456 CADY, LLC
190 E. MAIN STREET
NORTHVILLE, MI
PH: (248) 787-4690 EMAIL: kevin@schonsheck.com

November 16, 2021

City of Northville
215 W. Main Street
Northville, MI 48167

Attn: Ms. Sally M. Elmiger, Carlisle/Wortman Associates, Inc.
City of Northville Planning Commission Members

Re: The Foundry - 456 East Cady Street Mixed Use Development
Response to questions and comments from Planning Consultant and Planning Commission
Related to Final Site Plan Approval

Dear Ms. Elmiger and Planning Commission Members:

Please allow this letter to serve as our responses to questions and comments outlined in the Carlisle Wortman review letter dated November 8, 2021, relative to the referenced mixed-use development.

Questions and Comments from Planning Consultant Sally Elmiger:

A. *Status on brownfield issue, if available.*

Response: A meeting with the City to address brownfield issues is currently being scheduled.

B. ***Natural Resources****. 1) Necessity for both 15-foot wide and 20-foot wide river walk easement on the plans. 2) Dumpster location outside (vs. inside) the commercial building and in the Riverwalk easement.*

Response: 1) We are showing 2 options for discussions with the City, and 2) Per direction of planning commission during preliminary site plan, we have relocated the dumpster location outside; however, we can locate it to its original location if required.

C. ***Loading.*** *1) Show proposed loading/unloading space at 10' x 50'. 2) Applicant to describe types of trucks using the loading/unloading space; and confirmation that these trucks can traverse the easterly lot.*

Response: 1) The 10' x 50' Loading zone will be relocated to the 6 easterly parking spaces adjacent to the building. Signage will be provided at these spaces stating No Parking during Loading Hours. Loading Hours are TBD. 2) Large delivery vehicles or semi-trucks are not planned to make deliveries for the commercial use of the development (small grocer). It is expected that small delivery vehicles / box trucks will be used to make deliveries to the commercial portion of the development. The parking lot drive aisles and Loading Area will adequately support the expected delivery vehicles.

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D. ***Landscaping.*** *1. Turf grass along S. Main St. frontage requires irrigation. 2. Describe proposed decorative paving. 3. Confirm that tree grates used on E. Cady St. will be consistent with the DDA's Secondary Street Guidelines.*

Response: 1) We will irrigate the lawn area along the South Main Street frontage Pedestrian Plaza, 2) We have not selected the decorative pavement treatment. This product and detailing will complement the architecture and address ADA accessibility, and 3) We do intend to use the tree grate that is specified in the Secondary Streetscape Standards; however, due to the narrow sidewalk we may not be able to use a round tree grate.

E. ***Lighting.*** *1) Applicant to describe approach to lighting E. Cady St. side of building. 2) Applicant to confirm lighting for building façade facing S. Main St. will be provided via the parking lot lights. 3) Provide manufacturer cut sheets of proposed fixtures to determine shielding and positioning of fixtures meet ordinance requirements. 4) Applicant to indicate if the proposed vegetation along the southern boundary of the west parking lot was considered as part of the photometric plan.*

Response. 1) Public light fixtures will serve this purpose as modified in the future. Also, decorative wall mounted light fixtures will be included as part of the HDC application, 2) Confirmed, 3) Provided on November 12, 2021), and 4) It was considered and will diminish ambient light.

F. *Defer review of utility connections to DPW Director.*

Response: Noted.

Should you have any questions or concerns prior to our meeting on November 16, 2021, please don't hesitate to contact me at *(248) 787-4690* or *kevin@schonsheck.com*. Thank you.

Kind regards,

456 CADY, LLC

Kevin J. Schonsheck
Authorized Representative

CC: Mr. Jim Long

Attachments

456 CADY, LLC
190 E. MAIN STREET
NORTHVILLE, MI
PH: (248) 787-4690 EMAIL: kevin@schonsheck.com

November 30, 2021

City of Northville
215 W. Main Street
Northville, MI 48167

Attn: Ms. Sally M. Elmiger, Carlisle/Wortman Associates, Inc.
City of Northville Planning Commission Members

Re: The Foundry - 456 East Cady Street Mixed Use Development
Response to conditions outlined in motion from Planning Consultant and Planning Commission Related to Final Site Plan Approval

Dear Ms. Elmiger and Planning Commission Members:

Please allow this letter to serve as our responses to the conditions outlined in the motion made by the Planning Commission on November 16, 2021, relative to the referenced mixed-use development.

a. **How does contamination on the property affect the site design? Share information on the brownfield issues that can be shared publicly.**

   Response: We have submitted our brownfield application to the City of Northville and had a meeting with EGLE, the City of Northville and its Environmental consultant on November 22, 2021. The brownfield information is available for your review upon request to Patrick Sullivan.

   In addition, we understand a member of the Brownfield Redevelopment Authority will be available at the next Planning Commission meeting to address any questions or concerns the Commission Members might have.

b. **Modify landscape plan to show most recent site design.**

   Response: Completed and included in this submittal.

c. **Have Wayne County weigh in on the approach to stormwater management.**

   Response: Our stormwater application has been submitted to Wayne County for permit review. We have included the confirmation letter in this submittal and understand final site plan approval is contingent on receiving this permit as well as Final Engineering.

456 CADY, LLC
190 E. MAIN STREET
NORTHVILLE, MI
PH: (248) 787-4690 EMAIL: kevin@schonsheck.com

d. **Revise the current traffic study to reflect the Main St. closure.**

Response: Our development just meets the minimum capacity requirements for this zoning. Our traffic impact to the area is nominal. Our traffic study is based on pre-Covid traffic and does not reflect temporary closures initiated by the city due to unknown future changes.

e. **Specifically state what the intention is along the riverfront. Can be illustrated with "space" for a Riverwalk easement and indicated with notes**.

Response: The potential Riverwalk area is noted on the drawings and is currently being negotiated with the city.

f. Revise site plan with comments in CWA review, and the minor issues identified in the OHM review.

Response: Completed and included in this review letter with the exception of those items related to Final Engineering as confirmed by OHM during the Planning Commission meeting on November 16, 2021.

In addition, please note the dumpster enclosure has been relocated per the Planning Commission's recommendation and will be finished with building materials proposed for the main building (will be similar to the enclosure located on the north side of the Marquis Theater.)

Should you have any questions or concerns prior to our meeting on December 21, 2021, please don't hesitate to contact me at ***(248) 787-4690*** or ***kevin@schonsheck.com***. Thank you.

Kind regards,

456 CADY, LLC

Kevin J. Schonsheck
Authorized Representative

CC: Mr. Jim Long

Attachments

SEIBER KEAST ENGINEERING, LLC
ENGINEERING CONSULTANTS

Clif Seiber, P.E.
Patrick G. Keast, P.E.
Azad W. Awad
Robert J. Emerine, P.E.
Jason M. Emerine, P.E.

39205 Country Club Drive, C-8
Farmington Hills, MI 48331
Phone No. 248.308.3331
E-mail: be@seiberkeast.com

November 16, 2021

City of Northville
Mr. Michael Domine, DPS Director
Department of Public Works
215 W. Main Street
Northville, MI 48167

Re: **456 Cady Street – Final Site Plan Review**

Dear Mr. Domine:

In accordance with the OHM Final Site Plan review dated November 11, 2021 for the Final Site Plan submittal, we offer the following comments in response, the comment numbers shown below correspond to the comments contained in the consultant review letter where applicable.

GENERAL COMMENTS

1. The Cady Street additional right-of-way (ROW) will be shown to extend from the corner through to the easterly property line job in the east entrance as previously discussed.
2. A full topographic survey has been prepared for the project site including the full Cady Street ROW and pertinent features of properties across the street.
3. Noted.
4. Hatch patterns will be revised for clarity as requested.
5. The hollow squares within the walkway are for the proposed Tree Grate / Planting Pit as shown in the Landscaping Plans. Notes will be added to the Final Site Plan identifying these locations.
6. Vehicular access into the parking garage will be handled by an RFID transponder which will correspond to the individual vehicles and open the overhead door for access. No keypad nor pedestal is required for entry.

GRADING / PAVING

1. There are currently no existing sidewalks on the east side of Cady Street and the adjacent parcel is a large parking lot for use by the Car Wash. SKE will coordinate with the City Engineer to determine an appropriate location of a sidewalk through the drive approach if one is required.
2. Currently, the Final Site Plan shows the proposed drive approach up to the existing ROW line for Cady Street and matches the existing drive approach to the existing site parking lot and adjacent Car Wash parking lot. These two parking lots currently share an existing drive approach to Cady Street which we are proposing to remain in place. The unique layout of the existing ROW and existing drive approaches will be coordinated with the City Engineer to determine an agreed upon layout to the new eastern parking lot.

Extending the proposed drive approach to the existing Cady Street curb will limit access to the existing Car Wash parking lot.

3. Noted. The sidewalks through the drive approaches will be revised to a 5-foot width.
4. The full topographic survey includes the existing sidewalk at the adjacent property and the existing power pole. These items will be included in the Engineering Construction Plan submittal to the City.
5. Noted.
6. The proposed location of the Dumpster enclosure can be relocated to the south, closer to the building for better access for garbage trucks.
7. See item 6 above.

UTILITIES

8. The note will be revised as requested.
9. SKE will coordinate with the City Fire Marshal for an alternate location as requested.
10. The water service and fire suppression lines will be relocated as requested.
11. SKE will coordinate with the City Fire Marshal for an alternate location as requested. An 8" water main will extend from Cady Street to service the relocated hydrant as noted.
12. It is understood the overhead wires within the Cady Street ROW at both entrances will have to be relocated. Correspondence with DTE will be provided to the City for relocation of any existing overhead power line.
13. SKE is in process of preparing a submittal to Wayne County for the proposed underground detention basin. This submittal will be for permit of the Storm Water Management system for the project and will meet the requirements of the County. Typically, this permit is submitted to the County after completion of the Engineering Construction Plans. The Final Site Plan provides adequate calculations showing the viability of the proposed Storm Water Management system. Please see the attached letter from the project Environmental Consultant discussing the contaminates soils present on site. As a result, providing any infiltration systems on site are not recommended and likely not allowed by Wayne County. Correspondence from Wayne County regarding the proposed Strom Water Management system will be provided to the City as it becomes available.

Traffic Impact Study

The REVISED FINAL traffic impact study dated October 12, 2021, was provided to the City on October 13, 2021. We have not yet received any feedback on its contents.

SUMMARY OF NECESSARY FUTURE PERMITS AND/OR APPROVALS

1. An Agency Permits Required table will be added as requested.
2. Noted. A SESC permit is required from Wayne County.
3. Noted.
4. Noted.
5. Noted.

SKE requests approval of the Final Site Plan at this time as all items discussed in the OHM review letter can be resolved during the Engineering Construction Plan phase of the project.

Very Truly Yours,

SEIBER KEAST ENGINEERING, LLC

Robert J. Emerine, P.E.

FINAL SITE PLAN FOR

456 CADY STREET

PART OF THE SOUTH 1/2 OF SECTION 3, TOWN 1 SOUTH, RANGE 8 EAST, CITY OF NORTHVILLE, WAYNE COUNTY, MICHIGAN

LEGAL DESCRIPTION

LEGAL DESCRIPTION – SCHEDULE "C":
Commitment No.: 919122

Land in the City of Northville, Wayne County, MI, described as follows:

PARCEL 1:

Lot(s) 65, 66, 67 and 68 of ASSESSOR'S NORTHVILLE PLAT NO. 1 according to the plat thereof recorded in Liber 66 of Plats, Page 45 of Wayne County Records, and also that part of Lot(s) 92 of ASSESSOR'S NORTHVILLE PLAT NO. 1 according to the plat thereof recorded in Liber 66 of Plats, Page 45 of Wayne County Records, described as: Commencing at the Northeast corner of Lot 93 of said Plat No. 1; thence North 8 degrees 37 minutes 41 seconds West, 40 feet; thence South 81 degrees 22 minutes 19 seconds West, 190.37 feet; thence South 55 degrees 54 minutes 40 seconds West, 149.06 feet for a Point of Beginning; thence North 34 degrees 13 minutes 10 seconds West, 129.85 feet; thence South 55 degrees 45 minutes 20 seconds West, 45.83 feet; thence South 11 degrees 11 minutes 0 seconds East approximately 141 feet to the Northerly bank of the River Rouge; thence Northeasterly along the Northerly bank of said river to the Point of Beginning.

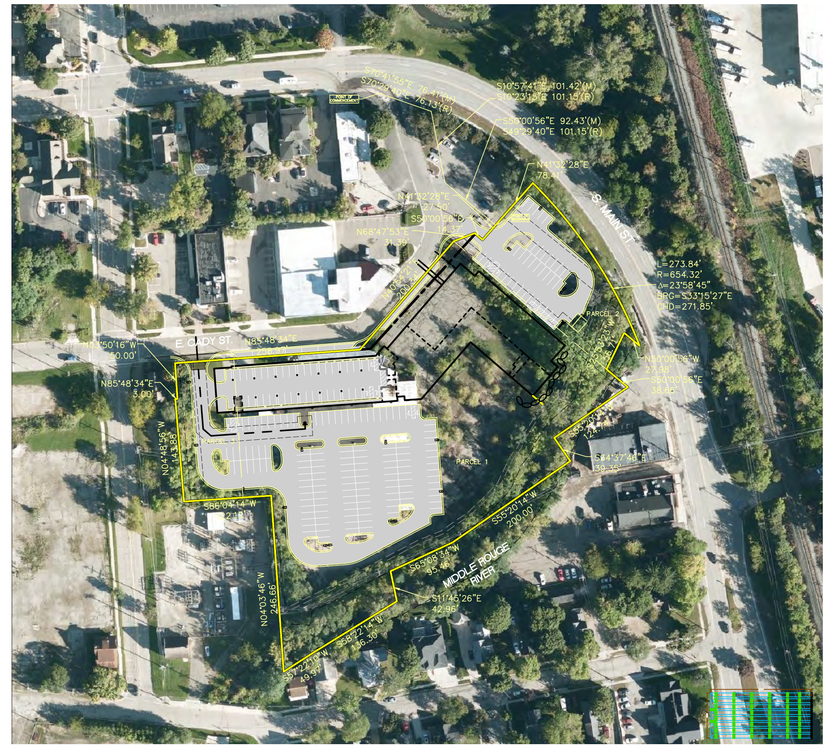
PARCEL 2:

Part of Lot(s) 9 of ASSESSOR'S NORTHVILLE PLAT NO. 1 according to the plat thereof recorded in Liber 66 of Plats, Page 45 of Wayne County Records, described as: Beginning at the Northeast corner of Lot 10 of ASSESSOR'S NORTHVILLE PLAT NO. 1, and running thence South 70 degrees 29 minutes 40 seconds East 76.13 feet and South 10 degrees 23 minutes 15 seconds East 101.15 feet and South 49 degrees 29 minutes 40 seconds East, 92.60 feet to a point on the Southwesterly line of Lot 9, which point is also on the Northeasterly line of Park Place, the Point of Beginning of this description; and running thence North 42 degrees 04 minutes 12 seconds East 78.41 feet to a point on the Westerly line of Plymouth Avenue, 100 feet wide; thence Southeasterly an arc distance of 241.25 feet along the said Westerly Avenue line on a curve concave to the Southwest, radius 647.32 feet, whose chord bears South 32 degrees 44 minutes 25 seconds East and is 239.85 feet long to a point on the centerline of the Rouge River, thence Southwesterly along said centerline South 26 degrees 27 minutes 49 seconds West, 8.96 feet to a point on the Southwesterly line of said Lot 9, which point is also on the Northeasterly line of Park Place; thence North 49 degrees 29 minutes 40 seconds West 234.45 feet along said Southwesterly lot line to the Point of Beginning.

ALSO:
Part of Lot(s) 9 of ASSESSOR'S NORTHVILLE PLAT NO. 1 according to the plat thereof recorded in Liber 66 of Plats, Page 45 of Wayne County Records, being more particularly described as beginning at a point on the centerline of the Rouge River where it intersects with a point on the Southwesterly line of said Lot 9, which point is also on the Northeasterly line of Park Place; thence Northeasterly along said centerline North 26 degrees 27 minutes 49 seconds East to a point where it intersects with the Westerly line of Plymouth Avenue (now South Main Street), 8.96 feet; thence Southeasterly along said Westerly Avenue line on a tangent curve concave to the Southwest radius 647.32 feet, whose chord bears South 34 degrees 20 minutes East and is 280.63 feet long an arc distance of approximately 30 feet to a concrete monument on the said Westerly Avenue line where it intersects with the Southwesterly line of said Lot 9, which point is also on the Northeasterly line of Park Place; thence North 49 degrees 29 minutes 40 seconds West, 28.69 feet along said Southwesterly lot line to the Point of Beginning on the centerline of the Rouge River.

PARCEL 3:

Lot(s) 69 of ASSESSOR'S NORTHVILLE PLAT NO. 1 according to the plat thereof recorded in Liber 66 of Plats, Page 45 of Wayne County Records.



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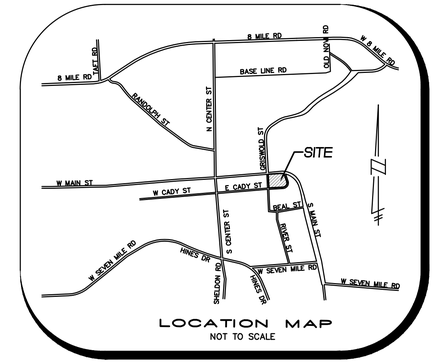
(IN FEET)
Scale: 1 inch = 100 ft.



LOCATION MAP
NOT TO SCALE

SHEET INDEX

ENGINEERING PLANS

1. COVERSHEET
2. ALTA SURVEY/ACSM PLAN
3. TREE LIST
4. OVERALL SITE PLAN
5. GRADING PLAN
6. STORM SEWER PLAN AND PROFILE
7. STORM WATER MANAGEMENT PLAN
8. UNDERGROUND DETENTION DETAILS
9. SEDIMENT STRUCTURE DETAILS AND STORM CALCULATIONS
10. EMERGENCY VEHICLE ROUTE

ARCHITECTURAL PLANS

A–1 CONCEPTUAL LEVEL 1 FLOOR PLAN
A–2 CONCEPTUAL LEVEL 2 FLOOR PLAN
A–3 CONCEPTUAL LEVEL 3 FLOOR PLAN
A–4 TYPICAL UNIT TYPES
A–5 CONCEPTUAL EXTERIOR VIEWS
A–6 CONCEPTUAL EXTERIOR VIEWS
A–7 CONCEPTUAL EXTERIOR VIEWS
A–8 CONCEPTUAL EXTERIOR VIEWS
A–9 CONCEPTUAL EXTERIOR VIEWS
A–10 CONCEPTUAL EXTERIOR ELEVATIONS
A–11 CONCEPTUAL EXTERIOR ELEVATIONS
A–12 CONCEPTUAL EXTERIOR ELEVATIONS

LANDSCAPE PLANS

LS–1 LANDSCAPE PLAN
LS–2 LANDSCAPE PLAN

PHOTOMETRIC PLAN

01 PHOTOMETRIC PLAN

Characteristic	Existing Conditions	Proposed Conditions
Total Development Area (ac)	4.71	4.71
Impervious Area (ac)	3.19	2.84
Total Pervious Area (ac)	1.52	1.87
Pervious Area Breakdown by Cover Type		
Meadow/fallow/natural areas (non-cultivated)	1.21	0
Predominant NRCS Soil Type (A, B, C, or D)	Type A	N/A
Improved areas (turf grass, landscape, rpw crops)	0	1.87
Predominant NRCS Soil Type (A, B, C, or D)	N/A	Type A
Wooded Areas	0.31	0
Predominant NRCS Soil Type (A, B, C, or D)	Type A	N/A
Calculated CPVC Volume (cubic feet)		10799
CPVC Volume Provided (cubic feet)		0
CPRC Volume Provided (cubic feet)		20519

BENCHMARKS

TOP NUT ON THE NE CORNER OF LIGHT POLE BASE AT THE NORTHEAST CORNER OF GRISWOLD STREET AND E. CADY STREET
ELEV.=792.64' (NAVD88)

SEIBER, KEAST ENGINEERING, L.L.C.
CONSULTING ENGINEERS
39205 COUNTRY CLUB DR. SUITE C–8 FARMINGTON HILLS, MICHIGAN 48331
PHONE: 248.308.3331

PREPARED FOR:
456 CADY , LLC
MR. JIM LONG – REPRESENTATIVE
190 E. MAIN STREET, NORTHVILLE, MI 48167
jrlong@longmechanical.com P: 248.330.5201

LANDSCAPE PLANS PROVIDED BY:
RUSSELL DESIGN, INC.
114 RAYSON STREET, SUITE 2A
NORTHVILLE, MICHIGAN, 48167
PHONE: 248.374.3222

SURVEY PROVIDED BY:
LEHNER ASSOCIATES, INC.
17001 NINETEEN MILE ROAD, SUITE 3
CLINTON TOWNSHIP, MICHIGAN, 48038
PHONE: 586.412.7050

ARCHITECTURAL PLANS PROVIDED BY:
OX STUDIO, INC
2373 OAK VALLEY DRIVE
ANN ARBOR, MICHIGAN, 48103
PHONE: 734.929.9000

REVISIONS

NO.	ITEM	DATE
1.	FINAL SITE PLAN SUBMITTAL	10–26–21
2.	REVISED FINAL SITE PLAN	11–30–21

ENGINEER'S SEAL

DATE: 10–26–21 | DESIGNED BY: A.A | CHECKED BY: B.E. | JOB NUMBER: 21–008 | DRAWING FILE: 21008–CV.dwg

ALTA/NSPS LAND TITLE SURVEY

LEGAL DESCRIPTION – SCHEDULE "C":
Commitment No.: 919122

Land in the City of Northville, Wayne County, MI, described as follows:

PARCEL 1:

Lot(s) 65, 66, 67 and 68 of ASSESSOR'S NORTHVILLE PLAT NO. 1 according to the plat thereof recorded in Liber 66 of Plats, Page 45 of Wayne County Records, and also that part of Lot(s) 92 of ASSESSOR'S NORTHVILLE PLAT NO. 1 according to the plat thereof recorded in Liber 66 of Plats, Page 45 of Wayne County Records, described as: Commencing at the Northeast corner of Lot 93 of said Plat No. 1; thence North 8 degrees 37 minutes 41 seconds West, 40 feet; thence South 81 degrees 22 minutes 19 seconds West, 190.37 feet; thence South 55 degrees 54 minutes 40 seconds West, 149.06 feet for a Point of Beginning; thence North 34 degrees 13 minutes 10 seconds West, 129.85 feet; thence South 55 degrees 45 minutes 20 seconds West, 45.83 feet; thence South 11 degrees 11 minutes 0 seconds East approximately 141 feet to the Northerly bank of the River Rouge; thence Northeasterly along the Northerly bank of said river to the Point of Beginning.

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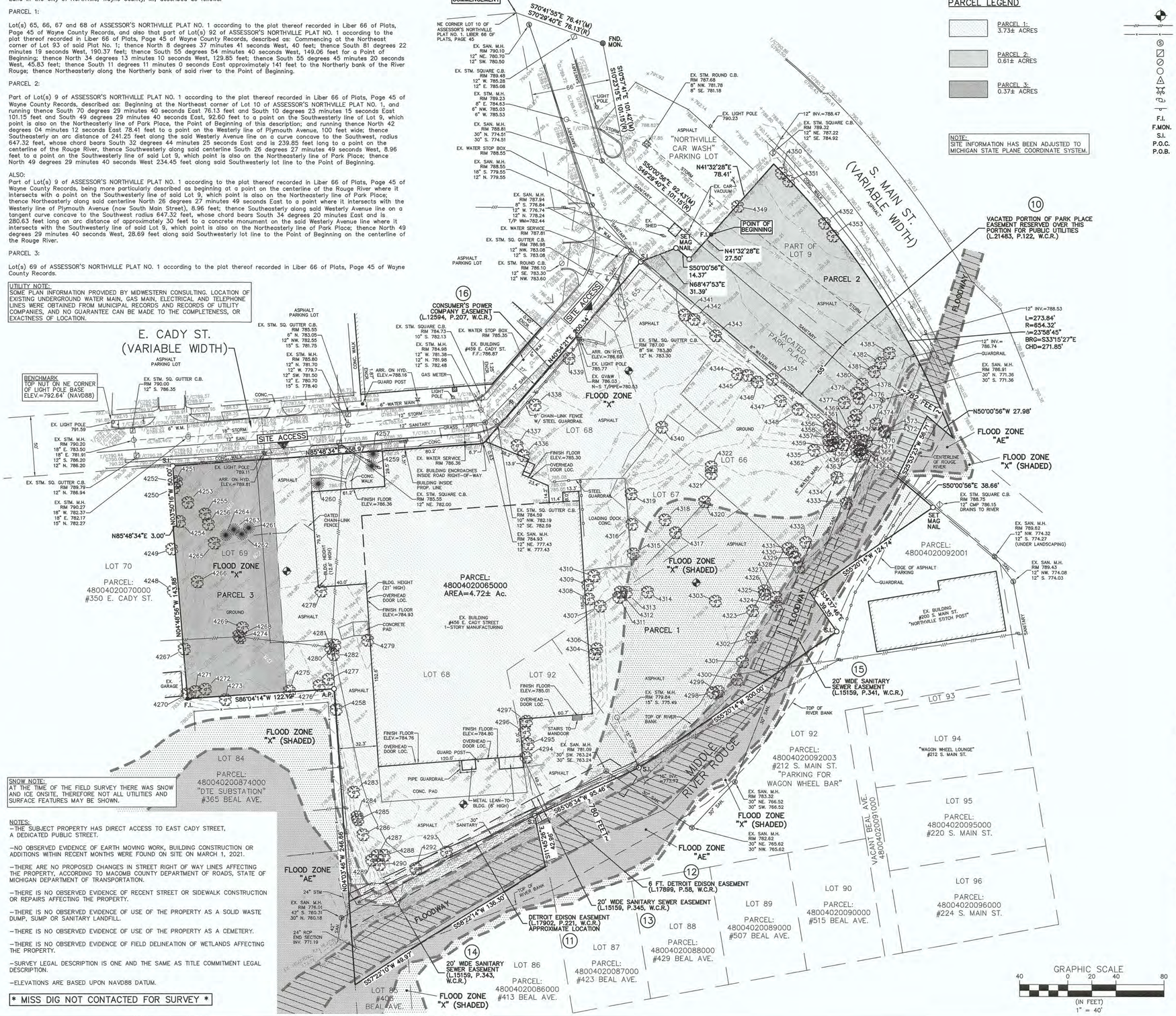
PARCEL 3:

Lot(s) 69 of ASSESSOR'S NORTHVILLE PLAT NO. 1 according to the plat thereof recorded in Liber 66 of Plats, Page 45 of Wayne County Records.

UTILITY NOTE:
SOME PLAN INFORMATION PROVIDED BY MIDWESTERN CONSULTING. LOCATION OF EXISTING UNDERGROUND WATER MAIN, GAS MAIN, ELECTRICAL AND TELEPHONE LINES WERE OBTAINED FROM MUNICIPAL RECORDS AND RECORDS OF UTILITY COMPANIES, AND NO GUARANTEE CAN BE MADE TO THE COMPLETENESS, OR EXACTNESS OF LOCATION.



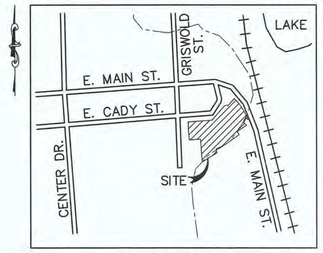
PARCEL LEGEND

- PARCEL 1: 3.73± ACRES
- PARCEL 2: 0.61± ACRES
- PARCEL 3: 0.37± ACRES

NOTE:
SITE INFORMATION HAS BEEN ADJUSTED TO MICHIGAN STATE PLANE COORDINATE SYSTEM.

