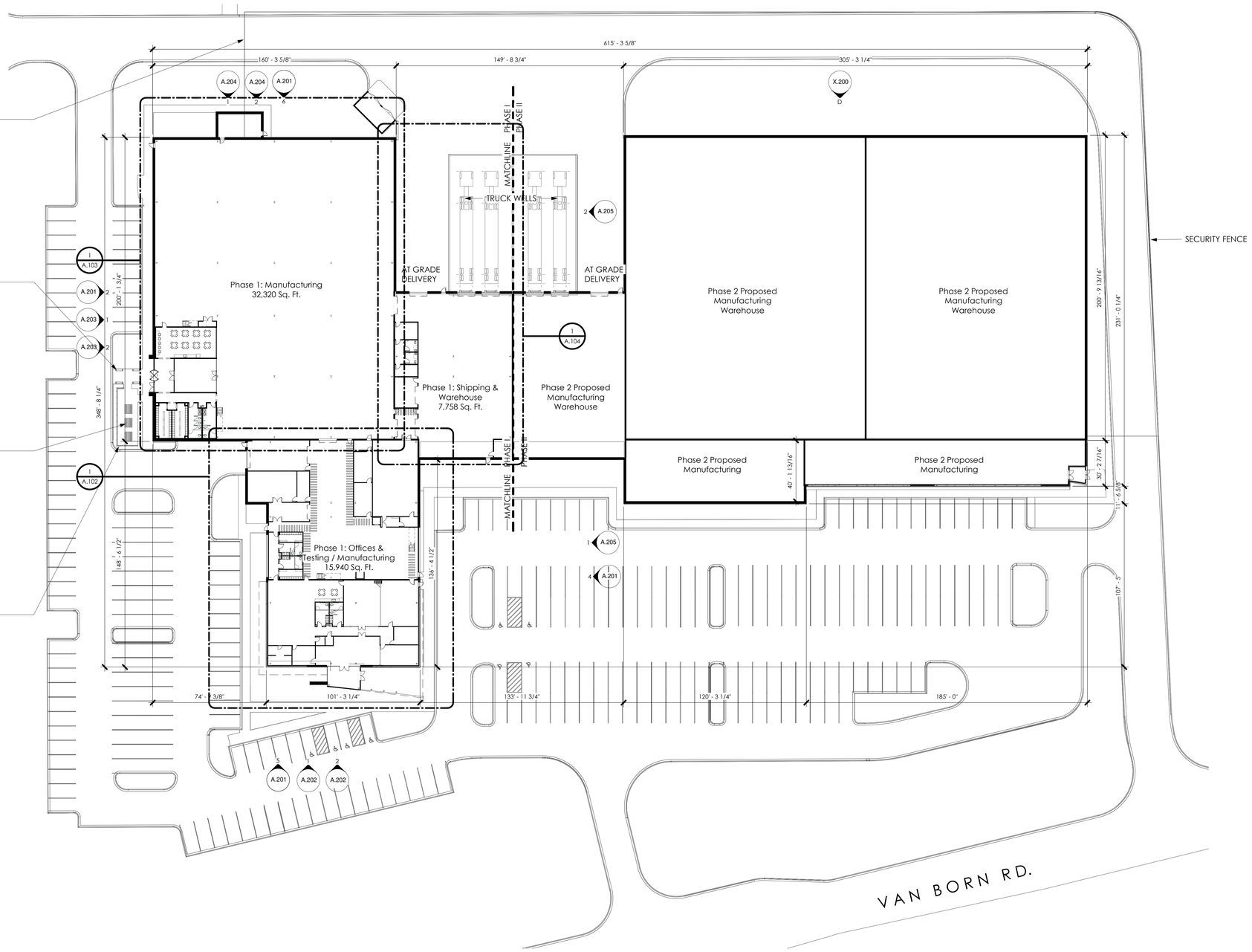
MAKE: Site Scapes
MODEL: FS1-1100 Six foot, Backless Bench, Ipe

Wynne Picnic Tables

MAKE: Site Scapes
MODEL: WN6-4451, 72 x 30inch Table Top, 4ft benches, Surface Mount

eGlass Element Glass Railing

MAKE: eGlass Railing
MODEL: EGLASS ELEMENT, FLOOR MOUNT, FLAT DECK, 36" RAILING SYSTEM



Overall Phasing Plan

1" = 30'-0"

TYC™

Client:
S.E. Graham & Associates, Inc.
22526 Maple St.
St. Clair Shores, MI 48081

Project:
TYC - Americas
44168 Van Born Rd.
Van Buren Charter Twp. MI 48111

KRIEGER KLATT ARCHITECTS
2120 E. 11 Mile Rd. | Royal Oak, MI 48067
P: 248.414.9270 F: 248.414.9275
www.kriegerklatt.com

PRELIMINARY NOT FOR CONSTRUCTION

Issued	Description	By
01-11-2023	Planning Submittal	
03-29-2023	Planning Resubmittal	

Seal:

Note:
Do not scale drawings. Use calculated dimensions only. Verify existing conditions in field.

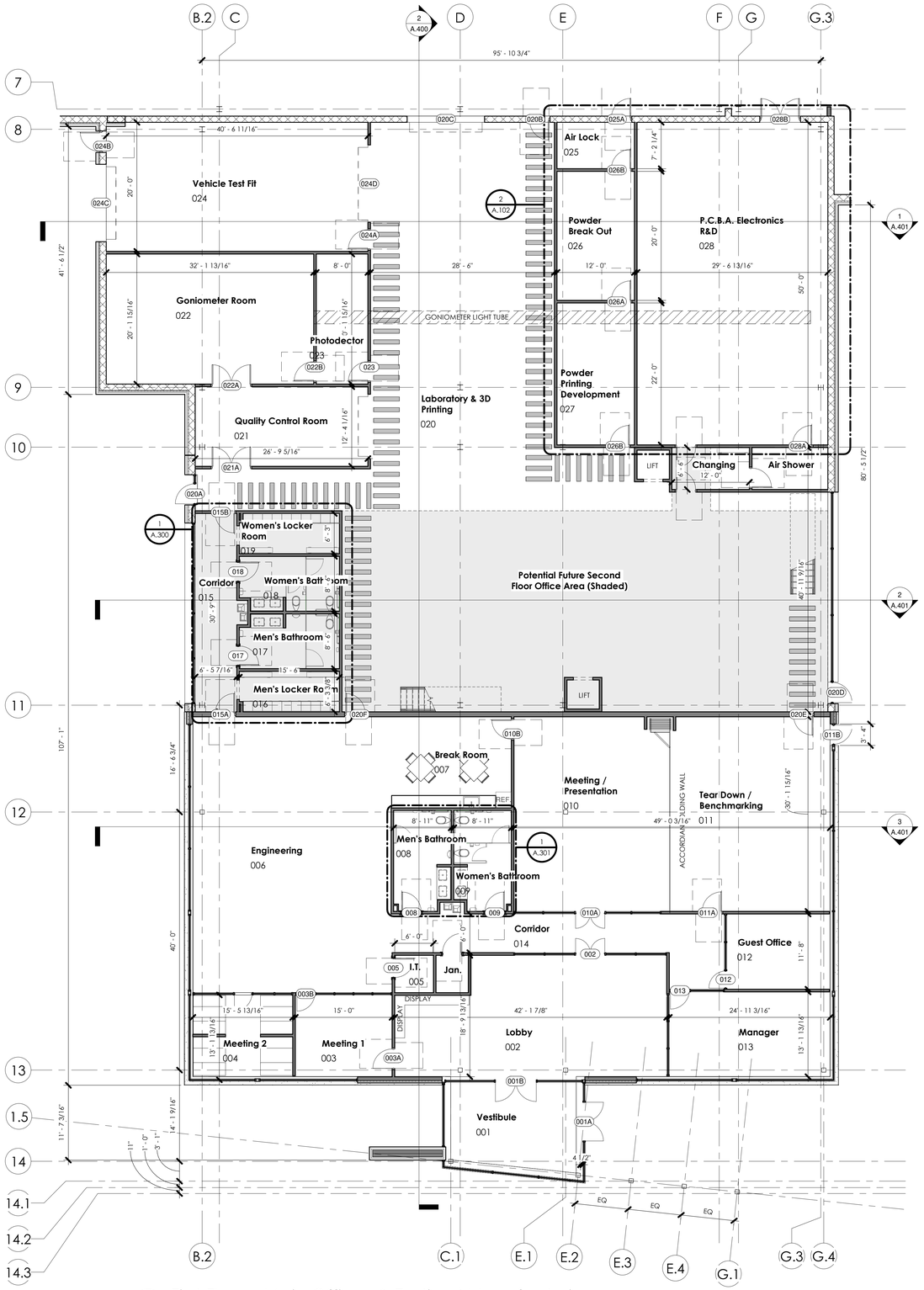
North Arrow:

Sheet Title:
Overall Phasing Plan

Project Number:
Project Number

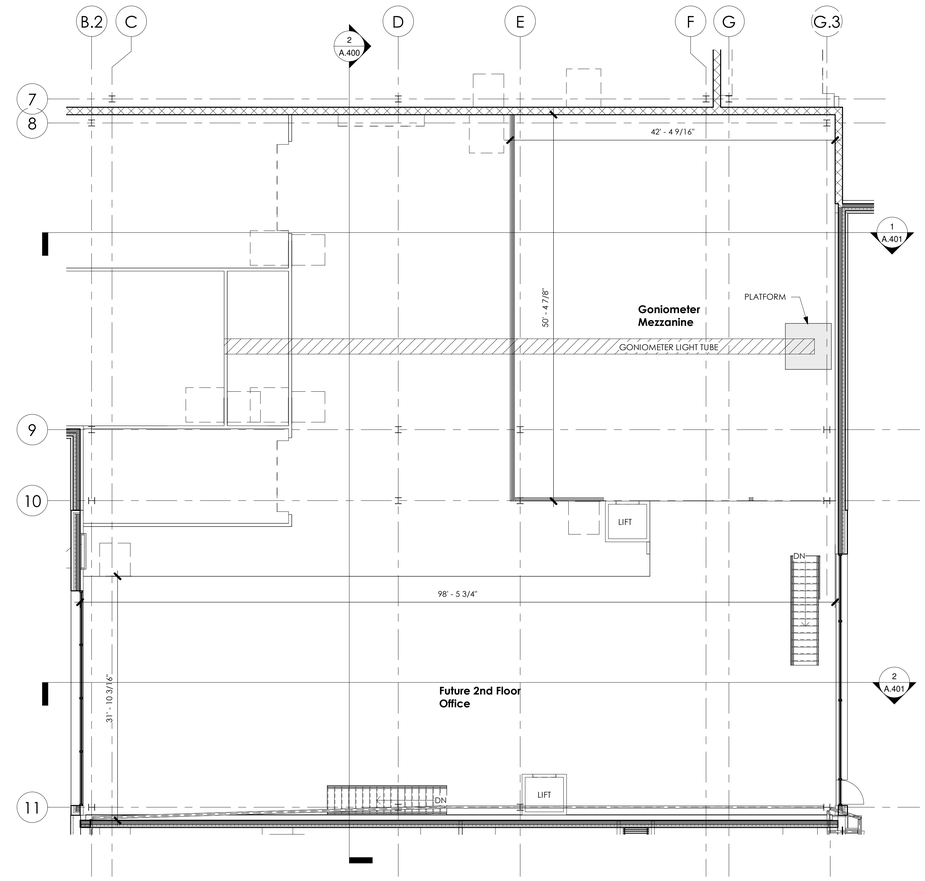
Scale:
1" = 30'-0"

Sheet Number:
A.101



1 A.101 First Floor - Main Offices & Testing/ Manufacturing

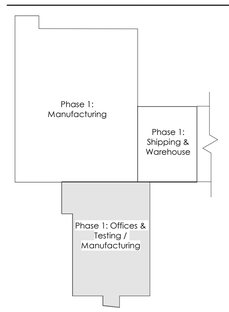
1/8" = 1'-0"



2 A.102 Mezzanine Floor Plan

1/8" = 1'-0"

KEY PLAN - OFFICES & TESTING



GENERAL FLOOR PLAN NOTES

1. SEE CIVIL DRAWINGS FOR SITE WORK AND SIDEWALK DETAILS.
2. REFER TO ENLARGED PLANS FOR ALL ELEVATOR AND STAIRWAY DIMENSIONS AND NOTES.
3. ACCESS CONTROLS WILL BE PROVIDED BY THE OWNER. THE GENERAL CONTRACTOR IS TO COORDINATE
4. SEE STOREFRONT WINDOW ELEVATIONS FOR WINDOW SIZES
5. SEE CODE COMPLIANCE SHEET FOR REQUIRED FIRE RESISTANCE RATINGS
6. ALL PENETRATIONS OF FIRE RATED ASSEMBLIES SHALL BE FIRE BLOCKED AND SEALED PER UL APPROVED METHODS.
7. ALL CONCEALED FIRE RATED ASSEMBLIES SHALL BE PROVIDED WITH SIGNAGE INDICATING THE TYPE OF ASSEMBLY AND THE FIRE RATING IN HOURS IN LETTERS NO SMALLER THAN 2" HIGH (PER CODE).
8. CONTRACTOR IS RESPONSIBLE FOR INSTALLING ALL BLOCKING AND REINFORCING AS REQ'D. FOR THE INSTALLATION OF, INCLUDING, BUT NOT LIMITED TO: TOILET PARTITIONS, TOILET ACCESSORIES, HANDRAILS, SIGNAGE AND MILLWORK.

PRELIMINARY NOT FOR CONSTRUCTION

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Issued	Description	By
01-11-2023	Planning Submittal	
03-29-2023	Planning Resubmittal	

Seal:

Note:
Do not scale drawings. Use calculated dimensions only. Verify existing conditions in field.

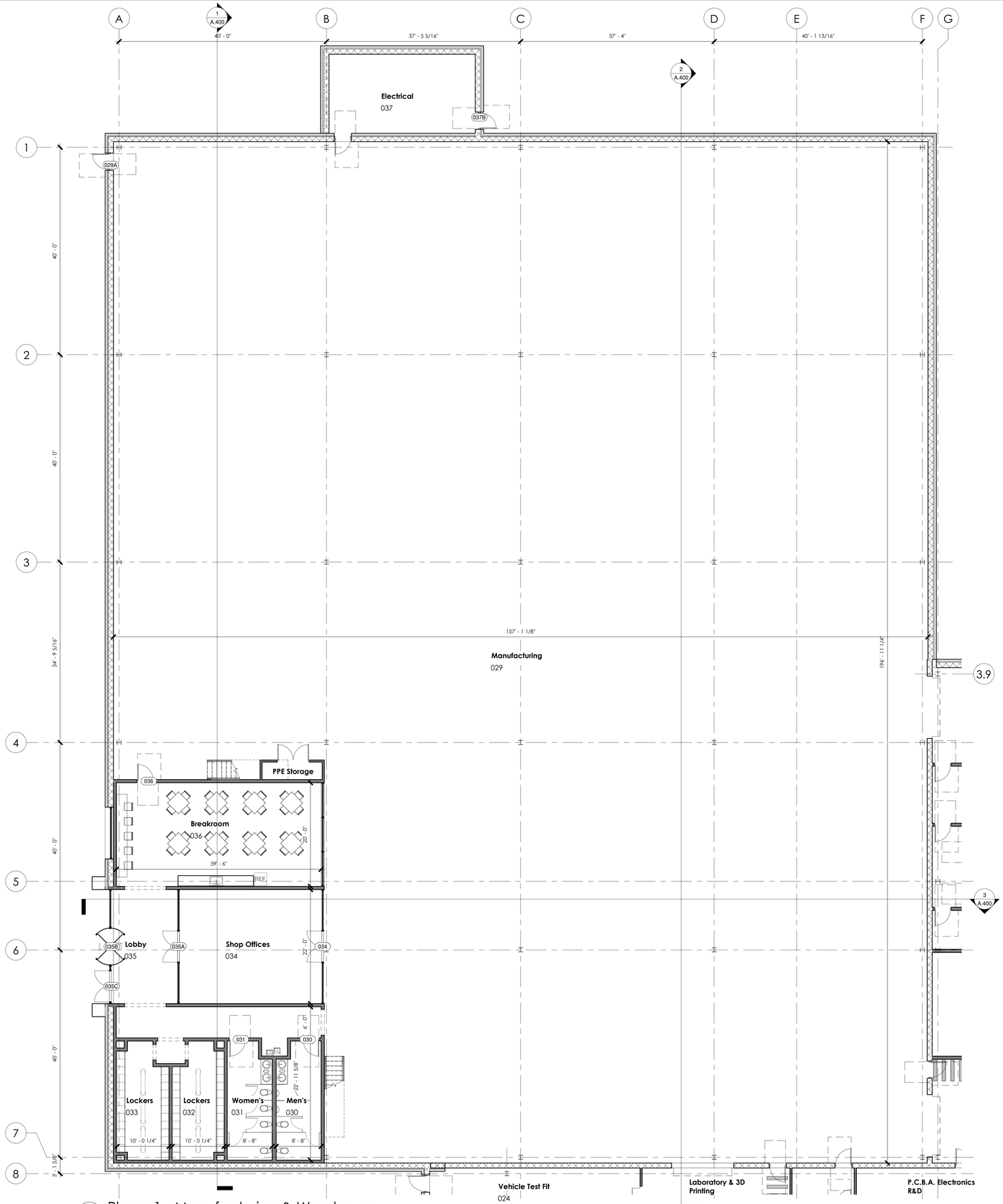
North Arrow:

Sheet Title:
Phase 1 - Offices & Testing Plans

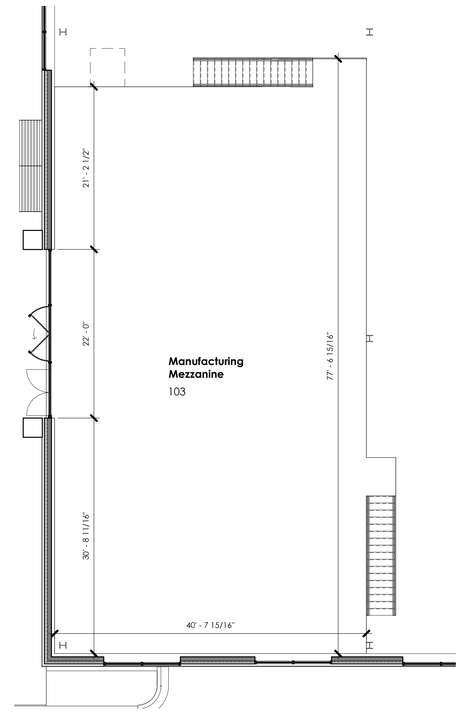
Project Number:
Project Number

Scale:
As indicated

Sheet Number:
A.102

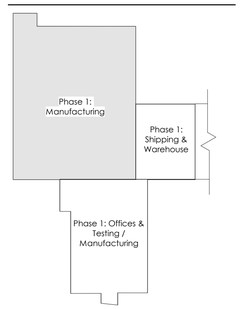


1 A.101 Phase 1 - Manufacturing & Warehouse
1/8" = 1'-0"



2 A.400 Manufacturing Mezzanine
1/8" = 1'-0"

KEY PLAN - MANUFACTURING



GENERAL FLOOR PLAN NOTES

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2. REFER TO ENLARGED PLANS FOR ALL ELEVATOR AND STAIRWAY DIMENSIONS AND NOTES.
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4. SEE STOREFRONT WINDOW ELEVATIONS FOR WINDOW SIZES
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6. ALL PENETRATIONS OF FIRE RATED ASSEMBLIES SHALL BE FIRE BLOCKED AND SEALED PER UL APPROVED METHODS.
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01-11-2023	Planning Submittal	
03-29-2023	Planning Resubmittal	

Seal:

Note:
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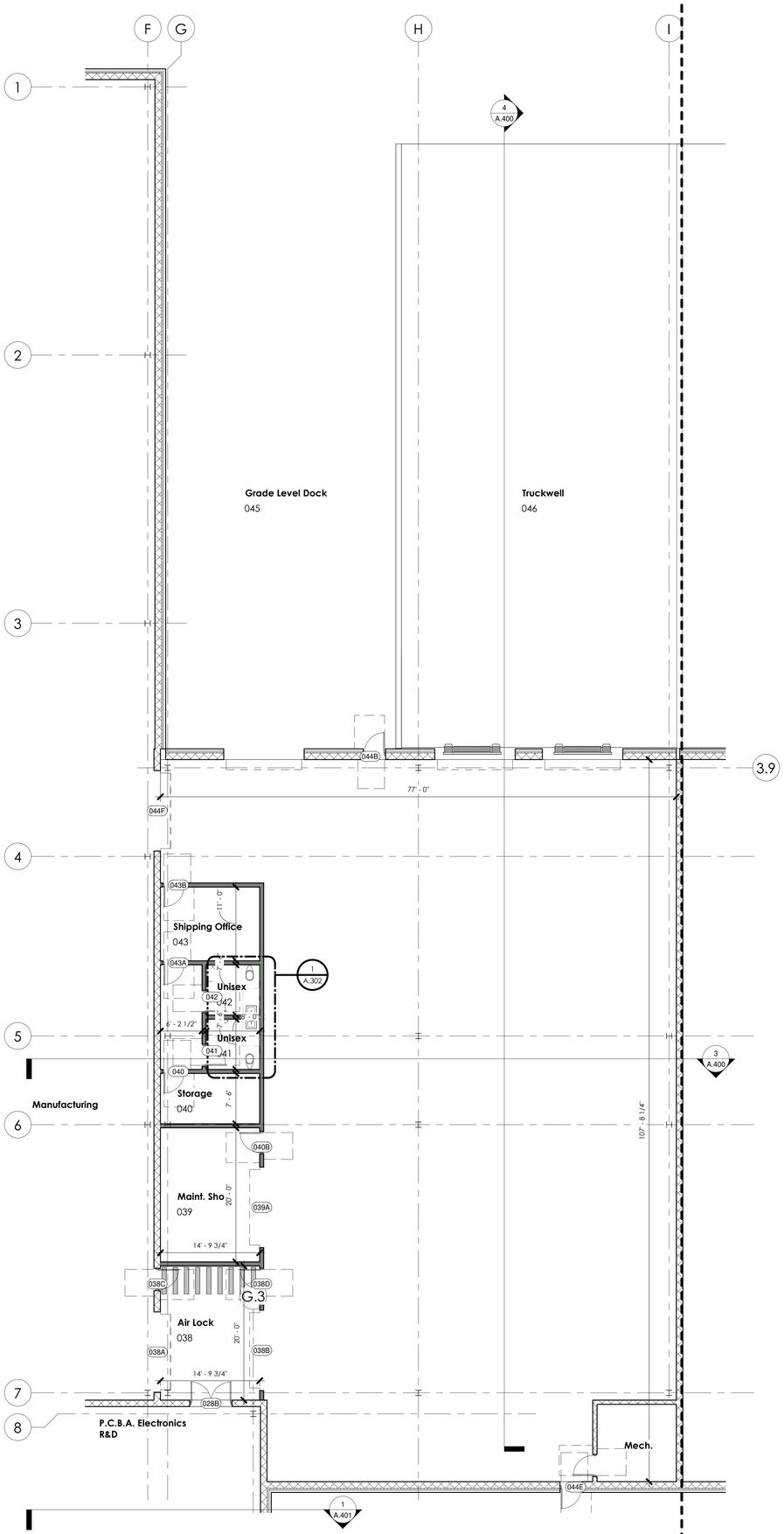
North Arrow:

Sheet Title:
Phase 1 - Manufacturing Plans

Project Number:
Project Number

Scale:
As indicated

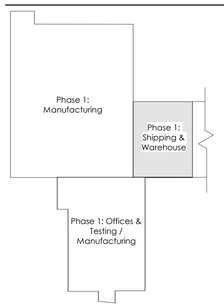
Sheet Number:
A.103



1 A.101 Phase 1 - Shipping and Warehouse

1/8" = 1'-0"

KEY PLAN - SHIPPING & WAREHOUSE



GENERAL FLOOR PLAN NOTES

1. SEE CIVIL DRAWINGS FOR SITE WORK AND SIDEWALK DETAILS.
2. REFER TO ENLARGED PLANS FOR ALL ELEVATOR AND STAIRWAY DIMENSIONS AND NOTES.
3. ACCESS CONTROLS WILL BE PROVIDED BY THE OWNER. THE GENERAL CONTRACTOR IS TO COORDINATE
4. SEE STOREFRONT WINDOW ELEVATIONS FOR WINDOW SIZES
5. SEE CODE COMPLIANCE SHEET FOR REQUIRED FIRE RESISTANCE RATINGS
6. ALL PENETRATIONS OF FIRE RATED ASSEMBLIES SHALL BE FIRE BLOCKED AND SEALED PER UL APPROVED METHODS.
7. ALL CONCEALED FIRE RATED ASSEMBLIES SHALL BE PROVIDED WITH SIGNAGE INDICATING THE TYPE OF ASSEMBLY AND THE FIRE RATING IN HOURS IN LETTERS NO SMALLER THAN 2" HIGH (PER CODE).
8. CONTRACTOR IS RESPONSIBLE FOR INSTALLING ALL BLOCKING AND REINFORCING AS REQ'D. FOR THE INSTALLATION OF, INCLUDING, BUT NOT LIMITED TO; TOILET PARTITIONS, TOILET ACCESSORIES, HANDRAILS, SIGNAGE AND MILLWORK.

PRELIMINARY NOT FOR CONSTRUCTION

Client:

S.E. Graham & Associates, Inc.
22526 Maple St.
St. Clair Shores, MI 48081

Project:

TYC - Americas
44168 Van Born Rd.
Van Buren Charter Twp. MI 48111

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Issued	Description	By
03-29-2023	Planning Resubmittal	

Seal:

Note:

Do not scale drawings. Use calculated dimensions only. Verify existing conditions in field.

North Arrow:

Sheet Title:

Phase 1 - Shipping and Warehouse Plans

Project Number:

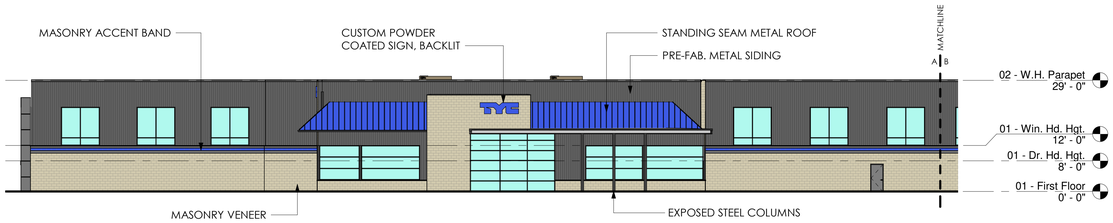
Project Number

Scale:

As indicated

Sheet Number:

A.104



1 A.101 South Elevation (Front, Phase 1) A
1/16" = 1'-0"

5 A.101 South Elevation (Front, Phase 2) B
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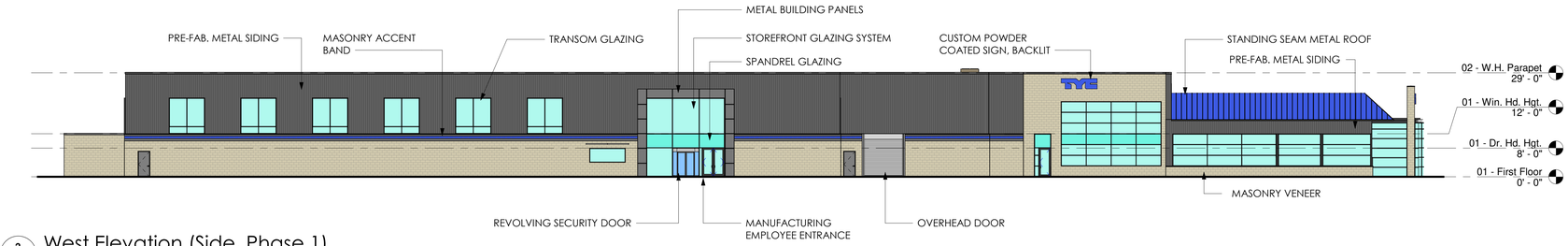

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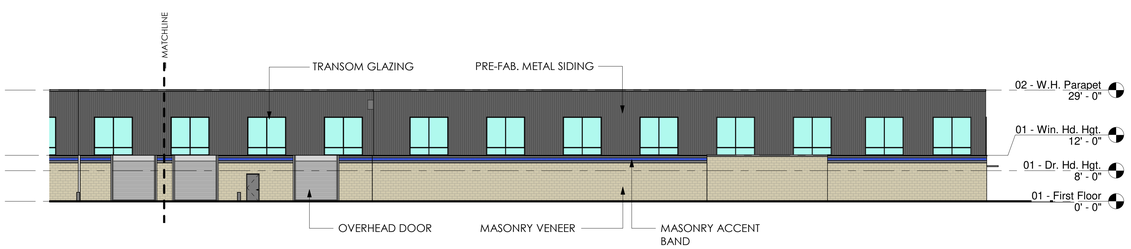

6 A.101 North Elevation (Rear, Phase 1) A
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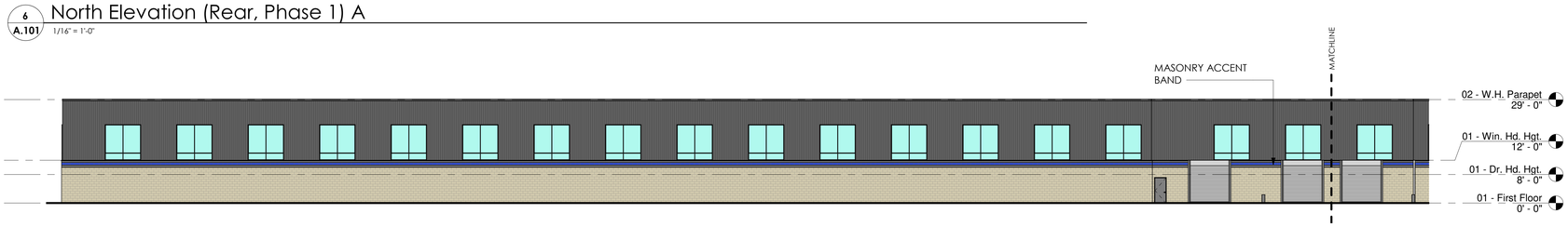

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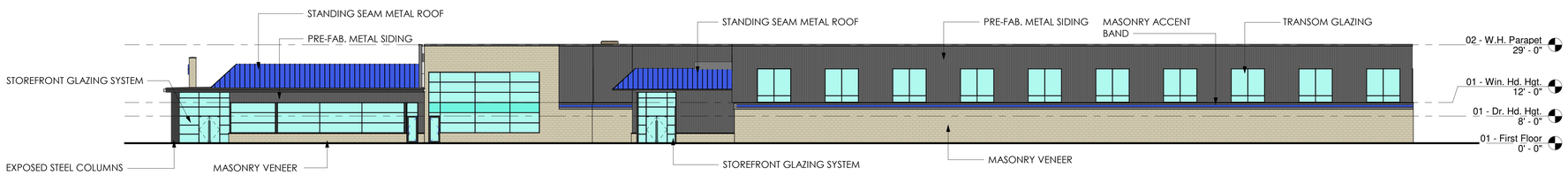

4 A.101 East Elevation (Side, Phase 1 & 2)
1/16" = 1'-0"

PRELIMINARY NOT FOR CONSTRUCTION

Client:
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TYC - Americas
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01-11-2023	Planning Submittal	
03-29-2023	Planning Resubmittal	

Seal:

Note:
Do not scale drawings. Use calculated dimensions only. Verify existing conditions in field.

North Arrow:

Sheet Title:
Overall Elevations

Project Number:
Project Number

Scale:
1/16" = 1'-0"

Sheet Number:
A.201

TYC

Traffic Impact Study

Proposed Mixed-Use Development
Van Born Road & Sheldon Road
Township of Van Buren
Wayne County, Michigan

Prepared for:
S.E Graham Associates, INC.

Date: March 31, 2023

SE&D Job Number: DET-220348

John R. Corak, PE
Project Manager
License No. 6201070230

STONEFIELD
607 Shelby St, Suite 200
Detroit, MI 48226

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INTRODUCTION

This Traffic Impact Study was prepared to investigate the potential impacts of the proposed mixed-use development on the adjacent roadway network. The subject property is located at the northeasterly corner of the intersection of Van Born Road and Sheldon Road, in the Township of Van Buren, Wayne County, Michigan. The site location is shown on appended **Figure 1**.

The subject property is designated as Parcel ID 89-009-99-0005-000. The site has approximately 802 feet of frontage along Van Born Road and approximately 809 feet of frontage along Sheldon Road. The existing site is undeveloped with no access provided. Under Phase 1 of the proposed development program 40,078 square feet of manufacturing space and 19,060 square feet of research and development space would be constructed. As part of a future development plan, an additional 78,845 square-feet of manufacturing space would be constructed. Access is proposed via two (2) full-movement driveways along Van Born Road and one (1) full-movement driveway along Sheldon Road.

METHODOLOGY

Stonefield Engineering & Design, LLC has prepared this Traffic Impact Study in accordance with the recommended guidelines and practices outlined by the Institute of Transportation Engineers (ITE) within Transportation Impact Analyses for Site Development. A detailed field investigation was performed to assess the existing conditions of the adjacent roadway network. A data collection effort was completed to identify the existing traffic volumes at the study intersections to serve as a base for the traffic analyses. Capacity analysis, a procedure used to estimate the traffic-carrying ability of roadway facilities over a range of defined operating conditions, was performed using the Highway Capacity Manual, 6th Edition (HCM) and the Synchro 11 Software for all study conditions to assess the roadway operations.

For an unsignalized intersection, Level of Service (LOS) A indicates operations with delay of less than 10 seconds per vehicle, while LOS F describes operations with delay in excess of 50 seconds per vehicle. For a signalized intersection, LOS A indicates operations with delay of less than 10 seconds per vehicle, while LOS F describes operations with delay in excess of 80 seconds per vehicle. The Technical Appendix contains the Highway Capacity Analysis Detail Sheets for the study intersections analyzed in this assessment. The traffic signal timing utilized within the signalized analysis is based on field recordings.

2023 EXISTING CONDITION

2023 EXISTING ROADWAY CONDITIONS

The proposed mixed-use development is located at the northeasterly corner of the intersection of Van Born Road and Sheldon Road, in the Township of Van Buren, Wayne County, Michigan. The subject property is designated as Parcel ID 89-009-99-0005-000. The site has approximately 802 feet of frontage along Van Born Road and approximately 809 feet of frontage along Sheldon Road. Land uses in the area are a mix of residential, office, and warehousing uses.

Van Born Road is classified as a Minor Arterial roadway with a general east-west orientation and is under the jurisdiction of Wayne County. Along the site frontage, the roadway provides one (1) lane of travel in each direction and has a posted speed limit of 50 mph. Curb and sidewalk are not provided, shoulders are provided along both sides of the roadway, and on-street parking is not permitted. Van Born Road provides east-west mobility within the Township of Van Buren and surrounding municipalities for a mix of residential, office, and warehousing uses along its length.

Sheldon Road is classified as a Major Collector roadway with a general north-south orientation and is under the jurisdiction of Wayne County. Along the site frontage, the roadway provides one (1) lane of travel in each direction and has a posted speed limit of 45 mph. Curb and sidewalk are not provided, shoulders are provided along both sides of the roadway, and on-street parking is not permitted. Sheldon Road provides north-south mobility within the Township of Van Buren and surrounding municipalities and provides access to U.S. Route 12 to the north of the site for a mix of residential, office, and warehousing uses along its length.

Belleville Road is classified as a Minor Arterial roadway with a general north-south orientation and is under the jurisdiction of Wayne County. In the vicinity of the site the roadway provides two (2) lanes of traffic in each direction and has a posted speed limit of 45 mph. Curb and sidewalk are not provided, shoulders are provided along both sides of the roadway, and on-street parking is not permitted. Belleville Road provides north-south mobility within the Township of Van Buren and surrounding municipalities and provides access to U.S. Route 12 to the north of the site for a mix of residential, office, and warehousing uses along its length.

Haggerty Road is classified as a Minor Arterial roadway with a general north-south orientation and is under the jurisdiction of Wayne County. In the vicinity of the site the roadway provides one (1) lane of travel in each direction, with additional lanes provided at key intersections to facilitate turning movements and has a posted speed limit of 45 mph. Curb and sidewalk are generally not provided, shoulders are provided along both sides of the roadway, and on-street parking is not permitted. Haggerty Road provides north-south mobility within

the Township of Van Buren and surrounding municipalities and provides access to U.S. Route 12 to the north of the site for a mix of residential, office, commercial, and retail uses along its length

Van Born Road and Sheldon Road intersect to form an unsignalized four (4)-leg intersection with the northbound and southbound approaches of Sheldon Road operating under stop control. The eastbound and westbound approaches of Van Born Road each provide one (1) full-movement lane. The northbound and southbound approaches of Sheldon Road each provide one (1) full-movement lane. Crosswalks and pedestrian ramps are not provided.

Van Born Road and Belleville Road intersect to form an unsignalized T-intersection with the westbound approach of Van Born Road operating under stop control. The westbound approach of Van Born Road provides one (1) exclusive left-turn lane and one (1) exclusive right-turn lane. The northbound approach of Belleville Road provides one (1) exclusive through lane and (1) shared through/right-turn lane and the southbound approach of Belleville Road provides one (1) shared left-turn/through lane and one (1) exclusive through lane. Crosswalks and pedestrian ramps are not provided.

Van Born Road and Haggerty Road intersection to form a controlled by a four (4)-leg intersection controlled by a two (2)-phase traffic signal operating on an 80-second background cycle length. The eastbound and westbound approaches of Van Born Road each provide one (1) exclusive left-turn lane, one (1) exclusive through lane, and one (1) shared through/right-turn lane. The northbound and southbound approaches of Haggerty Road each provide one (1) exclusive left-turn lane, one (1) exclusive through lane, and one (1) shared through/right-turn lane. Crosswalks and pedestrian ramps are not provided.

2023 EXISTING TRAFFIC VOLUMES

Turning movement counts were collected during the typical weekday morning and weekday evening time periods to evaluate existing traffic conditions and identify the specific hours when traffic activity on the adjacent roadways is at a maximum and could be potentially impacted by the development of the site. Turning movement counts were collected at the following intersections:

- Van Born Road & Sheldon Road
- Van Born Road & Belleville Road
- Van Born Road & Haggerty Road

Specifically, turning movement counts were conducted on Tuesday, March 14, 2023, from 7:00 a.m. to 9:00 a.m. and from 4:00 p.m. to 6:00 p.m.

The study time periods were chosen as they are representative of the peak periods of both the adjacent roadway network and the proposed development. The traffic volume data was collected and analyzed to identify the design peak hour in accordance with HCM and ITE guidelines. Based on the review of the count

data the weekday morning peak hour occurred from 7:30 a.m. to 8:30 a.m. and the weekday evening peak hour occurred from 4:15 p.m. to 5:15 p.m. The Technical Appendix contains a summary of the turning movement count data. The 2023 Existing weekday morning and weekday evening peak-hour volumes are summarized on appended **Figure 2**.

2023 EXISTING LOS/CAPACITY ANALYSIS

A Level of Service and Volume/Capacity analysis was conducted for the 2023 Existing Condition during the weekday morning and weekday evening peak hours at the study intersections. Under the existing condition, the tuning movements at the unsignalized intersection of Sheldon Road and Van Born Road are calculated to operate at Level of Service B or better during the weekday morning peak hour and at Level of Service C or better during the weekday evening peak hour. The turning movements at the unsignalized intersection of Belleville Road and Van Born Road are calculated to operate at Level of Service E or better during the weekday morning peak hour and the westbound left-turn movement is calculated to operate under capacity constraints during the weekday evening peak hour. The signalized intersection of Haggerty Road and Van Born Road is calculated to operate at overall Level of Service B during the weekday morning and weekday evening peak hours.

2025 NO-BUILD CONDITION

BACKGROUND GROWTH

The 2023 Existing Condition traffic volume data was grown to a future horizon year of 2025, which is a conservative estimate for when the proposed mixed-use development is expected to be fully constructed. Based on Michigan Department of Transportation (MDOT) traffic count data collected along Van Born Road in 2010 and 2021, the existing traffic volumes at the study intersections were increased by 1.90% annually for two (2) years.

2025 NO-BUILD TRAFFIC VOLUMES

The background growth rate was applied to the 2023 Existing Traffic Volumes to calculate the 2025 No-Build Traffic Volumes for the weekday morning and weekday evening peak hours. These volumes are summarized on appended **Figure 3**.