LEGEND

- SOIL BORING LOCATION
- OVERHEAD UTILITY LINES
- EXISTING FENCE
- EXISTING SANITARY MANHOLE
- EXISTING STORM SQ. CATCH BASIN
- EXISTING STORM ROUND CATCH BASIN
- EXISTING STORM MANHOLE
- EXISTING GAS MARKER
- EXISTING FIRE HYDRANT
- UTILITY POLE
- PUBLIC INFORMATION SIGN
- F.I. FOUND IRON
- F.MON. FOUND MONUMENT
- S.I. SET IRON
- P.O.C. POINT OF COMMENCEMENT
- P.O.B. POINT OF BEGINNING



VICINITY MAP

BENCHMARKS:

TOP NUT ON THE NE CORNER OF LIGHT POLE BASE AT THE NORTHEAST CORNER OF GRISWOLD STREET AND E. CADY STREET
ELEV.=792.64' (NAVD88)

FLOOD ZONE:

THE PROPERTY FALLS WITHIN FLOOD ZONE X AND ZONE AE, SPECIAL FLOOD HAZARD AND REGULATORY FLOODWAY (BASE FLOOD ELEVATIONS AS NOTED ON PLAN)
MAP No. 26163C0036E
DATED: 2/2/2012

FIRST AMERICAN TITLE INSURANCE COMPANY
Commitment No.: 919122
Property Address: 456 and Vacant E Cady Street, Vacant E Main Street, Northville, MI 48167
Commitment Date: November 13, 2020 8:00 AM

SCHEDULE B, PART II EXCEPTIONS

8. Covenants, conditions, restrictions and other provisions but omitting restrictions, if any, based on race, color, religion, sex, handicap, familial status or national origin as contained in instrument recorded in Liber 16110, page 675, as to Parcel 2. **(NOT A SURVEY MATTER, NOTHING TO PLOT)**

9. Resolution Establishing the Legal Boundary and Description of the City of Northville Historic District in favor of the City of Northville and the Covenants, Conditions and Restrictions contained in instrument recorded in Liber 46019, page 1479. **(NOTHING TO PLOT)**

10. Easement for public utilities over that portion of land included in the vacated street as evidenced by instrument recorded in Liber 21483, page 122, as to Parcels 1 and 2. **(AS SHOWN)**

11. Right of Way in favor of The Detroit Edison Company and the Covenants, Conditions and Restrictions contained in instrument recorded in Liber 17902, page 221, as to Parcel 1. **(SHOWN AS APPROXIMATE LOCATION, DOCUMENT ILLEGIBLE)**

12. Right of Way in favor of The Detroit Edison Company and the Covenants, Conditions and Restrictions contained in instrument recorded in Liber 17899, page 58, as to Parcel 1. **(AS SHOWN)**

13. Easement in favor of the Oakland County Department of Public Works and the Covenants, Conditions and Restrictions contained in instrument recorded in Liber 15159, page 345, as to Parcel 1. **(AS SHOWN)**

14. Easement in favor of the Oakland County Department of Public Works and the Covenants, Conditions and Restrictions contained in instrument recorded in Liber 15159, page 343, as to Parcel 1. **(AS SHOWN)**

15. Easement in favor of the Oakland County Department of Public Works and the Covenants, Conditions and Restrictions contained in instrument recorded in Liber 15159, page 341, as to Parcel 1. **(AS SHOWN)**

16. Easement in favor of Consumers Power Company and the Covenants, Conditions and Restrictions contained in instrument recorded in Liber 12594, page 207, as to Parcel 1. **(AS SHOWN)**

17. The rights of the lot owners of Assessor's Northville Plat No. 1 in and to the use of the vacated portion of Park Place, as to Parcels 1 and 2. **(NOTHING TO PLOT)**

18. Easement(s), Restrictions and/or Setback Lines, if any, as disclosed by the recorded plat. **(NOTHING TO PLOT)**

19. Any rights, title interest or claim thereof to that portion of the land taken, used or granted for streets, roads or highways. **(NOTHING TO PLOT)**

SNOW NOTE:
AT THE TIME OF THE FIELD SURVEY THERE WAS SNOW AND ICE ONSITE, THEREFORE NOT ALL UTILITIES AND SURFACE FEATURES MAY BE SHOWN.

NOTES:
–THE SUBJECT PROPERTY HAS DIRECT ACCESS TO EAST CADY STREET, A DEDICATED PUBLIC STREET.

–NO OBSERVED EVIDENCE OF EARTH MOVING WORK, BUILDING CONSTRUCTION OR ADDITIONS WITHIN RECENT MONTHS WERE FOUND ON SITE ON MARCH 1, 2021.

–THERE ARE NO PROPOSED CHANGES IN STREET RIGHT OF WAY LINES AFFECTING THE PROPERTY, ACCORDING TO MACOMB COUNTY DEPARTMENT OF ROADS, STATE OF MICHIGAN DEPARTMENT OF TRANSPORTATION.

–THERE IS NO OBSERVED EVIDENCE OF RECENT STREET OR SIDEWALK CONSTRUCTION OR REPAIRS AFFECTING THE PROPERTY.

–THERE IS NO OBSERVED EVIDENCE OF USE OF THE PROPERTY AS A SOLID WASTE DUMP, SUMP OR SANITARY LANDFILL.

–THERE IS NO OBSERVED EVIDENCE OF USE OF THE PROPERTY AS A CEMETERY.

–THERE IS NO OBSERVED EVIDENCE OF FIELD DELINEATION OF WETLANDS AFFECTING THE PROPERTY.

–SURVEY LEGAL DESCRIPTION IS ONE AND THE SAME AS TITLE COMMITMENT LEGAL DESCRIPTION.

–ELEVATIONS ARE BASED UPON NAVD88 DATUM.

*** MISS DIG NOT CONTACTED FOR SURVEY ***

CERTIFICATE:

TO: UTAH DEVELOPMENT, LLC, A MICHIGAN LIMITED LIABILITY COMPANY, FOUNDRY FLASK AND EQUIPMENT COMPANY, A MICHIGAN CORPORATION, AS TO PARCEL 1 THE FOUNDRY FLASK AND EQUIPMENT COMPANY, ALSO KNOWN AS FOUNDRY FLASK & EQUIPMENT COMPANY, A CORPORATION, AS TO PARCEL 2 FOUNDRY FLASK & EQUIPMENT, A MICHIGAN CORPORATION, AS TO PARCEL 3, AND FIRST AMERICAN TITLE INSURANCE COMPANY

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1, 2, 3, 4, 5, 8, 11, 13, 16, and 18 OF TABLE A THEREOF.

THE FIELD WORK WAS COMPLETED ON MARCH 1, 2021, UPDATED OCTOBER 29, 2021

DATE OF MAP: MARCH 11, 2021, UPDATED NOVEMBER 02, 2021

ROBERT R. DROUILLARD, P.S. NO. 4001052517 DATE: 11/3/2021
rick@la-eng.com
www.lehnerassociates.com

STATE OF MICHIGAN
Robert R. Drouillard
License No. 4001052517
LICENSED PROFESSIONAL SURVEYOR

Revisions:	
9-20-21 ADDED TREES & 2ND PG	RRD
11-01-21 ADDED TOPO GRADES	SK

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17001 Nineteen Mile Road, Suite 3
Clinton Township, Michigan 48038
o: 586.412.7050 | f: 586.412.7114
www.lehnerassociates.com

Client:
SCIBER KEAST ENGINEERING
c/o JASON EMERINE
100 MAINCENTRE, SUITE 10
NORTHVILLE, MI 48167
(248) 308-3331
je@sciberkeast.com

#456 E. CADY STREET
ALTA/NSPS LAND TITLE AND TOPOGRAPHIC SURVEY

PART OF THE SOUTH 1/2 OF SECTION 3, TOWN 1 SOUTH, RANGE 8 EAST, CITY OF NORTHVILLE, WAYNE COUNTY, MICHIGAN

Scale:	1"=40'
Paper Size:	24"x36"
Date:	03-11-21
Drawn By:	S.K.
Checked By:	R.R.D.
Job No.:	21-067
Sheet No.	2

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TREE LIST

TREE LIST				
POINT NO.	ELEVATION	NORTHING	EASTING	DESCRIPTION
4248	789.49	340186.06	13363145.64	35" SUGAR MAPLE
4249	789.45	340220.92	13363144.36	3-7" AMERICAN ELM
4250	790.03	340271.82	13363145.92	12" NORWAY MAPLE
4251	790.05	340275.82	13363146.25	8" NORWAY MAPLE
4252	790.48	340277.05	13363148.38	14" NORWAY MAPLE 6
4253	789.27	340259.60	13363157.71	13" NORWAY MAPLE
4254	790.47	340243.92	13363150.82	13" NORWAY MAPLE
~~4255~~	~~789.45~~	~~340250.85~~	~~13363172.01~~	~~10" AMERICAN ELM 2-8~~
~~4256~~	~~788.59~~	~~340241.48~~	~~13363174.79~~	~~6" AMERICAN ELM~~
~~4257~~	~~786.19~~	~~340300.62~~	~~13363311.70~~	~~3-7" EASTERN RED CEDAR~~
4258	783.65	340087.67	13363281.14	2-8" AMERICAN ELM 12
~~4259~~	~~786.37~~	~~340290.59~~	~~13363310.64~~	~~14" EASTERN RED CEDAR~~
~~4260~~	~~786.08~~	~~340275.65~~	~~13363205.98~~	~~2-8" EASTERN RED CEDAR~~
~~4261~~	~~787.04~~	~~340238.87~~	~~13363208.37~~	~~14" BLUE SPRUCE~~
~~4262~~	~~787.31~~	~~340233.63~~	~~13363202.46~~	~~7" BLUE SPRUCE~~
~~4263~~	~~787.31~~	~~340237.53~~	~~13363195.82~~	~~7" BLUE SPRUCE~~
~~4264~~	~~787.13~~	~~340232.87~~	~~13363189.18~~	~~7" BLUE SPRUCE~~
~~4265~~	~~786.93~~	~~340225.78~~	~~13363170.63~~	~~6" AMERICAN ELM~~
4266	787.38	340193.68	13363165.46	6" AMERICAN ELM
4267	785.71	340137.88	13363154.81	6" BLACK WALNUT
~~4268~~	~~784.63~~	~~340148.87~~	~~13363200.08~~	~~7" BOX ELDER 8~~
~~4269~~	~~784.61~~	~~340155.61~~	~~13363203.33~~	~~11" BOX ELDER~~
4270	783.31	340100.46	13363157.27	6" BLACK WALNUT
4271	783.66	340102.42	13363163.75	7" AMERICAN ELM
4272	783.48	340104.40	13363172.26	8" BOX ELDER
4273	783.73	340095.57	13363188.85	12" BOX ELDER 2-10
~~4274~~	~~784.38~~	~~340147.33~~	~~13363201.03~~	~~8" BOX ELDER 2-10~~
4275	783.79	340103.02	13363242.22	6" BOX ELDER
4276	783.59	340107.52	13363266.91	9" NORWAY MAPLE 10
4277	783.87	340112.81	13363274.72	7" BOX ELDER
~~4278~~	~~784.86~~	~~340186.11~~	~~13363268.47~~	~~7" BLACK LOCUST 8~~
~~4279~~	~~785.28~~	~~340145.20~~	~~13363307.33~~	~~8" BLACK LOCUST~~
~~4280~~	~~784.98~~	~~340111.29~~	~~13363289.05~~	~~8" BLACK CHERRY~~
~~4281~~	~~784.98~~	~~340130.57~~	~~13363270.59~~	~~8" BLACK CHERRY~~
~~4282~~	~~784.56~~	~~340133.34~~	~~13363278.65~~	~~6" BLACK CHERRY~~
4283	784.25	340018.90	13363295.73	6" WHITE ASH 8
4284	784.60	339998.27	13363298.50	10" HONEY LOCUST
4285	784.26	339995.90	13363299.24	6" WHITE ASH
4286	783.87	339983.36	13363303.45	7" WHITE ASH
4287	784.05	339966.15	13363315.35	6" HONEY LOCUST

TREE LIST				
POINT NO.	ELEVATION	NORTHING	EASTING	DESCRIPTION
4288	784.35	339966.27	13363321.08	6" HONEY LOCUST
4289	783.83	339962.21	13363310.72	6" HONEY LOCUST
4290	783.78	339958.54	13363316.93	6" HONEY LOCUST
4292	783.48	339955.08	13363347.31	6" BLACK WALNUT
4293	783.52	339968.98	13363372.92	6" WHITE ASH 8
~~4294~~	~~781.60~~	~~340047.96~~	~~13363438.98~~	~~7" WHITE ASH~~
~~4295~~	~~781.68~~	~~340068.08~~	~~13363440.80~~	~~2-6" WHITE ASH~~
~~4296~~	~~781.80~~	~~340068.81~~	~~13363437.60~~	~~7" WHITE ASH~~
~~4297~~	~~781.77~~	~~340078.00~~	~~13363430.30~~	~~10" BLACK LOCUST~~
4298	780.80	340102.13	13363594.51	10" HONEY LOCUST
4299	780.16	340103.21	13363599.09	6" HONEY LOCUST 9
4300	779.20	340113.03	13363614.35	5" HONEY LOCUST 6
4301	780.10	340127.79	13363619.03	6" NORWAY MAPLE
4302	780.02	340148.34	13363626.80	6" NORWAY MAPLE
~~4303~~	~~780.55~~	~~340178.21~~	~~13363606.48~~	~~7" EASTERN COTTONWOOD~~
~~4304~~	~~783.54~~	~~340134.00~~	~~13363496.03~~	~~7" HONEY LOCUST~~
~~4306~~	~~782.00~~	~~340130.32~~	~~13363497.94~~	~~6" HONEY LOCUST~~
~~4307~~	~~781.54~~	~~340173.78~~	~~13363500.70~~	~~6" BOX ELDER~~
~~4308~~	~~784.40~~	~~340179.77~~	~~13363491.03~~	~~9" HONEY LOCUST~~
~~4309~~	~~783.70~~	~~340191.44~~	~~13363490.42~~	~~9" WHITE ASH~~
~~4310~~	~~783.81~~	~~340198.88~~	~~13363495.47~~	~~8" HONEY LOCUST~~
~~4311~~	~~780.39~~	~~340181.18~~	~~13363516.13~~	~~7" SYCAMORE~~
~~4312~~	~~780.03~~	~~340185.78~~	~~13363517.50~~	~~10" EASTERN COTTONWOOD~~
~~4313~~	~~780.53~~	~~340188.54~~	~~13363522.44~~	~~8" EASTERN COTTONWOOD~~
~~4314~~	~~780.20~~	~~340185.62~~	~~13363540.15~~	~~2-5" EASTERN COTTONWOOD~~ 2-9
~~4315~~	~~779.92~~	~~340217.42~~	~~13363520.20~~	~~6" EASTERN COTTONWOOD~~
~~4316~~	~~780.77~~	~~340241.93~~	~~13363527.12~~	~~9" BOX ELDER~~
~~4317~~	~~780.20~~	~~340235.11~~	~~13363563.42~~	~~7" EASTERN COTTONWOOD~~ 8
~~4318~~	~~780.22~~	~~340245.72~~	~~13363554.50~~	~~6" EASTERN COTTONWOOD~~ 7
~~4319~~	~~781.09~~	~~340267.25~~	~~13363526.46~~	~~7" EASTERN COTTONWOOD~~
~~4320~~	~~780.77~~	~~340266.74~~	~~13363587.60~~	~~6" EASTERN COTTONWOOD~~
~~4321~~	~~780.67~~	~~340284.34~~	~~13363593.98~~	~~6" EASTERN COTTONWOOD~~
~~4322~~	~~781.04~~	~~340289.02~~	~~13363593.12~~	~~9" EASTERN COTTONWOOD~~
4323	780.29	340170.33	13363627.52	6" AMERICAN ELM
4324	779.78	340174.22	13363647.23	8" AMERICAN ELM 14
4325	780.72	340183.96	13363637.55	16" HONEY LOCUST
4326	780.34	340186.95	13363637.17	10" BOX ELDER
4327	779.98	340181.53	13363646.90	6" AMERICAN ELM
4328	780.09	340206.45	13363665.89	6" HONEY LOCUST
4329	780.62	340214.74	13363662.65	7" WHITE ASH

TREE TO BE REMOVED, TYP

TREE LIST				
POINT NO.	ELEVATION	NORTHING	EASTING	DESCRIPTION
4330	780.70	340219.06	13363660.45	8" WHITE ASH
4331	780.80	340222.07	13363657.03	2-7" WHITE ASH
4332	780.17	340227.15	13363671.62	6" HONEY LOCUST
4333	781.27	340259.72	13363705.46	6" WHITE ASH
4334	782.30	340281.25	13363697.72	19" AMERICAN ELM
~~4335~~	~~781.99~~	~~340303.70~~	~~13363678.57~~	~~2-8" BOX ELDER~~
~~4336~~	~~783.54~~	~~340298.00~~	~~13363436.99~~	~~10" EASTERN COTTONWOOD~~
~~4337~~	~~783.54~~	~~340397.39~~	~~13363431.67~~	~~7" EASTERN COTTONWOOD~~
~~4338~~	~~783.67~~	~~340341.18~~	~~13363446.50~~	~~8" AMERICAN ELM~~
~~4339~~	~~785.92~~	~~340379.87~~	~~13363474.74~~	~~7" WHITE ASH~~
~~4340~~	~~784.72~~	~~340322.71~~	~~13363552.85~~	~~8" EASTERN COTTONWOOD~~
~~4341~~	~~787.42~~	~~340416.92~~	~~13363570.72~~	~~9" WHITE ASH~~
~~4342~~	~~787.79~~	~~340412.40~~	~~13363578.68~~	~~6" AMERICAN ELM~~
~~4343~~	~~788.12~~	~~340398.81~~	~~13363596.78~~	~~6" HONEY LOCUST 8~~
~~4344~~	~~784.93~~	~~340367.87~~	~~13363614.99~~	~~9" HONEY LOCUST~~
~~4345~~	~~785.28~~	~~340365.80~~	~~13363623.40~~	~~5" HONEY LOCUST 8~~
~~4346~~	~~784.19~~	~~340360.52~~	~~13363631.42~~	~~5" WHITE ASH 7~~
~~4347~~	~~784.21~~	~~340344.60~~	~~13363650.70~~	~~6" HONEY LOCUST~~
~~4348~~	~~787.57~~	~~340337.82~~	~~13363665.17~~	~~6" HONEY LOCUST~~
4349	789.94	340506.44	13363615.17	11" AMERICAN ELM 12
4350	791.03	340534.03	13363651.53	12" AMERICAN ELM
4351	790.45	340527.59	13363657.55	12" BOX ELDER
4352	790.65	340492.34	13363687.41	17" AMERICAN ELM
4353	790.56	340481.80	13363694.26	19" AMERICAN ELM
~~4354~~	~~788.46~~	~~340362.60~~	~~13363643.94~~	~~2-6" AMERICAN ELM 2-7~~
~~4355~~	~~788.58~~	~~340324.30~~	~~13363691.25~~	~~11" WHITE ASH~~
~~4356~~	~~788.06~~	~~340321.61~~	~~13363691.84~~	~~13" WHITE ASH 2-10~~
4357	787.46	340314.20	13363694.20	8" WHITE ASH 9
~~4358~~	~~787.38~~	~~340312.12~~	~~13363690.77~~	~~2-8" WHITE ASH~~
~~4359~~	~~786.35~~	~~340307.36~~	~~13363691.14~~	~~12" WHITE ASH~~
4360	786.52	340307.87	13363693.95	9" AMERICAN ELM
~~4361~~	~~786.51~~	~~340310.02~~	~~13363698.43~~	~~9" AMERICAN ELM~~
~~4362~~	~~786.01~~	~~340308.46~~	~~13363703.17~~	~~7" AMERICAN ELM~~
4363	785.50	340298.78	13363714.26	7" AMERICAN ELM 9
4364	785.64	340300.70	13363718.81	10" AMERICAN ELM
4365	786.55	340303.82	13363716.32	9" AMERICAN ELM
4366	786.55	340304.54	13363717.33	7" AMERICAN ELM
4367	786.83	340304.84	13363713.91	9" AMERICAN ELM
4368	787.66	340315.15	13363713.03	7" AMERICAN ELM
~~4369~~	~~788.42~~	~~340318.99~~	~~13363708.84~~	~~8" AMERICAN ELM~~

TREE LIST				
POINT NO.	ELEVATION	NORTHING	EASTING	DESCRIPTION
4370	787.06	340312.26	13363719.49	6" AMERICAN ELM 8
4371	786.96	340311.29	13363722.22	7" AMERICAN ELM
4372	786.61	340318.95	13363737.22	7" SUGAR MAPLE
4373	786.89	340319.88	13363737.66	6" WHITE ASH
4374	787.51	340325.78	13363730.16	10" WHITE ASH
~~4375~~	~~788.39~~	~~340328.35~~	~~13363711.86~~	~~6" WHITE ASH~~
~~4376~~	~~788.61~~	~~340333.13~~	~~13363713.66~~	~~7" WHITE ASH~~
~~4377~~	~~788.56~~	~~340343.31~~	~~13363703.71~~	~~8" BOX ELDER~~
~~4378~~	~~787.05~~	~~340351.10~~	~~13363713.98~~	~~6" WHITE ASH~~
~~4379~~	~~787.07~~	~~340346.05~~	~~13363716.97~~	~~8" WHITE ASH~~
~~4380~~	~~787.49~~	~~340358.02~~	~~13363718.73~~	~~11" AMERICAN ELM dead~~
~~4381~~	~~787.12~~	~~340369.15~~	~~13363726.83~~	~~10" AMERICAN ELM dead~~
4382	787.11	340376.36	13363734.01	10" AMERICAN ELM dead
4383	788.32	340384.59	13363741.28	11" AMERICAN ELM dead

Revisions:

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#456 E. CADY STREET
EXISTING TREE LIST
SHEET

PART OF THE SOUTH 1/2 OF SECTION 3,
TOWN 1 SOUTH, RANGE 8 EAST,
CITY OF NORTHVILLE, WAYNE COUNTY, MICHIGAN

Scale: N/A
Paper Size: 24"x36"
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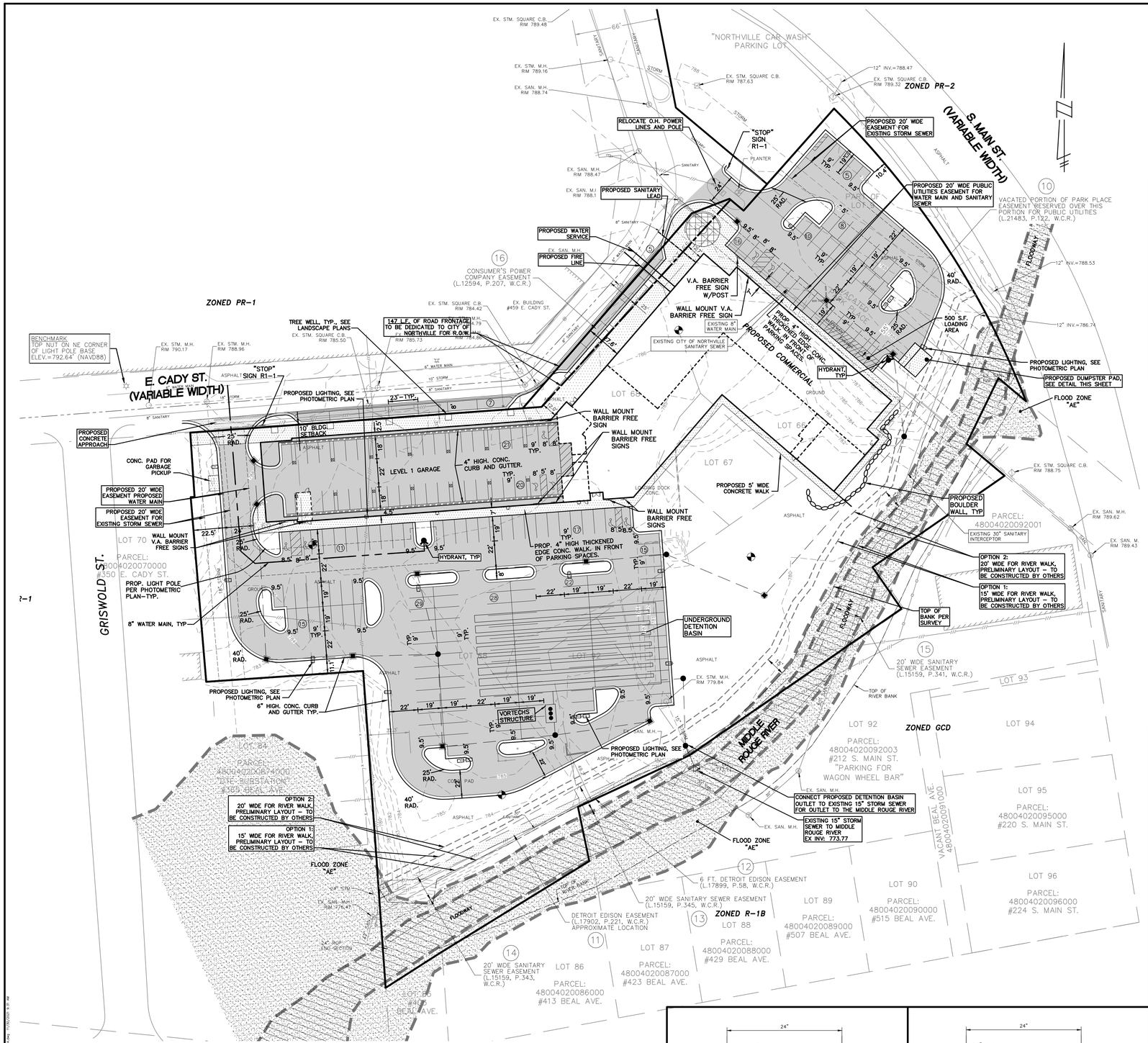


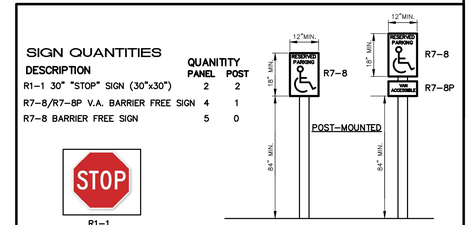
SCALE

40 0 20 40 80 160

(IN FEET)
Scale: 1 inch = 40 ft.

SIGN QUANTITIES

DESCRIPTION	QUANITITY PANEL	QUANITITY POST
R1-1 30" "STOP" SIGN (30"x30")	2	2
R7-8/R7-8P V.A. BARRIER FREE SIGN	4	1
R7-8 BARRIER FREE SIGN	5	0



BARRIER-FREE RESERVED PARKING SIGNS

NOTE: ACCESSIBLE PARKING SPACE SIGNS SHALL HAVE A MIN. HEIGHT AND SIZE TO PERMIT THE SPACE TO BE EASILY IDENTIFIED AND ARE ELEVATED SUCH THAT THEY SHALL NOT PRESENT A HAZARD TO PERSONS WALKING NEAR THE SIGN.

SITE SUMMARY

SITE AREA = 4.71 ACRES
EXISTING UNDERLYING ZONING = PR-1
EXISTING OVERLAY ZONING = CSO
EXISTING LAND USE = INDUSTRIAL
PROPOSED LAND USE = RESIDENTIAL & COMMERCIAL

LEVEL I BUILDING GROSS AREA = 41,912 S.F.
LEVEL I COMMERCIAL GROSS AREA = 12,830 S.F.
LEVEL I COMMERCIAL USABLE AREA = 12,300 S.F.

COMMERCIAL LOADING AREA REQUIRED: N.A.
PARCEL COVERAGE PERCENTAGE = 20.43%
RESIDENTIAL DENSITY PERCENTAGE = 79 UNITS/4.71 AC.
= 16.77 UNITS/AC.

DEVELOPMENT BREAKDOWN

APARTMENTS UNITS = 79 UNITS
1 BEDROOM APT. = 54 UNITS
2 BEDROOM APT. = 16 UNITS
3 BEDROOM APT. = 9 UNITS

COMMERCIAL AREA GROSS = 12,830 S.F.

RESIDENTIAL PARKING CALCULTIONS

PARKING REQUIRED:
2 SPACES FOR 1 BEDROOM APT. = 108 SPACES
2.5 SPACES FOR 2 BEDROOM APT. = 40 SPACES
3 SPACES FOR 3 BEDROOM APT. = 27 SPACES
TOTAL PARKING REQUIRED FOR APARTMENTS = 175 SPACES

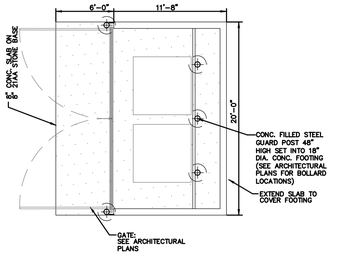
PARKING PROVIDED:
RESIDENTIAL PARKING = 137 SPACES
LEVEL 1 GARAGE = 41 SPACES
TOTAL PARKING PROVIDED = 178 SPACES (INCLUDING 6 H.P. SPACES)

COMMERCIAL PARKING CALCULTIONS

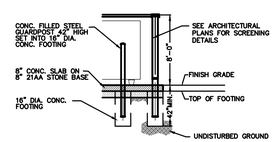
PARKING REQUIRED:
ONE SPACE FOR EACH 250 S.F. OF GROSS FLOOR AREA = 51 SPACES

PARKING PROVIDED:
CADY STREET PARKING = 12 SPACES
COMMERCIAL PARKING = 39 SPACES
TOTAL PARKING PROVIDED = 51 SPACES (INCLUDING 2 H.P. SPACES)

GRAND TOTAL PARKING PROVIDED = 178 + 51
= 229 SPACES



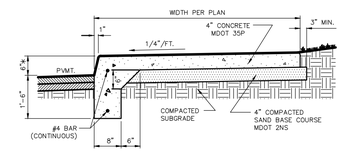
TRASH ENCLOSURE DETAIL



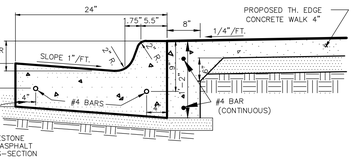
SECTION VIEW
DUMPSTER DETAIL

LEGEND

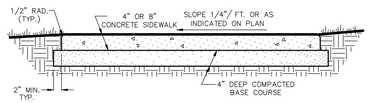
EXISTING	PROPOSED	
		PAVEMENT (ASPHALT)
		PAVEMENT (CONCRETE)
		CONCRETE CURB AND GUTTER
		STORM SEWER
		SANITARY SEWER
		WATER MAIN
		MANHOLE
		CATCH BASIN
		CURB INLET W/SILT SAC
		END SECTION
		GATE VALVE
		HYDRANT
		FLOOD PLAIN
1000	1000	CONTOURS
+ 1000.0	1000.00 T/C	SPOT ELEVATION
		SURFACE DRAINAGE
		OVERFLOW ROUTE
		TREE FENCE
		SILT FENCE
		PROPOSED DRIVEWAY LOCATION
		LIMIT OF DISTURBANCE



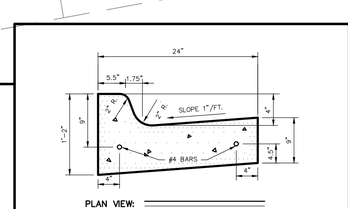
THICKENED EDGE SIDEWALK DETAIL
*4" HIGH THICKENED EDGE SIDEWALK IN FRONT OF PARKING SPACES



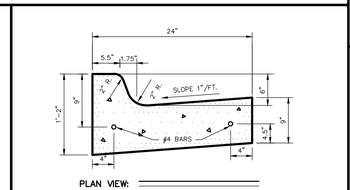
CONCRETE CURB WITH STANDARD GUTTER ABUTTING CONCRETE SIDEWALK DETAIL



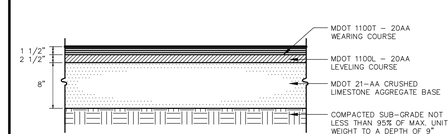
CONCRETE SIDEWALK DETAIL



4' STRAIGHT FACE CONC. CURB AND GUTTER



6' STRAIGHT FACE CONC. CURB AND GUTTER



TYPICAL ASPHALT CROSS-SECTION

456 CADY STREET

SECTION 16, TOWN 2 NORTH, RANGE 10 EAST
BLOOMFIELD TWP., OAKLAND COUNTY, MICHIGAN

REVISIONS

NO.	ITEM	DATE
1.	FINAL SITE PLAN SUBMITTAL	10-26-21
2.	REVISED FINAL SITE PLAN	11-30-21

UTILITY WARNING

UNDERGROUND UTILITY LOCATIONS AS SHOWN ON THE PLAN, WERE OBTAINED FROM UTILITY OWNER AND NOT FIELD LOCATED.

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

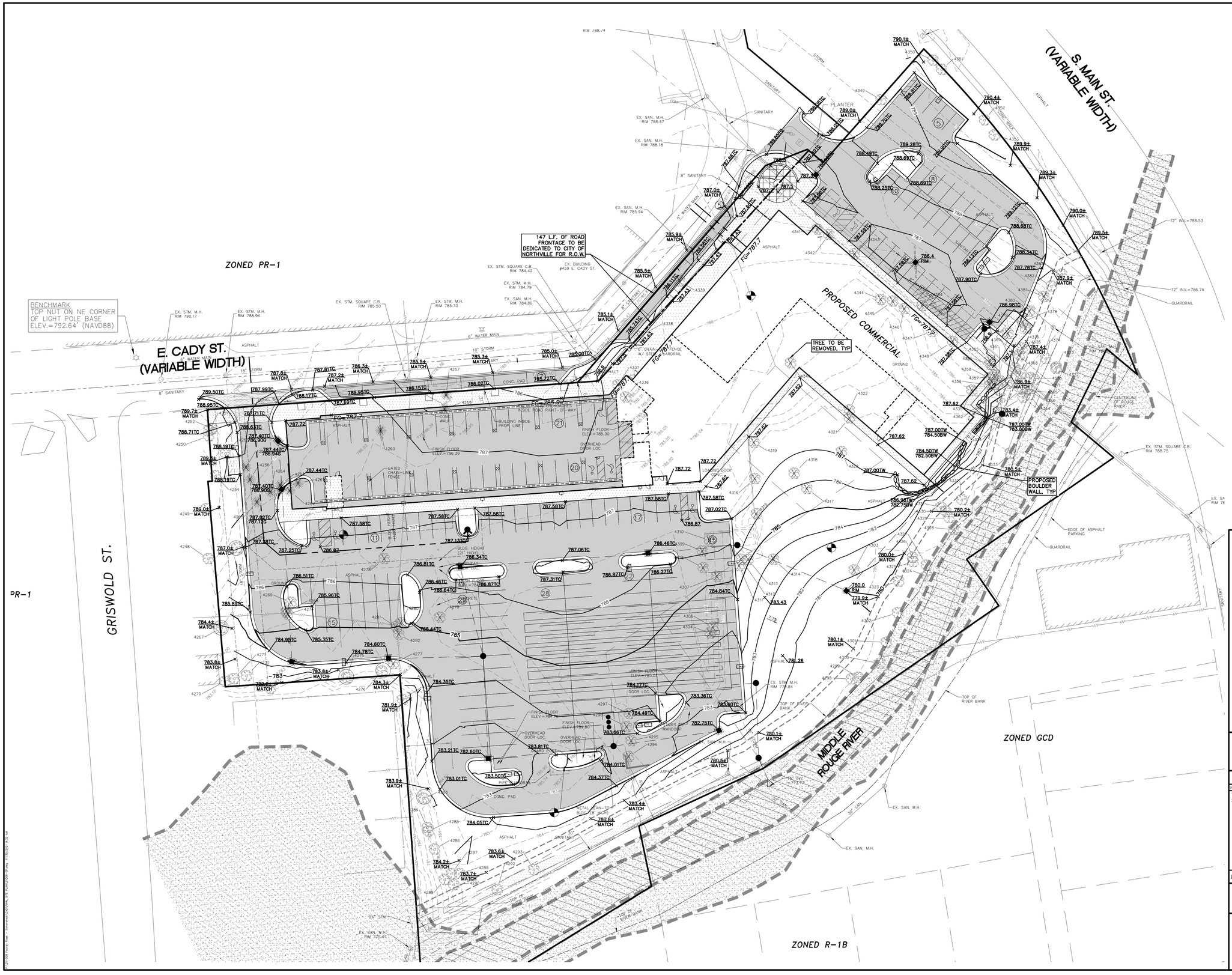
THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF AND/OR RELOCATION OF ALL UTILITIES THAT MAY INTERFERE WITH CONSTRUCTION.

DATE: 10-26-21 | DESIGNED BY: A.A. | JOB NUMBER: 21-008
CHECKED BY: B.E. | DRAWING FILE:21008-OA.dwg

OVERALL SITE PLAN

SEIBER, KEAST ENGINEERING, L.L.C.
CONSULTING ENGINEERS
39205 COUNTRY CLUB DR. SUITE C-8
FARMINGTON HILLS, MICHIGAN 48331
PHONE: 248.308.3331

SHEET 4



LEGEND

EXISTING	PROPOSED	
		PAVEMENT (ASPHALT)
		PAVEMENT (CONCRETE)
		CONCRETE CURB AND GUTTER
		STORM SEWER
		SANITARY SEWER
		WATER MAIN
		MANHOLE
		CATCH BASIN
		CURB INLET W/SILT SAC
		END SECTION
		GATE VALVE
		HYDRANT
		FLOOD PLAIN
1000	1000	CONTOURS
+ 1000.0	1000.00 T/C	SPOT ELEVATION
		SURFACE DRAINAGE
		OVERFLOW ROUTE
		TREE FENCE
		SILT FENCE
		PROPOSED DRIVEWAY LOCATION
		LIMIT OF DISTURBANCE

456 CADY STREET

SECTION 16, TOWN 2 NORTH, RANGE 10 EAST
BLOOMFIELD TWP., OAKLAND COUNTY, MICHIGAN

REVISIONS

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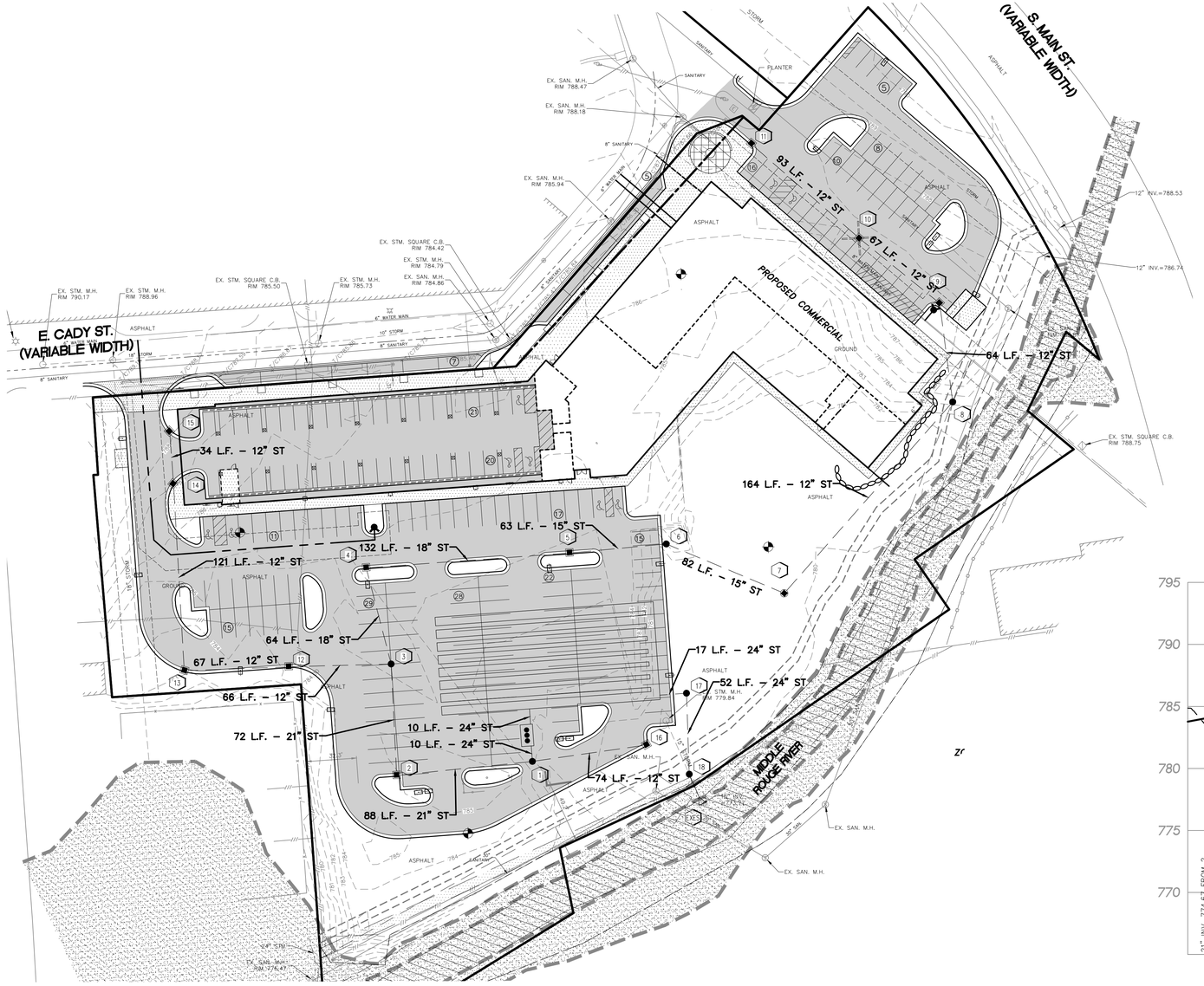
DATE: 10-26-21 | DESIGNED BY: A.A. | JOB NUMBER: 21-008
CHECKED BY: B.E. | DRAWING FILE:21008-GP.dwg

GRADING PLAN

SEIBER, KEAST ENGINEERING, L.L.C.
CONSULTING ENGINEERS
39205 COUNTRY CLUB DR. SUITE C-8
FARMINGTON HILLS, MICHIGAN 48331
PHONE: 248.308.3331

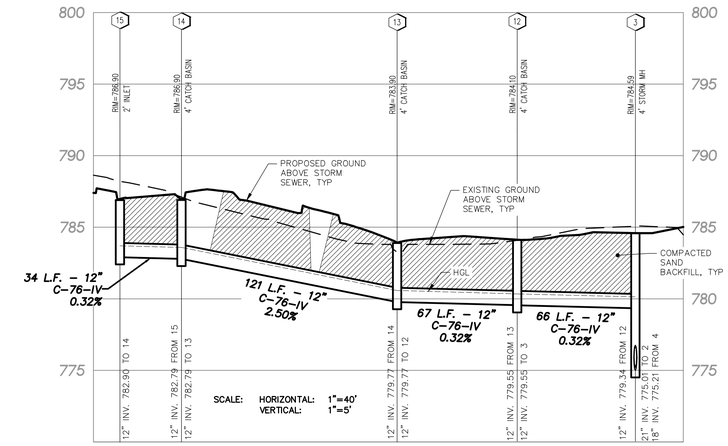
SHEET 5

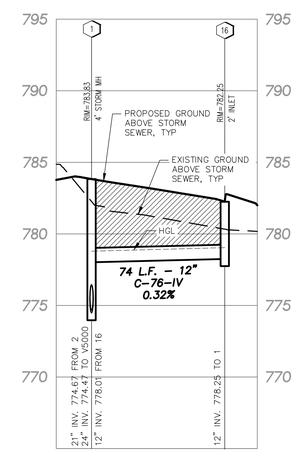


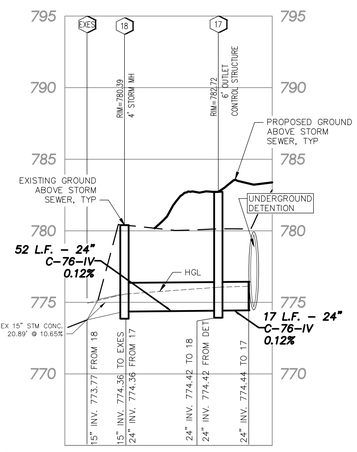
SCALE

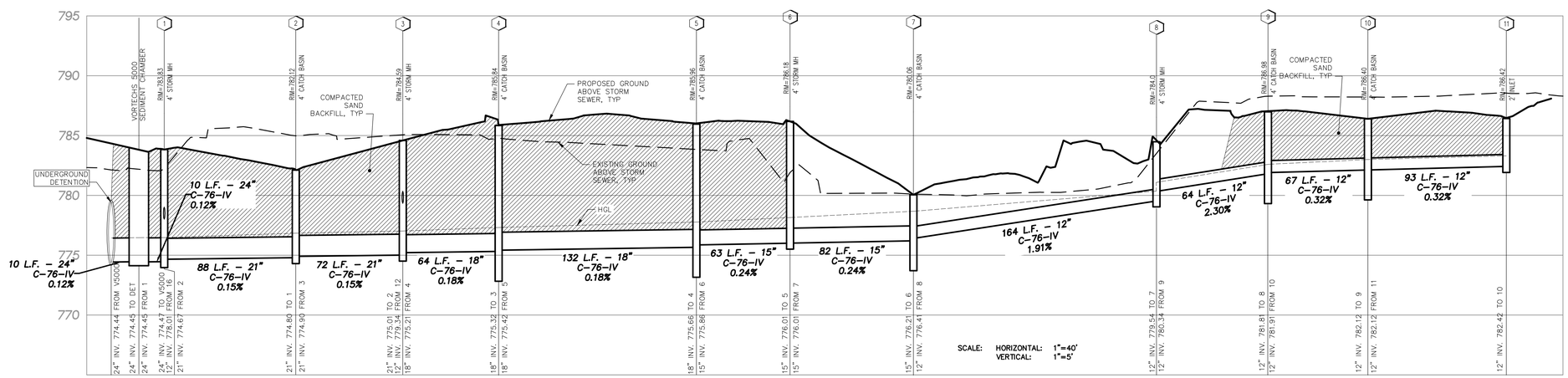
40 0 20 40 80 160

(IN FEET)
Scale: 1 inch = 40 ft.









LEGEND

EXISTING	PROPOSED	
		PAVEMENT (ASPHALT)
		PAVEMENT (CONCRETE)
		CONCRETE CURB AND GUTTER
		STORM SEWER
		SANITARY SEWER
		WATER MAIN
		MANHOLE
		CATCH BASIN
		CURB INLET W/SILT SAC
		END SECTION
		GATE VALVE
		HYDRANT
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1000	1000	CONTOURS
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		SURFACE DRAINAGE
		OVERFLOW ROUTE
		TREE FENCE
		SILT FENCE
		PROPOSED DRIVEWAY LOCATION
		LIMIT OF DISTURBANCE

456 CADY STREET

SECTION 16, TOWN 2 NORTH, RANGE 10 EAST
BLOOMFIELD TWP., OAKLAND COUNTY, MICHIGAN

REVISIONS

NO.	ITEM	DATE
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DATE: 10-26-21 | DESIGNED BY: A.A. | JOB NUMBER: 21-008
CHECKED BY: B.E. | DRAWING FILE:21008-ST.dwg

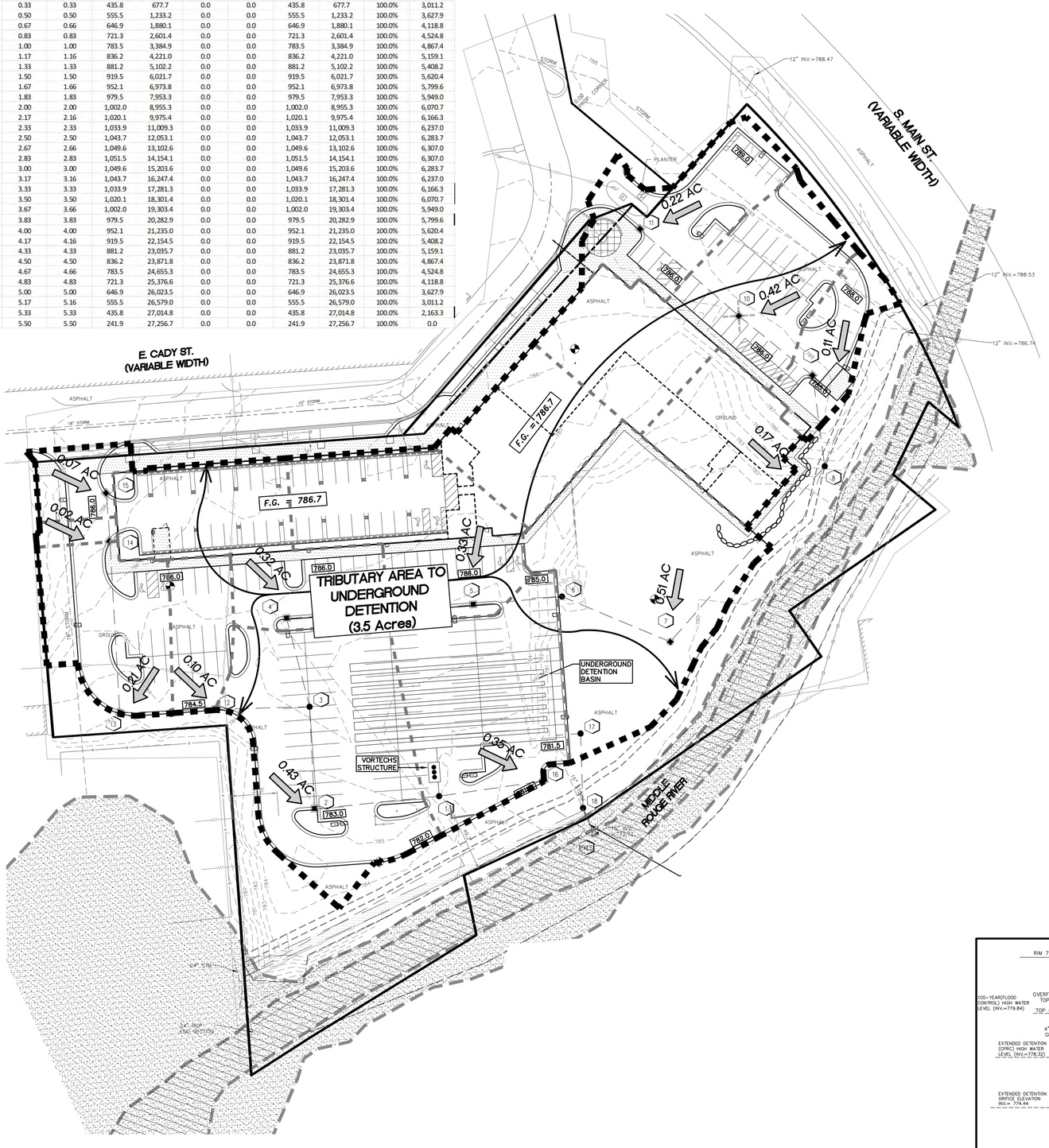
STORM SEWER PLAN AND PROFILE

SEIBER, KEAST ENGINEERING, L.L.C.
CONSULTING ENGINEERS
39205 COUNTRY CLUB DR. SUITE C-8
FARMINGTON HILLS, MICHIGAN 48331
PHONE: 248.308.3331

SHEET 6

Storage Volume Estimation

System		Pipe		Stone		Total System		Miscellaneous	
Depth (ft)	Elevation (ft)	Incremental Storage (cf)	Cumulative Storage (cf)	Incremental Storage (cf)	Cumulative Storage (cf)	Incremental Storage (cf)	Cumulative Storage (cf)	Open Storage (%)	Ave. Surface Area (sf)
0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0%	0.0
0.17	0.16	241.9	241.9	0.0	0.0	241.9	241.9	100.0%	2,163.3
0.33	0.33	435.8	677.7	0.0	0.0	435.8	677.7	100.0%	3,011.2
0.50	0.50	555.5	1,233.2	0.0	0.0	555.5	1,233.2	100.0%	3,627.9
0.67	0.66	646.9	1,880.1	0.0	0.0	646.9	1,880.1	100.0%	4,118.8
0.83	0.83	721.3	2,601.4	0.0	0.0	721.3	2,601.4	100.0%	4,524.8
1.00	1.00	783.5	3,384.9	0.0	0.0	783.5	3,384.9	100.0%	4,867.4
1.17	1.16	836.2	4,221.0	0.0	0.0	836.2	4,221.0	100.0%	5,159.1
1.33	1.33	881.2	5,102.2	0.0	0.0	881.2	5,102.2	100.0%	5,408.2
1.50	1.50	919.5	6,021.7	0.0	0.0	919.5	6,021.7	100.0%	5,620.4
1.67	1.66	952.1	6,973.8	0.0	0.0	952.1	6,973.8	100.0%	5,799.6
1.83	1.83	979.5	7,953.3	0.0	0.0	979.5	7,953.3	100.0%	5,949.0
2.00	2.00	1,002.0	8,955.3	0.0	0.0	1,002.0	8,955.3	100.0%	6,070.7
2.17	2.16	1,020.1	9,975.4	0.0	0.0	1,020.1	9,975.4	100.0%	6,166.3
2.33	2.33	1,033.9	11,009.3	0.0	0.0	1,033.9	11,009.3	100.0%	6,237.0
2.50	2.50	1,043.7	12,053.1	0.0	0.0	1,043.7	12,053.1	100.0%	6,283.7
2.67	2.66	1,049.6	13,102.6	0.0	0.0	1,049.6	13,102.6	100.0%	6,307.0
2.83	2.83	1,051.5	14,154.1	0.0	0.0	1,051.5	14,154.1	100.0%	6,307.0
3.00	3.00	1,049.6	15,203.6	0.0	0.0	1,049.6	15,203.6	100.0%	6,283.7
3.17	3.16	1,043.7	16,247.4	0.0	0.0	1,043.7	16,247.4	100.0%	6,237.0
3.33	3.33	1,033.9	17,281.3	0.0	0.0	1,033.9	17,281.3	100.0%	6,166.3
3.50	3.50	1,020.1	18,301.4	0.0	0.0	1,020.1	18,301.4	100.0%	6,070.7
3.67	3.66	1,002.0	19,303.4	0.0	0.0	1,002.0	19,303.4	100.0%	5,949.0
3.83	3.83	979.5	20,282.9	0.0	0.0	979.5	20,282.9	100.0%	5,799.6
4.00	4.00	952.1	21,235.0	0.0	0.0	952.1	21,235.0	100.0%	5,620.4
4.17	4.16	919.5	22,154.5	0.0	0.0	919.5	22,154.5	100.0%	5,408.2
4.33	4.33	881.2	23,035.7	0.0	0.0	881.2	23,035.7	100.0%	5,159.1
4.50	4.50	836.2	23,871.8	0.0	0.0	836.2	23,871.8	100.0%	4,867.4
4.67	4.66	783.5	24,655.3	0.0	0.0	783.5	24,655.3	100.0%	4,524.8
4.83	4.83	721.3	25,376.6	0.0	0.0	721.3	25,376.6	100.0%	4,118.8
5.00	5.00	646.9	26,023.5	0.0	0.0	646.9	26,023.5	100.0%	3,627.9
5.17	5.16	555.5	26,579.0	0.0	0.0	555.5	26,579.0	100.0%	3,011.2
5.33	5.33	435.8	27,014.8	0.0	0.0	435.8	27,014.8	100.0%	2,163.3
5.50	5.50	241.9	27,256.7	0.0	0.0	241.9	27,256.7	100.0%	0.0



456 CADY STREET
CITY OF NORTHVILLE, MI
SKE Job No. 21-008

Site Area = 3.5 Ac
C = 0.85 Ac

Intensity

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

Tc= 15 minutes

$$I_{100} = \frac{101}{(12.33+15)^{0.84}} = 6.27$$ **in/hr**

Calculate Channel Protection Volume Control (CPVC) Required Volume

$V_{CPVC} = A * C * 3{,}630$ [cubic feet]

$V_{CPVC} = 3.5 * 0.85 * 3630 =$ 10799 **Cubic feet** *(CPVC requested to be waived on this site due to contamination)*

Calculate Channel Protection Rate Control (CPRC) Required Volume

$V_{CPRC} = A * C * 6897$ [cubic feet]

$V_{CPRC} = 3.5 * 0.85 * 6897 =$ 20519 **Cubic feet**

Calculate 100-year Detention Volume

100-yr Allowable Release Discharge (Q allow): Q allow = 1.1055-0.207 ln(A) [cfs/acre] (maximum = 1.0 cfs/acre)
100-yr Allowable Release Discharge (Q allow): Q allow = 1.1055-0.207 ln(3.5) = 0.846 **cfs/acre**

100-yr Peak Allowable Discharge (Q o): Qo = Q allow * A [cfs]
100-yr Peak Allowable Discharge (Q o): Qo = 0.846 * 3.5 = 2.96 **cfs**

100-yr Peak Pond Inflow (Qi): Qi = C * I_{100} * A [cfs]
100-yr Peak Pond Inflow (Qi): Qi = 0.85 * 6.274 * 3.5 = 18.67 **cfs**

100-yr Runoff Volume (Vr): Vr = 18900 * C * A [cubic feet]
100-yr Runoff Volume (Vr): Vr = 18900 * 0.85 * 3.5 = 56227.5 **cubic feet**

Storage Ratio (Vr/Vs): Vs/Vr = 0.206 - 0.15 ln (Qo/Qi)
Storage Ratio (Vr/Vs): Vs/Vr = 0.206-0.15ln(2.962/18.66) = 0.48

100-yr Required Storage Volume (Vs): Vs = Vr*Storage Ratio
100-yr Required Storage Volume (Vs): Vs = 56227.5*0.482 27109 **cubic feet**

The Site Plan must be designed to accommodate the following volumes:

CPVC	10799 cubic feet	*(CPVC requested to be waived on this site due to contamination)*
CPRC	20519 cubic feet	
Flood Control	27109 cubic feet	

Design Requirements	Volume (cf)
CPVC	10799
CPRC	20519
Flood Control	27109

Orifice Calculations

Orifice Channel Protection Rate Control (CPRC) Orifice

Average Discharge Rate (Qave): $Qave =$ **[cfs, average discharge rate over a 48-hour period**

Average Discharge Rate (Qave): $Qave = \frac{20518.575}{172800}$ 0.118742 **cubic feet per second**

Average Gead (have): $h_{ave} = \frac{h_{ED}}{2}$ h_{ED} = maximum head, ft, resulting from CPRC Storage volume

H-100=	5.40 feet
H-cprc =	3.875 feet

Average Gead (have): $h_{ave} = \frac{2.83}{2}$ 1.9372958 feet

Extended Detention Orifice Area (a): $A = \frac{Q_{ave}}{0.62\sqrt{2*g*h_{ave}}}$ **[A=orifice area in square feet]**

Extended Detention Orifice Area (a): $A = \frac{0.118742}{0.62\sqrt{2*32.2*2.405}}$ 0.0171 **square feet**

Extended Detention Orifice Diameter (d): $d = 12 * \sqrt{4 * \frac{A}{\pi}}$ **[d=orifice diameter in inches, assuming single orifice]**

Extended Detention Orifice Diameter (d): $d = 12 * \sqrt{4 * \frac{0.015389}{\pi}}$ 1.77 **inches**

Flood Control Orifice

100-year Head: $h_{res} = h_{max} - h_{ED}$ **[h_res = residual head, ft, from 100-year peak storage to Extended Detention (CPRC) peak storage]**

100-year Head: $h_{res} = 2.915 - 1.415$ 3.46 **[feet, over 100-year orifice(s)]**

100-yr flow through Ext.Det. Orifice $Q_{ED} = a_{ED} * 0.62\sqrt{2 * g * h_{100}} = 0.015389 * 0.62\sqrt{2 * 32.2 * 2.915} =$ 0.146 **cubic feet per second**

Remaining flow flow 100-yr Orifice: $Q_{res} = Q_0 - Q_{ED}$ [cubic feet per second]

Remaining flow flow 100-yr Orifice: $Q_{res} = 2.961623 - 0.145655 =$ 2.82 **[cubic feet per second]**

Flood Control Orifice Area (a): $A = \frac{Q_{res}}{0.62\sqrt{2*g*h_{res}}}$ [A= 100-year orifice area in square feet]

Flood Control Orifice Area (a): $A = \frac{2.791194}{0.62\sqrt{2*32.2*1.5}}$ 0.304 **square feet**

Flood Control Orifice Diameter (d): $d = 12 * \sqrt{4 * \frac{A}{\pi}}$ **[d= 100-year orifice diameter in inches, assuming single orifice]**

Flood Control Orifice Diameter (d): $d = 12 * \sqrt{4 * \frac{0.458047}{\pi}}$ 7.47 **inches**

PROPOSED U.G. DETENTION BASIN

C FACTOR		Area		C		A *C
TOTAL AREA TRIBUTARY TO DETENTION BASINS	=	3.50	Ac			
PAVING AREA (WALKS, DRIVE, ROAD)	=	1.85	Ac	@ 0.95	=	1.76
BUILDING AREA	=	0.94	Ac	@ 0.95	=	0.89
LAWN AREA	=	0.71	Ac	@ 0.45	=	0.32
DETENTION (LOW WATER AREA)	=		Ac	@ 1.00	=	0.00
TOTAL AREA	=	3.50	Ac	@		2.97
C_{avg} = A * C / TOTAL ACRES =					=	0.85

SCALE
40 0 20 40 80 160
(IN FEET)
Scale: 1 inch = 40 ft.