2025 NO-BUILD LOS/CAPACITY ANALYSIS

A Level of Service and Volume/Capacity analysis was also conducted for the 2025 No-Build Condition during the weekday morning and weekday evening peak hours at the study intersections. The tuning movements at the unsignalized intersection of Sheldon Road and Van Born Road are calculated to operate generally

consistent with the findings of the Existing Condition during the weekday morning and weekday evening peak hours. The turning movements at the unsignalized intersection of Belleville Road and Van Born Road are calculated to operate generally consistent with the findings of the Existing Condition during the weekday morning peak hour and the westbound left-turn movement is calculated to operate under capacity constraints during the weekday evening peak hour. The signalized intersection of Haggerty Road and Van Born Road is calculated to operate generally consistent with the findings of the Existing Condition during the weekday morning and weekday evening peak hours.

2025 BUILD CONDITION

The site-generated traffic volume of the proposed mixed-use development was estimated to identify the potential impacts of the project. For the purpose of this analysis, a complete project "build out" is assumed within two (2) years of the preparation of this study.

TRIP GENERATION

Trip generation projections for the proposed mixed-use development were prepared utilizing the Institute of Transportation Engineers' (ITE) Trip Generation Manual, 11th Edition. Trip generation rates associated with Land Use 140 "Manufacturing" were cited for the proposed manufacturing space and trip generation rates associated with Land Use 760 "Research and Development Center" were cited for the proposed engineering, research, and design space. **Table 1** provides the weekday morning and weekday evening peak hour trip generation volumes associated with the proposed development.

TABLE 1 – PROPOSED TRIP GENERATION

Land Use	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
	Enter	**Exit**	**Total**	**Enter**	**Exit**	**Total**
Phase 1 Trip Generation						
40,078 SF Manufacturing *ITE Land Use 140*	26	8	34	5	12	17
19,060 SF Research and Development Center *ITE Land Use 760*	34	8	42	7	34	41
Total Phase 1 Trip Generation	**60**	**16**	**76**	**12**	**46**	**58**
Future Phase Trip Generation						
78,845 SF Manufacturing *ITE Land Use 140*	44	14	58	16	35	51
Total Phase 1 and Phase 2 Trip Generation	**104**	**30**	**134**	**28**	**81**	**109**

TRIP ASSIGNMENT/DISTRIBUTION

The trips generated by the proposed development were distributed according to the existing travel pattern along the adjacent roadways and the access management plan of the site. The Site-Generated Traffic Volumes are illustrated on **Figure 4**.

2025 BUILD TRAFFIC VOLUMES

The site-generated trips were added to the 2025 No-Build Traffic Volumes to calculate the 2025 Build Traffic Volumes and are shown on appended **Figure 5**.

2025 BUILD LOS/CAPACITY ANALYSIS

A Level of Service and Volume/Capacity analysis was also conducted for the 2025 Build Condition during the weekday morning and weekday evening peak hours at the study intersections and proposed site driveways. Appended **Table A1** compares the Existing, No-Build, and Build Conditions Level of Service and delay values.

The tuning movements at the unsignalized intersection of Sheldon Road and Van Born Road are calculated to operate at Level of Service C or better during the weekday morning and weekday evening peak hours. The westbound left-turn movement at the intersection of Van Born Road and Belleville Road is calculated to operate under capacity constraints during the weekday morning and weekday evening peak hours. The signalized intersection of Haggerty Road and Van Born Road is calculated to operate generally consistent with the findings of the No-Build Condition during the weekday morning and weekday evening peak hours. The turning movements at the site driveways along Van Born Road are calculated to operate at Level of Service B or better

during the weekday morning and weekday evening peak hours. The turning movements at the site driveway along Sheldon Road are calculated to operate at Level of Service A during the weekday morning and weekday evening peak hours.

SIMTRAFFIC ANALYSIS

SimTraffic analysis was utilized to assess the queuing at the intersection of Van Born Road and Sheldon Road as well as the site driveway along Sheldon Road. Under the 2025 Build Condition, the 95th percentile southbound queue was calculated to be 77 feet (approximately three (3) vehicles) during the weekday morning peak hour and 80 feet (approximately three (3) vehicles) during the weekday evening peak hour. Additionally, the southbound queue at the Sheldon Road site driveway was calculated to be 13 feet (approximately one (1) vehicle) during the weekday morning peak hour and six (6) feet (approximately one (1) vehicle) during the weekday evening peak hour. The proposed driveway along Sheldon Road would be located approximately 185 feet from the railroad crossing to the north. This equates to a southbound queue of approximately seven (7) vehicles at the southerly site driveway before the queue has an adverse impact on the railroad crossing. As such, the queueing at the Sheldon Road site driveway and at the intersection of Sheldon Road and Van Born Road would not impact the existing railroad crossing to the north of the site.

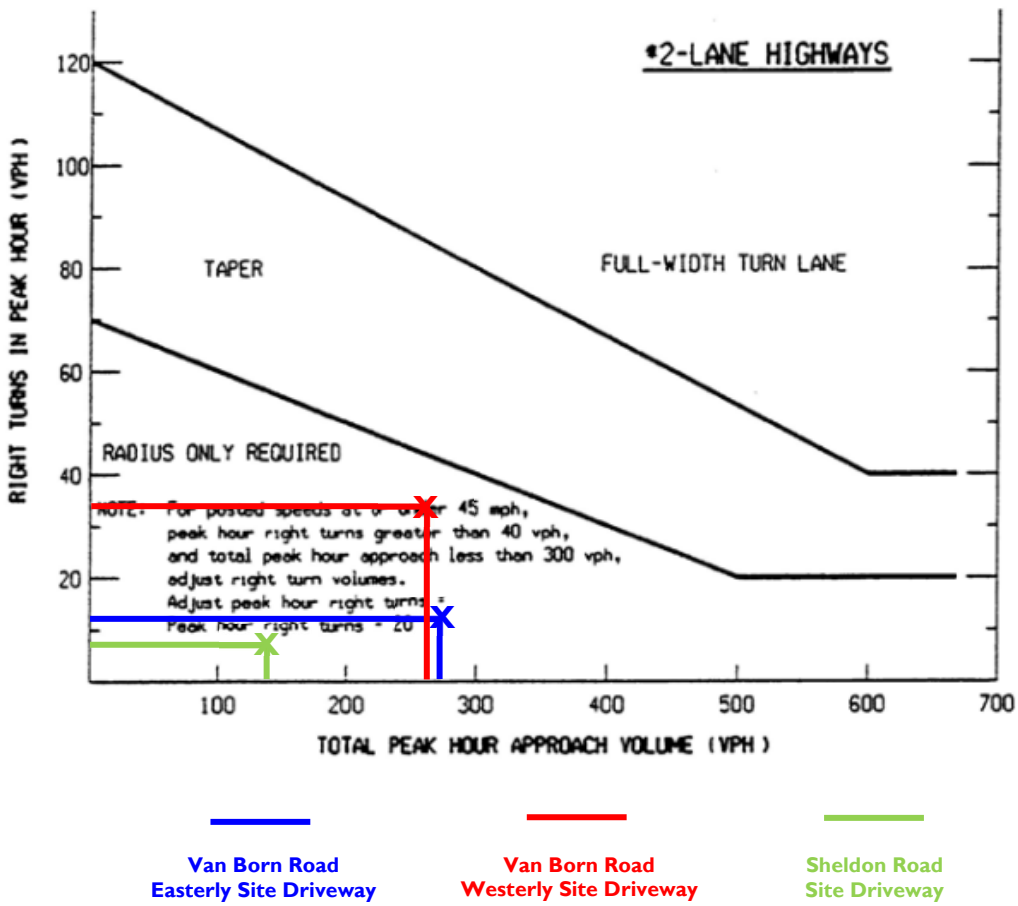
VAN BORN ROAD & BELLEVILLE ROAD MITIGATION

Based on the Level of Service and Volume/Capacity analysis conducted, the westbound left-turn movement at the intersection Van Born Road and Belleville Road is calculated to operate under capacity constraints throughout the Existing, No-Build, and Build Conditions during the weekday evening peak hour. To address delays and queuing at the intersection, it is recommended that the intersection be upgraded to accommodate the present-day volumes. Potential improvements may consist of a traffic signal, roundabout, or other traffic control device. It is noted that the proposed development would add one (1) additional westbound left-turn during the weekday morning peak hour and four (4) additional westbound left-turns during the weekday evening peak hour, an approximate 3% increase to the total left-turn volume along Van Buren Road. Potential traffic control alternatives should be explored as a potential mitigation by the Township independent of the subject application.

RIGHT-TURN LANE & TAPER ANALYSIS

The MDOT's Access Management Guidebook was used to determine the need for a right-turn lane or taper along Van Born Road and Sheldon Road at the proposed site driveways. To determine the need for a right-turn lane or taper, existing traffic volumes along Van Born Road and Sheldon Road and the trip generation of the proposed mixed-use development was used. Van Born Road and Sheldon Road are two (2) lane roadways with one (1) lane of travel in each direction along the site frontage. Based on appended Figure 5, the eastbound

through volume at the easterly site driveway along Van Born Road was calculated to be 263 vehicles during the weekday morning peak hour, the eastbound through volume at the westerly site driveway along Van Born Road was calculated to be 231 vehicles during the weekday morning peak hour, and the northbound through volume at the site driveway along Sheldon Road was calculated to be 130 vehicles during the weekday morning peak hour. The figure below depicts the MDOT's Right-Turn Lane and Taper Guidelines for two (2) lane roadways.



Based on the right-turn lane and taper analysis conducted, which utilized MDOT's Access Management Guidebook, the proposed site driveways along Van Born Road and Sheldon Road would not require a right-turn lane or taper. It is proposed to construct a 75-foot right-turn deceleration lane along Van Born Road at both of the proposed site driveways due to the high speed of the roadway.

CONCLUSIONS

This report was prepared to examine the potential traffic impact of the proposed mixed-use development. The analysis findings, which have been based on industry-standard guidelines, indicate that the proposed development would not have a significant impact on the traffic operations of the adjacent roadway network.

Based on the existing delays at the intersection of Van Born Road and Belleville Road, it is recommended that the intersection be upgraded, consisting of a traffic signal, roundabout, or other traffic control device, to accommodate the present-day volumes. Traffic control alternatives should be explored as a potential mitigation by the Township independent of the subject application due to the existing delays and queuing at the intersection and the minimal traffic volume being added by the proposed development to the critical movements at the intersection. It is proposed to construct right-turn deceleration lanes along Van Born Road at both of the proposed site driveways due to the high speed of the roadway. The southbound queuing at the intersection of Sheldon Road and Van Born Road and at the site driveway along Sheldon Road would not have an impact on the existing railroad crossing to the north of the site. The site driveways and on-site layout have been designed to provide effective access to and from the subject property.

Z:\Michigan\DET\2022\DET-220348-S.E. Graham & Associates-NEC Van Born Road & Sheldon Road, Van Buren Township, MI\Calculations & Reports\Traffic\Reports\2023-03 Traffic Impact Study\2023-03 Traffic Impact Study.docx

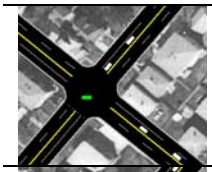
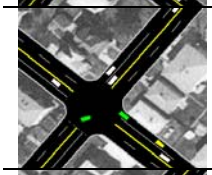
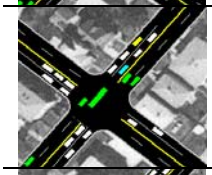
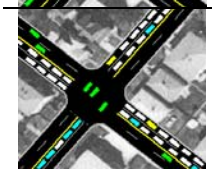
TECHNICAL APPENDIX

LEVEL OF SERVICE/AVERAGE CONTROL DELAY CRITERIA & COMPARISON TABLES

LEVEL OF SERVICE /AVERAGE CONTROL DELAY CRITERIA

The ability of a roadway to effectively accommodate traffic demand is determined through an assessment of the volume-to-capacity ratio, delay and Level of Service of the lane group and/or intersection. The volume-to-capacity ratio is the ratio of traffic flow rate to capacity for a given transportation facility. As defined within the Highway Capacity Manual, 6th Edition (HCM), intersection delay is the total additional travel time experienced by drivers, passengers, or pedestrians as a result of control measures and interaction with other users of the facility, divided by the volume departing from the corresponding cross section of the facility. Level of service is a qualitative measure describing operational conditions within a traffic stream, based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience.

For an unsignalized intersection, LOS A indicates operations with delay less than 10 seconds per vehicle, while LOS F describes operations with delay in excess of 50 seconds per vehicle. For a signalized intersection, LOS A indicates operations with delay less than 10 seconds per vehicle and LOS F denotes operations with delay in excess of 80 seconds per vehicle.

	Level Of Service (LOS)	Signalized Delay Range (average control delay in sec/veh)	Unsignalized Delay Range (average control delay in sec/veh)
	A	<=10	<=10
	B	>10 and <=20	>10 and <=15
	C	>20 and <=35	>15 and <=25
	D	>35 and <=55	>25 and <=35
	E	>55 and <=80	>35 and <=50
	F	>80	>50

Source: Highway Capacity Manual, 6th Edition

STONEFIELD

Table A1: Comparative Level of Service (Delay) Table
Township of Van Buren, Wayne County, Michigan
X (n) = Level of Service (seconds of delay)

		Weekday Morning Peak Hour			Weekday Evening Peak Hour		
Intersection	**Lane Group**	**2023 Existing Condition**	**2025 No-Build Condition**	**2025 Build Condition**	**2023 Existing Condition**	**2025 No-Build Condition**	**2025 Build Condition**
Sheldon Road & Van Born Road	EB Left/Through/Right	A (7.8)	A (7.8)	A (7.9)	A (7.9)	A (7.9)	A (8.0)
	WB Left/Through/Right	A (7.6)	A (7.6)	A (7.6)	A (7.9)	A (7.9)	A (8.0)
	NB Left/Through/Right	B (12.1)	B (12.2)	B (12.8)	C (15.5)	C (15.9)	C (16.6)
	SB Left/Through/Right	B (13.7)	B (14.0)	C (15.0)	C (21.1)	C (22.7)	C (24.8)
Belleville Road & Van Born Road	WB Left	E (40.0)	E (44.9)	F (55.6)	F (734.7)	F (985.5)	F (1134.8)
	WB Right	B (11.6)	B (11.8)	B (11.9)	B (12.3)	B (12.5)	B (12.9)
	SB Left/Through	A (9.3)	A (9.5)	A (9.6)	B (10.8)	B (11.0)	B (11.1)
Haggerty Road & Van Born Road	EB Left	B (17.3)	B (17.5)	B (17.9)	B (18.6)	B (19.0)	B (19.1)
	EB Through	B (13.6)	B (13.7)	B (13.7)	B (14.7)	B (14.8)	B (15.1)
	EB Through/Right	B (13.6)	B (13.7)	B (13.8)	B (14.7)	B (14.8)	B (15.1)
	WB Left	B (14.8)	B (14.9)	B (15.0)	B (16.5)	B (16.7)	B (17.2)
	WB Through	B (14.2)	B (14.2)	B (14.4)	B (14.5)	B (14.6)	B (14.7)
	WB Through/Right	B (14.3)	B (14.4)	B (14.5)	B (14.7)	B (14.8)	B (14.9)
	NB Left	B (15.9)	B (15.9)	B (16.9)	B (16.4)	B (16.5)	B (16.7)
	NB Through	B (14.4)	B (14.4)	B (14.4)	B (15.0)	B (15.1)	B (15.1)
	NB Through/Right	B (14.4)	B (14.5)	B (14.5)	B (15.1)	B (15.1)	B (15.1)
	SB Left	B (15.9)	B (16.0)	B (16.0)	B (17.7)	B (17.9)	B (17.9)
	SB Through	B (14.5)	B (14.6)	B (14.6)	B (14.9)	B (15.0)	B (15.0)
	SB Through/Right	B (14.6)	B (14.7)	B (14.7)	B (15.1)	B (15.2)	B (15.2)
	Overall	**B (14.7)**	**B (14.8)**	**B (15.0)**	**B (15.4)**	**B (15.6)**	**B (15.7)**
Van Born Road & Easterly Site Driveway	SB Left/Right			B (11.7)			B (13.8)
Van Born Road & Westerly Site Driveway	EB Left/Through			A (7.9)			A (7.9)
	SB Left/Right			B (11.9)			B (14.5)
Sheldon Road & Site Driveway	WB Left/Right			A (9.0)			A (9.0)
	SB Left/Through			A (7.5)			A (7.5)

TURNING MOVEMENT COUNT DATA

Stonefield Engineering & Design, LLC

607 Shelby Street, Suite 200, Detroit, MI 48226
248.247.1115 t. 201.340.4472 f.

Intersection of Van Born Rd (EB/WB)
and Sheldon Rd (NB/SB)
Van Buren, Wayne County, Michigan
Tuesday, March 14, 2023

File Name : DET-220348.02
Site Code : 00220348
Start Date : 3/14/2023
Page No : 1

Groups Printed- Auto - HV - B/SB

	Van Born Rd Eastbound				Van Born Rd Westbound				Sheldon Rd Northbound				Sheldon Rd Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	7	31	0	38	0	23	14	37	1	1	0	2	10	1	4	15	92
07:15 AM	12	39	0	51	0	20	19	39	0	0	1	1	14	1	3	18	109
07:30 AM	14	27	0	41	0	33	23	56	0	2	0	2	13	1	6	20	119
07:45 AM	9	39	0	48	1	29	25	55	1	0	1	2	15	1	5	21	126
Total	42	136	0	178	1	105	81	187	2	3	2	7	52	4	18	74	446
08:00 AM	4	41	0	45	1	23	30	54	0	0	1	1	26	0	3	29	129
08:15 AM	6	54	0	60	0	41	12	53	1	1	0	2	23	0	4	27	142
08:30 AM	5	37	0	42	0	34	13	47	0	2	0	2	24	1	5	30	121
08:45 AM	7	40	1	48	0	21	17	38	0	1	0	1	17	0	4	21	108
Total	22	172	1	195	1	119	72	192	1	4	1	6	90	1	16	107	500
*** BREAK ***																	
04:00 PM	9	48	1	58	0	32	29	61	1	0	0	1	50	3	3	56	176
04:15 PM	12	74	2	88	0	41	20	61	0	2	0	2	25	0	9	34	185
04:30 PM	2	56	1	59	0	44	23	67	1	1	0	2	44	0	8	52	180
04:45 PM	12	67	0	79	1	41	19	61	1	0	0	1	35	1	7	43	184
Total	35	245	4	284	1	158	91	250	3	3	0	6	154	4	27	185	725
05:00 PM	5	98	1	104	2	48	17	67	0	1	0	1	29	1	7	37	209
05:15 PM	6	53	0	59	0	31	20	51	0	1	0	1	39	3	9	51	162
05:30 PM	13	81	0	94	1	22	11	34	0	1	1	2	38	1	5	44	174
05:45 PM	11	54	1	66	0	32	15	47	0	0	1	1	35	1	6	42	156
Total	35	286	2	323	3	133	63	199	0	3	2	5	141	6	27	174	701
Grand Total	134	839	7	980	6	515	307	828	6	13	5	24	437	15	88	540	2372
Apprch %	13.7	85.6	0.7		0.7	62.2	37.1		25	54.2	20.8		80.9	2.8	16.3		
Total %	5.6	35.4	0.3	41.3	0.3	21.7	12.9	34.9	0.3	0.5	0.2	1	18.4	0.6	3.7	22.8	
Auto	131	770	6	907	6	471	289	766	6	12	5	23	401	14	79	494	2190
% Auto	97.8	91.8	85.7	92.6	100	91.5	94.1	92.5	100	92.3	100	95.8	91.8	93.3	89.8	91.5	92.3
HV	3	69	1	73	0	44	18	62	0	1	0	1	36	1	9	46	182
% HV	2.2	8.2	14.3	7.4	0	8.5	5.9	7.5	0	7.7	0	4.2	8.2	6.7	10.2	8.5	7.7
B/SB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% B/SB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Stonefield Engineering & Design, LLC

607 Shelby Street, Suite 200, Detroit, MI 48226
248.247.1115 t. 201.340.4472 f.

Intersection of Van Born Rd (EB/WB)
and Sheldon Rd (NB/SB)
Van Buren, Wayne County, Michigan
Tuesday, March 14, 2023