LEGEND

EXISTING	PROPOSED	
		PAVEMENT (ASPHALT)
		PAVEMENT (CONCRETE)
		CONCRETE CURB AND GUTTER
		STORM SEWER
		SANITARY SEWER
		WATER MAIN
		MANHOLE
		CATCH BASIN
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		END SECTION
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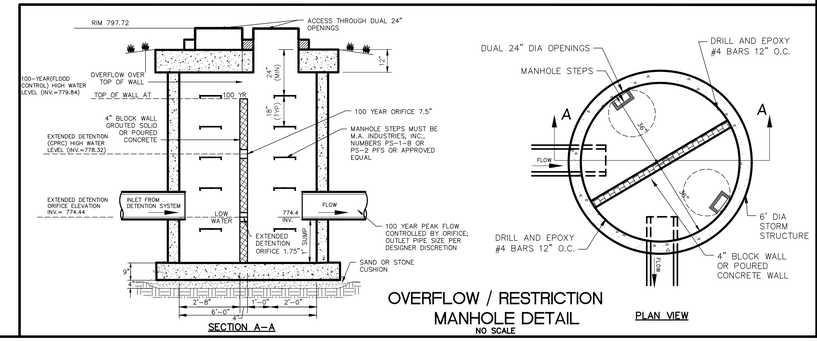
		SURFACE DRAINAGE
		OVERFLOW ROUTE
		TREE FENCE
		SILT FENCE
		PROPOSED DRIVEWAY LOCATION
		LIMIT OF DISTURBANCE

456 CADY STREET

SECTION 16, TOWN 2 NORTH, RANGE 10 EAST
BLOOMFIELD TWP., OAKLAND COUNTY, MICHIGAN



OVERFLOW / RESTRICTION MANHOLE DETAIL
NO SCALE

REVISIONS		
NO.	ITEM	DATE
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DATE: 10-26-21 | DESIGNED BY: A.A. | CHECKED BY: B.E. | JOB NUMBER: 21-008 | DRAWING FILE:21008-SWM.dwg

STORM WATER MANAGEMENT PLAN

SEIBER, KEAST ENGINEERING, L.L.C.
CONSULTING ENGINEERS
39205 COUNTRY CLUB DR. SUITE C-8
FARMINGTON HILLS, MICHIGAN 48331
PHONE: 248.308.3331

SHEET 7

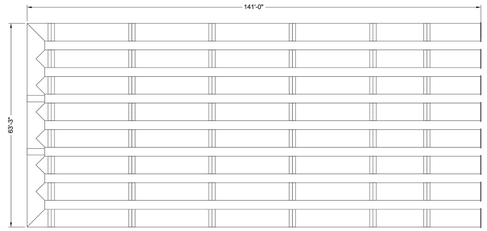
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20 & HS25
- APPROX. LINEAR FOOTAGE = 1,147 lf.

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 27,109 cf.
- PIPE STORAGE VOLUME = 27,257 cf.
- BACKFILL STORAGE VOLUME = 0 cf.
- TOTAL STORAGE PROVIDED = 27,257 cf.

PIPE DETAILS
- DIAMETER = 66 IN.
- CORRUGATION = 5x1
- GAGE = 14
- COATING = ALT2
- WALL TYPE = Solid
- BARRELL SPACING = 33 IN.

BACKFILL DETAILS
- WIDTH AT ENDS = 24 IN.
- ABOVE PIPE = 0 IN.
- WIDTH AT SIDES = 24 IN.
- BELOW PIPE = 0 IN.



NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}$" x $\frac{1}{2}$" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

ASSEMBLY
SCALE: 1" = 20'

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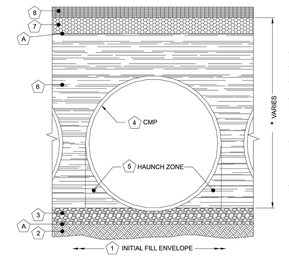
CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO11622 456 Cady Street
66" CMP Detention - 27257 cf.
Northville, MI
DETENTION SYSTEM

PROJECT No.: 6796	SEQ. No.: 11622	DATE: 11/15/2021
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D1		



DETENTION SYSTEMS - CMP DETENTION / CMP DRAINAGE

	Material Location	Description	Material Designation	Designation
8	Rigid or Flexible Pavement (if applicable)			
7	Road Base (if applicable)			
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types
6	Backfill	Well graded granular material which may contain small amounts of silt or clay.	AASHTO M 145- A-1, A-2, A-3	Placed in 8" +/- loose lifts and compacted to 90% Standard Proctor Per AASHTO T 99
3	Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57	Engineer to determine if bedding is required. Pipe may be placed on the trench bottom of a relatively loose, native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation. See AASHTO 26.3.8.1 / 26.5.3 Bedding info.
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types

* *Note: Backfill using controlled low-strength material (CLSM, "flash fill" or "flowable fill") when the spacing between the pipes will not allow for placement and adequate compaction of the backfill.*

1. MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT

FOUNDATION/BEDDING PREPARATION

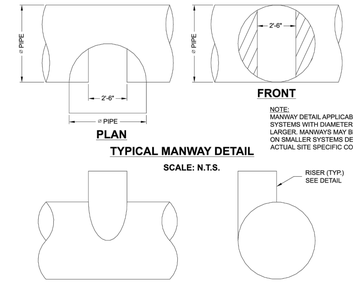
2. PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

5. HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMALLY COMPACTED WITHOUT SOFT SPOTS.

BACKFILL

WHEN PLACING THE FIRST LIFTS OF BACKFILL IT IS IMPORTANT TO MAKE SURE THAT THE BACKFILL IS PROPERLY COMPACTED UNDER AND AROUND THE PIPE HAUNCHES. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO LIFT (16") DIFFERENTIAL BETWEEN ANY OF THE PIPES AT ANY TIME DURING THE BACKFILL PROCESS. THE BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE DETENTION SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON THE PIPE.

OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS, AS APPROVED BY SITE ENGINEER.

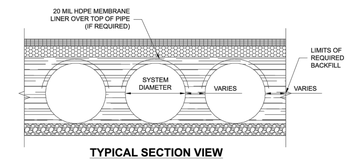


NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.

TYPICAL MANWAY DETAIL
SCALE: N.T.S.

TYPICAL RISER DETAIL
SCALE: N.T.S.

NOTE:
LADDERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.



TYPICAL SECTION VIEW
LINER OVER ROWS
SCALE: N.T.S.

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE IMPERMEABLE LINER INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

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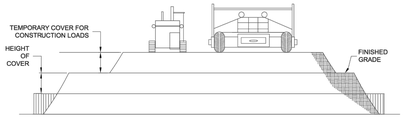
DETENTION SYSTEM

PROJECT No.: 6796 | SEQ. No.: 11622 | DATE: 11/15/2021
DESIGNED: DYO | DRAWN: DYO
CHECKED: DYO | APPROVED: DYO
SHEET NO.: D2



CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY. DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO PROTECT THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS
CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSPA GUIDELINES.

NOTE:
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

PIPE
THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

GALVANIZED: AASHTO M-36 OR ASTM A-760

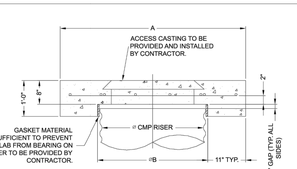
POLYMER COATED: AASHTO M-245 OR ASTM A-762

ALUMINUM: AASHTO M-196 OR ASTM B-745

HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSPS (NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.

INSTALLATION
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.

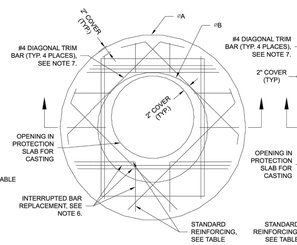


SECTION VIEW

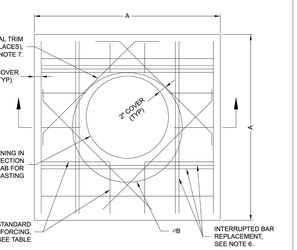
REINFORCING TABLE

ø CMP RISER	A	ø B	REINFORCING	**BEARING PRESSURE (PSF)
24"	ø 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	ø 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	ø 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	ø 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	ø 6' 6' X 6'	50"	#5 @ 8" OCEW #5 @ 8" OCEW	1,600 1,100

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

1. DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 3,500 psi
5. REINFORCING STEEL = ASTM A615, GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING. BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL

SCALE: N.T.S.

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CHECKED: DYO | APPROVED: DYO
SHEET NO.: D3

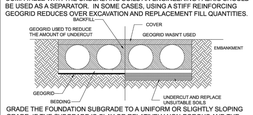
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

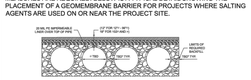


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

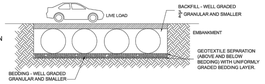
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

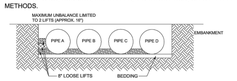
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



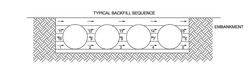
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

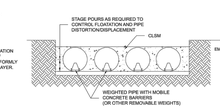


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10-FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

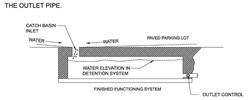


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

456 CADY STREET

SECTION 16, TOWN 2 NORTH, RANGE 10 EAST
BLOOMFIELD TWP., OAKLAND COUNTY, MICHIGAN

DATE: 10-26-21 | DESIGNED BY: A.A. JOB NUMBER: 21-008 | CHECKED BY: B.E. DRAWING FILE:21008-DET.dwg

REVISIONS

NO.	ITEM	DATE
1.	FINAL SITE PLAN SUBMITTAL	10-26-21
2.	REVISED FINAL SITE PLAN	11-30-21

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CONTECH ENGINEERED SOLUTIONS

Wayne County 1-Year Peak Flow

Project: **456 Cady Street**
Location: **Northville, MI**

Area (acres):	3.5
Runoff Coefficient, C:	0.85
T_c (min):	15

1-year I_1 = 2.00 in/hr

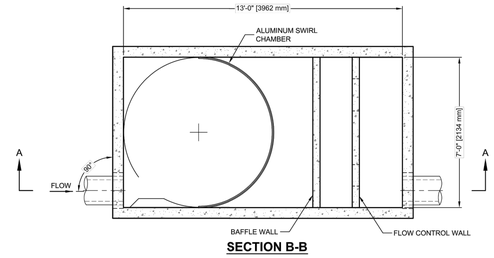
max I_1 = 2.0 inches/hour for smaller sites with Tc ≤ 15 minutes
min I_1 = 1.0 inches/hour for larger sites with Tc ≥ 1 hour

1-year Peak Flow = Q_{avg} = C x I_1 x A = **5.95** **cfs**

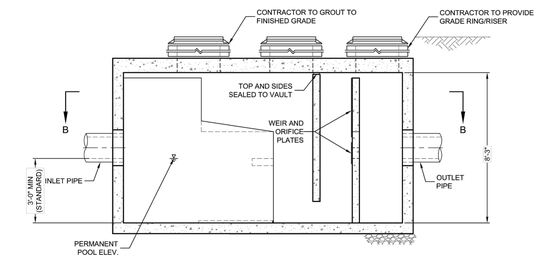
Recommended Model: **VX-5000**

Vortechs™

Vortechs™ Model	Peak Flow (cfs)
1000	1.2
2000	2.1
3000	3.4
4000	4.5
5000	6.4
7000	8.3
9000	10.5
11000	13.1
16000	18.8



SECTION B-B



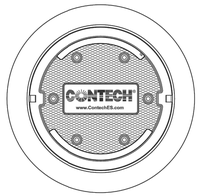
SECTION A-A

Vortechs
THIS PRODUCT MAY BE PROTECTED BY THE FOLLOWING U.S. PATENT: 5,759,415; RELATED FOREIGN PATENTS.

VORTECHS 5000 DESIGN NOTES

VORTECHS 5000 RATED TREATMENT CAPACITY IS 6.4 CFS, OR PER WAYNE COUNTY REGULATIONS. IF THE SITE CONDITIONS EXCEED RATED TREATMENT CAPACITY, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.

THE STANDARD INLET/OUTLET CONFIGURATION IS SHOWN. FOR OTHER CONFIGURATION OPTIONS , PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			*
WATER QUALITY FLOW RATE (CFS)			6.4 CFS
PEAK FLOW RATE (CFS)			6.4 CFS
RETURN PERIOD OF PEAK FLOW (YRS)			10 YR.
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*
RIM ELEVATION			*
ANTI-FLOTATION BALLAST	WIDTH	HEIGHT	
	*	*	
NOTES/SPECIAL REQUIREMENTS:			

* PER ENGINEER OF RECORD

THE MANUFACTURER OF THE VORTECHS STRUCTURE MUST CONTACT THE WAYNE COUNTY TESTING OFFICE AT (734) 595-6504 EXT. 2015 AT LEAT 72 HOURS PRIOR TO FABRICATION TO SCHEDULE INSPECTION DURING FABRICATION.

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH (.) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com
4. VORTECHS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS25 AND CASTINGS SHALL MEET AASHTO M306 LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. INLET PIPE(S) MUST BE PERPEDICULAR TO THE VAULT AND AT THE CORNER TO INTRODUCE THE FLOW TANGENTIALLY TO THE SWIRL CHAMBER. DUAL INLETS NOT TO HAVE OPPOSING TANGENTIAL FLOW DIRECTIONS.
7. OUTLET PIPE(S) MUST BE DOWN STREAM OF THE FLOW CONTROL BAFFLE AND MAY BE LOCATED ON THE SIDE OR END OF THE VAULT. THE FLOW CONTROL WALL MAY BE TURNED TO ACCOMODATE OUTLET PIPE KNOCKOUTS ON THE SIDE OF THE VAULT.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE VORTECHS STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

WAYNE COUNTY VORTECHS 5000
STANDARD DETAIL

C:\USERS\PVALENTINE\DESKTOP\WC-VX-5000-DTL.DWG 6/22/2015 10:43 AM

456 CADY STREET
CITY OF NORTHVILLE, MI

SEIBER KEAST ENGINEERING, LLC
11/30/2021
Job No. 21-029

10 Year Design: I = 151.8 /T+19.9 n = 0.013

MH-MH	A(s) acres	C	A(s)xC unit	A(s)xC cumul.	T min	I in/hr	Design Q cfs	Dia in	Hyd.Gr. %	Vel. ft/sec	Length ft	Tr Time min	Inv. upst.	Inv. dnst.	Grnd. upst.	HGL upst.	Pipe slope-%	RIM - HGL	T/Pipe - HGL	Rim - inv	T/Pipe - RIM	T/Pipe - RIM
16 - 1	0.35	0.85	0.30	0.30	15.00	4.35	1.31	12	0.32	2.57	74	0.48	778.25	778.01	782.25	779.05	0.32	3.20	0.20	4.00	3.00	4.82
											Downstream Data -				783.83	776.48						
15 - 14	0.07	0.85	0.06	0.06	15.00	4.35	0.26	12	0.32	2.57	34	0.22	782.90	782.79	786.90	783.70	0.32	3.20	0.20	4.00	3.00	3.11
14 - 13	0.02	0.85	0.02	0.08	15.22	4.32	0.34	12	2.50	7.17	121	0.28	782.79	779.77	786.90	783.59	2.5	3.31	0.20	4.11	3.11	3.13
13 - 12	0.21	0.85	0.18	0.26	15.50	4.29	1.11	12	0.32	2.57	67	0.44	779.77	779.55	783.90	780.57	0.32	3.33	0.20	4.13	3.13	3.55
12 - 3	0.10	0.85	0.09	0.35	15.94	4.24	1.47	12	0.32	2.57	66	0.43	779.55	779.34	784.10	780.35	0.32	3.75	0.20	4.55	3.55	4.25
											Downstream Data -				784.59	777.03						
11 - 10	0.22	0.85	0.19	0.19	15.00	4.35	0.81	12	0.32	2.57	93	0.60	782.42	782.12	786.42	783.29	0.32	3.13	0.13	4.00	3.00	3.28
10 - 9	0.42	0.85	0.35	0.54	15.60	4.28	2.30	12	0.42	2.93	67	0.38	782.12	781.91	786.40	782.99	0.32	3.41	0.13	4.28	3.28	3.95
9 - 8	0.11	0.85	0.10	0.64	15.98	4.23	2.69	12	2.30	6.88	64	0.16	781.81	780.34	786.86	782.61	2.30	4.25	0.20	5.05	4.05	2.66
8 - 7	0.17	0.85	0.15	0.78	16.14	4.21	3.30	12	0.86	6.26	164	0.44	779.54	776.41	784.00	780.34	1.91	3.66	0.20	4.46	3.46	2.59
7 - 6	0.51	0.85	0.44	1.22	16.58	4.16	5.08	15	0.62	4.14	82	0.33	776.21	776.01	780.00	778.66	0.24	1.34	-1.20	3.79	2.54	8.49
6 - 5	0.00	0.85	0.00	1.22	16.91	4.12	5.04	15	0.61	4.11	63	0.26	776.01	775.86	785.75	778.15	0.24	7.60	-0.89	9.74	8.49	8.85
5 - 4	0.33	0.85	0.28	1.50	17.16	4.10	6.13	18	0.34	3.47	132	0.63	775.66	775.42	785.96	777.77	0.18	8.19	-0.61	10.30	8.80	8.04
4 - 3	0.32	0.85	0.27	1.77	17.80	4.03	7.12	18	0.46	4.03	64	0.26	775.32	775.21	784.96	777.32	0.18	7.64	-0.50	9.64	8.14	7.88
3 - 2	0.00	0.85	0.00	1.77																		
+ FLOW FROM 12			0.35	2.11	18.06	4.00	8.45	21	0.28	3.51	72	0.34	775.01	774.90	784.59	777.03	0.15	7.56	-0.27	9.58	7.83	5.47
2 - 1	0.43	0.85	0.37	2.48	18.40	3.96	9.83	21	0.38	4.09	88	0.36	774.80	774.67	782.12	776.82	0.15	5.30	-0.27	7.32	5.57	7.41
1 - STR	0.00	0.85	0.00	2.48																		
+ FLOW FROM 16			0.30	2.78	18.76	3.93	10.92	24	0.23	3.48	10	0.05	774.47	774.46	783.83	776.48	0.12	7.35	-0.01	9.36	7.36	7.34
STR - BASIN	0.00	0.85	0.00	2.78	18.81	3.92	10.91	24	0.23	3.47	10	0.05	774.45	774.44	783.80	776.46	0.12	7.34	-0.01	9.35	7.35	9.36
											Downstream Data -				785.80	776.44						
BASIN - 17	0.00	0.85	0.00				10.91	24	0.23		17		774.44	774.42	783.00	776.12	0.12					
17 - 18	0.00	0.85	0.00				10.91	24	0.23		52		774.42	774.36	782.72	776.08	0.12					
18 - EXES	0.00	0.85	0.00				10.91	15	2.85		20		774.36	773.77	780.39	775.59	2.95					
											Downstream Data -				781.64	775.02						

456 CADY STREET

SECTION 16, TOWN 2 NORTH, RANGE 10 EAST
BLOOMFIELD TWP., OAKLAND COUNTY, MICHIGAN

DATE: 10-26-21 | DESIGNED BY: A.A. JOB NUMBER: 21-008 | CHECKED BY: B.E. DRAWING FILE:21008-DET.dwg

SEDIMENT STRUCTURE DETAILS AND STORM CALCULATIONS

REVISIONS

NO.	ITEM	DATE
1.	FINAL SITE PLAN SUBMITTAL	10-26-21
2.	REVISED FINAL SITE PLAN	11-30-21

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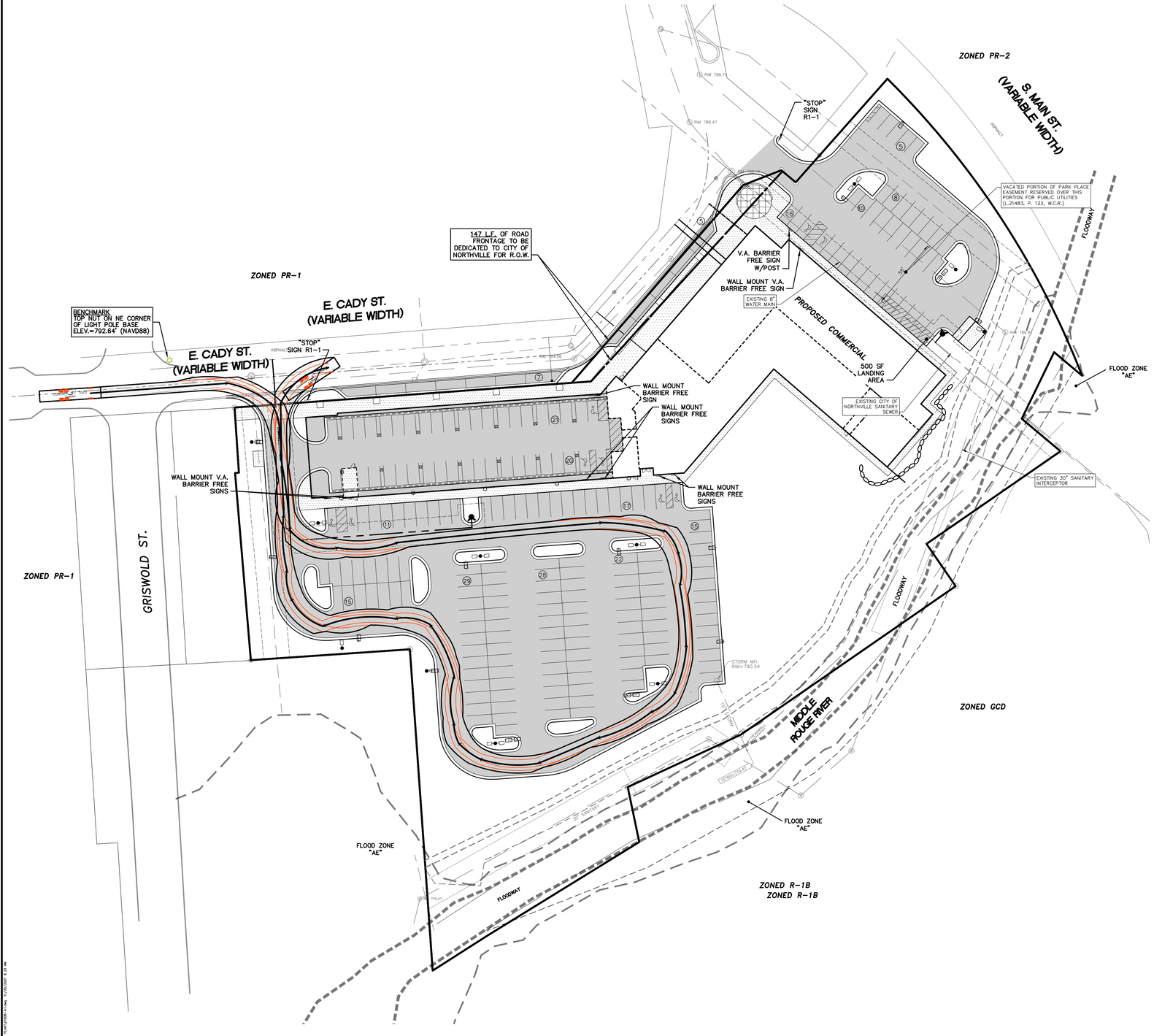
SEIBER, KEAST ENGINEERING, L.L.C.
CONSULTING ENGINEERS
39205 COUNTRY CLUB DR. SUITE C-8
FARMINGTON HILLS, MICHIGAN 48331
PHONE: 248.308.3331

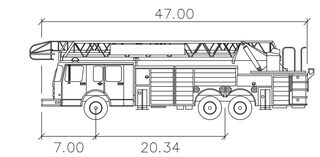
SHEET 9



SCALE

40 0 20 40 80 160

(IN FEET)
Scale: 1 inch = 40 ft.



47 foot custom

	feet
Width	: 8.50
Track	: 8.50
Lock to Lock Time	: 6.0
Steering Angle	: 33.3

FIRE TRUCK PROFILE

LEGEND

EXISTING	PROPOSED	
		PAVEMENT (ASPHALT)
		PAVEMENT (CONCRETE)
		CONCRETE CURB AND GUTTER
		STORM SEWER
		SANITARY SEWER
		WATER MAIN
		MANHOLE
		CATCH BASIN
		CURB INLET W/SILT SAC
		END SECTION
		GATE VALVE
		HYDRANT
		FLOOD PLAIN
1000	1000	CONTOURS
+ 1000.0	1000.00 T/C	SPOT ELEVATION
		SURFACE DRAINAGE
		OVERFLOW ROUTE
		TREE FENCE
		SILT FENCE
		PROPOSED DRIVEWAY LOCATION
		LIMIT OF DISTURBANCE

456 CADY STREET

SECTION 16, TOWN 2 NORTH, RANGE 10 EAST
BLOOMFIELD TWP., OAKLAND COUNTY, MICHIGAN

REVISIONS

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EMERGENCY VEHICLE ROUTE

SEIBER, KEAST ENGINEERING, L.L.C.
CONSULTING ENGINEERS
39205 COUNTRY CLUB DR. SUITE C-8
FARMINGTON HILLS, MICHIGAN 48331
PHONE: 248.308.3331

SHEET 10

LEVEL 1

North

Scale: 1" = 16'-0"

8' 16' 32'

Scales listed are for 22x34 drawing size

ROOM TYPE KEY

1 Bed	2 Bed	3 Bed
Circulation	Commercial	Support Space

CSR21 - 456 East Cady Street - Mixed Use Development | Conceptual Level 1 Floor Plan

456 East Cady Street, Northville, MI 48167
Created on: November 30, 2021

O|X STUDIO INC.

A - 1

LEVEL 2

North

Scale: 1" = 16'-0"

8' 16' 32'

Scales listed are for 22x34 drawing size

ROOM TYPE KEY

1 Bed	2 Bed	3 Bed
Circulation	Commercial	Support Space

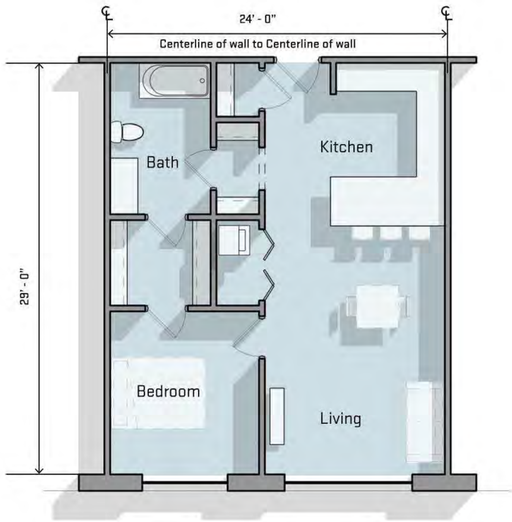
CSR21 - 456 East Cady Street - Mixed Use Development | Conceptual Level 2 Floor Plan

456 East Cady Street, Northville, MI 48167
Created on: November 30, 2021

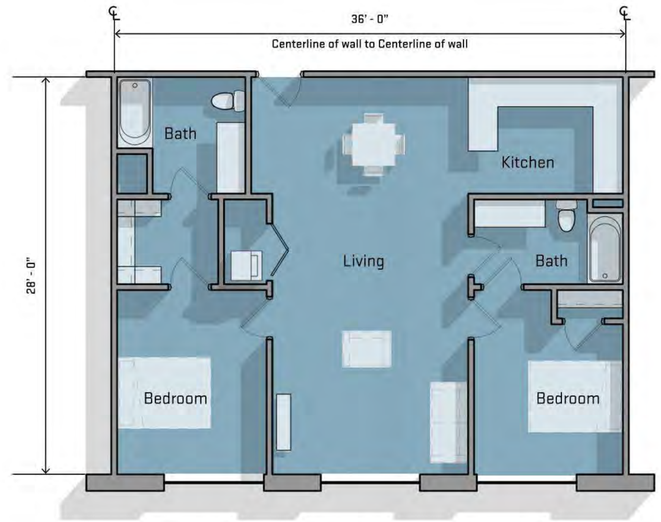
O|X STUDIO INC.