File Name : DET-220348.02
Site Code : 00220348
Start Date : 3/14/2023
Page No : 2

	Van Born Rd Eastbound				Van Born Rd Westbound				Sheldon Rd Northbound				Sheldon Rd Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	**14**	27	0	41	0	33	23	**56**	0	**2**	0	**2**	13	**1**	**6**	20	119
07:45 AM	9	39	0	48	**1**	29	25	55	**1**	0	**1**	2	15	1	5	21	126
08:00 AM	4	41	0	45	1	23	**30**	54	0	0	1	1	**26**	0	3	**29**	129
08:15 AM	6	**54**	0	**60**	0	**41**	12	53	1	1	0	2	23	0	4	27	**142**
Total Volume	33	161	0	194	2	126	90	218	2	3	2	7	77	2	18	97	516
% App. Total	17	83	0		0.9	57.8	41.3		28.6	42.9	28.6		79.4	2.1	18.6		
PHF	.589	.745	.000	.808	.500	.768	.750	.973	.500	.375	.500	.875	.740	.500	.750	.836	.908
Auto	32	141	0	173	2	112	84	198	2	2	2	6	66	2	12	80	457
% Auto	97.0	87.6	0	89.2	100	88.9	93.3	90.8	100	66.7	100	85.7	85.7	100	66.7	82.5	88.6
HV	1	20	0	21	0	14	6	20	0	1	0	1	11	0	6	17	59
% HV	3.0	12.4	0	10.8	0	11.1	6.7	9.2	0	33.3	0	14.3	14.3	0	33.3	17.5	11.4
B/SB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% B/SB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour Analysis From 04:15 PM to 05:00 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	**12**	74	**2**	88	0	41	20	61	0	**2**	0	**2**	25	0	**9**	34	185
04:30 PM	2	56	1	59	0	44	**23**	**67**	**1**	1	0	2	**44**	0	8	**52**	180
04:45 PM	12	67	0	79	1	41	19	61	1	0	0	1	35	**1**	7	43	184
05:00 PM	5	**98**	1	**104**	**2**	**48**	17	67	0	1	0	1	29	1	7	37	**209**
Total Volume	31	295	4	330	3	174	79	256	2	4	0	6	133	2	31	166	758
% App. Total	9.4	89.4	1.2		1.2	68	30.9		33.3	66.7	0		80.1	1.2	18.7		
PHF	.646	.753	.500	.793	.375	.906	.859	.955	.500	.500	.000	.750	.756	.500	.861	.798	.907
Auto	31	277	4	312	3	163	73	239	2	4	0	6	129	2	31	162	719
% Auto	100	93.9	100	94.5	100	93.7	92.4	93.4	100	100	0	100	97.0	100	100	97.6	94.9
HV	0	18	0	18	0	11	6	17	0	0	0	0	4	0	0	4	39
% HV	0	6.1	0	5.5	0	6.3	7.6	6.6	0	0	0	0	3.0	0	0	2.4	5.1
B/SB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% B/SB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Stonefield Engineering & Design, LLC

607 Shelby Street, Suite 200, Detroit, MI 48226
248.247.1115 t. 201.340.4472 f.

Intersection of Van Born Rd (WB)
and Belleville Rd (NB/SB)
Van Buren, Wayne County,
Michigan Tuesday, March 14, 2023

File Name : DET-220348.01
Site Code : 00220348
Start Date : 3/14/2023
Page No : 1

Groups Printed- Auto - HV - B/SB

	Van Born Rd Westbound				Belleville Rd Northbound				Belleville Rd Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	11	0	20	31	0	84	17	101	17	69	0	86	218
07:15 AM	8	0	11	19	0	144	25	169	16	86	0	102	290
07:30 AM	13	0	31	44	0	140	27	167	15	121	0	136	347
07:45 AM	18	0	19	37	0	146	22	168	23	122	0	145	350
Total	50	0	81	131	0	514	91	605	71	398	0	469	1205
08:00 AM	10	0	14	24	0	145	14	159	26	137	0	163	346
08:15 AM	13	0	31	44	0	126	19	145	33	131	0	164	353
08:30 AM	18	0	19	37	0	112	18	130	22	106	0	128	295
08:45 AM	17	0	12	29	0	123	24	147	26	96	0	122	298
Total	58	0	76	134	0	506	75	581	107	470	0	577	1292
*** BREAK ***													
04:00 PM	12	0	20	32	0	163	23	186	42	194	0	236	454
04:15 PM	28	0	20	48	0	142	28	170	54	193	0	247	465
04:30 PM	19	0	30	49	0	171	25	196	40	191	0	231	476
04:45 PM	20	0	27	47	0	145	38	183	50	179	0	229	459
Total	79	0	97	176	0	621	114	735	186	757	0	943	1854
05:00 PM	24	0	17	41	0	145	21	166	75	214	0	289	496
05:15 PM	22	0	25	47	0	146	24	170	42	190	0	232	449
05:30 PM	6	0	22	28	0	142	33	175	59	200	0	259	462
05:45 PM	20	0	17	37	0	167	24	191	46	179	0	225	453
Total	72	0	81	153	0	600	102	702	222	783	0	1005	1860
Grand Total	259	0	335	594	0	2241	382	2623	586	2408	0	2994	6211
Apprch %	43.6	0	56.4		0	85.4	14.6		19.6	80.4	0		
Total %	4.2	0	5.4	9.6	0	36.1	6.2	42.2	9.4	38.8	0	48.2	
Auto	230	0	311	541	0	2143	353	2496	544	2269	0	2813	5850
% Auto	88.8	0	92.8	91.1	0	95.6	92.4	95.2	92.8	94.2	0	94	94.2
HV	29	0	24	53	0	98	29	127	42	139	0	181	361
% HV	11.2	0	7.2	8.9	0	4.4	7.6	4.8	7.2	5.8	0	6	5.8
B/SB	0	0	0	0	0	0	0	0	0	0	0	0	0
% B/SB	0	0	0	0	0	0	0	0	0	0	0	0	0

Stonefield Engineering & Design, LLC

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Intersection of Van Born Rd (WB)
and Belleville Rd (NB/SB)
Van Buren, Wayne County,
Michigan Tuesday, March 14, 2023

File Name : DET-220348.01
Site Code : 00220348
Start Date : 3/14/2023
Page No : 2

	Van Born Rd Westbound				Belleville Rd Northbound				Belleville Rd Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:30 AM													
07:30 AM	13	0	**31**	**44**	0	140	**27**	167	15	121	0	136	347
07:45 AM	**18**	0	19	37	0	**146**	22	**168**	23	122	0	145	350
08:00 AM	10	0	14	24	0	145	14	159	26	**137**	0	163	346
08:15 AM	13	0	31	44	0	126	19	145	**33**	131	0	**164**	**353**
Total Volume	54	0	95	149	0	557	82	639	97	511	0	608	1396
% App. Total	36.2	0	63.8		0	87.2	12.8		16	84	0		
PHF	.750	.000	.766	.847	.000	.954	.759	.951	.735	.932	.000	.927	.989
Auto	43	0	85	128	0	529	71	600	86	458	0	544	1272
% Auto	79.6	0	89.5	85.9	0	95.0	86.6	93.9	88.7	89.6	0	89.5	91.1
HV	11	0	10	21	0	28	11	39	11	53	0	64	124
% HV	20.4	0	10.5	14.1	0	5.0	13.4	6.1	11.3	10.4	0	10.5	8.9
B/SB	0	0	0	0	0	0	0	0	0	0	0	0	0
% B/SB	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour Analysis From 04:15 PM to 05:00 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:15 PM													
04:15 PM	**28**	0	20	48	0	142	28	170	54	193	0	247	465
04:30 PM	19	0	**30**	**49**	0	**171**	25	**196**	40	191	0	231	476
04:45 PM	20	0	27	47	0	145	**38**	183	50	179	0	229	459
05:00 PM	24	0	17	41	0	145	21	166	**75**	**214**	0	**289**	**496**
Total Volume	91	0	94	185	0	603	112	715	219	777	0	996	1896
% App. Total	49.2	0	50.8		0	84.3	15.7		22	78	0		
PHF	.813	.000	.783	.944	.000	.882	.737	.912	.730	.908	.000	.862	.956
Auto	85	0	88	173	0	586	103	689	213	750	0	963	1825
% Auto	93.4	0	93.6	93.5	0	97.2	92.0	96.4	97.3	96.5	0	96.7	96.3
HV	6	0	6	12	0	17	9	26	6	27	0	33	71
% HV	6.6	0	6.4	6.5	0	2.8	8.0	3.6	2.7	3.5	0	3.3	3.7
B/SB	0	0	0	0	0	0	0	0	0	0	0	0	0
% B/SB	0	0	0	0	0	0	0	0	0	0	0	0	0

Stonefield Engineering & Design, LLC

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Intersection of Van Born Rd (EB/WB)
and Haggerty Rd (NB/SB)
Van Buren, Wayne County, Michigan
Tuesday, March 14, 2023

File Name : DET-220348.03
Site Code : 00220348
Start Date : 3/14/2023
Page No : 1

Groups Printed- Auto - HV - B/SB

	Van Born Rd Eastbound				Van Born Rd Westbound				Haggerty Rd Northbound				Haggerty Rd Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	21	17	1	39	2	18	16	36	6	36	9	51	9	18	9	36	162
07:15 AM	19	25	4	48	2	33	18	53	3	22	4	29	12	21	11	44	174
07:30 AM	17	18	5	40	9	42	12	63	5	25	6	36	22	27	6	55	194
07:45 AM	22	28	6	56	7	36	25	68	2	20	4	26	11	18	8	37	187
Total	79	88	16	183	20	129	71	220	16	103	23	142	54	84	34	172	717
08:00 AM	20	36	7	63	5	38	17	60	9	21	0	30	12	8	6	26	179
08:15 AM	23	41	5	69	7	25	17	49	5	18	3	26	14	15	11	40	184
08:30 AM	22	29	10	61	1	27	20	48	4	14	8	26	19	20	10	49	184
08:45 AM	21	26	9	56	2	22	24	48	6	19	8	33	13	10	17	40	177
Total	86	132	31	249	15	112	78	205	24	72	19	115	58	53	44	155	724
*** BREAK ***																	
04:00 PM	20	60	11	91	8	46	21	75	8	40	16	64	12	20	13	45	275
04:15 PM	20	55	5	80	3	31	25	59	10	33	8	51	10	26	13	49	239
04:30 PM	23	68	5	96	4	51	24	79	13	41	22	76	25	20	18	63	314
04:45 PM	28	69	9	106	7	45	28	80	6	37	5	48	20	27	16	63	297
Total	91	252	30	373	22	173	98	293	37	151	51	239	67	93	60	220	1125
05:00 PM	30	69	8	107	9	43	30	82	6	32	6	44	22	18	26	66	299
05:15 PM	21	64	5	90	5	24	19	48	7	43	2	52	33	22	14	69	259
05:30 PM	26	79	3	108	5	31	17	53	5	32	8	45	30	18	14	62	268
05:45 PM	23	60	7	90	3	24	13	40	5	21	6	32	15	18	14	47	209
Total	100	272	23	395	22	122	79	223	23	128	22	173	100	76	68	244	1035
Grand Total	356	744	100	1200	79	536	326	941	100	454	115	669	279	306	206	791	3601
Apprch %	29.7	62	8.3		8.4	57	34.6		14.9	67.9	17.2		35.3	38.7	26		
Total %	9.9	20.7	2.8	33.3	2.2	14.9	9.1	26.1	2.8	12.6	3.2	18.6	7.7	8.5	5.7	22	
Auto	318	682	72	1072	53	480	276	809	65	429	76	570	241	280	173	694	3145
% Auto	89.3	91.7	72	89.3	67.1	89.6	84.7	86	65	94.5	66.1	85.2	86.4	91.5	84	87.7	87.3
HV	38	62	28	128	26	56	50	132	35	25	39	99	38	26	33	97	456
% HV	10.7	8.3	28	10.7	32.9	10.4	15.3	14	35	5.5	33.9	14.8	13.6	8.5	16	12.3	12.7
B/SB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% B/SB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Stonefield Engineering & Design, LLC

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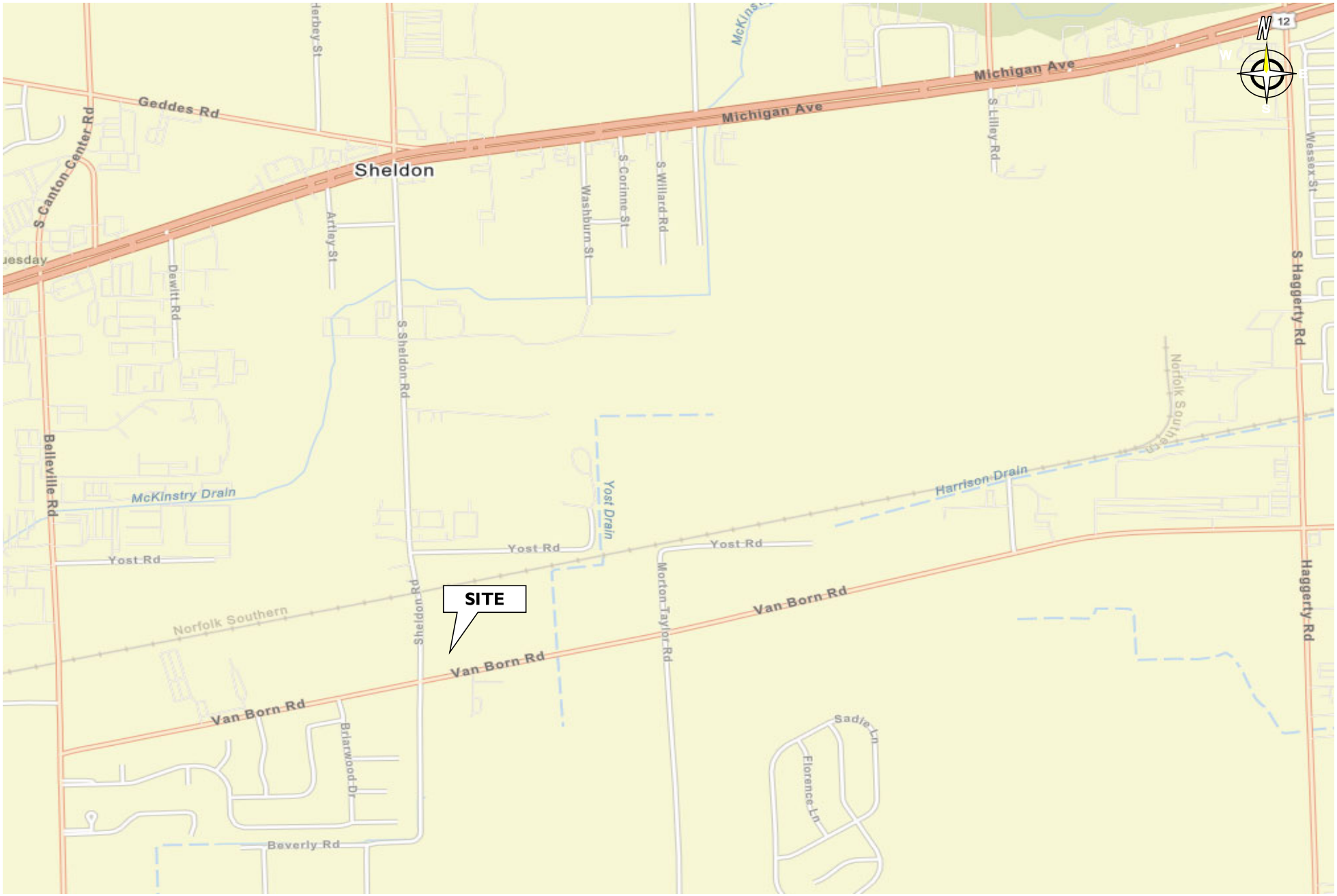
Intersection of Van Born Rd (EB/WB)
and Haggerty Rd (NB/SB)
Van Buren, Wayne County, Michigan
Tuesday, March 14, 2023

File Name : DET-220348.03
Site Code : 00220348
Start Date : 3/14/2023
Page No : 2

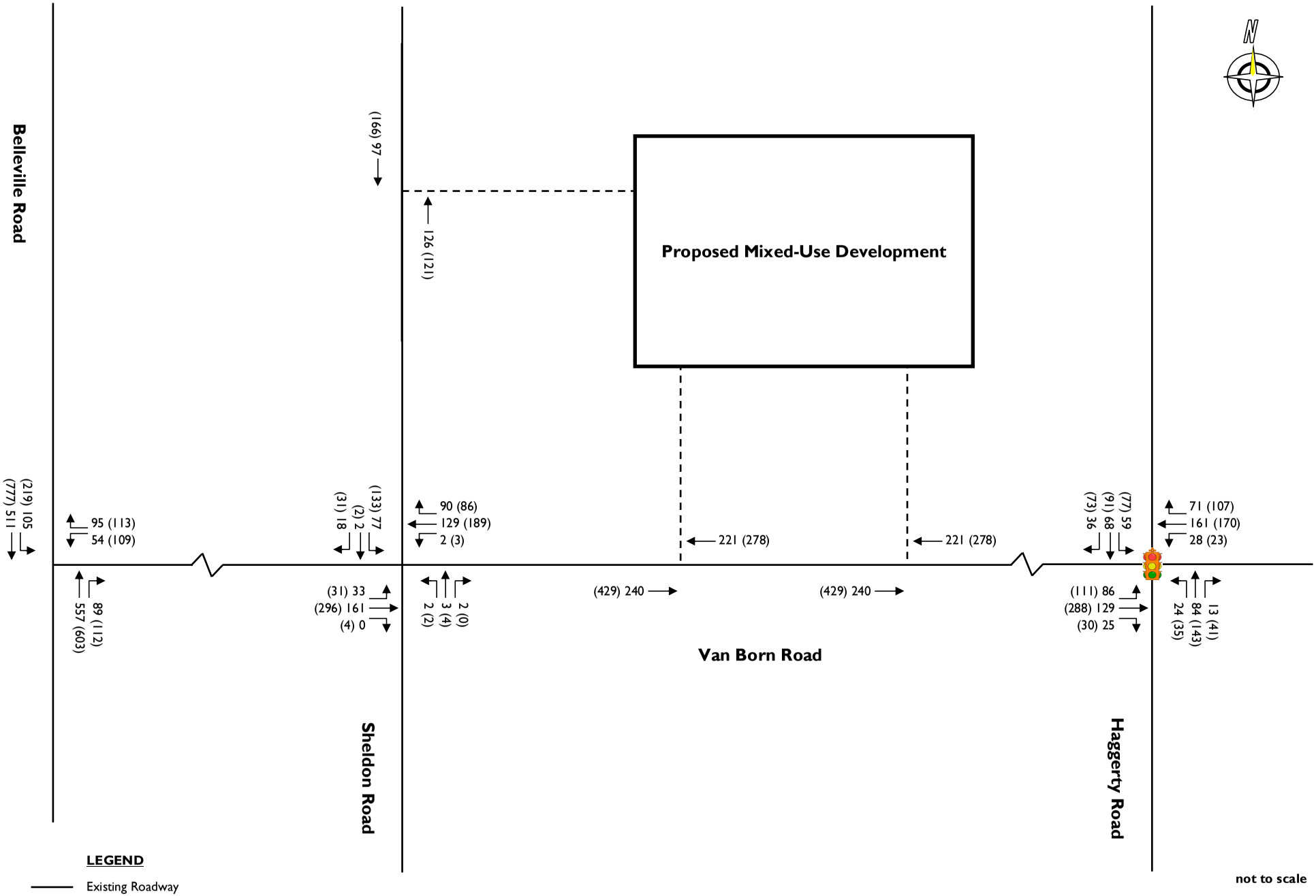
	Van Born Rd Eastbound				Van Born Rd Westbound				Haggerty Rd Northbound				Haggerty Rd Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	17	18	5	40	**9**	**42**	12	63	5	**25**	**6**	**36**	**22**	**27**	6	**55**	**194**
07:45 AM	22	28	6	56	7	36	**25**	**68**	2	20	4	26	11	18	8	37	187
08:00 AM	20	36	**7**	63	5	38	17	60	**9**	21	0	30	12	8	6	26	179
08:15 AM	**23**	**41**	5	**69**	7	25	17	49	5	18	3	26	14	15	**11**	40	184
Total Volume	82	123	23	228	28	141	71	240	21	84	13	118	59	68	31	158	744
% App. Total	36	53.9	10.1		11.7	58.8	29.6		17.8	71.2	11		37.3	43	19.6		
PHF	.891	.750	.821	.826	.778	.839	.710	.882	.583	.840	.542	.819	.670	.630	.705	.718	.959
Auto	66	108	11	185	18	125	50	193	8	77	5	90	52	57	23	132	600
% Auto	80.5	87.8	47.8	81.1	64.3	88.7	70.4	80.4	38.1	91.7	38.5	76.3	88.1	83.8	74.2	83.5	80.6
HV	16	15	12	43	10	16	21	47	13	7	8	28	7	11	8	26	144
% HV	19.5	12.2	52.2	18.9	35.7	11.3	29.6	19.6	61.9	8.3	61.5	23.7	11.9	16.2	25.8	16.5	19.4
B/SB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% B/SB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Peak Hour Analysis From 04:15 PM to 05:00 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	20	55	5	80	3	31	25	59	10	33	8	51	10	26	13	49	239
04:30 PM	23	68	5	96	4	**51**	24	79	**13**	**41**	**22**	**76**	**25**	20	18	63	**314**
04:45 PM	28	**69**	**9**	106	7	45	28	80	6	37	5	48	20	**27**	16	63	297
05:00 PM	**30**	69	8	**107**	**9**	43	**30**	**82**	6	32	6	44	22	18	**26**	**66**	299
Total Volume	101	261	27	389	23	170	107	300	35	143	41	219	77	91	73	241	1149
% App. Total	26	67.1	6.9		7.7	56.7	35.7		16	65.3	18.7		32	37.8	30.3		
PHF	.842	.946	.750	.909	.639	.833	.892	.915	.673	.872	.466	.720	.770	.843	.702	.913	.915
Auto	97	249	23	369	15	156	98	269	29	139	32	200	65	85	65	215	1053
% Auto	96.0	95.4	85.2	94.9	65.2	91.8	91.6	89.7	82.9	97.2	78.0	91.3	84.4	93.4	89.0	89.2	91.6
HV	4	12	4	20	8	14	9	31	6	4	9	19	12	6	8	26	96
% HV	4.0	4.6	14.8	5.1	34.8	8.2	8.4	10.3	17.1	2.8	22.0	8.7	15.6	6.6	11.0	10.8	8.4
B/SB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% B/SB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