A - 2

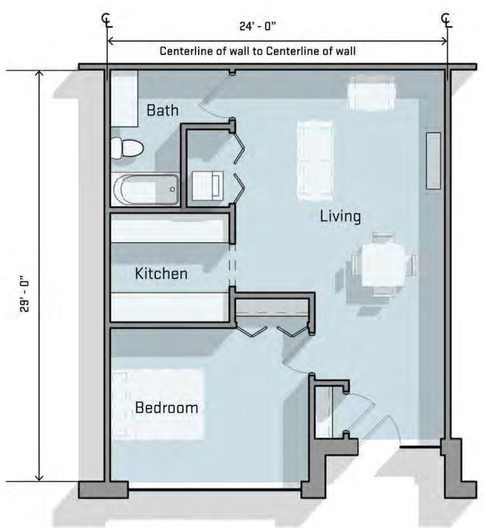
3 Bed
1 Bed
1 Bed
1



Typical 1A Bed (Levels 2-3)



Typical 2 Bed (Lvls 2-3)



Typical 1 Bed (Level 1)

2 Bed (Level 1)

Proposed Unit Matrix

Floor	# Units	
1st		
1 Bed	4	
2 Bed	2	
3 Bed	1	
Total	7	
2nd (3rd)		
1 Bed	25	
2 Bed	7	
3 Bed	4	
Total	36	
Overall		
1 Bed	54	(68%)
2 Bed	16	(20%)
3 Bed	9	(12%)
Total	79	

175 Parking Spaces Required

TYPICAL UNIT LAYOUTS

Scale: 3/16" = 1'-0"

4' 8' 12'

Scales listed are for 22x34 drawing size

ROOM TYPE KEY

1 Bed 2 Bed

View looking Southwest at main commercial entrance

Exterior design is conceptual and subject to change as the project progresses in development

View looking Southwest along East Cady Street

Exterior design is conceptual and subject to change as the project progresses in development

View looking East along East Cady Street

Exterior design is conceptual and subject to change as the project progresses in development

View looking East at main residential entrance

Exterior design is conceptual and subject to change as the project progresses in development

View looking Northeast at residential open space

Exterior design is conceptual and subject to change as the project progresses in development

WEST ELEVATION

4' 8' 16' 1/8" = 1'-0"

KEY PLAN

NORTH ELEVATION

4' 8' 16' 1/8" = 1'-0"

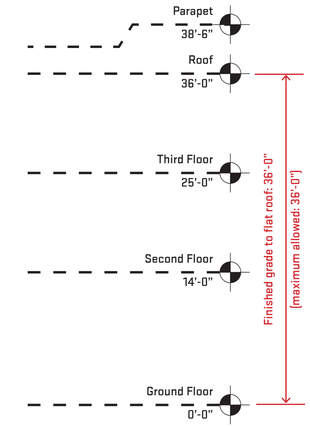
KEY PLAN

NORTHWEST ELEVATION

4' 8' 16' 1/8" = 1'-0"

KEY PLAN

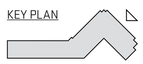
Scales listed are for 22x34 drawing size



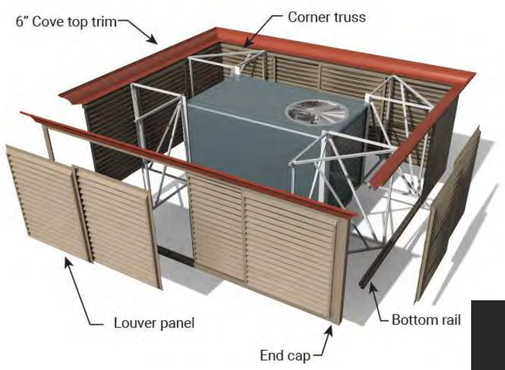
NORTHEAST ELEVATION

4' 8' 16' 1/8" = 1'-0"

KEY PLAN

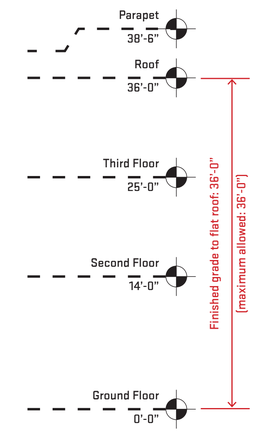


cityscapes®
architectural innovations



Color: RAL 9011
Graphite Black

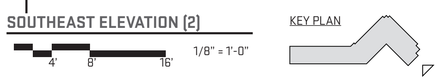
MECHANICAL SCREEN

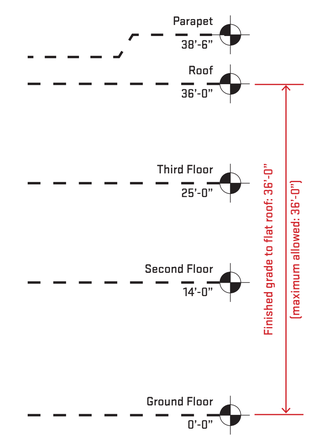


SOUTHEAST ELEVATION (2)

4' 8' 16' 1/8" = 1'-0"

KEY PLAN



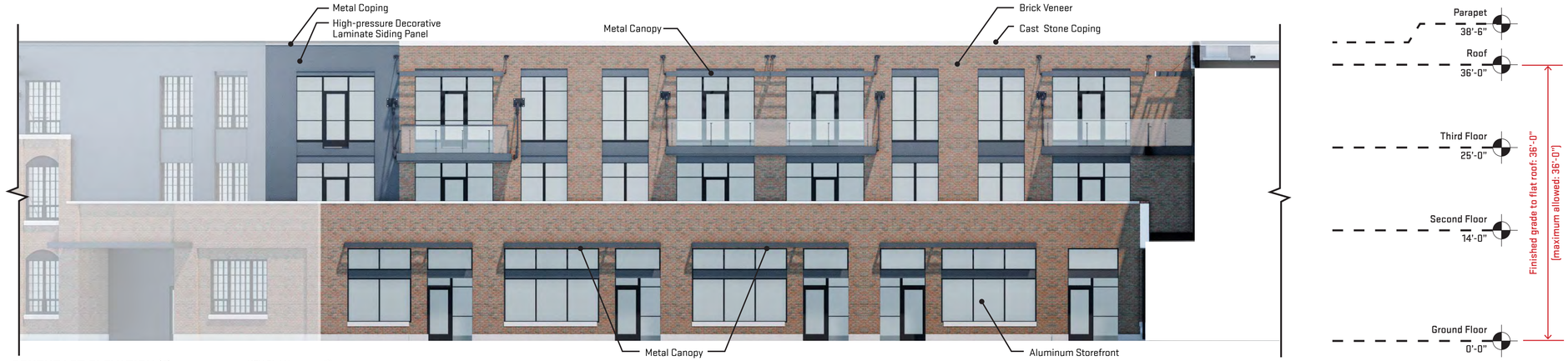


SOUTHWEST ELEVATION

4' 8' 16' 1/8" = 1'-0"

KEY PLAN

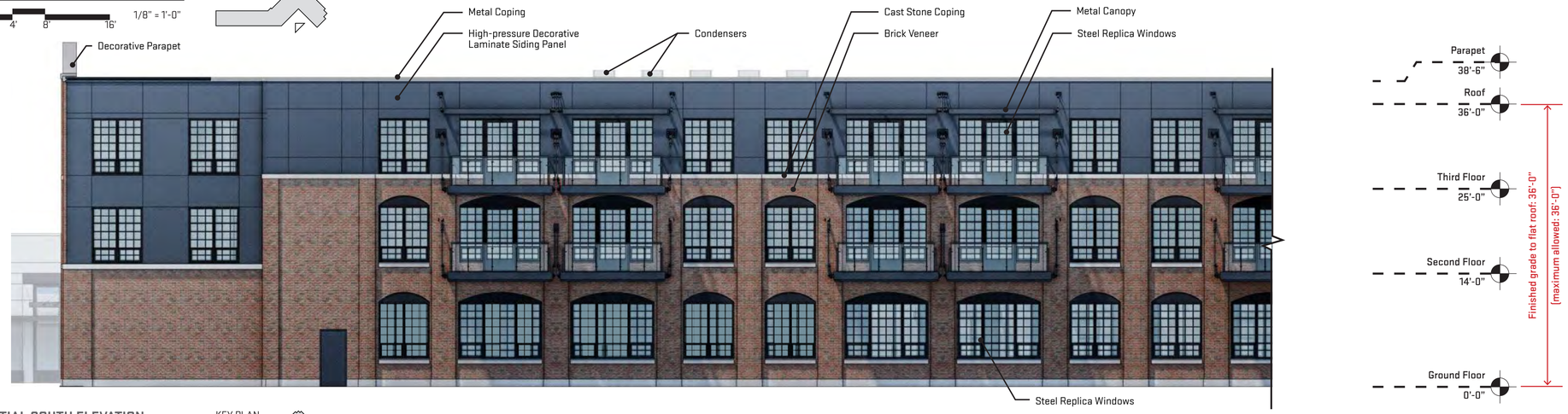
Scales listed are for 22x34 drawing size



SOUTHEAST ELEVATION (1)

4' 8' 16' 1/8" = 1'-0"

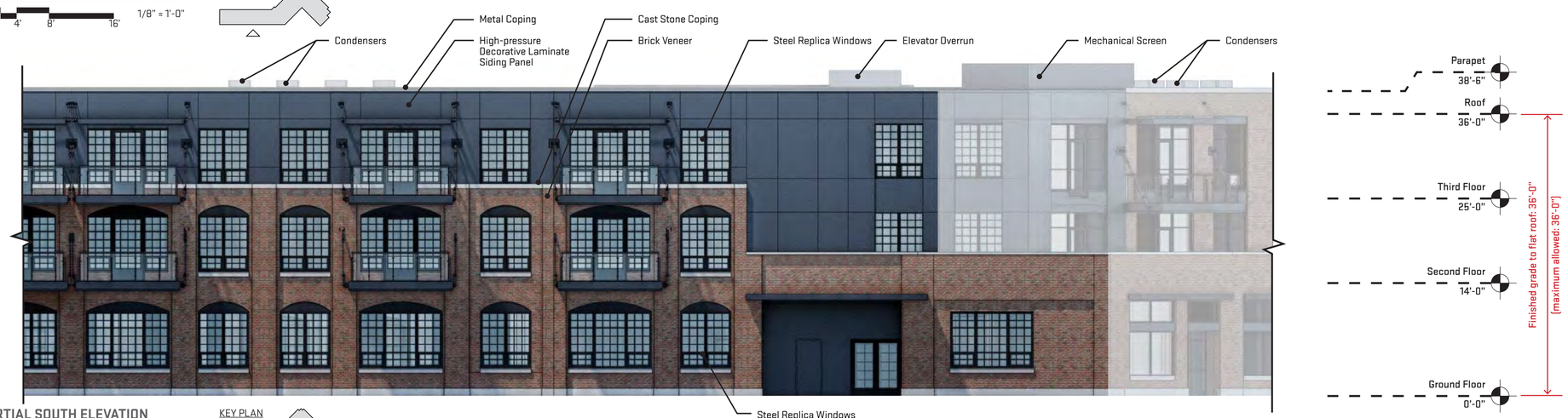
KEY PLAN



PARTIAL SOUTH ELEVATION

4' 8' 16' 1/8" = 1'-0"

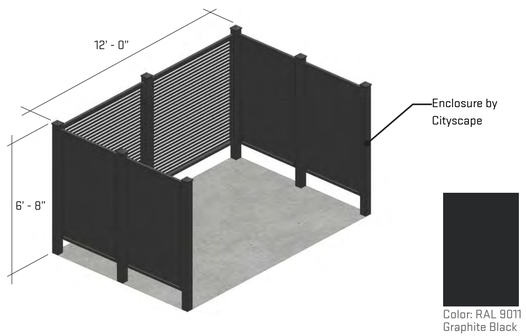
KEY PLAN



PARTIAL SOUTH ELEVATION

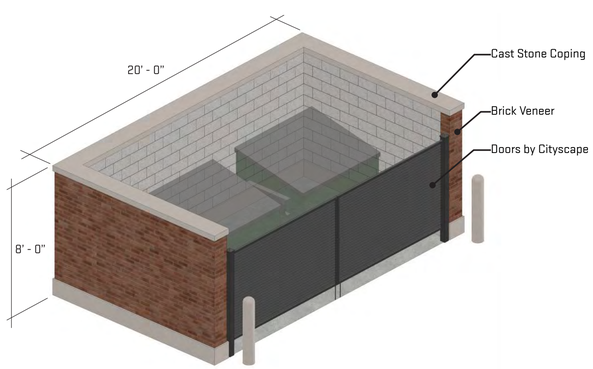
4' 8' 16' 1/8" = 1'-0"

KEY PLAN



RESIDENTIAL TRASH ENCLOSURE

(For Roll Out Dumpster)



COMMERCIAL DUMPSTER ENCLOSURE

Scales listed are for 22x34 drawing size

Plant List

sym.	qty.	botanical name	common name	size	spacing	root	comments
Trees							
AC	13	Abies concolor	Concolor Fir	8' ht.	as shown	B&B	Unsheared, branched to ground
AR	6	Acer x freemanii 'Jeffersred'	Autumn Blaze Red Maple	3" cal.	as shown	B&B	Single Straight Trunk
AL	10	Amelanchier lamarckii	Lamarck Serviceberry	8' ht.	as shown	cont.	Multistem. Minimum 3 Stems.
CO	2	Celtis occidentalis	Hackberry	3" cal.	as shown	B&B	Single Straight Trunk
GT	8	Gleditsia triacanthos 'Skyline'	Skyline Honeylocust	2.5" cal.	as shown	B&B	Single Straight Trunk
LT	13	Liriodendron tulipifera	Tulip Tree	3" cal.	as shown	B&B	Single Straight Trunk
NS	6	Nyssa sylvatica	Black Gum	2" cal.	as shown	B&B	Single Straight Trunk
OV	3	Ostrya virginiana	American Hophombeam	2" cal.	as shown	B&B	Single Straight Trunk
PG	12	Picea glauca	White Spruce	8' ht.	as shown	B&B	Unsheared, branched to ground
PS	12	Pinus strobus	Eastern White Pine	8' ht.	as shown	B&B	Unsheared, branched to ground
QB	2	Quercus bicolor	Swamp White Oak	3" cal.	as shown	B&B	Single Straight Trunk
QI	7	Quercus imbricaria	Shingle Oak	3" cal.	as shown	B&B	Single Straight Trunk
ZS	11	Zelkova serrata 'Green Vase'	Green Vase Japanese Zelkova	2.5" cal.	as shown	B&B	Single Straight Trunk
Shrubs							
sym.	**qty.**	**botanical name**	**common name**	**size**	**spacing**	**root**	**comments**
CS	66	Cornus sericea 'Kelseyi'	Kelsey Dwarf Red-Osier Dogwood	5 gal.	as shown	cont.	
IV	67	Ilex verticillata	Michigan Holly	5 gal.	as shown	cont.	
PO	24	Physocarpus opulifolius	Common Ninebark	5 gal.	as shown	cont.	
RA	32	Rhus aromatica 'Gro-Low'	Gro-Low Fragrant Sumac	5 gal.	as shown	cont.	
VD	27	Viburnum dentatum	Arrowwood Viburnum	5 gal.	as shown	cont.	
TH	155	Taxus x media 'Hicksii'	Hicks Yew	24-30" ht.	24" o.c.	cont.	Trim to Uniform Hedge
Perennials							
HS	1260	Hemerocallis 'Stella d'oro'	Stella D'oro Daylily	1 gal.	18" o.c.	cont.	
NF	1080	Nepta 'Walker's Low'	Walker's Low Catmint	1 gal.	18" o.c.	cont.	

SURVEY PROVIDED BY:

Lehner Associates, Inc.
17001 Nineteen Mile Rd, Ste 3
Clinton Twp, MI 48038
(586) 412-7050

JOB NUMBER: 21-067
DATED: March, 2021

Note Key

1. DECIDUOUS TREE PLANTING, SEE TYP. DETAIL.
2. EVERGREEN TREE PLANTING, SEE TYP. DETAIL.
3. HEDGE PLANTINGS, SEE TYP. DETAIL.
4. SHRUB PLANTINGS, SEE TYP. DETAIL.
5. PERENNIAL PLANTINGS, SEE TYP. DETAIL.
6. NON-IRRIGATED SEED LAWN ON 4" DEPTH TOPSOIL, TYP.
7. METAL EDGING BETWEEN LAWN AND LANDSCAPE BED.
8. RESIDENTIAL OPEN SPACE.
9. EXISTING TREE TO BE PRESERVED. SEE TREE PROTECTION DETAIL, TYP.
10. DECORATIVE PAVING. PAVING SHALL COMPLEMENT THE ARCHITECTURE AND ADDRESS ADA ACCESSIBILITY.
11. PROPOSED SEAT WALL, SEE CIVIL.
12. PROPOSED BUILDING, SEE ARCH.
13. CONCRETE WALK, SEE CIVIL.
14. SNOW STORAGE.
15. IRRIGATED SOD LAWN AT SOUTH MAIN ST FRONTAGE

NOTES:

1. DOUBLE SHREDDED BARK MULCH IN PLANTING BEDS, SEE TYPICAL PLANTING DETAILS FOR REQUIRED DEPTH.

Site Landscape Tabulations

STREETSCAPE LANDSCAPING:
S. MAIN ST.
215 LF / 40 LF = 5 TREES

TREES REQUIRED = 5 STREET TREES
TREES PROVIDED = *0 PROVODED TREES

E. CADY ST.
458 LF / 40 LF = 11 TREES

TREES REQUIRED = 11 STREET TREES
TREES PROVIDED = **8 PROPOSED TREES

* APPLICANT REQUESTS A WAIVER FOR STREETSCAPE TREE REQUIREMENTS ALONG S. MAIN ST. AS THE EXISTING TREES SATISFY THE INTENT OF THE ORDINANCE. EXISTING UNDERSTORY WILL BE REMOVED AND EXISTING TREES WILL BE PRUNED AS REQUIRED.

**APPLICANT REQUESTS A WAIVER FOR STREETSCAPE TREE REQUIREMENTS ALONG E. CADY STREET TO ACCOMMODATE PARALLEL PARKING. PROPOSED TREE SPACING MEETS THE INTENT OF THE ORDINANCE.

PARKING LOT INTERIOR LANDSCAPING:
NORTH LOT (17,809 SF)
(17,809 SF / 100) 1.5 = 267 SF
267 SF MIN. INTERNAL PARKING LANDSCAPE REQ.
1,248 SF PROVIDED
267 SF / 100 = 3 TREES

TREES REQUIRED = 3 TREES
TREES PROVIDED = 3 TREES

SOUTH LOT (57,789 SF)
(50,000 SF / 100) 1.5 = 750 SF + (7,789 SF / 100) = 828 SF
828 SF MIN. INTERNAL PARKING LANDSCAPE REQ.
3,042 SF PROVIDED
828 SF / 100 = 8 TREES

TREES REQUIRED = 8 TREES
TREES PROVIDED = 18 TREES

PARKING LOT SCREENING:
NORTH LOT
215 LF / 40 = 5 TREES
215 / 40 x 10 = 54 SHRUBS

TREES REQUIRED = 5 TREES, SHRUBS REQUIRED = 54 SHRUBS
TREES PROVIDED = ***0 TREES, SHRUBS PROVIDED = 140 SHRUBS

*** APPLICANT REQUESTS A WAIVER FOR PARKING LOT SCREENING TREE REQUIREMENTS ALONG S. MAIN ST. AS THE EXISTING TREES SATISFY THE INTENT OF THE ORDINANCE.

SOUTH LOT
N/A - PARKING IN REAR YARD

REPLACEMENT TREES:
286.5" CAL. REPLACEMENT REQUIRED

PROVIDED:
26 - 3" CAL LARGE DECIDUOUS TREES = 78"
19 - ORNAMENTAL TREES (2 O.T. = 2.5" REPLACEMENT) = 23.75"
37 - 8' HT. EVERGREEN TREES (1 EVG.T. = 2.5" REPLACE.) = 92.5"
222 - SHRUBS (6 SHRUBS = 2.5" REPLACEMENT) = 92.5"

TOTAL REPLACEMENT = 286.75" PROVIDED

NORTH

GRAPHIC SCALE
40 0 20 40 80 160
1" = 40'

3 FULL WORKING DAYS BEFORE YOU DIG CALL
811
Know what's below. Call before you dig.

RUSSELL DESIGN
LANDSCAPE ARCHITECTURE
DESIGN ▪ ▪ ▪ PLANNING
114 Rayson Street Suite 2A Northville, MI 48167 P. 248.374.3222

Project:
The Foundry
456 Cady Street
Northville, MI 48167

Client:
Schonshesk, Inc.
50555 Pontiac Trail
Wixom, MI 48393

Job Number:	S12-211
Drawn:	JBG
Checked:	MRR
Date:	8.13.21
Scale:	1" = 40' - 0"

Issued:
08.31.21 PRELIM SITE PLAN REVIEW
10.26.21 FINAL SITE PLAN REVIEW
11.30.21 REVISED PER TWP REVIEW

STATE OF MICHIGAN
MARC RUSSELL
LICENSED LANDSCAPE ARCHITECT
No. 1193
REGISTERED LANDSCAPE ARCHITECT

PRELIMINARY
NOT FOR CONSTRUCTION

Sheet:
Landscape Plan

Sheet Number: L-1

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Planting Notes:

The Contractor shall verify all rights of way, easements, property lines and limits of work, etc. prior to commencing work.

The Contractor shall be responsible for contacting and coordinating with all pertinent utility companies 72 hours in advance of any digging to make themself familiar with all underground utilities, pipes and structures. The Contractor shall take sole responsibility for any cost incurred of said utilities.

The Contractor shall not willfully proceed with construction as designed when it is obvious that unknown obstructions and/or grade differences exist. Such conditions shall be immediately brought to the attention of the owner's representative and/or Landscape Architect. The Contractor shall assume full responsibility for all necessary revisions due to failure to give such notification.

Any discrepancies between dimensioned layout and actual field conditions shall be reported to the Owner's representative and Landscape Architect. Failure to make such discrepancies know will result in the Contractor's responsibility and liability for any changes and associated cost.

The Contractor shall be responsible for any coordination with subcontractors as required to accomplish construction installation operations.

Do not scale drawings. Refer to written dimensions only.

The Contractor shall provide and maintain positive surface drainage.

The Contractor shall be responsible for any existing materials that are damaged during construction.

See specifications, plant list and planting details for plating requirements, materials and execution.

All trees to have clay loam or clay balls - trees with sand balls shall not be accepted.

All trees to be approved by Owner's Representative and/or Landscape Architect prior to delivery to the site. Any trees delivered to the site not previously approved may be rejected and are the sole responsibility of the Contractor.

Final location of all plant material shall be subject to the approval of the Landscape Architect.

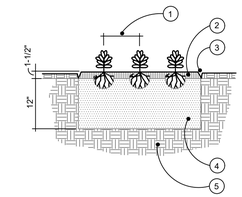
The Contractor to verify percolation of all planting pits prior to installation of plant material.

The Contractor shall place 3" depth shredded bark mulch in all planting beds, unless otherwise indicated.

Landscape Maintenance

Landscaping required by this ordinance shall be maintained in a healthy, neat and orderly appearance, free from refuse and debris. All unhealthy and dead plant material shall be replaced immediately, unless the season is not appropriate for planting, in which case such plant material shall be replaced at the beginning of the next planting season. The owner shall insure perpetual and mandatory maintenance and/or replacement of vegetative plantings pursuant to the approved landscape plan.

All landscaped areas will be irrigated with an automatic irrigation system.



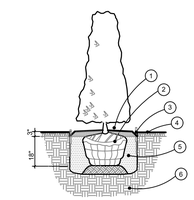
NOTES:

1. CONTRACTOR TO VERIFY PERCOLATION OF PLANTING PIT PRIOR TO INSTALLATION

1. SEE PLANT LIST FOR SPACING
2. 1-1/2" DEPTH, CANADIAN PEAT TOP DRESSING OR 1-1/2" DOUBLE PROCESSED SHREDDED BARK MULCH
3. SHOVEL CUT EDGE OR METAL EDGE, SEE PLAN
4. EXCAVATE EXISTING SOIL 12" DEEP FILL WITH PLANT MIX (SEE SPECS.)
5. UNDISTURBED SUBGRADE

4 / L-1 PERENNIAL / GROUNDCOVER PLANTING DETAIL

NOT TO SCALE



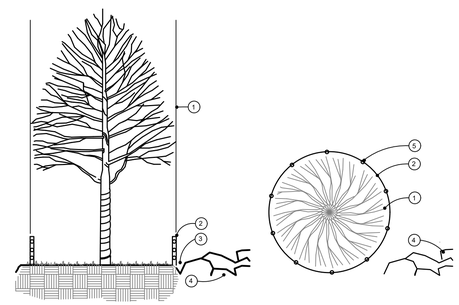
NOTES:

1. CONTRACTOR TO VERIFY PERCOLATION OF PLANTING PIT PRIOR TO INSTALLATION

1. SHREDDED BARK MULCH 3" DEPTH, TYPICAL
2. SLIT BURLAP AND REMOVE BURLAP & CUT TWINE FROM TOP 1/3 OF BALL
3. SHOVEL CUT EDGE OR METAL EDGING, SEE PLAN
4. FINISH GRADE
5. EXCAVATE EXISTING SOIL 18" DEEP. FILL WITH PLANT MIX (SEE SPECS.)
6. UNDISTURBED SUBGRADE

3 / L-1 HEDGE PLANTING DETAIL

NOT TO SCALE



SECTION PLAN

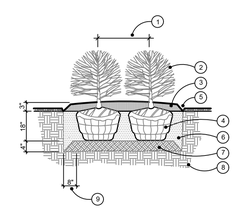
NOTES:

1. 4' HIGH SNOWFENCE TO BE INSTALLED AROUND DRIP LINE OF TREES TO BE SAVED, PRIOR TO ANY LAND CLEARING OR CONSTRUCTION (PLASTIC, SAFETY FENCE)
2. NO CUTTING, FILLING OR TRESPASSING SHALL OCCUR INSIDE FENCED AREA WITHOUT APPROVAL FROM LANDSCAPE ARCHITECT

1. TREE DRIPLINE
2. 4' HIGH SNOWFENCE
3. TRENCH OR CURB
4. CONSTRUCTION AREA
5. STEEL POSTS EVERY 10' 5/8" X 6'-6" REROD OR EQUAL. INSTALL POSTS 2' IN GROUND

6 / L-1 TREE PROTECTION DETAIL

NOT TO SCALE



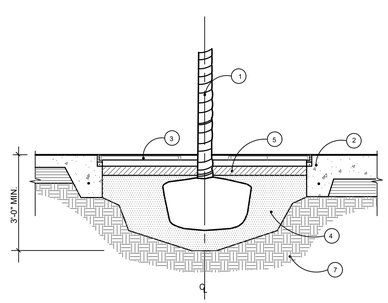
NOTES:

1. CONTRACTOR TO VERIFY PERCOLATION OF PLANTING PIT PRIOR TO INSTALLATION

1. SEE PLAN FOR SPACING
2. SHRUB PLANTS
3. SHREDDED BARK MULCH 3" DEPTH TYPICAL
4. REMOVE BURLAP & CUT TWINE FROM TOP 1/3 OF BALL
5. SHOVEL CUT EDGE OR METAL EDGING, SEE PLAN
6. EXCAVATE EXISTING SOIL 18" DEEP. FILL WITH PLANT MIX (SEE SPECS.)
7. 4" SCARIFY AND RECOMPACT
8. UNDISTURBED SUBGRADE
9. 8" MIN. BETWEEN ROOTBALL AND EDGE OF PLANT PIT

2 / L-1 SHRUB PLANTING DETAIL

NOT TO SCALE



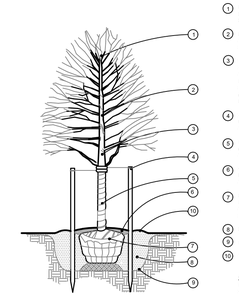
1. SEE TYP. DECIDUOUS TREE PLANTING DETAIL - SET TREE PLUMB IN PIT.
2. CONCRETE PAVEMENT SEE ARCH./CIVIL PLANS
3. TREE GRATE TO MATCH CITY STANDARDS
4. PLANT MIX (SEE SPECS)
5. 3" SHREDDED BARK MULCH. HOLD 2" BELOW GRATE.
6. COMPACT SUBGRADE - BENEATH TREE PIT TO 85%.

NOTES:

1. THE INTENT IS TO SE THE TREE GRATE SPECIFIED IN THE SECONDARY STREETSCAPE STANDARDS; HOWEVER, DUE TO THE NARROW SIDEWALK WE MAY NOT BE ABLE TO USE A ROUND TREE GRATE. CHOSEN TREE GRATE SHALL REFLECT STYLE AND QUALITY OF THE CITY'S SPECIFIED TREE GRATE.

5 / L-1 SECTION - TREE GRATE/PLANTING PIT

SCALE: 1/2" = 1'-0"



1. REMOVE SECONDARY LEADERS. DO NOT PRUNE TERMINAL LEADER OR BRANCH TOPS. PRUNE ALL DEAD AND BROKEN BRANCHES.
2. REMOVE ALL TAGS, STRINGS, PLASTICS, AND ANY OTHER MATERIALS WHICH ARE UNSIGHTLY OR COULD CAUSE GIRDLING.
3. STAKE TREES JUST BELOW FIRST BRANCH W/ 2-3" WIDE BELT-LIKE, FABRIC STRAPS ONLY. ARBOR TIE OR APPROVED EQUAL. (CONNECT FROM TREE TO STAKE OPPOSITE FROM EACH OTHER, AND ALLOW FOR SOME "FLEXING") DO NOT USE WIRE OR ROPE THROUGH A HOSE. REMOVE AFTER ONE YEAR.
4. (2) 2"X2" HARDWOOD STAKES OR EQUIVALENT DRIVEN 6-8" OUTSIDE OF ROOTBALL. REMOVE AFTER ONE YEAR.
5. TREE WRAP SECURED W/ BIODEGRADABLE MATERIAL AT TOP AND BOTTOM. REMOVE AFTER FIRST WINTER.
6. COVER PLANTING W/ 3" SHREDDED HARDWOOD BARK MULCH. LEAVE 3" CIRCLE OF BARE SOIL AROUND THE TREE.
7. REMOVE ALL NON-BIODEGRADABLE MATERIALS FROM THE ROOTBALL. FOLD DOWN ALL BURLAP AND REMOVE WIRE BASKET FROM THE TOP 1/3 OF THE ROOTBALL.
8. PLANT MIX
9. TREE PIT TO BE 3 TIMES WIDTH OF ROOTBALL
10. 4" TOPSOIL SAUCER

NOTE:

TREE SHALL BEAR SAME RELATION TO FINISH GRADE AS IT BORE ORIGINALLY OR SLIGHTLY HIGHER THAN FINISH GRADE UP TO 6" ABOVE GRADE, IF DIRECTED BY LANDSCAPE ARCHITECT FOR HEAVY CLAY SOIL AREAS.