FIGURES



STONEFIELD	**Proposed Mixed-Use Development** **Van Born Road & Sheldon Road** **Township of Van Born, Wayne County, Michigan** **Traffic Impact Study**	**FIGURE 1** **Site Location Map**



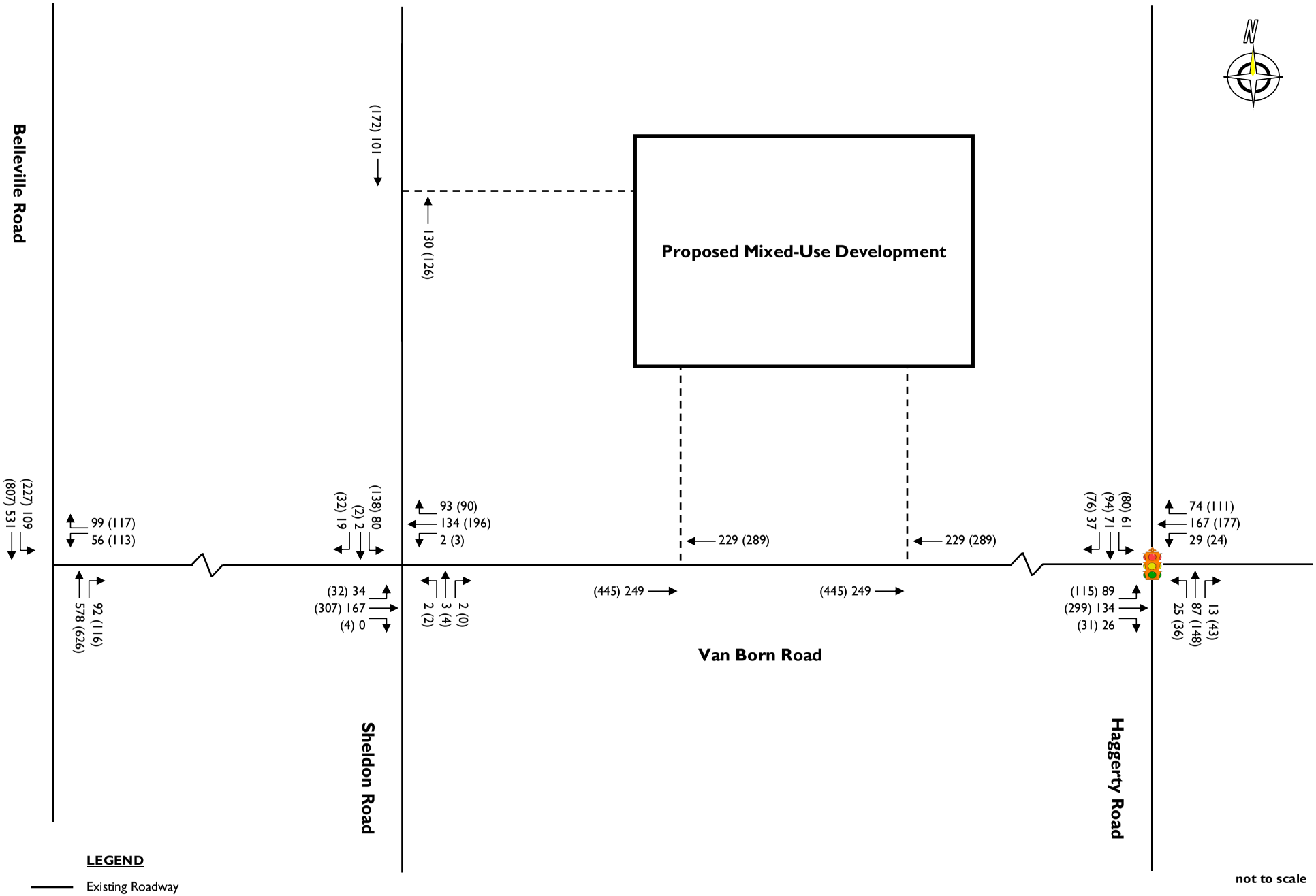
LEGEND

- Existing Roadway
- Proposed Driveway
- Existing Private Driveway
- AM (PM) Peak Hour Volumes
- Signalized Intersection

STONEFIELD

Proposed Mixed-Use Development
Van Born Road & Sheldon Road
Township of Van Born, Wayne County, Michigan
Traffic Impact Study

FIGURE 2
2023 Existing Traffic Volumes



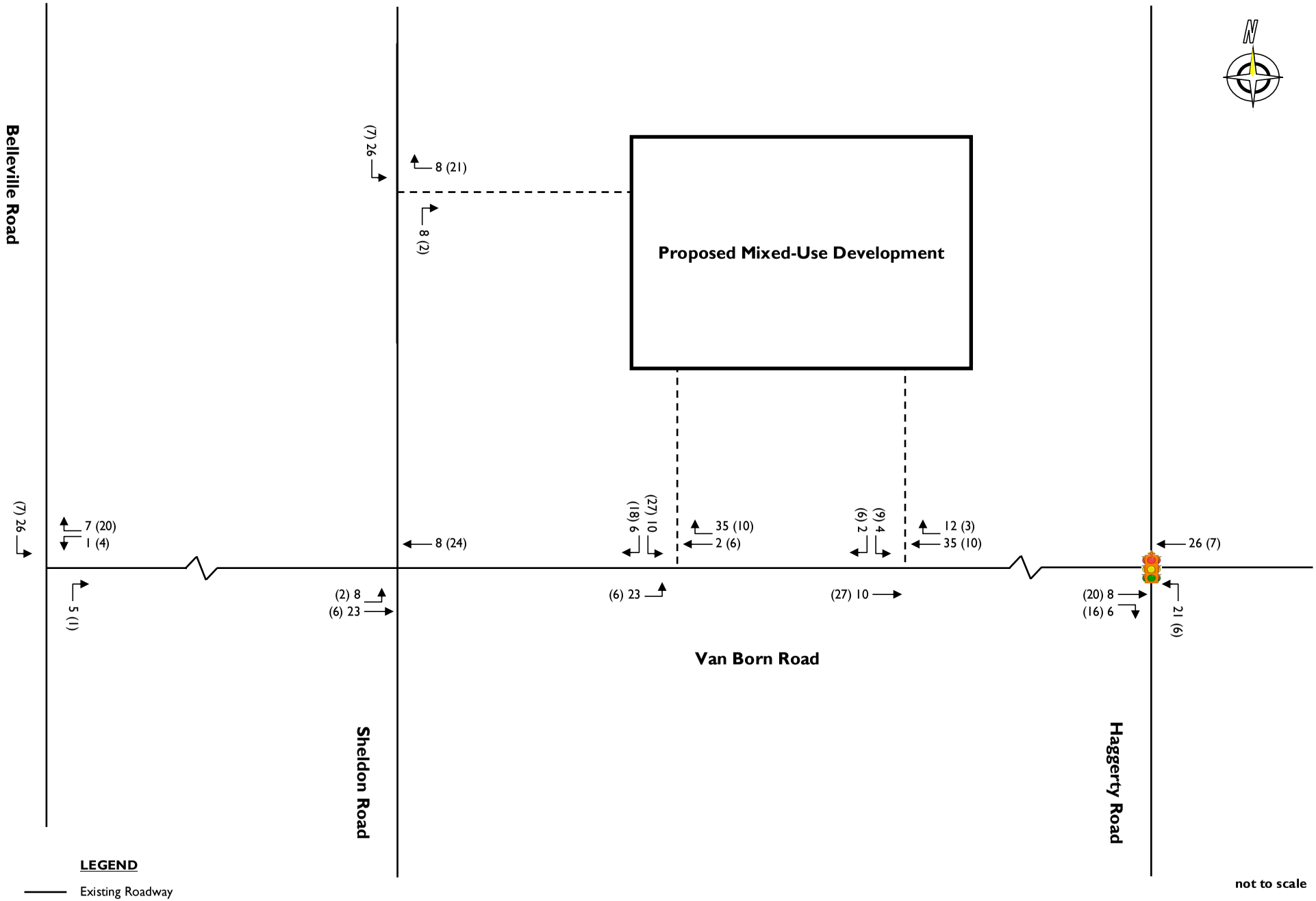
LEGEND

- Existing Roadway
- Proposed Driveway
- Existing Private Driveway
- AM (PM) Peak Hour Volumes
- Signalized Intersection

STONEFIELD

Proposed Mixed-Use Development
Van Born Road & Sheldon Road
Township of Van Born, Wayne County, Michigan
Traffic Impact Study

FIGURE 3
2025 No-Build Traffic Volumes



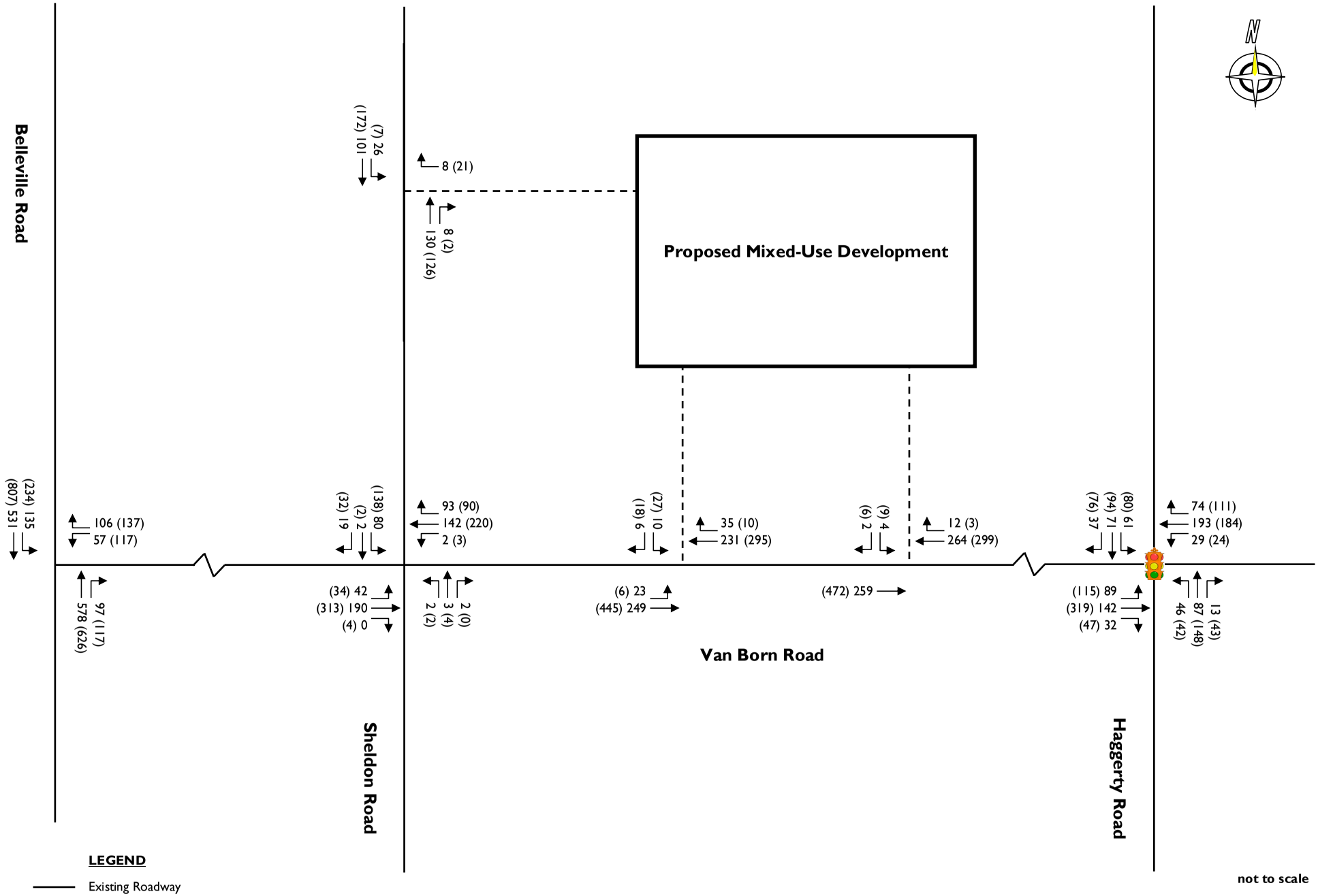
LEGEND

- Existing Roadway
- Proposed Driveway
- Existing Private Driveway
- AM (PM) Peak Hour Volumes
- Signalized Intersection

STONEFIELD

Proposed Mixed-Use Development
Van Born Road & Sheldon Road
Township of Van Born, Wayne County, Michigan
Traffic Impact Study

FIGURE 4
Site-Generated Traffic Volumes



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Proposed Mixed-Use Development
Van Born Road & Sheldon Road
Township of Van Born, Wayne County, Michigan
Traffic Impact Study

FIGURE 5
2025 Build Traffic Volumes

CAPACITY ANALYSIS DETAIL SHEETS

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	33	161	0	2	129	90	2	3	2	77	2	18
Future Vol, veh/h	33	161	0	2	129	90	2	3	2	77	2	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	3	12	0	0	11	7	0	33	0	14	0	33
Mvmt Flow	36	177	0	2	142	99	2	3	2	85	2	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	241	0	0	177	0	0	456	494	177	448	445	192
Stage 1	-	-	-	-	-	-	249	249	-	196	196	-
Stage 2	-	-	-	-	-	-	207	245	-	252	249	-
Critical Hdwy	4.13	-	-	4.1	-	-	7.1	6.83	6.2	7.24	6.5	6.53
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.83	-	6.24	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.83	-	6.24	5.5	-
Follow-up Hdwy	2.227	-	-	2.2	-	-	3.5	4.297	3.3	3.626	4	3.597
Pot Cap-1 Maneuver	1320	-	-	1411	-	-	518	434	871	501	511	776
Stage 1	-	-	-	-	-	-	759	647	-	779	742	-
Stage 2	-	-	-	-	-	-	800	650	-	726	704	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1320	-	-	1411	-	-	491	420	871	484	495	776
Mov Cap-2 Maneuver	-	-	-	-	-	-	491	420	-	484	495	-
Stage 1	-	-	-	-	-	-	736	628	-	756	741	-
Stage 2	-	-	-	-	-	-	776	649	-	699	683	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.3	0.1	12.1	13.7
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	518	1320	-	-	1411	-	-	521
HCM Lane V/C Ratio	0.015	0.027	-	-	0.002	-	-	0.205
HCM Control Delay (s)	12.1	7.8	0	-	7.6	0	-	13.7
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.8

Intersection	
Int Delay, s/veh	3.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	54	95	557	89	105	511
Future Vol, veh/h	54	95	557	89	105	511
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	125	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	99	99	99	99	99	99
Heavy Vehicles, %	20	11	5	13	1	10
Mvmt Flow	55	96	563	90	106	516

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1078	327	0	0	653	0
Stage 1	608	-	-	-	-	-
Stage 2	470	-	-	-	-	-
Critical Hdwy	7.2	7.12	-	-	4.12	-
Critical Hdwy Stg 1	6.2	-	-	-	-	-
Critical Hdwy Stg 2	6.2	-	-	-	-	-
Follow-up Hdwy	3.7	3.41	-	-	2.21	-
Pot Cap-1 Maneuver	186	643	-	-	936	-
Stage 1	459	-	-	-	-	-
Stage 2	546	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	156	643	-	-	936	-
Mov Cap-2 Maneuver	156	-	-	-	-	-
Stage 1	459	-	-	-	-	-
Stage 2	459	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	21.9	0	2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	156	643	936	-
HCM Lane V/C Ratio	-	-	0.35	0.149	0.113	-
HCM Control Delay (s)	-	-	40	11.6	9.3	0.5
HCM Lane LOS	-	-	E	B	A	A
HCM 95th %tile Q(veh)	-	-	1.4	0.5	0.4	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	86	129	25	28	161	71	24	84	13	59	68	36
Future Volume (veh/h)	86	129	25	28	161	71	24	84	13	59	68	36
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1604	1722	1129	1366	1737	1455	981	1781	981	1722	1663	1515
Adj Flow Rate, veh/h	90	134	26	29	168	74	25	88	14	61	71	38
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	20	12	52	36	11	30	62	8	62	12	16	26
Cap, veh/h	471	1201	228	455	989	418	353	1211	188	559	842	420
Arrive On Green	0.44	0.44	0.44	0.44	0.44	0.44	0.41	0.41	0.41	0.41	0.41	0.41
Sat Flow, veh/h	976	2744	520	896	2260	955	674	2935	457	1190	2041	1019
Grp Volume(v), veh/h	90	79	81	29	121	121	25	50	52	61	54	55
Grp Sat Flow(s),veh/h/ln	976	1636	1628	896	1650	1565	674	1692	1699	1190	1580	1480
Q Serve(g_s), s	5.0	2.3	2.4	1.6	3.6	3.8	1.9	1.4	1.5	2.6	1.7	1.8
Cycle Q Clear(g_c), s	8.7	2.3	2.4	4.0	3.6	3.8	3.7	1.4	1.5	4.1	1.7	1.8
Prop In Lane	1.00		0.32	1.00		0.61	1.00		0.27	1.00		0.69
Lane Grp Cap(c), veh/h	471	716	712	455	722	685	353	698	701	559	652	610
V/C Ratio(X)	0.19	0.11	0.11	0.06	0.17	0.18	0.07	0.07	0.07	0.11	0.08	0.09
Avail Cap(c_a), veh/h	471	716	712	455	722	685	353	698	701	559	652	610
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.4	13.3	13.3	14.5	13.7	13.7	15.5	14.2	14.2	15.5	14.3	14.3
Incr Delay (d2), s/veh	0.9	0.3	0.3	0.3	0.5	0.6	0.4	0.2	0.2	0.4	0.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.0	1.4	1.5	0.6	2.2	2.2	0.5	0.9	1.0	1.3	1.0	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.3	13.6	13.6	14.8	14.2	14.3	15.9	14.4	14.4	15.9	14.5	14.6
LnGrp LOS	B	B	B	B	B	B	B	B	B	B	B	B
Approach Vol, veh/h		250			271			127			170	
Approach Delay, s/veh		14.9			14.3			14.7			15.1	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		39.0		41.0		39.0		41.0				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		33.0		35.0		33.0		35.0				
Max Q Clear Time (g_c+I1), s		5.7		10.7		6.1		6.0				
Green Ext Time (p_c), s		0.7		1.2		0.7		1.4				