NOTES:

1. STAKE TREES UNDER 4" CALIPER
2. GUY TREES 4" CALIPER & OVER
3. CONTRACTOR TO VERIFY PER-COLATION OF PLANTING PIT PRIOR TO INSTALLATION
4. SET TOP OF BALL 3" ABOVE FINISH GRADE
5. SET STAKES VERTICAL & EVENLY SPACED
6. STAYS OR GUYS TO BE SET ABOVE 1ST BRANCH

1 / L-1 DECIDUOUS TREE PLANTING DETAIL

NOT TO SCALE

RUSSELL DESIGN
LANDSCAPE ARCHITECTURE
DESIGN ■ ■ ■ PLANNING
114 Rayson Street Suite 2A Northville, MI 48167 P. 248.374.3222

Project:
The Foundry
456 Cady Street
Northville, MI 48167

Client:
Schonshesk, Inc.
50555 Pontiac Trail
Wixom, MI 48393

Job Number:	S12-211
Drawn:	JBG
Checked:	MRR
Date:	8.13.21
Scale:	1" = 40' - 0"

Issued:
08.31.21 PRELIM SITE PLAN REVIEW
10.26.21 FINAL SITE PLAN REVIEW
11.30.21 REVISED PER TWP REVIEW

STATE OF MICHIGAN
MARC RUSSELL
LICENSED LANDSCAPE ARCHITECT
No. 1193

PRELIMINARY NOT FOR CONSTRUCTION

3 FULL WORKING DAYS BEFORE YOU DIG CALL
811
Know what's below. Call before you dig.

Sheet:
Landscape Notes & Details

Sheet Number: L-2

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Scale: 1 inch= 30 Ft.

Luminaire Schedule					
Symbol	Qty	Label	Description	Lum. Watts	Lum. Lumens
	3	SA2C-5WQ-1	GALN-SA2C-740-U-5WQ	108	14797
	3	SA2C-5WQ-2	GALN-SA2C-740-U-5WQ	108	14797
	8	SA2C-SL4-HSS-1	GALN-SA2C-740-U-SL4-HSS	108	11629
	5	GWC-SA1C-SL4	GWC-SA1C-740-U-SL4	59	7178

Calculation Summary						
Label	Units	Avg	Max	Min	Max/Min	Avg/Min
Large Lot	Fc	2.51	5.9	1.0	5.90	2.51
Property Line	Fc	0.19	1.1	0.0	N.A.	N.A.
Small Lot	Fc	2.61	5.7	1.0	5.70	2.61

REVISION
REV2 (REVISED NEW BASE) 10.26.21

30775 Barrington St.
Madison Heights, MI 48071
P: 248.677.0850
F: 248.677.0512
E: info@clarus-lighting.com

CLARUS LIGHTING & CONTROLS

PROJECT TITLE
456 E. CADY STREET DEVELOPMENT

SHEET TITLE
SITE LIGHTING LAYOUT

DATE
10/26/21
PROJECT No.
CLC21-87942
SHEET No.
L201

Project		Catalog #		Type	
Prepared by		Notes		Date	

McGraw-Edison

GALN Galleon II

Area / Site Luminaire

Typical Applications

Outdoor • Parking Lots • Walkways • Roadways • Building Areas

Interactive Menu

- Ordering Information page 2
- Mounting Details page 3
- Optical Distributions page 5
- Product Specifications page 5
- Energy and Performance Data page 6
- Control Options page 10

Product Certifications

Resources

LumenSafe Technology

Light ARchitect™

Quick Facts

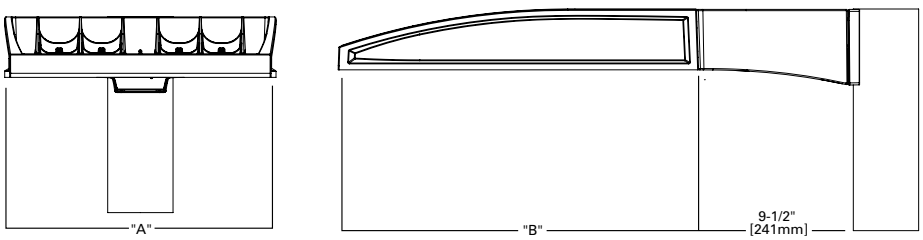
- Lumen packages range from 3,300 - 73,500 (33W - 552W)
- 16 optical distributions
- Efficacy up to 159 lumens per watt

Connected Systems

- WaveLinx Lite
- WaveLinx

Dimensional Details

Standard Arm



Number of Light Squares	Width "A"	Housing Length "B"	Weight with Standard or QM Arm	EPA with Standard or QM Arm
1-4	16"	22"	29 lb	0.95
5-6	22"	22"	39 lb	0.95
7-9	22"	28-1/8"	48 lb	1.1

NOTES:
For arm selection requirements and additional line art, see Mounting Details section.

McGraw-Edison

GALN Galleon II

Ordering Information

SAMPLE NUMBER: **GALN-SA4C-740-U-T4FT-GM**

Product Family [1, 2]	Light Engine		Color Temperature	Voltage	Distribution	Mounting	Finish
	Configuration	Drive Current					
GALN=Galleon II	**SA1**=1 Square **SA2**=2 Squares **SA3**=3 Squares **SA4**=4 Squares **SA5**=5 Squares **SA6**=6 Squares **SA7**=7 Squares **SA8**=8 Squares **SA9**=9 Squares	**A**=600mA **B**=800mA **C**=1000mA **D**=1200mA [4, 17]	**722**=70CRI, 2200K **727**=70CRI, 2700K **730**=70CRI, 3000K **735**=70CRI, 3500K **740**=70CRI, 4000K **750**=70CRI, 5000K **760**=70CRI, 6000K **827**=80CRI, 2700K **830**=80CRI, 3000K **AMB**=Amber, 590nm [15, 17]	**U**=120-277V **H**=347V-480V [7] **1**=120V **2**=208V **3**=240V **4**=277V **8**=480V [7] **9**=347V [7]	**T2**=Type II **T2R**=Type II Roadway **T3**=Type III **T3R**=Type III Roadway **T4FT**=Type IV Forward Throw **T4W**=Type IV Wide **5NQ**=Type V Narrow **5MQ**=Type V Square Medium **5WQ**=Type V Square Wide **SL2**=Type II w/Spill Control **SL3**=Type III w/Spill Control **SL4**=Type IV w/Spill Control **SLL**=90° Spill Light Eliminator Left **SLR**=90° Spill Light Eliminator Right **RW**=Rectangular Wide Type I **AFL**=Automotive Frontline	**[Blank]**=Standard Pole Mount Arm **QM**=Standard Pole Mount Arm with Quick Mount Adaptor **PA**=Pole Mount, Adjustable **SP**=Slipfitter, Adjustable [8] **MA**=Mast Arm, Fixed **WM**=Wall Mount, Fixed **WA**=Wall Mount, Adjustable **UP**=Upswept Arm	**AP**=Grey **BZ**=Bronze **BK**=Black **DP**=Dark Platinum **GM**=Graphite Metallic **WH**=White

Options (Add as Suffix)	Controls and Systems Options (Add as Suffix)	Accessories (Order Separately)
DIM=External 0-10V Dimming Leads [20] **F**=Single Fuse (120, 277 or 347V Specify Voltage) **FF**=Double Fuse (208, 240 or 480V Specify Voltage) **20K**=20kV UL 1449 fused surge protective device [10] **2L**=Two Circuits [10] **HA**=50°C High Ambient **HSS**=Installed House Side Shield [18] **GRSBK**=Glare Reducing Shield, Black [23] **GRSWH**=Glare Reducing Shield, White [23] **LCF**=Light Square Trim Painted to Match Housing [26] **MTH**=Tool-less Door Hardware [5] **CC**=Coastal Construction finish [3] **L90**=Optics Rotated 90° Left **R90**=Optics Rotated 90° Right **AHD145**=After Hours Dim, 5 Hours [22] **AHD245**=After Hours Dim, 6 Hours [22] **AHD255**=After Hours Dim, 7 Hours [22] **AHD355**=After Hours Dim, 8 Hours [22] **DALI**=DALI Drivers	**BPC**=Button Type Photocontrol [6] **PR**=NEMA 3-PIN Photocontrol Receptacle **PR7**=NEMA 7-PIN Photocontrol Receptacle [21] **SPB2**=Dimming Motion Sensor, 9'-20' mounting [24] **SPB4**=Dimming Motion Sensor, 21'-40' mounting [24] **SPB2/X**=Dimming Motion Sensor, limited square count, 9'-20' mounting [24] **SPB4/X**=Dimming Motion Sensor, limited square count, 21'-40' mounting [24] **ZW**=WaveLinx Module and 4-PIN Receptacle [19] **ZD**=WaveLinx Module with DALI driver and 4-PIN Receptacle [19] **ZW-SWPD4XX**=WaveLinx Sensor Only, 7-15ft [19, 12, 13] **ZW-SWPD5XX**=WaveLinx Sensor Only, 15-40ft [19, 12, 13] **ZW-WOBXX**=WaveLinx Sensor with Bluetooth, 7-15ft [19, 12, 13] **ZW-WOFXX**=WaveLinx Sensor with Bluetooth, 15-40ft [19, 12, 13] **ZD-SWPD4XX**=WaveLinx Sensor Only, 7-15ft [19, 12, 13] **ZD-SWPD5XX**=WaveLinx Sensor Only, 15-40ft [19, 12, 13] **ZD-WOBXX**=WaveLinx Sensor with Bluetooth, 7-15ft [19, 12, 13] **ZD-WOFXX**=WaveLinx Sensor with Bluetooth, 15-40ft [19, 12, 13] **DIM10-MS/DIM-L20**=Synapse Occupancy Sensor (9'-20' Mounting) [19] **DIM10-MS/DIM-L40**=Synapse Occupancy Sensor (21'-40' Mounting) [19]	**OA/RA1016**=NEMA Photocontrol Multi-Tap - 105-285V **OA/RA1027**=NEMA Photocontrol - 480V **OA/RA1201**=NEMA Photocontrol - 347V **OA/RA1013**=Photocontrol Shorting Cap **OA/RA1014**=120V Photocontrol **MA1252**=10kV Surge Module Replacement **MA1036-XX**=Single Tenon Adapter for 2-3/8" O.D. Tenon **MA1037-XX**=2@180° Tenon Adapter for 2-3/8" O.D. Tenon **MA1197-XX**=3@120° Tenon Adapter for 2-3/8" O.D. Tenon **MA1188-XX**=4@90° Tenon Adapter for 2-3/8" O.D. Tenon **MA1189-XX**=2@90° Tenon Adapter for 2-3/8" O.D. Tenon **MA1190-XX**=3@90° Tenon Adapter for 2-3/8" O.D. Tenon **MA1191-XX**=2@120° Tenon Adapter for 2-3/8" O.D. Tenon **MA1038-XX**=Single Tenon Adapter for 3-1/2" O.D. Tenon **MA1039-XX**=2@180° Tenon Adapter for 3-1/2" O.D. Tenon **MA1192-XX**=3@120° Tenon Adapter for 3-1/2" O.D. Tenon **MA1193-XX**=4@90° Tenon Adapter for 3-1/2" O.D. Tenon **MA1194-XX**=2@90° Tenon Adapter for 3-1/2" O.D. Tenon **MA1195-XX**=3@90° Tenon Adapter for 3-1/2" O.D. Tenon **LS/HSS**=Field Installed House Side Shield [9, 18] **LS/GRSBK**=Glare Reducing Shield, Black [9, 23] **LS/GRSWH**=Glare Reducing Shield, White [9, 23] **LS/PFS**=Perimeter Shield, Black [16] **WOLC-7P-10A**=WaveLinx Outdoor Control Module [11, 19] **WOA-XX**=WaveLinx Wireless Sensor, 7'–15' Mounting Height [12, 13, 14, 19] **WOE-XX**=WaveLinx Wireless Sensor, 15'–40' Mounting Height [12, 13, 14, 19]

NOTES:
1. Customer is responsible for engineering analysis to confirm pole and fixture compatibility for all applications. Refer to our white paper WP513001EN for additional support information.
2. DesignLights Consortium® Qualified. Refer to www.designlights.org Qualified Products List under Family Models for details.
3. Coastal construction finish salt spray tested to over 5,000-hours per ASTM B117, with a scribe rating of 9 per ASTM D1654. Not available with TH option.
4. Not available with color temperatures 722, 727 or 830.
5. TH option not 3G rated. Not available with Coastal Construction (CC) option.
6. Not available with voltage options H, 8 or 9.
7. Requires the use of an internal step down transformer when combined with sensor options. Not available with sensor at 1200mA. Not available in combination with the HA high ambient and sensor options at 1A.
8. Adjustable Slipfitter arm limited to vertical 3" tenon
9. One required for each Light Square.
10. 2L is not available with SPB at 347V or 480V. Not available with WaveLinx or Enlighted sensors, or 20kV surge option.
11. Requires PR7.
12. Replace XX with sensor color (WH, BZ or BK.)
13. WAC Gateway required to enable field-configurability: Order WAC-PoE and WPOE-120 (10V to PoE injector) power supply if needed. WAC not required for LC Bluetooth sensors.
14. Requires ZW or ZD receptacle.
15. Narrow-band 590nm +/- 5nm for wildlife and observatory use. Choose drive current A; supplied at 500mA drive current only. Available with 5WQ, 5MQ, SL2, SL3 and SL4 distributions. Can be used with HSS option.
16. Set of 4 pcs. One set required per Light Square.
17. Not available with HA option.
18. Not for use with 5NQ, 5MQ, 5WQ or RW optics. A black trim plate is used when HSS is selected.
19. Cannot be used with other control options.
20. Low voltage control lead brought out 18" outside fixture. Not available with DALI or integrated controls options
21. Not available if any SPB, LWR, or WaveLinx sensor is selected. Motion sensor has an integral photocell.
22. Requires the use of BPC photocontrol or the PR7 or PR photocontrol receptacle with photocontrol accessory.
23. Not for use with T4FT, T4W or SL4 optics. See IES files for details.
24. Sensor configuration mobile application required for configuration. See controls page for details.
25. Replace X with number of Light Squares controlled by the SPB, referencing the "SPB/X Availability Table" on the controls page.
26. Not available with HSS, GRSWH or GRSBK.

LumenSafe Integrated Network Security Camera Technology Options (Add as Suffix)

Product Family	Camera Type	Data Backhaul	
L=LumenSafe Technology	**D**=Standard Dome Camera **H**=Hi-Res Dome Camera **Z**=Remote PTZ Camera	**C**=Cellular, No SIM **A**=Cellular, AT&T **V**=Cellular, Verizon **S**=Cellular, Sprint	**R**=Cellular, Rogers **W**=Wi-Fi Networking w/ Omni-Directional Antenna **E**=Ethernet Networking

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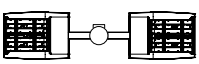
GALN Galleon II

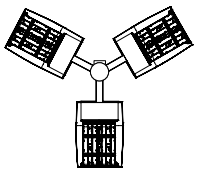
Mounting Details

Pole Configuration Options

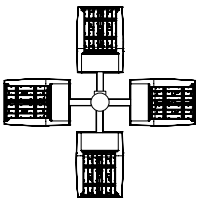
2 @ 180°



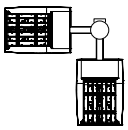
3 @ 120°
(Round poles only)



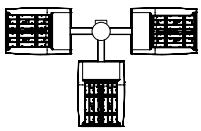
4 @ 90°



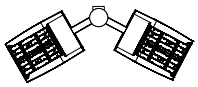
2 @ 90°



3 @ 90°
(Round or square poles only)

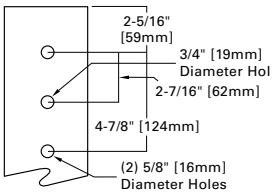


2 @ 120°
(Round poles only)

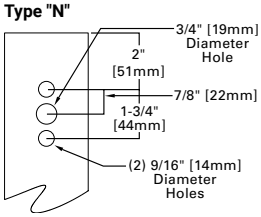


Pole Drilling Patterns

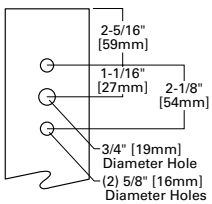
Type "M"



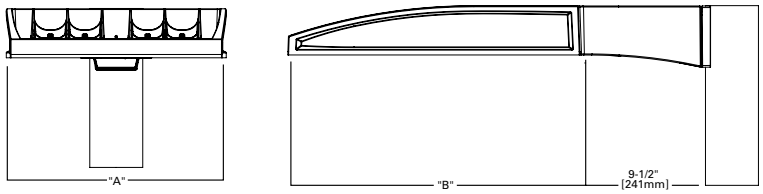
Type "N"



Type "R"

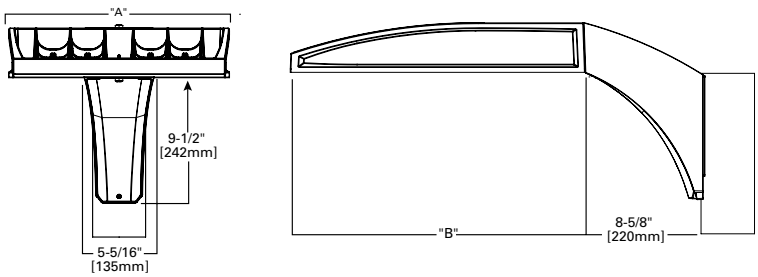


Quick Mount Arm (QM) *



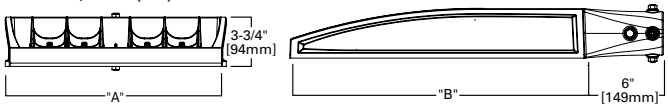
*NOTE: Use Type N drilling pattern

Upswept Arm (UP) *

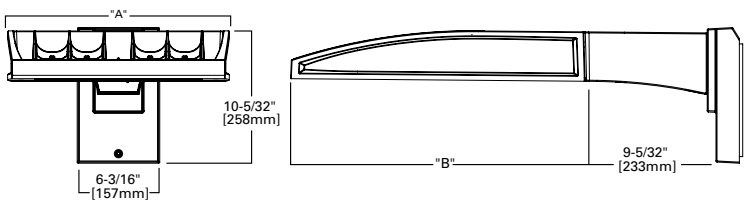


*NOTE: Use Type N, R or M drilling pattern

Mast Arm, Fixed (MA)



Wall Mount, Fixed (WM)



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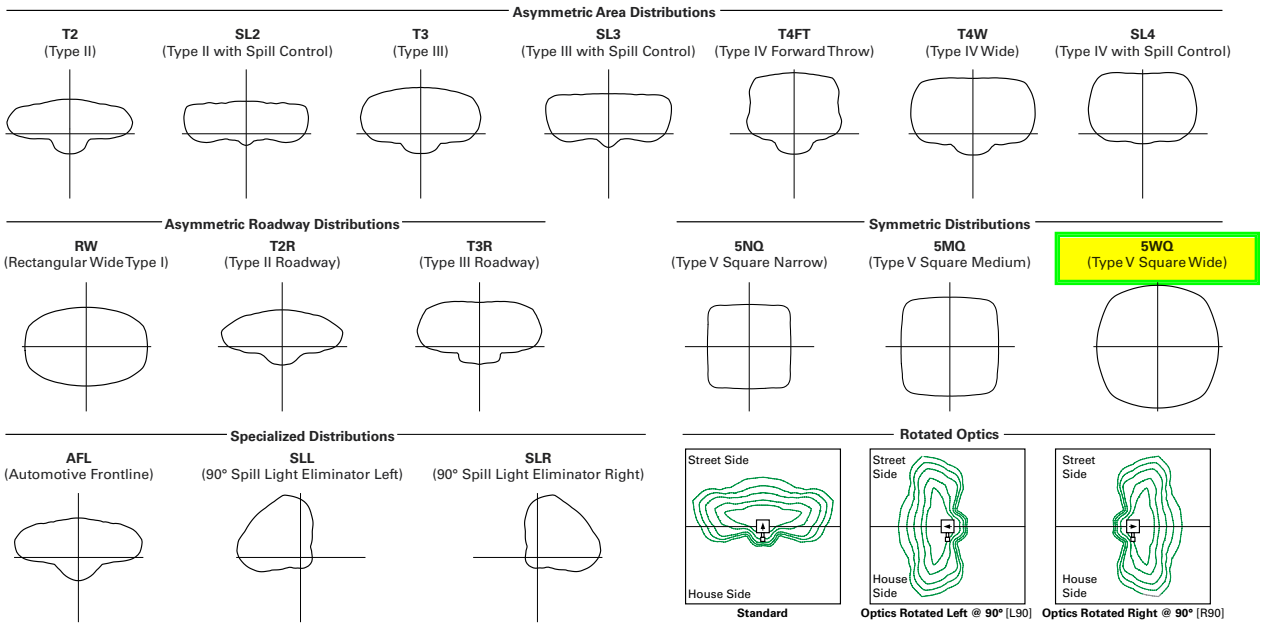
Optical Distributions



Product Specifications

Construction
- Die-cast aluminum housing and heat sink
- Three housing sizes, using 1 to 9 light squares

Optics
- High-efficiency injection-molded AccuLED Optics technology
- 16 optical distributions for area site and roadway applications
- 3 shielding options include HSS, GRS and PFS
- IDA certified (3000K CCT and warmer only, arms at 0° tilt)

Electrical
- Removable power tray assembly includes drivers, surge modules and control modules for ease of maintenance and serviceability
- Standard with 0-10V dimming
- Standard with 10kV surge module, optional 20kV surge module
- Suitable for operation in -40°C to 40°C ambient environments. Optional 50°C high ambient (HA) configuration

Mounting
- Arms are factory installed, enabling closed-housing installation
- All arms suitable for round or square pole installation
- All arms provide clearance for multiple fixture installations at 90°

Finish
- 6 standard finishes use super durable TGIC polyester powder coat paint, providing 2.5 mil nominal thickness and salt-spray tested to 3,000 hours per ASTM B117
- RAL and custom color matches available
- Coastal Construction (CC) option salt-spray tested to 5,000 hours per ASTM B117, achieving a scribe rating of 9 per ASTM D1654

Warranty
- Five year limited warranty

Energy and Performance Data

Lumen Maintenance (TM-21)

Drive Current	Ambient Temperature	25,000 hours*	50,000 hours*	60,000 hours*	100,000 hours**	Theoretical L70 hours**
Up to 1A	25°C	99.4%	99.0%	98.9%	98.3%	> 2.4M
	40°C	98.7%	98.3%	98.1%	97.4%	> 1.9M
	50°C	98.2%	97.2%	96.8%	95.2%	> 851,000
1.2A	25°C	99.4%	99.0%	98.9%	98.3%	> 2.4M
	40°C	98.5%	97.9%	97.7%	96.7%	> 1.3M

* Supported by IES TM-21 standards
** Theoretical values represent estimations commonly used; however, refer to the IES position on LED Product Lifetime Prediction, IES PS-10-18, explaining proper use of IES TM-21 and LM-80.

Lumen Multiplier

Ambient Temperature	Lumen Multiplier
0ºC	1.02
10ºC	1.01
25ºC	1.00
40ºC	0.99
50ºC	0.97

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GALN Galleon II

Performance Table, Drive Current "C" (1050mA)

Number of Light Squares		1	2	3	4	5	6	7	8	9
Nominal Power (Watts)		57	108	160	213	269	321	377	429	481
Input Current @ 120V		0.478	0.905	1.338	1.810	2.244	2.675	3.150	3.584	4.013
Input Current @ 208V		0.279	0.532	0.780	1.064	1.313	1.559	1.845	2.093	2.339
Input Current @ 240V		0.243	0.458	0.664	0.916	1.123	1.328	1.582	1.788	1.991
Input Current @ 277V		0.213	0.404	0.582	0.808	0.997	1.164	1.401	1.589	1.745
Input Current @ 347V		0.164	0.322	0.471	0.644	0.795	0.943	1.117	1.269	1.414
Input Current @ 480V		0.121	0.235	0.341	0.469	0.579	0.681	0.814	0.923	1.022
Optics										
T2	4000K Lumens	7,154	14,219	21,107	27,970	35,408	41,927	49,247	57,094	64,098
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
	Lumens per Watt	126	132	132	131	132	131	131	133	133
T2R	4000K Lumens	7,250	14,408	21,389	28,344	35,881	42,487	49,905	57,857	64,954
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5
	Lumens per Watt	127	133	134	133	133	132	132	135	135
T3	4000K Lumens	7,054	14,020	20,812	27,580	34,914	41,342	48,560	56,297	63,203
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B4-U0-G4	B4-U0-G5	B4-U0-G5	B4-U0-G5
	Lumens per Watt	124	130	130	129	130	129	129	131	131
T3R	4000K Lumens	7,280	14,468	21,477	28,461	36,029	42,663	50,111	58,096	65,222
	BUG Rating	B1-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
	Lumens per Watt	128	134	134	134	134	133	133	135	136
T4FT	4000K Lumens	7,098	14,107	20,941	27,751	35,130	41,598	48,860	56,646	63,594
	BUG Rating	B1-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
	Lumens per Watt	125	131	131	130	131	130	130	132	132
T4W	4000K Lumens	7,119	14,148	21,003	27,832	35,233	41,720	49,004	56,812	63,781
	BUG Rating	B1-U0-G1	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B4-U0-G4	B4-U0-G4	B4-U0-G5	B5-U0-G5
	Lumens per Watt	125	131	131	131	131	130	130	132	133
SL2	4000K Lumens	7,101	14,112	20,949	27,761	35,144	41,614	48,879	56,668	63,619
	BUG Rating	B1-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
	Lumens per Watt	125	131	131	130	131	130	130	132	132
SL3	4000K Lumens	7,051	14,013	20,802	27,566	34,897	41,321	48,535	56,269	63,172
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
	Lumens per Watt	124	130	130	129	130	129	129	131	131
SL4	4000K Lumens	6,963	13,839	20,543	27,223	34,463	40,808	47,932	55,569	62,386
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
	Lumens per Watt	122	128	128	128	128	127	127	130	130
5NQ	4000K Lumens	7,424	14,755	21,903	29,025	36,743	43,508	51,104	59,247	66,515
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4
	Lumens per Watt	130	137	137	136	137	136	136	138	138
5MQ	4000K Lumens	7,461	14,828	22,012	29,169	36,926	43,725	51,359	59,542	66,846
	BUG Rating	B3-U0-G1	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5
	Lumens per Watt	131	137	138	137	137	136	136	139	139
5WQ	4000K Lumens	7,445	14,797	21,966	29,108	36,849	43,633	51,250	59,417	66,705
	BUG Rating	B3-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5	B5-U0-G5	B5-U0-G5
	Lumens per Watt	131	137	137	137	137	136	136	139	139
SLL/ SLR	4000K Lumens	6,132	12,187	18,091	23,973	30,348	35,936	42,210	48,935	54,938
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
	Lumens per Watt	108	113	113	113	113	112	112	114	114
RW	4000K Lumens	7,340	14,587	21,653	28,694	36,325	43,013	50,522	58,573	65,757
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4
	Lumens per Watt	129	135	135	135	135	134	134	137	137
AFL	4000K Lumens	7,183	14,276	21,193	28,084	35,552	42,098	49,448	57,327	64,359
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B4-U0-G4
	Lumens per Watt	126	132	132	132	132	131	131	134	134

* Nominal data for 70 CRI. ** For additional performance data, please reference the Galleon Supplemental Performance Guide.

McGraw-Edison

GALN Galleon II

Control Options

0-10V (DIM)
This fixture is offered standard with 0-10V dimming driver(s). The DIM option provides 0-10V dimming wire leads for use with a lighting control panel or other control method.

Photocontrol (BPC, PR and PR7)
Optional button-type photocontrol (BPC) and photocontrol receptacles (PR and PR7) provide a flexible solution to enable "dusk-to-dawn" lighting by sensing light levels. Advanced control systems compatible with NEMA 7-pin standards can be utilized with the PR7 receptacle.

After Hours Dim (AHD)
This feature allows photocontrol-enabled luminaires to achieve additional energy savings by dimming during scheduled portions of the night. The dimming profile will automatically take effect after a "dusk-to-dawn" period has been calculated from the photocontrol input. Specify the desired dimming profile for a simple, factory-shipped dimming solution requiring no external control wiring. Reference the After Hours Dim supplemental guide for additional information.

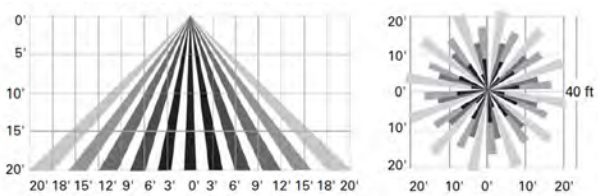
Dimming Occupancy Sensor (SPB)
These passive infrared (PIR) sensors are factory installed in the luminaire housing. When the SPB sensor option is selected, the occupancy sensor is connected to a dimming driver and the entire luminaire dims when no motion is detected. After a period of time, the luminaire turns off, and when motion is detected, the luminaire returns to full light output. The SPB sensor default parameters are listed in the table below, and can be configured utilizing the Sensor Configuration mobile application for iOS and Android devices. The SPB/X is configured to control only the specified number of light squares. An integral photocontrol can be activated with the app for "dusk-to-dawn" control or daylight harvesting - the factory default is off. Three sensor lenses are available to optimize the coverage pattern for mounting heights from 8'-40'. Four sensor colors are available; Bronze, Black, Gray and White, and are automatically selected based on the luminaire finish as indicated by the table below.