Intersection Summary												
HCM 6th Ctrl Delay			14.7									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	31	296	4	3	189	86	2	4	0	133	2	31
Future Vol, veh/h	31	296	4	3	189	86	2	4	0	133	2	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	0	6	0	0	6	8	0	0	0	3	0	0
Mvmt Flow	34	325	4	3	208	95	2	4	0	146	2	34

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	303	0	0	329	0	0	675	704	327	659	659	256
Stage 1	-	-	-	-	-	-	395	395	-	262	262	-
Stage 2	-	-	-	-	-	-	280	309	-	397	397	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.13	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.13	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.13	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.527	4	3.3
Pot Cap-1 Maneuver	1269	-	-	1242	-	-	371	364	719	376	386	788
Stage 1	-	-	-	-	-	-	634	608	-	741	695	-
Stage 2	-	-	-	-	-	-	731	663	-	627	607	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1269	-	-	1242	-	-	344	351	719	362	372	788
Mov Cap-2 Maneuver	-	-	-	-	-	-	344	351	-	362	372	-
Stage 1	-	-	-	-	-	-	613	588	-	717	693	-
Stage 2	-	-	-	-	-	-	695	661	-	602	587	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.1	15.5	21.1
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	349	1269	-	-	1242	-	-	403
HCM Lane V/C Ratio	0.019	0.027	-	-	0.003	-	-	0.453
HCM Control Delay (s)	15.5	7.9	0	-	7.9	0	-	21.1
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	2.3

Intersection	
Int Delay, s/veh	44.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	109	113	603	112	219	777
Future Vol, veh/h	109	113	603	112	219	777
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	125	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	7	6	3	8	3	4
Mvmt Flow	114	118	628	117	228	809

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1548	373	0	0	745	0
Stage 1	687	-	-	-	-	-
Stage 2	861	-	-	-	-	-
Critical Hdwy	6.94	7.02	-	-	4.16	-
Critical Hdwy Stg 1	5.94	-	-	-	-	-
Critical Hdwy Stg 2	5.94	-	-	-	-	-
Follow-up Hdwy	3.57	3.36	-	-	2.23	-
Pot Cap-1 Maneuver	~ 100	613	-	-	852	-
Stage 1	448	-	-	-	-	-
Stage 2	362	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 51	613	-	-	852	-
Mov Cap-2 Maneuver	~ 51	-	-	-	-	-
Stage 1	448	-	-	-	-	-
Stage 2	186	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 367	0	3.7
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	51	613	852	-
HCM Lane V/C Ratio	-	-	2.226	0.192	0.268	-
HCM Control Delay (s)	-	-	$ 734.7	12.3	10.8	1.7
HCM Lane LOS	-	-	F	B	B	A
HCM 95th %tile Q(veh)	-	-	11.5	0.7	1.1	-

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	111	288	30	23	170	107	35	143	41	77	91	73
Future Volume (veh/h)	111	288	30	23	170	107	35	143	41	77	91	73
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1826	1678	1381	1781	1781	1648	1856	1574	1663	1796	1737
Adj Flow Rate, veh/h	121	313	33	25	185	116	38	155	45	84	99	79
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	5	15	35	8	8	17	3	22	16	7	11
Cap, veh/h	491	1387	145	377	892	532	490	1120	315	485	776	567
Arrive On Green	0.44	0.44	0.44	0.44	0.44	0.44	0.41	0.41	0.41	0.41	0.41	0.41
Sat Flow, veh/h	1061	3169	332	764	2039	1216	1063	2716	765	1051	1880	1375
Grp Volume(v), veh/h	121	170	176	25	152	149	38	99	101	84	89	89
Grp Sat Flow(s),veh/h/ln	1061	1735	1766	764	1692	1563	1063	1763	1718	1051	1706	1549
Q Serve(g_s), s	6.4	4.9	5.0	1.7	4.4	4.7	1.8	2.8	2.9	4.3	2.6	2.9
Cycle Q Clear(g_c), s	11.1	4.9	5.0	6.7	4.4	4.7	4.7	2.8	2.9	7.3	2.6	2.9
Prop In Lane	1.00		0.19	1.00		0.78	1.00		0.45	1.00		0.89
Lane Grp Cap(c), veh/h	491	759	773	377	740	684	490	727	709	485	704	639
V/C Ratio(X)	0.25	0.22	0.23	0.07	0.21	0.22	0.08	0.14	0.14	0.17	0.13	0.14
Avail Cap(c_a), veh/h	491	759	773	377	740	684	490	727	709	485	704	639
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.5	14.0	14.1	16.1	13.9	14.0	16.1	14.6	14.7	16.9	14.6	14.6
Incr Delay (d2), s/veh	1.2	0.7	0.7	0.3	0.6	0.7	0.3	0.4	0.4	0.8	0.4	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.8	3.2	3.3	0.5	2.8	2.8	0.8	1.9	2.0	1.9	1.7	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.6	14.7	14.7	16.5	14.5	14.7	16.4	15.0	15.1	17.7	14.9	15.1
LnGrp LOS	B	B	B	B	B	B	B	B	B	B	B	B
Approach Vol, veh/h		467			326			238			262	
Approach Delay, s/veh		15.7			14.8			15.3			15.9	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		39.0		41.0		39.0		41.0				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		33.0		35.0		33.0		35.0				
Max Q Clear Time (g_c+I1), s		6.7		13.1		9.3		8.7				
Green Ext Time (p_c), s		1.2		2.2		1.3		1.7				

Intersection Summary												
HCM 6th Ctrl Delay			15.4									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	34	167	0	2	134	93	2	3	2	80	2	19
Future Vol, veh/h	34	167	0	2	134	93	2	3	2	80	2	19
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	3	12	0	0	11	7	0	33	0	14	0	33
Mvmt Flow	37	184	0	2	147	102	2	3	2	88	2	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	249	0	0	184	0	0	472	511	184	463	460	198
Stage 1	-	-	-	-	-	-	258	258	-	202	202	-
Stage 2	-	-	-	-	-	-	214	253	-	261	258	-
Critical Hdwy	4.13	-	-	4.1	-	-	7.1	6.83	6.2	7.24	6.5	6.53
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.83	-	6.24	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.83	-	6.24	5.5	-
Follow-up Hdwy	2.227	-	-	2.2	-	-	3.5	4.297	3.3	3.626	4	3.597
Pot Cap-1 Maneuver	1311	-	-	1403	-	-	506	424	864	490	501	770
Stage 1	-	-	-	-	-	-	751	641	-	773	738	-
Stage 2	-	-	-	-	-	-	793	644	-	718	698	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1311	-	-	1403	-	-	478	410	864	473	484	770
Mov Cap-2 Maneuver	-	-	-	-	-	-	478	410	-	473	484	-
Stage 1	-	-	-	-	-	-	728	621	-	749	737	-
Stage 2	-	-	-	-	-	-	768	643	-	690	676	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.3	0.1	12.2	14
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	507	1311	-	-	1403	-	-	510
HCM Lane V/C Ratio	0.015	0.028	-	-	0.002	-	-	0.218
HCM Control Delay (s)	12.2	7.8	0	-	7.6	0	-	14
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	0.8

Intersection	
Int Delay, s/veh	3.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	56	99	578	92	109	531
Future Vol, veh/h	56	99	578	92	109	531
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	125	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	99	99	99	99	99	99
Heavy Vehicles, %	20	11	5	13	1	10
Mvmt Flow	57	100	584	93	110	536

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1119	339	0	0	677	0
Stage 1	631	-	-	-	-	-
Stage 2	488	-	-	-	-	-
Critical Hdwy	7.2	7.12	-	-	4.12	-
Critical Hdwy Stg 1	6.2	-	-	-	-	-
Critical Hdwy Stg 2	6.2	-	-	-	-	-
Follow-up Hdwy	3.7	3.41	-	-	2.21	-
Pot Cap-1 Maneuver	175	631	-	-	917	-
Stage 1	446	-	-	-	-	-
Stage 2	534	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	145	631	-	-	917	-
Mov Cap-2 Maneuver	145	-	-	-	-	-
Stage 1	446	-	-	-	-	-
Stage 2	443	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.8	0	2.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	145	631	917	-
HCM Lane V/C Ratio	-	-	0.39	0.158	0.12	-
HCM Control Delay (s)	-	-	44.9	11.8	9.5	0.6
HCM Lane LOS	-	-	E	B	A	A
HCM 95th %tile Q(veh)	-	-	1.7	0.6	0.4	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	89	134	26	29	167	74	25	87	13	61	71	37
Future Volume (veh/h)	89	134	26	29	167	74	25	87	13	61	71	37
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1604	1722	1129	1366	1737	1455	981	1781	981	1722	1663	1515
Adj Flow Rate, veh/h	93	140	27	30	174	77	26	91	14	64	74	39
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	20	12	52	36	11	30	62	8	62	12	16	26
Cap, veh/h	466	1202	227	452	987	419	351	1217	183	557	846	417
Arrive On Green	0.44	0.44	0.44	0.44	0.44	0.44	0.41	0.41	0.41	0.41	0.41	0.41
Sat Flow, veh/h	968	2747	518	890	2256	958	671	2949	444	1187	2051	1010
Grp Volume(v), veh/h	93	82	85	30	125	126	26	51	54	64	56	57
Grp Sat Flow(s),veh/h/ln	968	1636	1629	890	1650	1564	671	1692	1701	1187	1580	1481
Q Serve(g_s), s	5.2	2.4	2.5	1.7	3.7	3.9	2.0	1.5	1.5	2.8	1.7	1.9
Cycle Q Clear(g_c), s	9.1	2.4	2.5	4.1	3.7	3.9	3.9	1.5	1.5	4.3	1.7	1.9
Prop In Lane	1.00		0.32	1.00		0.61	1.00		0.26	1.00		0.68
Lane Grp Cap(c), veh/h	466	716	713	452	722	684	351	698	702	557	652	611
V/C Ratio(X)	0.20	0.11	0.12	0.07	0.17	0.18	0.07	0.07	0.08	0.11	0.09	0.09
Avail Cap(c_a), veh/h	466	716	713	452	722	684	351	698	702	557	652	611
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.6	13.3	13.4	14.6	13.7	13.8	15.5	14.2	14.3	15.6	14.3	14.4
Incr Delay (d2), s/veh	1.0	0.3	0.3	0.3	0.5	0.6	0.4	0.2	0.2	0.4	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.0	1.5	1.5	0.6	2.3	2.3	0.6	1.0	1.0	1.3	1.1	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.5	13.7	13.7	14.9	14.2	14.4	15.9	14.4	14.5	16.0	14.6	14.7
LnGrp LOS	B	B	B	B	B	B	B	B	B	B	B	B
Approach Vol, veh/h		260			281			131			177	
Approach Delay, s/veh		15.0			14.3			14.8			15.1	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	39.0	41.0	39.0	41.0
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0
Max Green Setting (Gmax), s	33.0	35.0	33.0	35.0
Max Q Clear Time (g_c+I1), s	5.9	11.1	6.3	6.1
Green Ext Time (p_c), s	0.7	1.2	0.8	1.5

Intersection Summary	
HCM 6th Ctrl Delay	14.8
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	32	307	4	3	196	90	2	4	0	138	2	32
Future Vol, veh/h	32	307	4	3	196	90	2	4	0	138	2	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	0	6	0	0	6	8	0	0	0	3	0	0
Mvmt Flow	35	337	4	3	215	99	2	4	0	152	2	35

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	314	0	0	341	0	0	698	729	339	682	682	265
Stage 1	-	-	-	-	-	-	409	409	-	271	271	-
Stage 2	-	-	-	-	-	-	289	320	-	411	411	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.13	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.13	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.13	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.527	4	3.3
Pot Cap-1 Maneuver	1258	-	-	1229	-	-	358	352	708	363	375	779
Stage 1	-	-	-	-	-	-	623	600	-	733	689	-
Stage 2	-	-	-	-	-	-	723	656	-	616	598	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1258	-	-	1229	-	-	331	339	708	349	361	779
Mov Cap-2 Maneuver	-	-	-	-	-	-	331	339	-	349	361	-
Stage 1	-	-	-	-	-	-	602	580	-	708	687	-
Stage 2	-	-	-	-	-	-	686	654	-	591	578	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	0.1	15.9	22.7
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	336	1258	-	-	1229	-	-	389
HCM Lane V/C Ratio	0.02	0.028	-	-	0.003	-	-	0.486
HCM Control Delay (s)	15.9	7.9	0	-	7.9	0	-	22.7
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	2.6

Intersection	
Int Delay, s/veh	58.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	113	117	626	116	227	807
Future Vol, veh/h	113	117	626	116	227	807
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	125	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	7	6	3	8	3	4
Mvmt Flow	118	122	652	121	236	841

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1606	387	0	0	773	0
Stage 1	713	-	-	-	-	-
Stage 2	893	-	-	-	-	-
Critical Hdwy	6.94	7.02	-	-	4.16	-
Critical Hdwy Stg 1	5.94	-	-	-	-	-
Critical Hdwy Stg 2	5.94	-	-	-	-	-
Follow-up Hdwy	3.57	3.36	-	-	2.23	-
Pot Cap-1 Maneuver	~ 91	600	-	-	832	-
Stage 1	434	-	-	-	-	-
Stage 2	348	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 43	600	-	-	832	-
Mov Cap-2 Maneuver	~ 43	-	-	-	-	-
Stage 1	434	-	-	-	-	-
Stage 2	163	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s$	490.5	0	3.9
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	43	600	832	-
HCM Lane V/C Ratio	-	-	2.737	0.203	0.284	-
HCM Control Delay (s)	-	-	$ 985.5	12.5	11	1.9
HCM Lane LOS	-	-	F	B	B	A
HCM 95th %tile Q(veh)	-	-	12.8	0.8	1.2	-

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	299	31	24	177	111	36	148	43	80	94	76
Future Volume (veh/h)	115	299	31	24	177	111	36	148	43	80	94	76
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1826	1678	1381	1781	1781	1648	1856	1574	1663	1796	1737
Adj Flow Rate, veh/h	125	325	34	26	192	121	39	161	47	87	102	83
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	5	15	35	8	8	17	3	22	16	7	11
Cap, veh/h	484	1388	144	371	890	534	486	1119	317	481	769	573
Arrive On Green	0.44	0.44	0.44	0.44	0.44	0.44	0.41	0.41	0.41	0.41	0.41	0.41
Sat Flow, veh/h	1050	3172	329	755	2033	1221	1056	2712	768	1044	1863	1389
Grp Volume(v), veh/h	125	177	182	26	158	155	39	103	105	87	93	92
Grp Sat Flow(s),veh/h/ln	1050	1735	1767	755	1692	1562	1056	1763	1717	1044	1706	1546
Q Serve(g_s), s	6.8	5.1	5.2	1.8	4.6	5.0	1.9	2.9	3.1	4.6	2.7	3.0
Cycle Q Clear(g_c), s	11.7	5.1	5.2	7.0	4.6	5.0	4.9	2.9	3.1	7.6	2.7	3.0
Prop In Lane	1.00		0.19	1.00		0.78	1.00		0.45	1.00		0.90
Lane Grp Cap(c), veh/h	484	759	773	371	740	683	486	727	708	481	704	638
V/C Ratio(X)	0.26	0.23	0.24	0.07	0.21	0.23	0.08	0.14	0.15	0.18	0.13	0.14
Avail Cap(c_a), veh/h	484	759	773	371	740	683	486	727	708	481	704	638
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.7	14.1	14.1	16.3	14.0	14.0	16.2	14.7	14.7	17.1	14.6	14.7
Incr Delay (d2), s/veh	1.3	0.7	0.7	0.4	0.7	0.8	0.3	0.4	0.4	0.8	0.4	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.9	3.3	3.5	0.6	3.0	3.0	0.8	2.0	2.1	2.0	1.8	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.0	14.8	14.8	16.7	14.6	14.8	16.5	15.1	15.1	17.9	15.0	15.2
LnGrp LOS	B	B	B	B	B	B	B	B	B	B	B	B
Approach Vol, veh/h		484			339			247			272	
Approach Delay, s/veh		15.9			14.9			15.3			16.0	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		39.0		41.0		39.0		41.0				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		33.0		35.0		33.0		35.0				
Max Q Clear Time (g_c+I1), s		6.9		13.7		9.6		9.0				
Green Ext Time (p_c), s		1.2		2.3		1.3		1.8				

Intersection Summary												
HCM 6th Ctrl Delay			15.6									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	42	190	0	2	142	93	2	3	2	80	2	19
Future Vol, veh/h	42	190	0	2	142	93	2	3	2	80	2	19
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	3	12	0	0	11	7	0	33	0	14	0	33
Mvmt Flow	46	209	0	2	156	102	2	3	2	88	2	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	258	0	0	209	0	0	524	563	209	515	512	207
Stage 1	-	-	-	-	-	-	301	301	-	211	211	-
Stage 2	-	-	-	-	-	-	223	262	-	304	301	-
Critical Hdwy	4.13	-	-	4.1	-	-	7.1	6.83	6.2	7.24	6.5	6.53
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.83	-	6.24	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.83	-	6.24	5.5	-
Follow-up Hdwy	2.227	-	-	2.2	-	-	3.5	4.297	3.3	3.626	4	3.597
Pot Cap-1 Maneuver	1301	-	-	1374	-	-	467	395	836	452	468	761
Stage 1	-	-	-	-	-	-	712	613	-	764	731	-
Stage 2	-	-	-	-	-	-	784	638	-	680	669	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1301	-	-	1374	-	-	438	378	836	433	448	761
Mov Cap-2 Maneuver	-	-	-	-	-	-	438	378	-	433	448	-
Stage 1	-	-	-	-	-	-	684	588	-	733	730	-
Stage 2	-	-	-	-	-	-	759	637	-	647	642	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.4	0.1	12.8	15
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	470	1301	-	-	1374	-	-	472
HCM Lane V/C Ratio	0.016	0.035	-	-	0.002	-	-	0.235
HCM Control Delay (s)	12.8	7.9	0	-	7.6	0	-	15
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	0.9

Intersection	
Int Delay, s/veh	4.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	57	106	578	97	135	531
Future Vol, veh/h	57	106	578	97	135	531
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	125	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	99	99	99	99	99	99
Heavy Vehicles, %	20	11	5	13	1	10
Mvmt Flow	58	107	584	98	136	536

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1173	341	0	0	682	0
Stage 1	633	-	-	-	-	-
Stage 2	540	-	-	-	-	-
Critical Hdwy	7.2	7.12	-	-	4.12	-
Critical Hdwy Stg 1	6.2	-	-	-	-	-
Critical Hdwy Stg 2	6.2	-	-	-	-	-
Follow-up Hdwy	3.7	3.41	-	-	2.21	-
Pot Cap-1 Maneuver	160	629	-	-	913	-
Stage 1	445	-	-	-	-	-
Stage 2	500	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	126	629	-	-	913	-
Mov Cap-2 Maneuver	126	-	-	-	-	-
Stage 1	445	-	-	-	-	-
Stage 2	394	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	27.2	0	2.5
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	126	629	913	-
HCM Lane V/C Ratio	-	-	0.457	0.17	0.149	-
HCM Control Delay (s)	-	-	55.6	11.9	9.6	0.7
HCM Lane LOS	-	-	F	B	A	A
HCM 95th %tile Q(veh)	-	-	2	0.6	0.5	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	89	142	32	29	193	74	46	87	13	61	71	37
Future Volume (veh/h)	89	142	32	29	193	74	46	87	13	61	71	37
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1604	1722	1129	1366	1737	1455	981	1781	981	1722	1663	1515
Adj Flow Rate, veh/h	93	148	33	30	201	77	48	91	14	64	74	39
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	20	12	52	36	11	30	62	8	62	12	16	26
Cap, veh/h	452	1169	254	445	1031	382	351	1217	183	557	846	417
Arrive On Green	0.44	0.44	0.44	0.44	0.44	0.44	0.41	0.41	0.41	0.41	0.41	0.41
Sat Flow, veh/h	944	2672	581	879	2356	874	671	2949	444	1187	2051	1010
Grp Volume(v), veh/h	93	89	92	30	139	139	48	51	54	64	56	57
Grp Sat Flow(s),veh/h/ln	944	1636	1618	879	1650	1580	671	1692	1701	1187	1580	1481
Q Serve(g_s), s	5.4	2.6	2.7	1.7	4.1	4.4	3.8	1.5	1.5	2.8	1.7	1.9
Cycle Q Clear(g_c), s	9.7	2.6	2.7	4.4	4.1	4.4	5.7	1.5	1.5	4.3	1.7	1.9
Prop In Lane	1.00		0.36	1.00		0.55	1.00		0.26	1.00		0.68
Lane Grp Cap(c), veh/h	452	716	708	445	722	691	351	698	702	557	652	611
V/C Ratio(X)	0.21	0.12	0.13	0.07	0.19	0.20	0.14	0.07	0.08	0.11	0.09	0.09
Avail Cap(c_a), veh/h	452	716	708	445	722	691	351	698	702	557	652	611
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.9	13.4	13.4	14.7	13.8	13.9	16.1	14.2	14.3	15.6	14.3	14.4
Incr Delay (d2), s/veh	1.0	0.4	0.4	0.3	0.6	0.7	0.8	0.2	0.2	0.4	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.1	1.6	1.7	0.6	2.6	2.6	1.1	1.0	1.0	1.3	1.1	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.9	13.7	13.8	15.0	14.4	14.5	16.9	14.4	14.5	16.0	14.6	14.7
LnGrp LOS	B	B	B	B	B	B	B	B	B	B	B	B
Approach Vol, veh/h		274			308			153			177	
Approach Delay, s/veh		15.2			14.5			15.2			15.1	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		39.0		41.0		39.0		41.0				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		33.0		35.0		33.0		35.0				
Max Q Clear Time (g_c+I1), s		7.7		11.7		6.3		6.4				
Green Ext Time (p_c), s		0.9		1.3		0.8		1.6				

Intersection Summary												
HCM 6th Ctrl Delay			15.0									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	259	264	12	4	2
Future Vol, veh/h	0	259	264	12	4	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	0	13	10	0	0	0
Mvmt Flow	0	285	290	13	4	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	303	0	-	0	582	297
Stage 1	-	-	-	-	297	-
Stage 2	-	-	-	-	285	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1269	-	-	-	479	747
Stage 1	-	-	-	-	758	-
Stage 2	-	-	-	-	768	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1269	-	-	-	479	747
Mov Cap-2 Maneuver	-	-	-	-	479	-
Stage 1	-	-	-	-	758	-
Stage 2	-	-	-	-	768	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	11.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1269	-	-	-	544
HCM Lane V/C Ratio	-	-	-	-	0.012
HCM Control Delay (s)	0	-	-	-	11.7
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	23	249	231	35	10	6
Future Vol, veh/h	23	249	231	35	10	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	0	13	10	0	0	0
Mvmt Flow	25	274	254	38	11	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	292	0	-	0	597	273
Stage 1	-	-	-	-	273	-
Stage 2	-	-	-	-	324	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1281	-	-	-	469	771
Stage 1	-	-	-	-	778	-
Stage 2	-	-	-	-	738	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1281	-	-	-	458	771
Mov Cap-2 Maneuver	-	-	-	-	458	-
Stage 1	-	-	-	-	760	-
Stage 2	-	-	-	-	738	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	11.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1281	-	-	-	540
HCM Lane V/C Ratio	0.02	-	-	-	0.033
HCM Control Delay (s)	7.9	0	-	-	11.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Intersection	
Int Delay, s/veh	1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	8	130	8	26	101
Future Vol, veh/h	0	8	130	8	26	101
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	91	91	91	91	91	91
Heavy Vehicles, %	0	0	6	0	0	21
Mvmt Flow	0	9	143	9	29	111

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	317	148	0	0	152	0
Stage 1	148	-	-	-	-	-
Stage 2	169	-	-	-	-	-
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	680	904	-	-	1441	-
Stage 1	884	-	-	-	-	-
Stage 2	866	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	666	904	-	-	1441	-
Mov Cap-2 Maneuver	666	-	-	-	-	-
Stage 1	884	-	-	-	-	-
Stage 2	848	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	1.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	904	1441	-
HCM Lane V/C Ratio	-	-	0.01	0.02	-
HCM Control Delay (s)	-	-	9	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0.1	-

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	34	313	4	3	220	90	2	4	0	138	2	32
Future Vol, veh/h	34	313	4	3	220	90	2	4	0	138	2	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	0	6	0	0	6	8	0	0	0	3	0	0
Mvmt Flow	37	344	4	3	242	99	2	4	0	152	2	35

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	341	0	0	348	0	0	736	767	346	720	720	292
Stage 1	-	-	-	-	-	-	420	420	-	298	298	-
Stage 2	-	-	-	-	-	-	316	347	-	422	422	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.13	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.13	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.13	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.527	4	3.3
Pot Cap-1 Maneuver	1229	-	-	1222	-	-	337	335	702	342	356	752
Stage 1	-	-	-	-	-	-	615	593	-	709	671	-
Stage 2	-	-	-	-	-	-	699	638	-	607	592	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1229	-	-	1222	-	-	310	322	702	328	342	752
Mov Cap-2 Maneuver	-	-	-	-	-	-	310	322	-	328	342	-
Stage 1	-	-	-	-	-	-	592	571	-	683	669	-
Stage 2	-	-	-	-	-	-	662	636	-	580	570	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	0.1	16.6	24.8
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	318	1229	-	-	1222	-	-	367
HCM Lane V/C Ratio	0.021	0.03	-	-	0.003	-	-	0.515
HCM Control Delay (s)	16.6	8	0	-	8	0	-	24.8
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	2.8

Intersection	
Int Delay, s/veh	68.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	117	137	626	117	234	807
Future Vol, veh/h	117	137	626	117	234	807
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	125	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	7	6	3	8	3	4
Mvmt Flow	122	143	652	122	244	841

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1622	387	0	0	774	0
Stage 1	713	-	-	-	-	-
Stage 2	909	-	-	-	-	-
Critical Hdwy	6.94	7.02	-	-	4.16	-
Critical Hdwy Stg 1	5.94	-	-	-	-	-
Critical Hdwy Stg 2	5.94	-	-	-	-	-
Follow-up Hdwy	3.57	3.36	-	-	2.23	-
Pot Cap-1 Maneuver	~ 89	600	-	-	831	-
Stage 1	434	-	-	-	-	-
Stage 2	342	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 40	600	-	-	831	-
Mov Cap-2 Maneuver	~ 40	-	-	-	-	-
Stage 1	434	-	-	-	-	-
Stage 2	154	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s$	529.7	0	4
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	40	600	831	-
HCM Lane V/C Ratio	-	-	3.047	0.238	0.293	-
HCM Control Delay (s)	-	-	$ 1134.8	12.9	11.1	1.9
HCM Lane LOS	-	-	F	B	B	A
HCM 95th %tile Q(veh)	-	-	13.6	0.9	1.2	-

Notes

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	319	47	24	184	111	42	148	43	80	94	76
Future Volume (veh/h)	115	319	47	24	184	111	42	148	43	80	94	76
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1826	1678	1381	1781	1781	1648	1856	1574	1663	1796	1737
Adj Flow Rate, veh/h	125	347	51	26	200	121	46	161	47	87	102	83
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	5	15	35	8	8	17	3	22	16	7	11
Cap, veh/h	480	1329	194	355	903	522	486	1119	317	481	769	573
Arrive On Green	0.44	0.44	0.44	0.44	0.44	0.44	0.41	0.41	0.41	0.41	0.41	0.41
Sat Flow, veh/h	1042	3038	443	729	2065	1194	1056	2712	768	1044	1863	1389
Grp Volume(v), veh/h	125	197	201	26	162	159	46	103	105	87	93	92
Grp Sat Flow(s),veh/h/ln	1042	1735	1746	729	1692	1567	1056	1763	1717	1044	1706	1546
Q Serve(g_s), s	6.8	5.8	5.9	1.9	4.8	5.1	2.3	2.9	3.1	4.6	2.7	3.0
Cycle Q Clear(g_c), s	11.9	5.8	5.9	7.7	4.8	5.1	5.3	2.9	3.1	7.6	2.7	3.0
Prop In Lane	1.00		0.25	1.00		0.76	1.00		0.45	1.00		0.90
Lane Grp Cap(c), veh/h	480	759	764	355	740	685	486	727	708	481	704	638
V/C Ratio(X)	0.26	0.26	0.26	0.07	0.22	0.23	0.09	0.14	0.15	0.18	0.13	0.14
Avail Cap(c_a), veh/h	480	759	764	355	740	685	486	727	708	481	704	638
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.8	14.3	14.3	16.8	14.0	14.1	16.3	14.7	14.7	17.1	14.6	14.7
Incr Delay (d2), s/veh	1.3	0.8	0.8	0.4	0.7	0.8	0.4	0.4	0.4	0.8	0.4	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.9	3.8	3.9	0.6	3.1	3.0	1.0	2.0	2.1	2.0	1.8	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.1	15.1	15.1	17.2	14.7	14.9	16.7	15.1	15.1	17.9	15.0	15.2
LnGrp LOS	B	B	B	B	B	B	B	B	B	B	B	B
Approach Vol, veh/h		523			347			254			272	
Approach Delay, s/veh		16.1			15.0			15.4			16.0	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		39.0		41.0		39.0		41.0				
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0				
Max Green Setting (Gmax), s		33.0		35.0		33.0		35.0				
Max Q Clear Time (g_c+I1), s		7.3		13.9		9.6		9.7				
Green Ext Time (p_c), s		1.2		2.5		1.3		1.9				

Intersection Summary												
HCM 6th Ctrl Delay			15.7									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	472	299	3	9	6
Future Vol, veh/h	0	472	299	3	9	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	0	6	7	0	0	0
Mvmt Flow	0	519	329	3	10	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	332	0	-	0	850	331
Stage 1	-	-	-	-	331	-
Stage 2	-	-	-	-	519	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1239	-	-	-	334	715
Stage 1	-	-	-	-	732	-
Stage 2	-	-	-	-	601	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1239	-	-	-	334	715
Mov Cap-2 Maneuver	-	-	-	-	334	-
Stage 1	-	-	-	-	732	-
Stage 2	-	-	-	-	601	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	13.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1239	-	-	-	424
HCM Lane V/C Ratio	-	-	-	-	0.039
HCM Control Delay (s)	0	-	-	-	13.8
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	6	445	295	10	27	18
Future Vol, veh/h	6	445	295	10	27	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	0	6	7	0	0	0
Mvmt Flow	7	489	324	11	30	20

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	335	0	-	0	833	330
Stage 1	-	-	-	-	330	-
Stage 2	-	-	-	-	503	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1236	-	-	-	341	716
Stage 1	-	-	-	-	733	-
Stage 2	-	-	-	-	612	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1236	-	-	-	338	716
Mov Cap-2 Maneuver	-	-	-	-	338	-
Stage 1	-	-	-	-	727	-
Stage 2	-	-	-	-	612	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	14.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1236	-	-	-	428
HCM Lane V/C Ratio	0.005	-	-	-	0.116
HCM Control Delay (s)	7.9	0	-	-	14.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.4

Intersection	
Int Delay, s/veh	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	21	126	2	7	172
Future Vol, veh/h	0	21	126	2	7	172
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	91	91	91	91	91	91
Heavy Vehicles, %	0	0	5	0	0	2
Mvmt Flow	0	23	138	2	8	189

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	344	139	0	0	140	0
Stage 1	139	-	-	-	-	-
Stage 2	205	-	-	-	-	-
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	657	915	-	-	1456	-
Stage 1	893	-	-	-	-	-
Stage 2	834	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	653	915	-	-	1456	-
Mov Cap-2 Maneuver	653	-	-	-	-	-
Stage 1	893	-	-	-	-	-
Stage 2	829	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	0.3
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	915	1456	-
HCM Lane V/C Ratio	-	-	0.025	0.005	-
HCM Control Delay (s)	-	-	9	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

SIMTRAFFIC ANALYSIS

Intersection: 1: Sheldon Road & Van Born Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	48	16	56	82
Average Queue (ft)	6	1	6	34
95th Queue (ft)	29	6	29	64
Link Distance (ft)	3136	414	328	429
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: Belleville Road & Van Born Road

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	R	T	TR	LT	T
Maximum Queue (ft)	99	72	6	13	171	24
Average Queue (ft)	35	35	0	1	51	1
95th Queue (ft)	75	60	6	7	122	17
Link Distance (ft)	3136		187	187	180	180
Upstream Blk Time (%)					0	
Queuing Penalty (veh)					0	
Storage Bay Dist (ft)		125				
Storage Blk Time (%)	0					
Queuing Penalty (veh)	0					

Intersection: 3: Haggerty Road & Van Born Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	145	79	94	106	138	101	103	90	64	98	93	67
Average Queue (ft)	52	32	35	23	52	31	25	39	12	36	31	21
95th Queue (ft)	110	71	79	71	100	71	75	77	48	76	73	55
Link Distance (ft)		2477			593	593	264	264	264	352	352	352
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	175		250	300								
Storage Blk Time (%)	0											
Queuing Penalty (veh)	0											

Intersection: 1: Sheldon Road & Van Born Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	54	32	24	106
Average Queue (ft)	8	1	3	46
95th Queue (ft)	33	14	17	86
Link Distance (ft)	3136	414	328	429
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: Belleville Road & Van Born Road

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	R	T	TR	LT	T
Maximum Queue (ft)	1450	225	25	38	208	184
Average Queue (ft)	741	130	1	4	121	22
95th Queue (ft)	1596	298	9	21	218	109
Link Distance (ft)	3136		187	187	180	180
Upstream Blk Time (%)					5	0
Queuing Penalty (veh)					0	0
Storage Bay Dist (ft)		125				
Storage Blk Time (%)	80	0				
Queuing Penalty (veh)	95	0				

Intersection: 3: Haggerty Road & Van Born Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	138	110	121	81	125	105	78	102	65	128	98	81
Average Queue (ft)	57	53	58	15	56	33	26	48	23	47	36	29
95th Queue (ft)	116	99	99	52	103	73	68	89	56	101	77	61
Link Distance (ft)		2477			593	593	264	264	264	352	352	352
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	175		250	300								
Storage Blk Time (%)	0											
Queuing Penalty (veh)	0											

Intersection: 1: Sheldon Road & Van Born Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	62	18	40	105
Average Queue (ft)	9	1	5	39
95th Queue (ft)	35	8	22	77
Link Distance (ft)	3136	414	328	429
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: Belleville Road & Van Born Road

Movement	WB	WB	NB	SB	SB
Directions Served	L	R	TR	LT	T
Maximum Queue (ft)	100	76	36	175	57
Average Queue (ft)	37	40	2	62	3
95th Queue (ft)	81	68	15	137	34
Link Distance (ft)	3136		187	180	180
Upstream Blk Time (%)				0	0
Queuing Penalty (veh)				0	0
Storage Bay Dist (ft)		125			
Storage Blk Time (%)	0				
Queuing Penalty (veh)	0				

Intersection: 3: Haggerty Road & Van Born Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	147	78	93	88	136	95	120	88	67	97	90	67
Average Queue (ft)	56	34	36	20	60	31	41	37	10	32	31	18
95th Queue (ft)	112	72	80	61	114	73	94	77	42	74	75	51
Link Distance (ft)		2477			593	593	264	264	264	352	352	352
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	175		250	300								
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 4: Van Born Road & Easterly Site Driveway

Movement	SB
Directions Served	LR
Maximum Queue (ft)	29
Average Queue (ft)	6
95th Queue (ft)	25
Link Distance (ft)	103
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: Van Born Road & Westerly Site Driveway

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	30	34
Average Queue (ft)	5	13
95th Queue (ft)	22	37
Link Distance (ft)	414	123
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Sheldon Road & Site Driveway

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	30	30
Average Queue (ft)	6	2
95th Queue (ft)	26	13
Link Distance (ft)	120	126
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: Sheldon Road & Van Born Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	84	29	24	105
Average Queue (ft)	8	1	4	43
95th Queue (ft)	39	12	18	80
Link Distance (ft)	3136	414	328	429
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: Belleville Road & Van Born Road

Movement	WB	WB	NB	NB	SB	SB
Directions Served	L	R	T	TR	LT	T
Maximum Queue (ft)	1800	225	18	35	202	180
Average Queue (ft)	1019	167	1	3	119	13
95th Queue (ft)	2005	327	10	17	209	84
Link Distance (ft)	3136		187	187	180	180
Upstream Blk Time (%)					3	0
Queuing Penalty (veh)					0	0
Storage Bay Dist (ft)		125				
Storage Blk Time (%)	98	0				
Queuing Penalty (veh)	135	0				

Intersection: 3: Haggerty Road & Van Born Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	125	114	130	74	123	86	98	108	67	130	99	67
Average Queue (ft)	55	58	61	18	52	32	26	56	28	46	36	24
95th Queue (ft)	105	98	108	55	100	66	69	96	64	100	79	55
Link Distance (ft)		2477			593	593	264	264	264	352	352	352
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	175		250	300								
Storage Blk Time (%)	0											
Queuing Penalty (veh)	0											

Intersection: 4: Van Born Road & Easterly Site Driveway

Movement	SB
Directions Served	LR
Maximum Queue (ft)	30
Average Queue (ft)	11
95th Queue (ft)	34
Link Distance (ft)	103
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: Van Born Road & Westerly Site Driveway

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	27	61
Average Queue (ft)	1	25
95th Queue (ft)	10	50
Link Distance (ft)	414	123
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Sheldon Road & Site Driveway

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	30	12
Average Queue (ft)	15	0
95th Queue (ft)	40	6
Link Distance (ft)	120	126
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 135

EASEMENT

For good and valuable consideration, exempt under MCL 207.526(a) and MCL 207.505(a), receipt of which is hereby acknowledged, **James K. Dowling, Jr. and Peggy Ann Dowling** whose address is 494 Birch Street, Brooklyn, MI 49230 (Grantor) hereby grants to **DTE Gas Company**, a Michigan Corporation (Grantee), with its principal office at One Energy Plaza, Detroit, Michigan 48226, its successors and assigns, an easement to construct, test, reconstruct, renew, operate, maintain, inspect, alter, repair and remove a pipeline or pipelines for the transportation of gas, oil or other substances which can be transported through a pipeline or pipelines, and such mains, service laterals, drips, valves, regulators, fittings, meters and other equipment and appurtenances as may be necessary or convenient for its operations (collectively, "Grantee's Facilities"), over and through the following described real estate in the Township of Van Buren, Wayne County, State of Michigan, to wit:

REAL ESTATE DESCRIPTION: SEE ATTACHED EXHIBIT A

EASEMENT DESCRIPTION: SEE ATTACHED EXHIBIT A

THE PARTIES FURTHER AGREE THAT:

Structures and Trees: No buildings or other structures shall be erected or placed, and no trees shall be planted, on or in the above-described easement without the written consent of the Grantee. Additionally, Grantee may remove any vegetation, buildings, or structures within in the above-described easement that Grantee believes could interfere with the safe and reliable construction, operation, maintenance and repair of Grantee's Facilities.

Additional Work Space: Additional workspace, contiguous to the easement may be used temporarily during construction, maintenance or removal of the pipeline or pipelines installed hereunder.

Ground Elevation: Grantee shall initially bury said pipeline or pipelines at a minimum depth of 48 inches. Grantor shall not materially alter the ground elevation within the above-described easement without a prior written agreement executed by Grantee allowing said alteration.

Damages/Restoration: Grantee shall pay reasonable damages to improvements occasioned by said installation or by any of its subsequent operations under this easement or shall replace the damaged area to its original condition as reasonably practical. Grantee shall replace in good workmanlike manner all tile cut in the construction of the pipeline or pipelines.

Assignment/Successors: Grantee's rights herein granted may be assigned in whole or in part. This easement runs with the land, and all rights, privileges and obligations created by this instrument shall inure to the benefit of, and be binding upon, the heirs, devisees, administrators, executors, successors, and assigns of the parties hereto.

Ownership: Grantor covenants that they are the lawful fee simple owner of the above-described property and that they have the right and authority to make this grant, and that they will forever warrant and defend the title thereto against all claims whatsoever.

Exercise of Easement: Grantee's nonuse or limited use of this easement shall not preclude Grantee's later use of this easement to its full extent.

Indemnity: Grantee shall indemnify, defend, and hold Grantor harmless from and against all claims and liabilities for injury to persons or property, including without limitation, reasonable attorney's fees expended in defending against any such claims, to the extent caused by Grantee's willful or negligent acts or omissions in exercising the rights granted in this Easement.