SPB sensor finish matched to luminaire finish		
Luminaire Finish		SPB Sensor Finish
WH	White	White
BK	Black	Black
GM	Graphite Metallic	Black
BZ	Bronze	Bronze
AP	Gray	Gray
DP	Dark Platinum	Gray

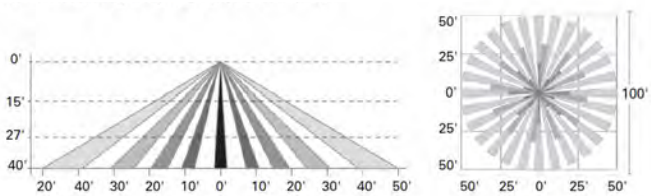
SPB/X Availability Table	
Fixture Square Count	Available SPB/X Square Count
1	Not Available
2	Not Available
3	Not Available
4	2
5	2 or 3
6	3
7	2, 3, 4 or 5
8	2, 3, 5 or 6
9	3 or 6

WaveLinx Wireless Control and Monitoring System
Operates on a wireless mesh network based on IEEE 802.15.4 standards enabling wireless control of outdoor lighting. WaveLinx and WaveLinx Lite sensors utilize the Zhaga Book 18 compliant 4-PIN receptacle (ZD or ZW), while the WOLC control module utilizes a 7-PIN receptacle. ZW option provides 4-PIN receptacle and control module to enable future installation of WaveLinx sensors. ZD option provides 4-PIN receptacle and sensor-ready (SR) driver to enable future installation of WaveLinx sensors, power monitoring, and advanced functionality. WaveLinx (SWPD4 to SWPD5) outdoor wireless sensors offer passive infrared (PIR) occupancy and photocell for closed loop daylight harvesting, and can be factory or field-installed. Sensors are factory preset to dim down to 50% after 15 minutes of no motion detected. Two lens options are available for mounting heights of 7' to 40'. Use the WaveLinx mobile application for set-up and configuration. At least one Wireless Area Controller (WAC) is required for full functionality and remote communication (including adjustment of any factory pre-sets). WaveLinx Lite (WOF and WOB) outdoor wireless sensors provide PIR occupancy and photocell for closed loop daylight harvesting, and can be factory or field-installed. Sensors are factory preset to dim down to 50% after 15 minutes of no motion detected. Two lens options are available for mounting heights of 7' to 40'. Use the WaveLinx Lite mobile application for set-up and configuration. WAC not required. WaveLinx Outdoor Control Module (WOLC-7P-10A) accessory provides a photocontrol enabling astronomic or time-based schedules to provide ON, OFF and dimming control of fixtures utilizing a 7-PIN receptacle. The out-of-box functionality is ON at dusk and OFF at dawn.

For mounting heights up to 15' (SWPD4 and WOB)



For mounting heights up to 40' (SWPD5 and WOF)



LumenSafe Integrated Network Security Camera (LD)
Cooper Lighting Solutions brings ease of camera deployment to a whole new level. No additional wiring is needed beyond providing line power to the luminaire. A variety of networking options allows security integrators to design the optimal solution for active surveillance. As the ideal solution to meet the needs for active surveillance, the LumenSafe integrated network camera is a streamlined, outdoor-ready fixed dome that provides HDTV 1080p video. This IP camera is optimally designed for deployment in the video management system or security software platform of choice.

Synapse (DIM10)
SimplySNAP integrated wireless controls system by Synapse. Includes factory installed DIM10 Synapse control module and MS/DC motion sensor; requires additional Synapse system components for operation. Contact Synapse at www.synapsewireless.com for product support, warranty and terms and conditions.

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Specifications and dimensions
subject to change without notice.

Submitted by Clarus Lighting & Controls

Job Name:
456 E. CADY STREET
Architect: O/X Studio (Ann Arbor)
General Contractor: Schonsheck Inc (Wixom)

Catalog Number:
SSS20B4-4-D190-BA

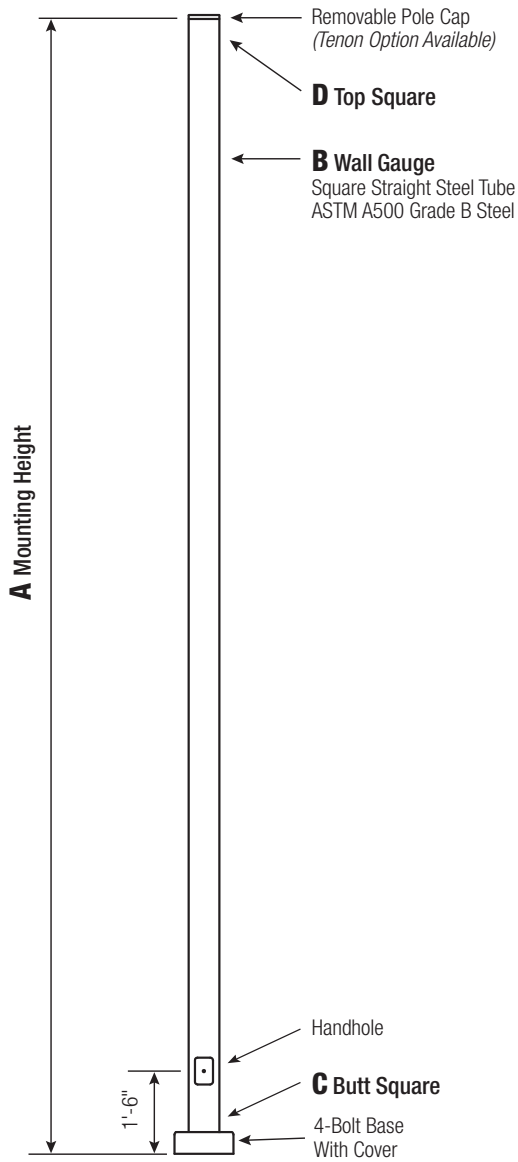
Notes:

Type:
SA5C-5WQ-1

CLC21-87942

SSS

Square Straight Steel Pole
No Arm — 4-Bolt Base



Powder Coated, Galvanized or Powder Coated over Galvanized Finish Per Customer Specification.

C Butt Sq.	D Top Sq.	F Bolt Cir. Dia.	G Base Sq.	H Bolt Proj.	I Bolt Size
4 *(11 Gauge)*	4	8 - 9	8	3.75	.75 x 17 x 3
4 *(7 Gauge)*	4	8 - 9	8	3.75	.75 x 30 x 3
5 *(11 Gauge)**	5	10 - 12	11	4.875	.75 x 30 x 3
5 *(7 Gauge)*	5	10 - 12	11	4.875	1 x 36 x 4
6	6	11 - 13	12.5	4.875	1 x 36 x 4

**Requires the use of oversized washers (provided).*

Dimensions in Inches

Pole

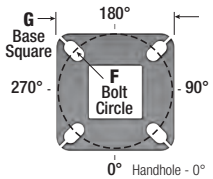
Pole shaft shall be weldable-grade, cold-rolled, commercial quality carbon steel tubing conforming to ASTM A500 Grade B. Options include 11 gauge and 7 gauge. All welds shall conform to AWS D1.1 using ER70S-6 electrodes.

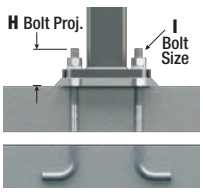
Base Style

4-Bolt Steel Plate Base Flange of fabricated hot rolled carbon steel conforming to ASTM A36 or equivalent (36 ksi minimum yield) with 2-piece Base Cover and attaching hardware.

Anchorage

Anchorage Kit will include four (4) L-shaped Steel Anchor Bolts conforming to AASHTO M314-90 Grade 55. Ten inches (10") of threaded end will be galvanized per ASTM A153. Kits will contain eight (8) Hex Nuts, four (4) Lock Washers, and eight (8) Flat Washers (all components Galvanized Steel). A paper bolt circle template will be provided.





Handhole

Reinforced, 3" x 5" Handhole with cover, stainless steel screw and backbar. A grounding provision incorporating a tapped 1/2"-13NC hole will be provided.

Base Cover

Square ABS plastic Base Covers are standard on all SSS poles specified in BA-Black, BM-Dark Bronze and BH-White. SSS poles specified in all other colors will be manufactured of metal materials. *Custom specification of SSS square metal style Base Covers in BA, BM and BH powder coated finishes is available.*

Vibration Damper

If determined necessary by Hapco, or if specified by the customer, a first and/or second mode vibration damper will be provided.

WARNING: *Do not install light pole without luminaire.*

Submitted by Clarus Lighting & Controls

Job Name:
456 E. CADY STREET
Architect: O/X Studio (Ann Arbor)
General Contractor: Schonsheck Inc (Wixom)

Catalog Number:
SSS20B4-4-D190-BA

Notes:

Type:
SA5C-5WQ-1

CLC21-87942

A Mtg. Hgt.	B Wall Gauge	C Butt Sq.	Total Lum. Weight	Maximum EPA 90	100	110	120	130	140	Catalog Number
10	11	4	320	25.2	20.0	18.6	15.3	12.7	10.6	SSS10B4-4-**
12	11	4	285	20.6	16.2	14.9	12.1	9.9	8.2	SSS12B4-4-**
14	11	4	255	17.0	13.2	12.1	9.7	7.8	6.3	SSS14B4-4-**
15	11	4	245	15.5	11.9	10.9	8.6	6.8	5.4	SSS15B4-4-**
15	7	4	305	23.4	18.4	17.0	13.8	11.4	9.4	SSS15D4-4-**
16	11	4	235	14.0	10.7	9.7	7.6	5.9	4.6	SSS16B4-4-**
16	7	4	290	21.5	16.8	15.5	12.5	10.2	8.4	SSS16D4-4-**
18	11	4	215	11.3	8.4	7.6	5.7	4.3	3.2	SSS18B4-4-**
18	7	4	265	18.0	13.9	12.8	10.2	8.2	6.6	SSS18D4-4-**
20	11	4	200	9.1	6.5	5.8	4.2	2.9	1.9	SSS20B4-4-**
20	11	5	235	14.1	10.3	9.2	6.8	4.9	3.4	SSS20B5-4-**
20	7	4	240	15.1	11.5	10.5	8.2	6.5	5.0	SSS20D4-4-**
20	7	5	330	26.3	20.3	18.6	14.8	11.9	9.6	SSS20D5-4-**
22	11	4	200	7.2	4.9	4.2	2.8	1.7	0.8	SSS22B4-4-**
22	11	5	215	11.4	8.0	7.1	4.9	3.2	1.9	SSS22B5-4-**
22	7	4	225	12.7	9.5	8.6	6.6	5.0	3.7	SSS22D4-4-**
22	7	5	300	22.4	17.1	15.6	12.2	9.6	7.5	SSS22D5-4-**
25	11	4	200	4.7	2.8	2.2	1.0	-	-	SSS25B4-4-**
25	11	5	200	8.0	5.1	4.3	2.4	1.0	-	SSS25B5-4-**
25	7	4	205	9.7	6.9	6.2	4.4	3.1	2.0	SSS25D4-4-**
25	7	5	260	17.7	13.2	11.9	9.0	6.7	4.9	SSS25D5-4-**
28	11	4	200	2.6	1.0	-	-	-	-	SSS28B4-4-**
28	11	5	200	5.1	2.6	1.9	-	-	-	SSS28B5-4-**
28	7	4	200	7.1	4.8	4.1	2.6	1.5	-	SSS28D4-4-**
28	7	5	235	13.9	9.9	8.8	6.3	4.3	2.7	SSS28D5-4-**
30	11	5	200	3.4	1.1	-	-	-	-	SSS30B5-4-**
30	7	4	200	5.6	3.5	2.9	1.6	-	-	SSS30D4-4-**
30	7	5	215	11.7	8.0	7.0	4.7	2.9	1.5	SSS30D5-4-**
30	7	6	275	19.2	13.7	12.2	8.7	5.9	3.8	SSS30D6-4-**
35	7	5	200	6.9	4.0	3.1	1.2	-	-	SSS35D5-4-**
35	7	6	220	12.6	8.0	6.8	3.9	1.6	-	SSS35D6-4-**
39	7	6	200	8.2	4.2	3.1	0.6	-	-	SSS39D6-4-**

Catalog Number System

The catalog number for Hapco poles utilizes the following identification system.

MOUNTING HEIGHT | BUTT SQ. | BASE STYLE | FINISH

S S S _ _ _ - 4 - _ _ _ - _ _

SHAFT ASSEMBLY | WALL GAUGE | TOP SQ. | ACCESORIES OPTIONS

Catalog Number Example -

SSS 20 D 5 - 4 – BA

Square Straight Steel, 20' Mounting Height, 7 Gauge, 5" Butt Square, No Taper, 4-Bolt Base, Black Powder Coat Finish.

EPA Notes:

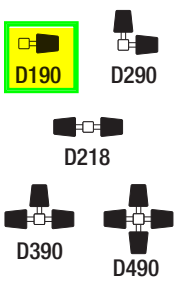
Effective Projected Area (EPA) in square feet. EPA's calculated using wind velocity (mph) indicated in accordance with 2009 AASHTO LTS-5 using a 25-year design life. Maximum EPA is based on the luminaire weight shown. Increased luminaire weight may reduce the maximum EPA. If weight is exceeded, or if other design life or code is required, please consult the factory.

Mounting Options

Side Drill Mount
Includes removable pole cap.
NOTE: A luminaire drilling template must be supplied at time of order.

Tenon Mount
For Tenon Mount applications specify both Tenon diameter and length.

Drill Mount Options



Electrical Box

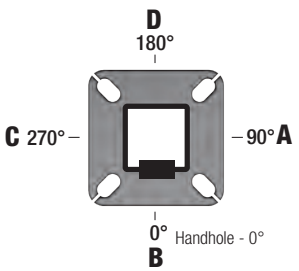
Box Only

GF1
Duplex GFI Receptacle *with Cover*

GF2
Duplex GFI *with In-Use Cover*

Note: *GFI Options must be specified in Accessories.*

Pole Orientation



SSS _ _ _ _ - **4** - _ _ _ _ - _ _ - _ _ - _ _

SSS- Square Straight Steel Pole

Height	Gauge	Butt Sq.	Top Sq.	Base Style
10 = 10' **12** = 12' **14** = 14' **16** = 16' **18** = 18' **20** = 20' **22** = 22' **25** = 25' **28** = 28' **30** = 30' **35** = 35' **39** = 39'	**B** = 11 Gauge **D** = 7 Gauge	**4** = 4" **5** = 5" **6** = 6"	"-"= No Taper	**4** = 4-Bolt Base

Mounting Options

DRILL MOUNT
D000 - No Drilling
D190 - Std. "A"
D290 - Std. "A" & "D"
D218 - Std. "A" & "C"
D390 - Std. "A", "D", & "C"
D490 - Std. "A", "B", "C", & "D"
DCUS - Custom*

TENON
T204 - 2-3/8" O.D. x 4"
T304 - 2-7/8" O.D. x 4"
T356 - 3-1/2" O.D. x 6"
T406 - 4" O.D. x 6"
TCUS - Custom Tenon**

** Specify Number and Orientation*
*** Specify O.D. and Height*

Electrical Box*
FA - 30" Up, "D"
FB - 30" Up, "B"
FC - 30" Up, "A"
FD - 30" Up, "C"
FE - 36" Up, "D"
FF - 36" Up, "B"
FG - 36" Up, "A"
FH - 36" Up, "C"
FI - 24" Up, "D"
FK - 24" Up, "A"
FL - 24" Up, "C"
FZ - Custom**

** GFI Receptacle Options Available (Specify in Accessories)*
*** Specify Height and Orientation*

Accessories/Options*
C12 - Threaded 1/2" Coupling**
C34 - Threaded 3/4" Coupling**
C10 - Threaded 1" Coupling**
EHH - Extra Handhole**
GF1 - Duplex GFI Receptacle *(WR) with Cover*
GF2 - Duplex GFI *(WR) with In-Use Cover*
LAB - Less Anchor Bolts
LPC - Less Pole Cap
PAB - Pre-shipped Anchor Bolts
VD1 - Vib. Damper - 1st Mode
VD2 - Vib. Damper - 2nd Mode

** Add all that apply (Example: CPL-LAB-VD1)*
*** Specify Location*

Finish

POWDER COAT COLORS
BA - Black Powder Coat
BH - White Powder Coat
BM - Dark Bronze Powder Coat
BV - Dark Green Powder Coat
GC - Gray Powder Coat
XX - Special Colors*

GALVANIZED
1Q - Galvanized Only
1C - Black PC Over Galv.
1D - White PC Over Galv.
1B - D. Bronze PC Over Galv.
1Y - D. Green PC Over Galv.
1J - Gray PC Over Galv.
XX - Special PC Over Galv.*

** Provide RAL # or Sample Color Chip*

SSS- Square Straight Steel Pole | No Arm | 4-Bolt Base

Project		Catalog #		Type	
Prepared by		Notes		Date	

McGraw-Edison

GALN Galleon II

Area / Site Luminaire

Typical Applications

Outdoor • Parking Lots • Walkways • Roadways • Building Areas

Interactive Menu

- Ordering Information page 2
- Mounting Details page 3
- Optical Distributions page 5
- Product Specifications page 5
- Energy and Performance Data page 6
- Control Options page 10

Product Certifications

Resources

LumenSafe Technology

Light ARchitect™

Quick Facts

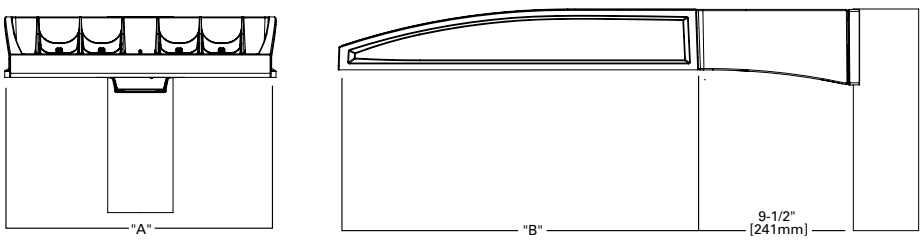
- Lumen packages range from 3,300 - 73,500 (33W - 552W)
- 16 optical distributions
- Efficacy up to 159 lumens per watt

Connected Systems

- WaveLinx Lite
- WaveLinx

Dimensional Details

Standard Arm



Number of Light Squares	Width "A"	Housing Length "B"	Weight with Standard or QM Arm	EPA with Standard or QM Arm
1-4	16"	22"	29 lb	0.95
5-6	22"	22"	39 lb	0.95
7-9	22"	28-1/8"	48 lb	1.1

NOTES:
For arm selection requirements and additional line art, see Mounting Details section.

McGraw-Edison

GALN Galleon II

Ordering Information

SAMPLE NUMBER: **GALN-SA4C-740-U-T4FT-GM**

Product Family [1, 2]	Light Engine		Color Temperature	Voltage	Distribution	Mounting	Finish
	Configuration	Drive Current					
GALN=Galleon II	**SA1**=1 Square **SA2**=2 Squares **SA3**=3 Squares **SA4**=4 Squares **SA5**=5 Squares **SA6**=6 Squares **SA7**=7 Squares **SA8**=8 Squares **SA9**=9 Squares	**A**=600mA **B**=800mA **C**=1000mA **D**=1200mA [4, 17]	**722**=70CRI, 2200K **727**=70CRI, 2700K **730**=70CRI, 3000K **735**=70CRI, 3500K **740**=70CRI, 4000K **750**=70CRI, 5000K **760**=70CRI, 6000K **827**=80CRI, 2700K **830**=80CRI, 3000K **AMB**=Amber, 590nm [15, 17]	**U**=120-277V **H**=347V-480V [7] **1**=120V **2**=208V **3**=240V **4**=277V **8**=480V [7] **9**=347V [7]	**T2**=Type II **T2R**=Type II Roadway **T3**=Type III **T3R**=Type III Roadway **T4FT**=Type IV Forward Throw **T4W**=Type IV Wide **5NQ**=Type V Narrow **5MQ**=Type V Square Medium **5WQ**=Type V Square Wide **SL2**=Type II w/Spill Control **SL3**=Type III w/Spill Control **SL4**=Type IV w/Spill Control **SLL**=90° Spill Light Eliminator Left **SLR**=90° Spill Light Eliminator Right **RW**=Rectangular Wide Type I **AFL**=Automotive Frontline	**[Blank]**=Standard Pole Mount Arm **QM**=Standard Pole Mount Arm with Quick Mount Adaptor **PA**=Pole Mount, Adjustable **SP**=Slipfitter, Adjustable [8] **MA**=Mast Arm, Fixed **WM**=Wall Mount, Fixed **WA**=Wall Mount, Adjustable **UP**=Upswept Arm	**AP**=Grey **BZ**=Bronze **BK**=Black **DP**=Dark Platinum **GM**=Graphite Metallic **WH**=White

Options (Add as Suffix)	Controls and Systems Options (Add as Suffix)	Accessories (Order Separately)
DIM=External 0-10V Dimming Leads [20] **F**=Single Fuse (120, 277 or 347V Specify Voltage) **FF**=Double Fuse (208, 240 or 480V Specify Voltage) **20K**=20kV UL 1449 fused surge protective device [10] **2L**=Two Circuits [10] **HA**=50°C High Ambient **HSS**=Installed House Side Shield [18] **GRSBK**=Glare Reducing Shield, Black [23] **GRSWH**=Glare Reducing Shield, White [23] **LCF**=Light Square Trim Painted to Match Housing [26] **MTH**=Tool-less Door Hardware [5] **CC**=Coastal Construction finish [3] **L90**=Optics Rotated 90° Left **R90**=Optics Rotated 90° Right **AHD145**=After Hours Dim, 5 Hours [22] **AHD245**=After Hours Dim, 6 Hours [22] **AHD255**=After Hours Dim, 7 Hours [22] **AHD355**=After Hours Dim, 8 Hours [22] **DALI**=DALI Drivers	**BPC**=Button Type Photocontrol [6] **PR**=NEMA 3-PIN Photocontrol Receptacle **PR7**=NEMA 7-PIN Photocontrol Receptacle [21] **SPB2**=Dimming Motion Sensor, 9'-20' mounting [24] **SPB4**=Dimming Motion Sensor, 21'-40' mounting [24] **SPB2/X**=Dimming Motion Sensor, limited square count, 9'-20' mounting [24] **SPB4/X**=Dimming Motion Sensor, limited square count, 21'-40' mounting [24] **ZW**=WaveLinx Module and 4-PIN Receptacle [19] **ZD**=WaveLinx Module with DALI driver and 4-PIN Receptacle [19] **ZW-SWPD4XX**=WaveLinx Sensor Only, 7-15ft [19, 12, 13] **ZW-SWPD5XX**=WaveLinx Sensor Only, 15-40ft [19, 12, 13] **ZW-WOBXX**=WaveLinx Sensor with Bluetooth, 7-15ft [19, 12, 13] **ZW-WOFXX**=WaveLinx Sensor with Bluetooth, 15-40ft [19, 12, 13] **ZD-SWPD4XX**=WaveLinx Sensor Only, 7-15ft [19, 12, 13] **ZD-SWPD5XX**=WaveLinx Sensor Only, 15-40ft [19, 12, 13] **ZD-WOBXX**=WaveLinx Sensor with Bluetooth, 7-15ft [19, 12, 13] **ZD-WOFXX**=WaveLinx Sensor with Bluetooth, 15-40ft [19, 12, 13] **DIM10-MS/DIM-L20**=Synapse Occupancy Sensor (9'-20' Mounting) [19] **DIM10-MS/DIM-L40**=Synapse Occupancy Sensor (21'-40' Mounting) [19]	**OA/RA1016**=NEMA Photocontrol Multi-Tap - 105-285V **OA/RA1027**=NEMA Photocontrol - 480V **OA/RA1201**=NEMA Photocontrol - 347V **OA/RA1013**=Photocontrol Shorting Cap **OA/RA1014**=120V Photocontrol **MA1252**=10kV Surge Module Replacement **MA1036-XX**=Single Tenon Adapter for 2-3/8" O.D. Tenon **MA1037-XX**=2@180° Tenon Adapter for 2-3/8" O.D. Tenon **MA1197-XX**=3@120° Tenon Adapter for 2-3/8" O.D. Tenon **MA1188-XX**=4@90° Tenon Adapter for 2-3/8" O.D. Tenon **MA1189-XX**=2@90° Tenon Adapter for 2-3/8" O.D. Tenon **MA1190-XX**=3@90° Tenon Adapter for 2-3/8" O.D. Tenon **MA1191-XX**=2@120° Tenon Adapter for 2-3/8" O.D. Tenon **MA1038-XX**=Single Tenon Adapter for 3-1/2" O.D. Tenon **MA1039-XX**=2@180° Tenon Adapter for 3-1/2" O.D. Tenon **MA1192-XX**=3@120° Tenon Adapter for 3-1/2" O.D. Tenon **MA1193-XX**=4@90° Tenon Adapter for 3-1/2" O.D. Tenon **MA1194-XX**=2@90° Tenon Adapter for 3-1/2" O.D. Tenon **MA1195-XX**=3@90° Tenon Adapter for 3-1/2" O.D. Tenon **LS/HSS**=Field Installed House Side Shield [9, 18] **LS/GRSBK**=Glare Reducing Shield, Black [9, 23] **LS/GRSWH**=Glare Reducing Shield, White [9, 23] **LS/PFS**=Perimeter Shield, Black [16] **WOLC-7P-10A**=WaveLinx Outdoor Control Module [11, 19] **WOA-XX**=WaveLinx Wireless Sensor, 7'–15' Mounting Height [12, 13, 14, 19] **WOE-XX**=WaveLinx Wireless Sensor, 15'–40' Mounting Height [12, 13, 14, 19]

NOTES:
1. Customer is responsible for engineering analysis to confirm pole and fixture compatibility for all applications. Refer to our white paper WP513001EN for additional support information.
2. DesignLights Consortium® Qualified. Refer to www.designlights.org Qualified Products List under Family Models for details.
3. Coastal construction finish salt spray tested to over 5,000-hours per ASTM B117, with a scribe rating of 9 per ASTM D1654. Not available with TH option.
4. Not available with color temperatures 722, 727 or 830.
5. TH option not 3G rated. Not available with Coastal Construction (CC) option.
6. Not available with voltage options H, 8 or 9.
7. Requires the use of an internal step down transformer when combined with sensor options. Not available with sensor at 1200mA. Not available in combination with the HA high ambient and sensor options at 1A.
8. Adjustable Slipfitter arm limited to vertical 3" tenon
9. One required for each Light Square.
10. 2L is not available with SPB at 347V or 480V. Not available with WaveLinx or Enlighted sensors, or 20kV surge option.
11. Requires PR7.
12. Replace XX with sensor color (WH, BZ or BK.)
13. WAC Gateway required to enable field-configurability: Order WAC-PoE and WPOE-120 (10V to PoE injector) power supply if needed. WAC not required for LC Bluetooth sensors.
14. Requires ZW or ZD receptacle.
15. Narrow-band 590nm +/- 5nm for wildlife and observatory use. Choose drive current A; supplied at 500mA drive current only. Available with 5WQ, 5MQ, SL2, SL3 and SL4 distributions. Can be used with HSS option.
16. Set of 4 pcs. One set required per Light Square.
17. Not available with HA option.
18. Not for use with 5NQ, 5MQ, 5WQ or RW optics. A black trim plate is used when HSS is selected.
19. Cannot be used with other control options.
20. Low voltage control lead brought out 18" outside fixture. Not available with DALI or integrated controls options
21. Not available if any SPB, LWR, or WaveLinx sensor is selected. Motion sensor has an integral photocell.
22. Requires the use of BPC photocontrol or the PR7 or PR photocontrol receptacle with photocontrol accessory.
23. Not for use with T4FT, T4W or SL4 optics. See IES files for details.
24. Sensor configuration mobile application required for configuration. See controls page for details.
25. Replace X with number of Light Squares controlled by the SPB, referencing the "SPB/X Availability Table" on the controls page.
26. Not available with HSS, GRSWH or GRSBK.