It is understood that the person securing this easement is without authority from Grantee to make any agreement in respect of the subject matter hereof not herein expressed.

Executed this 1st day of March, 2022.

James K. Dowling Jr

James K. Dowling, Jr.

Peggy Dowling

Peggy Ann Dowling

ACKNOWLEDGMENT

STATE OF MICHIGAN

County of Washtenaw

The foregoing instrument was acknowledged before me this 1st day of March, 2022, by **James K. Dowling, Jr.**

SCOTT REPINE
Notary Public - State of Michigan
County of Washtenaw
My Commission Expires Oct 20, 2024
Acting in the County of Washtenaw

Notary Public Washtenaw County, Michigan

Acting in Washtenaw County, Michigan

My Commission Expires: 10-20-2024

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My Commission Expires: 10-20-2024

Prepared by and return to:

Tyler Remington
DTE Gas Company
PO Box 279
Kalkaska, MI 49646

PROPOSED VAN BORN PIPELINE
EXHIBIT 'A'

SCALE: 1"= 200'

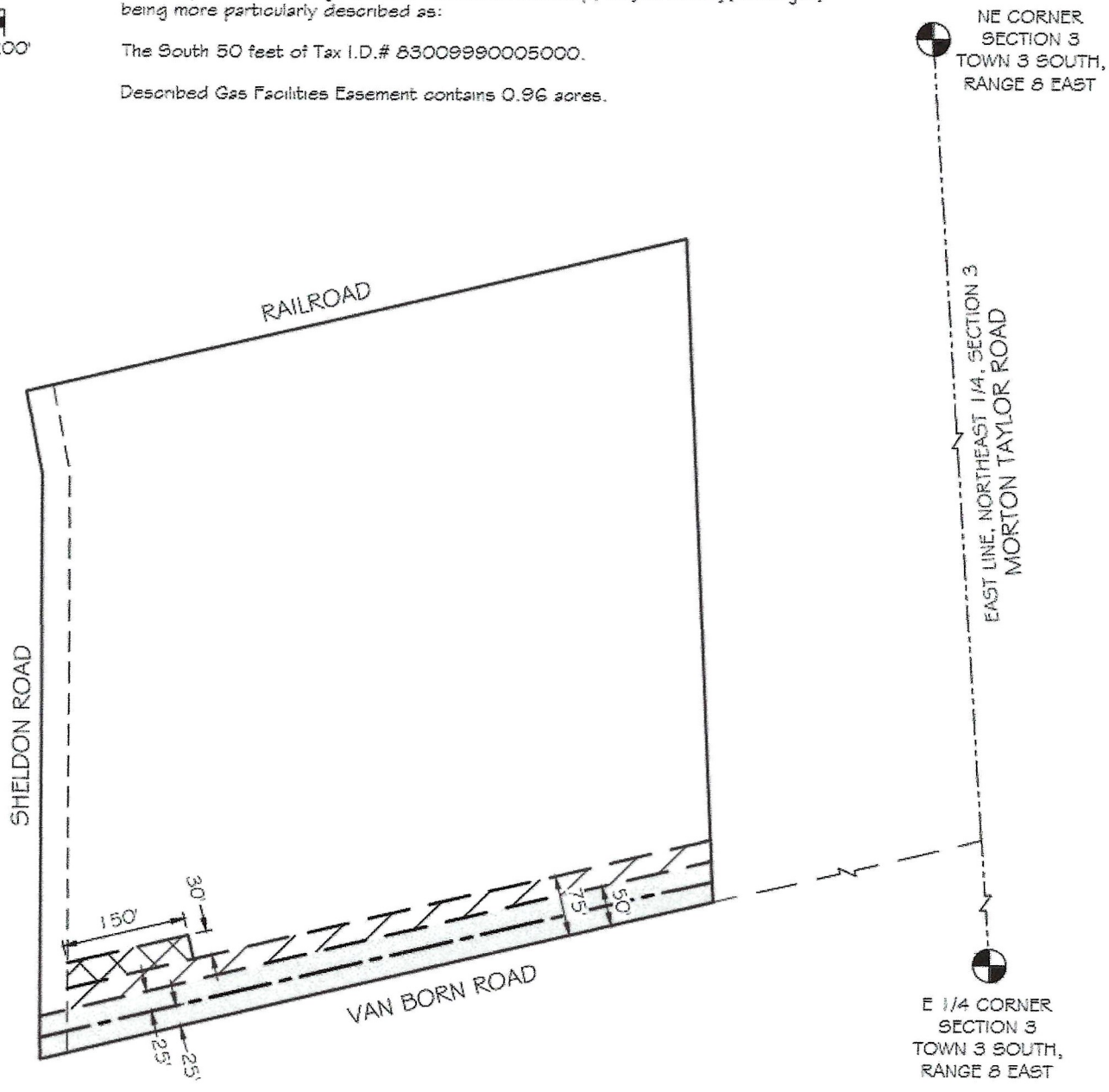
0 100' 200'

Legal Description: Proposed Permanent Easement

A strip of land 50 feet in width located in the Northeast 1/4 of Section 3, Township 3 South, Range 8 East, Van Buren Township, Wayne County, Michigan, being more particularly described as:

The South 50 feet of Tax I.D.# 83009990005000.

Described Gas Facilities Easement contains 0.96 acres.



PROPOSED VAN BORN PIPELINE - 836 FEET

PROPOSED PERMANENT EASEMENT - 0.96 ACRES

PROPOSED TEMPORARY WORK SPACE - 0.46 ACRES

PROPOSED ADDITIONAL TEMPORARY WORK SPACE - 0.11 ACRES

JAMES DOWLING
TAX I.D.# 83009990005000

HOLLAND ENGINEERING

PROPOSED
VAN BORN PIPELINE

NE 1/4, SECTION 3
Town 3 South, Range 8 East
Van Buren Twp., Wayne Co., Michigan

DTE

DTE Gas Company
Transmission Engineering

DATE: 06/21/2021	REVIEWED BY: JLB	
SCALE: 1" = 200'	DRAWN BY: DRF	
DWG NO. PL-VB-12	REV. 0	SHEET 1 OF 2

H:\Hatch\2020\20-02-005 (JA) DTE Van Born Study\Drafting\Pipeline\Exhibits\Acquisition Exhibits.dwg 6/21/2021 1:53:32 PM

SOILS INVESTIGATION
PROPOSED LIGHT INDUSTRIAL BUILDING
NORTHEAST CORNER OF VAN BORN AND SHELDON ROADS
VAN BUREN TOWNSHIP, MICHIGAN

S. E. GRAHAM & ASSOCIATES, INC.
22526 MAPLE STREET
ST. CLAIR SHORES, MICHIGAN 48081

DECEMBER 12, 2022
BY
McDOWELL & ASSOCIATES

McDowell & Associates
Geotechnical, Environmental & Hydrogeological Services • Materials Testing & Inspection
21355 Hatcher Avenue • Ferndale, MI 48220
Phone: (248) 399-2066 • Fax: (248) 399-2157
www.mcdowasc.com

December 12, 2022

S.E. Graham & Associates, Inc.
22526 Maple Street
St. Clair Shores, Michigan 48081 Job No. 22-457

Attention: Mr. Steven Graham

Subject: Soils Investigation
Proposed Light Industrial Building
Northeast Corner of Van Born and Sheldon Roads
Van Buren Township, Michigan

Dear Mr. Graham:

In accordance with your request, we have made a Soils Investigation at the subject project.

Field Work and Laboratory Testing

Eighteen Soil Test Borings, designated as 1 through 18, and three Test Pits, designated as TP-19 through TP-21, were performed at the subject property at the approximate locations shown on the Soil Boring Location Plan which accompanies this report. The boring and test pit locations were located by the client prior to drilling/excavation. The borings were advanced to depths ranging from about five feet (5') to twenty feet (20') below the existing ground surface at the boring locations.

Soil descriptions, groundwater observations and the results of field and laboratory tests are to be found on the accompanying Logs of Soil Test Borings and summary sheet of Sieve Analysis results.

The borings encountered nine inches (9") to one foot six inches of surficial topsoil. Fill or possible fill soils generally consisting of clay with some areas of sand were encountered in Borings 2, 3, 6, 7, 9, 12, 15 and 16 to depths ranging from one foot six inches (1'6") to five feet two inches (5'2"). The apparent native soils underlying the topsoil, fill and possible fill generally consisted of silty clay.

Soil descriptions and depths shown on the boring logs are approximate indications of change from one soil type to another and are not intended to represent an area of exact geologic change or stratification. The transition from one soil type to the next may be gradual rather than abrupt and subsurface conditions may be different from those found by the borings at locations between or beyond the actual boring locations. Also, the site shows some signs of modification which could indicate fill and soil conditions different from those encountered at the boring locations.

Groundwater was encountered in Borings 2, 4 through 6, 8, 10 and 12 through 15 at initial depths ranging from nine feet (9') to nineteen feet (19') below the existing ground surface. Upon completion of drilling, all borings were dry. Groundwater was not encountered in Borings 1, 3, 7, 9,

11 and 16 through 18. It should be noted that short-term groundwater observations may not provide a reliable indication of the depth of the water table. In soils with significant fines content (clay and/or silt), this is due to the slow rate of infiltration of water into the borehole as well as the potential for water to become trapped in overlying layers of granular soils during periods of heavy rainfall. Water levels in granular soils fluctuate with seasonal and climatic changes as well as the amount of rainfall in the area immediately prior to the measurements. It should be expected that groundwater fluctuations could occur on a seasonal basis and that seams of water-bearing sands or silts could be found within the various clay strata at the site.

Standard Penetration Tests (SPTs) made during the sampling operation indicate that the site soils have good to very good strengths and densities. The tests at a depth of two feet six inches (2'6") resulted in values of 9 blows per foot or higher. At five feet (5') and below, penetration indices were 16 blows per foot or higher. All SPTs were performed with a rope and cathead safety hammer.

Test Pits TP-19 through TP-21 were performed for the purposes of infiltration testing. After the test pits were excavated, Double Ring infiltration tests were performed in general accordance with the guidelines outlined in the city of Detroit's "Stormwater Management Design Manual", dated December 2020. Each of the tests resulted in no noticeable infiltration. See the attached Test Pit Log sheets for additional information.

Project Description

It is understood that the project will consist of constructing a single-story, slab-on-grade building with parking areas and drives at the subject property. It is anticipated that the structure will transmit relatively light loads to the supporting soils.

Foundation Recommendations

Based on the project information provided and the results of field and laboratory tests, the indications are that the structures could be supported by conventional to deeper than normal spread or strip footings. All exterior footings should be constructed at, or below, a minimum frost penetration depth of three feet six inches (3'6") below finished grade. All interior and exterior load-bearing footings should extend through non-engineered fill soils, soils containing significant amounts of organic substances, or excessively weak soils. All strip footings should be continuously reinforced in order to minimize any noticeable effects of differential settlement.

Footings constructed at the following boring locations could be proportioned for the design soil pressures shown below, provided this results in the footings bearing on native, non-organic soils:

Boring	Depth	Soil Pressure (psf)
2	2'0" to 4'0"	4,000*
	4'0" to 8'0"	5,000
4	2'0" to 8'0"	5,000
5	2'0" to 8'0"	5,000
6	4'6" to 8'0"	5,000
8	2'0" to 8'0"	5,000
9	2'9" to 8'0"	5,000
10	2'0" to 8'0"	5,000
11	2'0" to 8'0"	5,000
12	2'0" to 8'0"	5,000
13	2'0" to 8'0"	5,000
14	2'0" to 8'0"	5,000
15	2'0" to 4'0"	5,000*
	4'0" to 8'0"	5,000
17	2'0" to 8'0"	5,000

* Soils at these locations were described by our drillers as possible fill materials or containing some organic matter. During footing excavation, if it is determined that these soils contain significant amounts of organic material or are indeed fill soils, then the footing depths should be extended so that they bear on native, non-organic material.

A maximum design soil pressure of 5,000 psf was considered for the above table. Higher design soil pressures are available at various depths in the borings and could be detailed, if desired.

Engineered Fill

As an alternative to potentially deeper than normal footings where fill is present, the building spread or strip footings could be supported on engineered fill. All existing non-engineered fill, organic soils, soft soils and loose granular soils should be excavated and removed from the proposed foundation area. The excavations should extend beyond the edge of the structure's proposed footings six inches (6") for every foot below the footing. The removal of the unsuitable soils should be done in the presence of a qualified soils engineer or technician to limit the potential for uncontrolled fill or highly organic soils being left behind before the placement of engineered fill. After the unsuitable

soils have been removed, the excavation should preferably be filled with compacted bank run sand similar to MDOT Type I or II granular soils. If clay material is utilized, it should be placed within 3% of its optimum moisture content. If the bottom of the excavation is not sufficiently stable to install the fill material, then a layer of coarse stone fill such as MDOT 6AA crushed stone could be installed. Geotextile fabric should be placed between the coarse stone engineered fill material and lower native granular soils to minimize the amount of fines infiltrating into the aggregate material. If granular material is to be placed above the stone, a six inch (6”) layer of MDOT 21AA or an additional layer of filter fabric should be placed above the stone, overlapping the underlying fabric to further minimize the amount of material infiltrating into the aggregate material. The fill soils should be deposited in horizontal lifts not to exceed nine inches (9”) in thickness with each lift being compacted uniformly to a minimum density of 95% of its maximum value as determined by the Modified Proctor Test (ASTM D-1557).

One inch by three-inch (1" x 3") size crushed stone or crushed concrete could be used in lieu of the MDOT Type 6AA aggregate and bank run sand that we recommended above. The crushed material would need to be placed and compacted in lifts not exceeding nine inches (9") up to about one foot (1') below the planned footings and/or floor slabs. About a one foot (1') thick layer of MDOT 21AA dense aggregate could then be placed above the crushed material in an effort to choke off the stone. The crushed stone or crushed concrete material should not contain significant amounts of brick and should be relatively clean of lime or cement dust which could potentially foul up or clog the drain tiles. We suggest that the brick content should be less than 5% and cement/lime dust should be less than 3%. The large crushed material will need to be separated from the existing site granular soils by a geotextile fabric. We suggest that a geotextile filter fabric be placed along the bottom and sides of the engineered fill excavation in an effort to minimize fines from migrating into the voids within the crushed material. It should be noted that the use of crushed concrete could cause problems for the basement drains and sump pump. When water percolates through crushed concrete, the pH of the water can increase and minerals can precipitate out of the solution (mostly calcium salts and, in some cases, calcium hydroxide). Mineral deposits precipitating from the solution can shorten the life of sump pumps and plug drain tiles. High pH water can also corrode metal pipes. See AASHTO M 319-02 for discussion of these problems. Since the new structures will have a slab-on-grade, precipitating mineral deposits should not be a major concern.

Foundations placed on the engineered fill could be proportioned for a design soil pressure of 3,000 psf provided the strength is not limited by the presence of weaker underlying materials. Engineered fill should be placed and compacted up to footing and floor invert elevations.

Groundwater Considerations

Based on the indications from the borings, footing excavation should be in primarily clay type soils. Water seepage from wet sand or silt seams was encountered as shallow as one foot (1’) in Boring 1. If significant, seepage from wet sand seams should be manageable with construction pumping and sumps. However, this is not known for certain. If large volumes of water or saturated granular soils are encountered, special dewatering techniques may be required. Care must be taken to minimize the removal of soil fines during any pumping operations. If standing water remains on the clay type footing invert soils for an extended period of time, it may result in a couple inches of “slop” material at the footing invert. This material should be removed prior to the placement of concrete.

Potential below-grade structures such as truck-wells should be provided with an adequate drainage system to protect the floors and walls from the possible effects of hydrostatic pressure. The drainage system should be designed and installed to minimize the potential for soil fines to erode into the underdrainage system. We suggest using a drain tile with one-sixteenth inch (1/16") slot openings; larger openings would require a filter sock. We also suggest surrounding any drain tiles with at least four inches (4") of MDOT 2NS sand.

Floor Slabs

Concrete floors or floor-supporting backfill could be placed at, or near, the present grade at Borings 4, 5, 8, 10, 11, 13, 14, 17 and 18. Any existing topsoil or other obviously objectionable materials should be removed and the subgrade should then be thoroughly proof-compacted. If, during the proof-compaction operation, areas are found where the soils yield excessively, the yielding materials should be scarified, dried, and recompacted or removed and replaced with engineered fill meeting the specifications outlined above.

Fill or possible fill soils were encountered in Borings 2, 3, 6, 7, 9, 12, 15 and 16 to depths ranging from one foot six inches (1'6") to five feet two inches (5'2") below the existing ground surface. If the possibility of more than normal differential settlement can be tolerated, slab-on-grade floors or floor-supporting backfill could be placed at, or near, the present grade in the vicinity of these borings. Any topsoil or other obviously objectionable material should be removed and the subgrade thoroughly proof-compacted. If, during the proof-compaction operation, areas are found where the soils yield excessively, the yielding materials should be scarified, dried, and recompacted or removed and replaced with engineered fill as outlined above.

If the possibility of more than normal differential movement cannot be tolerated, then all existing fill soils should be removed and replaced with engineered fill meeting the requirements outlined above, or the floor slab should be structurally supported.

If any existing structures are found, they should be entirely removed from the proposed building area. Buried utilities should be removed or grouted in place. Resulting excavations should be backfilled with engineered fill meeting the requirements outlined above.

To minimize capillary action under floor slabs, we suggest placing at least four inches (4") of clean material on the subgrade followed by a suitable plastic vapor barrier between the clean material and the concrete slab. The clean material could consist of pea stone, MDOT Class I sand, 2NS sand or 6AA crushed stone.

Pavement Design

It appears that the subgrade soils consist primarily of clay soils. We would expect the clay soils to have relatively low California Bearing Ratios (CBRs) on the order of 4% and a modulus of subgrade reaction of about 120 pci. It appears these soils have a high percentage of silt-sized particles which would indicate they would tend to have a severe frost heave potential.

Based on the above estimated CBR value, we have made the following pavement analysis. The site soils appear to be very susceptible to frost heave. Consequently, it is suggested that in areas of automobile and light truck traffic, three inches (3") of asphalt with eight inches (8") of high quality, well-graded granular base course be used. In drive areas subject to truck traffic, it is recommended that the asphalt thickness be increased by one and one-half inches (1.5"). In the areas to be paved, the site should be prepared in a manner similar to that recommended above. The subgrade should be reworked until approximately the upper one foot (1') of the subgrade is compacted to at least 95% of its maximum dry density as determined by the Modified Proctor Test. It is recommended, as a minimum, that stub drains be provided at the storm sewer catch basins to provide some drainage for the pavement base. The subgrade should be properly sloped to allow drainage of surface water. Eight inches (8") of concrete pavement should be used in the dumpster area and other intensive truck wheel load areas. Edge drains should be installed in watered landscaped areas.

Stormwater Management System

It is understood that you are proposing a stormwater management system with a desired "infiltration to the ground" component. The apparent native site soils generally consist of stiff to extremely stiff silty clay soils. We would typically expect these soils to have permeability coefficients on the order of 1.0×10^{-7} cm/s. Each of the infiltration test performed in Test Pits TP-19 through TP-21resulted in an infiltration rate of 0.00 in/hr. Based on the indications from the test pits, the apparent native site soils do not appear to be suitable for infiltration.

Closing

Experience indicates that actual subsurface conditions at the site could vary from those found at the various borings and test pits made at specific locations. It is, therefore, essential that McDowell & Associates be notified of any variation of soil conditions to determine their effects on the recommendations presented in this report. The evaluations and recommendations presented in this report have been formulated on the basis of reported or assumed data relating to the proposed project. Any significant change in the final design plans should be brought to our attention for review and evaluation with respect to the prevailing subsoil conditions.

It is recommended that the services of McDowell & Associates be engaged to observe the soils in the footing excavations prior to concreting in order to test the soils for the required bearing capacities. Testing should also be performed to check that suitable materials are being used for controlled fills and that they are properly placed and compacted.

If we can be of any further service, please feel free to call.

Very truly yours,

McDOWELL & ASSOCIATES

David Quintal, M.S., P.E.
Senior Engineer

Robert McDowell, M.S., P.E.
CEO McDowell & Associates

DQ/

Attachments: Soil Boring Logs (18 pp)
Test Pit Logs (3 pp)
Sieve Analysis sheet (1 p)
Gradation Curve sheet (1 p)
Soil Boring Location Plan (1 p)