LumenSafe Integrated Network Security Camera Technology Options (Add as Suffix)

Product Family	Camera Type	Data Backhaul	
L=LumenSafe Technology	**D**=Standard Dome Camera **H**=Hi-Res Dome Camera **Z**=Remote PTZ Camera	**C**=Cellular, No SIM **A**=Cellular, AT&T **V**=Cellular, Verizon **S**=Cellular, Sprint	**R**=Cellular, Rogers **W**=Wi-Fi Networking w/ Omni-Directional Antenna **E**=Ethernet Networking

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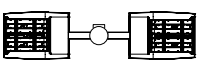
GALN Galleon II

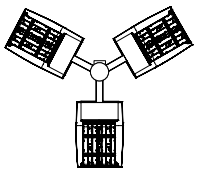
Mounting Details

Pole Configuration Options

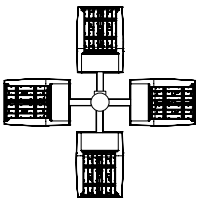
2 @ 180°



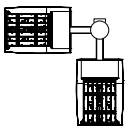
3 @ 120°
(Round poles only)



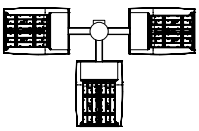
4 @ 90°



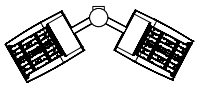
2 @ 90°



3 @ 90°
(Round or square poles only)

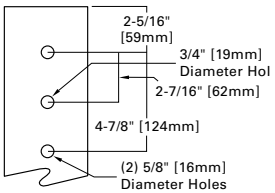


2 @ 120°
(Round poles only)

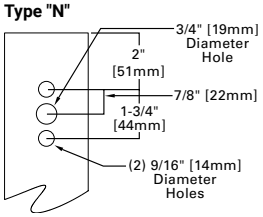


Pole Drilling Patterns

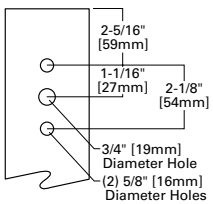
Type "M"



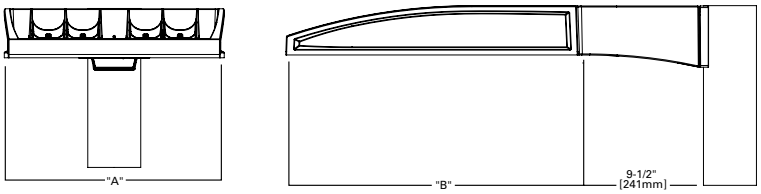
Type "N"



Type "R"

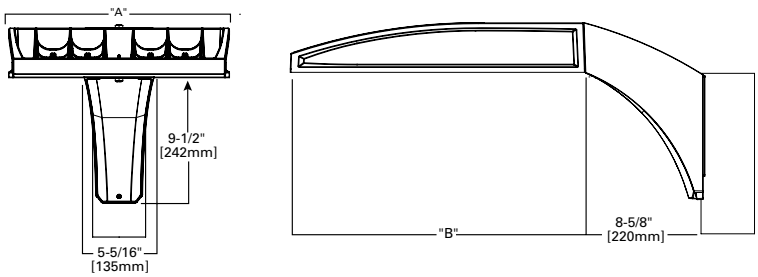


Quick Mount Arm (QM) *



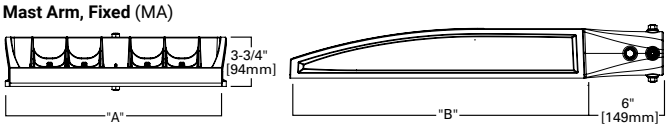
*NOTE: Use Type N drilling pattern

Upswept Arm (UP) *

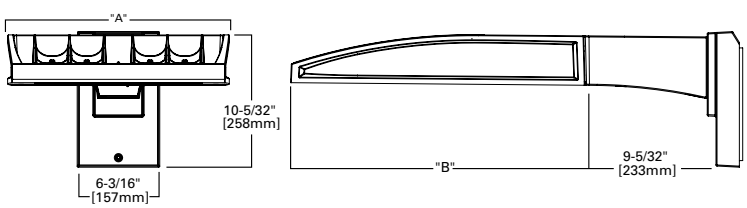


*NOTE: Use Type N, R or M drilling pattern

Mast Arm, Fixed (MA)



Wall Mount, Fixed (WM)



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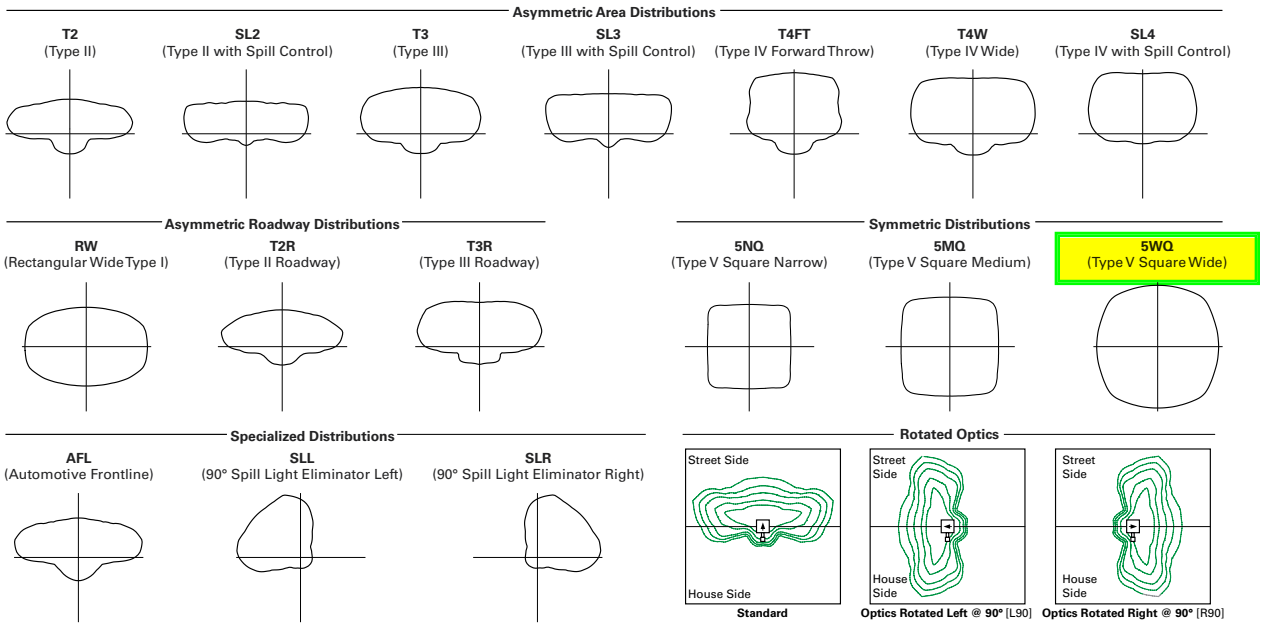
Optical Distributions



Product Specifications

Construction
- Die-cast aluminum housing and heat sink
- Three housing sizes, using 1 to 9 light squares

Optics
- High-efficiency injection-molded AccuLED Optics technology
- 16 optical distributions for area site and roadway applications
- 3 shielding options include HSS, GRS and PFS
- IDA certified (3000K CCT and warmer only, arms at 0° tilt)

Electrical
- Removable power tray assembly includes drivers, surge modules and control modules for ease of maintenance and serviceability
- Standard with 0-10V dimming
- Standard with 10kV surge module, optional 20kV surge module
- Suitable for operation in -40°C to 40°C ambient environments. Optional 50°C high ambient (HA) configuration

Mounting
- Arms are factory installed, enabling closed-housing installation
- All arms suitable for round or square pole installation
- All arms provide clearance for multiple fixture installations at 90°

Finish
- 6 standard finishes use super durable TGIC polyester powder coat paint, providing 2.5 mil nominal thickness and salt-spray tested to 3,000 hours per ASTM B117
- RAL and custom color matches available
- Coastal Construction (CC) option salt-spray tested to 5,000 hours per ASTM B117, achieving a scribe rating of 9 per ASTM D1654

Warranty
- Five year limited warranty

Energy and Performance Data

Lumen Maintenance (TM-21)

Drive Current	Ambient Temperature	25,000 hours*	50,000 hours*	60,000 hours*	100,000 hours**	Theoretical L70 hours**
Up to 1A	25°C	99.4%	99.0%	98.9%	98.3%	> 2.4M
	40°C	98.7%	98.3%	98.1%	97.4%	> 1.9M
	50°C	98.2%	97.2%	96.8%	95.2%	> 851,000
1.2A	25°C	99.4%	99.0%	98.9%	98.3%	> 2.4M
	40°C	98.5%	97.9%	97.7%	96.7%	> 1.3M

* Supported by IES TM-21 standards
** Theoretical values represent estimations commonly used; however, refer to the IES position on LED Product Lifetime Prediction, IES PS-10-18, explaining proper use of IES TM-21 and LM-80.

Lumen Multiplier

Ambient Temperature	Lumen Multiplier
0ºC	1.02
10ºC	1.01
25ºC	1.00
40ºC	0.99
50ºC	0.97

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GALN Galleon II

Performance Table, Drive Current "C" (1050mA)

Number of Light Squares		1	2	3	4	5	6	7	8	9
Nominal Power (Watts)		57	108	160	213	269	321	377	429	481
Input Current @ 120V		0.478	0.905	1.338	1.810	2.244	2.675	3.150	3.584	4.013
Input Current @ 208V		0.279	0.532	0.780	1.064	1.313	1.559	1.845	2.093	2.339
Input Current @ 240V		0.243	0.458	0.664	0.916	1.123	1.328	1.582	1.788	1.991
Input Current @ 277V		0.213	0.404	0.582	0.808	0.997	1.164	1.401	1.589	1.745
Input Current @ 347V		0.164	0.322	0.471	0.644	0.795	0.943	1.117	1.269	1.414
Input Current @ 480V		0.121	0.235	0.341	0.469	0.579	0.681	0.814	0.923	1.022
Optics										
T2	4000K Lumens	7,154	14,219	21,107	27,970	35,408	41,927	49,247	57,094	64,098
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
	Lumens per Watt	126	132	132	131	132	131	131	133	133
T2R	4000K Lumens	7,250	14,408	21,389	28,344	35,881	42,487	49,905	57,857	64,954
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5
	Lumens per Watt	127	133	134	133	133	132	132	135	135
T3	4000K Lumens	7,054	14,020	20,812	27,580	34,914	41,342	48,560	56,297	63,203
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B4-U0-G4	B4-U0-G5	B4-U0-G5	B4-U0-G5
	Lumens per Watt	124	130	130	129	130	129	129	131	131
T3R	4000K Lumens	7,280	14,468	21,477	28,461	36,029	42,663	50,111	58,096	65,222
	BUG Rating	B1-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
	Lumens per Watt	128	134	134	134	134	133	133	135	136
T4FT	4000K Lumens	7,098	14,107	20,941	27,751	35,130	41,598	48,860	56,646	63,594
	BUG Rating	B1-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
	Lumens per Watt	125	131	131	130	131	130	130	132	132
T4W	4000K Lumens	7,119	14,148	21,003	27,832	35,233	41,720	49,004	56,812	63,781
	BUG Rating	B1-U0-G1	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B4-U0-G4	B4-U0-G4	B4-U0-G5	B5-U0-G5
	Lumens per Watt	125	131	131	131	131	130	130	132	133
SL2	4000K Lumens	7,101	14,112	20,949	27,761	35,144	41,614	48,879	56,668	63,619
	BUG Rating	B1-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
	Lumens per Watt	125	131	131	130	131	130	130	132	132
SL3	4000K Lumens	7,051	14,013	20,802	27,566	34,897	41,321	48,535	56,269	63,172
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
	Lumens per Watt	124	130	130	129	130	129	129	131	131
SL4	4000K Lumens	6,963	13,839	20,543	27,223	34,463	40,808	47,932	55,569	62,386
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
	Lumens per Watt	122	128	128	128	128	127	127	130	130
5NQ	4000K Lumens	7,424	14,755	21,903	29,025	36,743	43,508	51,104	59,247	66,515
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4
	Lumens per Watt	130	137	137	136	137	136	136	138	138
5MQ	4000K Lumens	7,461	14,828	22,012	29,169	36,926	43,725	51,359	59,542	66,846
	BUG Rating	B3-U0-G1	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5
	Lumens per Watt	131	137	138	137	137	136	136	139	139
5WQ	4000K Lumens	7,445	14,797	21,966	29,108	36,849	43,633	51,250	59,417	66,705
	BUG Rating	B3-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5	B5-U0-G5	B5-U0-G5
	Lumens per Watt	131	137	137	137	137	136	136	139	139
SLL/ SLR	4000K Lumens	6,132	12,187	18,091	23,973	30,348	35,936	42,210	48,935	54,938
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
	Lumens per Watt	108	113	113	113	113	112	112	114	114
RW	4000K Lumens	7,340	14,587	21,653	28,694	36,325	43,013	50,522	58,573	65,757
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4
	Lumens per Watt	129	135	135	135	135	134	134	137	137
AFL	4000K Lumens	7,183	14,276	21,193	28,084	35,552	42,098	49,448	57,327	64,359
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B4-U0-G4
	Lumens per Watt	126	132	132	132	132	131	131	134	134

* Nominal data for 70 CRI. ** For additional performance data, please reference the Galleon Supplemental Performance Guide.

McGraw-Edison GALN Galleon II

Control Options

0-10V (DIM)
This fixture is offered standard with 0-10V dimming driver(s). The DIM option provides 0-10V dimming wire leads for use with a lighting control panel or other control method.

Photocontrol (BPC, PR and PR7)
Optional button-type photocontrol (BPC) and photocontrol receptacles (PR and PR7) provide a flexible solution to enable "dusk-to-dawn" lighting by sensing light levels. Advanced control systems compatible with NEMA 7-pin standards can be utilized with the PR7 receptacle.

After Hours Dim (AHD)
This feature allows photocontrol-enabled luminaires to achieve additional energy savings by dimming during scheduled portions of the night. The dimming profile will automatically take effect after a "dusk-to-dawn" period has been calculated from the photocontrol input. Specify the desired dimming profile for a simple, factory-shipped dimming solution requiring no external control wiring. Reference the After Hours Dim supplemental guide for additional information.

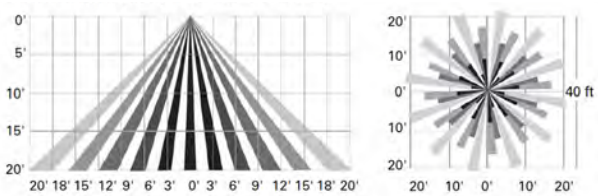
Dimming Occupancy Sensor (SPB)
These passive infrared (PIR) sensors are factory installed in the luminaire housing. When the SPB sensor option is selected, the occupancy sensor is connected to a dimming driver and the entire luminaire dims when no motion is detected. After a period of time, the luminaire turns off, and when motion is detected, the luminaire returns to full light output. The SPB sensor default parameters are listed in the table below, and can be configured utilizing the Sensor Configuration mobile application for iOS and Android devices. The SPB/X is configured to control only the specified number of light squares. An integral photocontrol can be activated with the app for "dusk-to-dawn" control or daylight harvesting - the factory default is off. Three sensor lenses are available to optimize the coverage pattern for mounting heights from 8'-40'. Four sensor colors are available; Bronze, Black, Gray and White, and are automatically selected based on the luminaire finish as indicated by the table below.

SPB sensor finish matched to luminaire finish		
Luminaire Finish		SPB Sensor Finish
WH	White	White
BK	Black	Black
GM	Graphite Metallic	Black
BZ	Bronze	Bronze
AP	Gray	Gray
DP	Dark Platinum	Gray

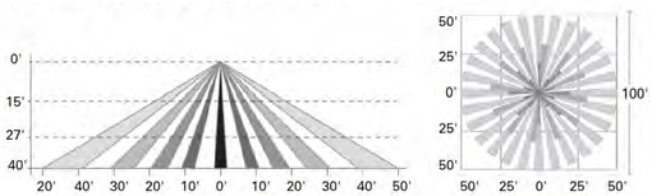
SPB/X Availability Table	
Fixture Square Count	Available SPB/X Square Count
1	Not Available
2	Not Available
3	Not Available
4	2
5	2 or 3
6	3
7	2, 3, 4 or 5
8	2, 3, 5 or 6
9	3 or 6

WaveLinx Wireless Control and Monitoring System
Operates on a wireless mesh network based on IEEE 802.15.4 standards enabling wireless control of outdoor lighting. WaveLinx and WaveLinx Lite sensors utilize the Zhaga Book 18 compliant 4-PIN receptacle (ZD or ZW), while the WOLC control module utilizes a 7-PIN receptacle. ZW option provides 4-PIN receptacle and control module to enable future installation of WaveLinx sensors. ZD option provides 4-PIN receptacle and sensor-ready (SR) driver to enable future installation of WaveLinx sensors, power monitoring, and advanced functionality. WaveLinx (SWPD4 to SWPD5) outdoor wireless sensors offer passive infrared (PIR) occupancy and photocell for closed loop daylight harvesting, and can be factory or field-installed. Sensors are factory preset to dim down to 50% after 15 minutes of no motion detected. Two lens options are available for mounting heights of 7' to 40'. Use the WaveLinx mobile application for set-up and configuration. At least one Wireless Area Controller (WAC) is required for full functionality and remote communication (including adjustment of any factory pre-sets). WaveLinx Lite (WOF and WOB) outdoor wireless sensors provide PIR occupancy and photocell for closed loop daylight harvesting, and can be factory or field-installed. Sensors are factory preset to dim down to 50% after 15 minutes of no motion detected. Two lens options are available for mounting heights of 7' to 40'. Use the WaveLinx Lite mobile application for set-up and configuration. WAC not required. WaveLinx Outdoor Control Module (WOLC-7P-10A) accessory provides a photocontrol enabling astronomic or time-based schedules to provide ON, OFF and dimming control of fixtures utilizing a 7-PIN receptacle. The out-of-box functionality is ON at dusk and OFF at dawn.

For mounting heights up to 15' (SWPD4 and WOB)



For mounting heights up to 40' (SWPD5 and WOF)



LumenSafe Integrated Network Security Camera (LD)
Cooper Lighting Solutions brings ease of camera deployment to a whole new level. No additional wiring is needed beyond providing line power to the luminaire. A variety of networking options allows security integrators to design the optimal solution for active surveillance. As the ideal solution to meet the needs for active surveillance, the LumenSafe integrated network camera is a streamlined, outdoor-ready fixed dome that provides HDTV 1080p video. This IP camera is optimally designed for deployment in the video management system or security software platform of choice.

Synapse (DIM10)
SimplySNAP integrated wireless controls system by Synapse. Includes factory installed DIM10 Synapse control module and MS/DC motion sensor; requires additional Synapse system components for operation. Contact Synapse at www.synapsewireless.com for product support, warranty and terms and conditions.

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Specifications and dimensions
subject to change without notice.

Submitted by Clarus Lighting & Controls

Job Name:
456 E. CADY STREET
Architect: O/X Studio (Ann Arbor)
General Contractor: Schonsheck Inc (Wixom)

Catalog Number:
SSS20B4-4-D218-BA

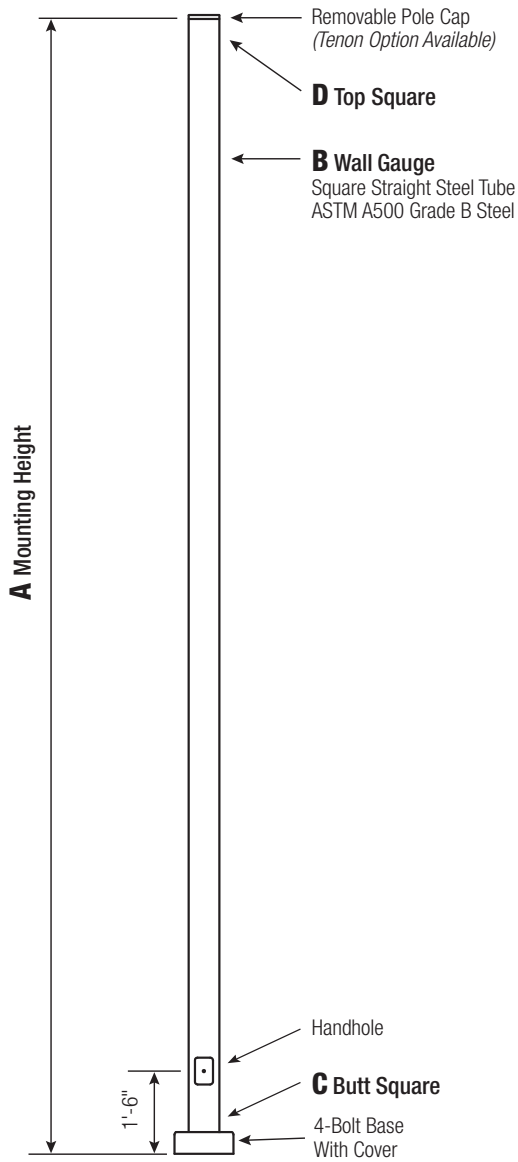
Notes:

Type:
SA5C-5WQ-2

CLC21-87942

SSS

Square Straight Steel Pole
No Arm — 4-Bolt Base



Powder Coated, Galvanized or Powder Coated over Galvanized Finish Per Customer Specification.

C Butt Sq.	D Top Sq.	F Bolt Cir. Dia.	G Base Sq.	H Bolt Proj.	I Bolt Size
4 *(11 Gauge)*	4	8 - 9	8	3.75	.75 x 17 x 3
4 *(7 Gauge)*	4	8 - 9	8	3.75	.75 x 30 x 3
5 *(11 Gauge)**	5	10 - 12	11	4.875	.75 x 30 x 3
5 *(7 Gauge)*	5	10 - 12	11	4.875	1 x 36 x 4
6	6	11 - 13	12.5	4.875	1 x 36 x 4

**Requires the use of oversized washers (provided).*

Dimensions in Inches

Pole

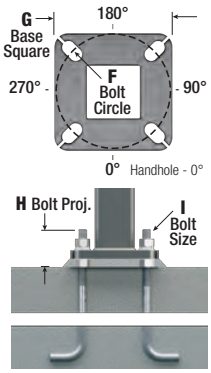
Pole shaft shall be weldable-grade, cold-rolled, commercial quality carbon steel tubing conforming to ASTM A500 Grade B. Options include 11 gauge and 7 gauge. All welds shall conform to AWS D1.1 using ER70S-6 electrodes.

Base Style

4-Bolt Steel Plate Base Flange of fabricated hot rolled carbon steel conforming to ASTM A36 or equivalent (36 ksi minimum yield) with 2-piece Base Cover and attaching hardware.

Anchorage

Anchorage Kit will include four (4) L-shaped Steel Anchor Bolts conforming to AASHTO M314-90 Grade 55. Ten inches (10") of threaded end will be galvanized per ASTM A153. Kits will contain eight (8) Hex Nuts, four (4) Lock Washers, and eight (8) Flat Washers (all components Galvanized Steel). A paper bolt circle template will be provided.



Handhole

Reinforced, 3" x 5" Handhole with cover, stainless steel screw and backbar. A grounding provision incorporating a tapped 1/2"-13NC hole will be provided.

Base Cover

Square ABS plastic Base Covers are standard on all SSS poles specified in BA-Black, BM-Dark Bronze and BH-White. SSS poles specified in all other colors will be manufactured of metal materials. *Custom specification of SSS square metal style Base Covers in BA, BM and BH powder coated finishes is available.*

Vibration Damper

If determined necessary by Hapco, or if specified by the customer, a first and/or second mode vibration damper will be provided.

WARNING: *Do not install light pole without luminaire.*

Submitted by Clarus Lighting & Controls

Job Name:
456 E. CADY STREET
Architect: O/X Studio (Ann Arbor)
General Contractor: Schonsheck Inc (Wixom)

Catalog Number:
SSS20B4-4-D218-BA

Notes:

Type:
SA5C-5WQ-2

CLC21-87942

A Mtg. Hgt.	B Wall Gauge	C Butt Sq.	Total Lum. Weight	Maximum EPA 90	100	110	120	130	140	Catalog Number
10	11	4	320	25.2	20.0	18.6	15.3	12.7	10.6	SSS10B4-4-**
12	11	4	285	20.6	16.2	14.9	12.1	9.9	8.2	SSS12B4-4-**
14	11	4	255	17.0	13.2	12.1	9.7	7.8	6.3	SSS14B4-4-**
15	11	4	245	15.5	11.9	10.9	8.6	6.8	5.4	SSS15B4-4-**
15	7	4	305	23.4	18.4	17.0	13.8	11.4	9.4	SSS15D4-4-**
16	11	4	235	14.0	10.7	9.7	7.6	5.9	4.6	SSS16B4-4-**
16	7	4	290	21.5	16.8	15.5	12.5	10.2	8.4	SSS16D4-4-**
18	11	4	215	11.3	8.4	7.6	5.7	4.3	3.2	SSS18B4-4-**
18	7	4	265	18.0	13.9	12.8	10.2	8.2	6.6	SSS18D4-4-**
20	11	4	200	9.1	6.5	5.8	4.2	2.9	1.9	SSS20B4-4-**
20	11	5	235	14.1	10.3	9.2	6.8	4.9	3.4	SSS20B5-4-**
20	7	4	240	15.1	11.5	10.5	8.2	6.5	5.0	SSS20D4-4-**
20	7	5	330	26.3	20.3	18.6	14.8	11.9	9.6	SSS20D5-4-**
22	11	4	200	7.2	4.9	4.2	2.8	1.7	0.8	SSS22B4-4-**
22	11	5	215	11.4	8.0	7.1	4.9	3.2	1.9	SSS22B5-4-**
22	7	4	225	12.7	9.5	8.6	6.6	5.0	3.7	SSS22D4-4-**
22	7	5	300	22.4	17.1	15.6	12.2	9.6	7.5	SSS22D5-4-**
25	11	4	200	4.7	2.8	2.2	1.0	-	-	SSS25B4-4-**
25	11	5	200	8.0	5.1	4.3	2.4	1.0	-	SSS25B5-4-**
25	7	4	205	9.7	6.9	6.2	4.4	3.1	2.0	SSS25D4-4-**
25	7	5	260	17.7	13.2	11.9	9.0	6.7	4.9	SSS25D5-4-**
28	11	4	200	2.6	1.0	-	-	-	-	SSS28B4-4-**
28	11	5	200	5.1	2.6	1.9	-	-	-	SSS28B5-4-**
28	7	4	200	7.1	4.8	4.1	2.6	1.5	-	SSS28D4-4-**
28	7	5	235	13.9	9.9	8.8	6.3	4.3	2.7	SSS28D5-4-**
30	11	5	200	3.4	1.1	-	-	-	-	SSS30B5-4-**
30	7	4	200	5.6	3.5	2.9	1.6	-	-	SSS30D4-4-**
30	7	5	215	11.7	8.0	7.0	4.7	2.9	1.5	SSS30D5-4-**
30	7	6	275	19.2	13.7	12.2	8.7	5.9	3.8	SSS30D6-4-**
35	7	5	200	6.9	4.0	3.1	1.2	-	-	SSS35D5-4-**
35	7	6	220	12.6	8.0	6.8	3.9	1.6	-	SSS35D6-4-**
39	7	6	200	8.2	4.2	3.1	0.6	-	-	SSS39D6-4-**

Catalog Number System

The catalog number for Hapco poles utilizes the following identification system.

MOUNTING HEIGHT | BUTT SQ. | BASE STYLE | FINISH

S S S _ _ _ - 4 - _ _ _ - _ _

SHAFT ASSEMBLY | WALL GAUGE | TOP SQ. | ACCESORIES OPTIONS

Catalog Number Example -

SSS 20 D 5 - 4 – BA

Square Straight Steel, 20' Mounting Height, 7 Gauge, 5" Butt Square, No Taper, 4-Bolt Base, Black Powder Coat Finish.

EPA Notes:

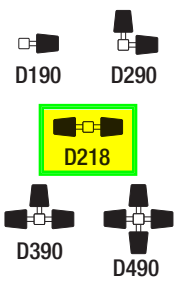
Effective Projected Area (EPA) in square feet. EPA's calculated using wind velocity (mph) indicated in accordance with 2009 AASHTO LTS-5 using a 25-year design life. Maximum EPA is based on the luminaire weight shown. Increased luminaire weight may reduce the maximum EPA. If weight is exceeded, or if other design life or code is required, please consult the factory.

Mounting Options

Side Drill Mount
Includes removable pole cap.
NOTE: A luminaire drilling template must be supplied at time of order.

Tenon Mount
For Tenon Mount applications specify both Tenon diameter and length.

Drill Mount Options



Electrical Box

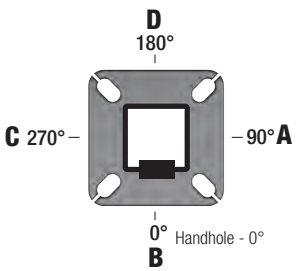
Box Only

GF1
Duplex GFI Receptacle *with Cover*

GF2
Duplex GFI *with In-Use Cover*

Note: *GFI Options must be specified in Accessories.*

Pole Orientation



SSS _ _ _ _ - 4 - _ _ _ _ - _ _ - _ _ - _ _

SSS- Square Straight Steel Pole

Height	Gauge	Butt Sq.	Top Sq.	Base Style
10 = 10' **12** = 12' **14** = 14' **16** = 16' **18** = 18' **20** = 20' **22** = 22' **25** = 25' **28** = 28' **30** = 30' **35** = 35' **39** = 39'	**B** = 11 Gauge **D** = 7 Gauge	**4** = 4" **5** = 5" **6** = 6"	"-"= No Taper	**4** = 4-Bolt Base

Mounting Options

DRILL MOUNT
D000 - No Drilling
D190 - Std. "A"
D290 - Std. "A" & "D"
D218 - Std. "A" & "C"
D390 - Std. "A", "D", & "C"
D490 - Std. "A", "B", "C", & "D"
DCUS - Custom*

TENON
T204 - 2-3/8" O.D. x 4"
T304 - 2-7/8" O.D. x 4"
T356 - 3-1/2" O.D. x 6"
T406 - 4" O.D. x 6"
TCUS - Custom Tenon**

** Specify Number and Orientation*
*** Specify O.D. and Height*

Electrical Box*
FA - 30" Up, "D"
FB - 30" Up, "B"
FC - 30" Up, "A"
FD - 30" Up, "C"
FE - 36" Up, "D"
FF - 36" Up, "B"
FG - 36" Up, "A"
FH - 36" Up, "C"
FI - 24" Up, "D"
FK - 24" Up, "A"
FL - 24" Up, "C"
FZ - Custom**

** GFI Receptacle Options Available (Specify in Accessories)*
*** Specify Height and Orientation*

Accessories/Options*
C12 - Threaded 1/2" Coupling**
C34 - Threaded 3/4" Coupling**
C10 - Threaded 1" Coupling**
EHH - Extra Handhole**
GF1 - Duplex GFI Receptacle *(WR) with Cover*
GF2 - Duplex GFI *(WR) with In-Use Cover*
LAB - Less Anchor Bolts
LPC - Less Pole Cap
PAB - Pre-shipped Anchor Bolts
VD1 - Vib. Damper - 1st Mode
VD2 - Vib. Damper - 2nd Mode

** Add all that apply (Example: CPL-LAB-VD1)*
*** Specify Location*

Finish

POWDER COAT COLORS
BA - Black Powder Coat
BH - White Powder Coat
BM - Dark Bronze Powder Coat
BV - Dark Green Powder Coat
GC - Gray Powder Coat
XX - Special Colors*

GALVANIZED
1Q - Galvanized Only
1C - Black PC Over Galv.
1D - White PC Over Galv.
1B - D. Bronze PC Over Galv.
1Y - D. Green PC Over Galv.
1J - Gray PC Over Galv.
XX - Special PC Over Galv.*

** Provide RAL # or Sample Color Chip*

SSS- Square Straight Steel Pole | No Arm | 4-Bolt Base

Project		Catalog #		Type	
Prepared by		Notes		Date	

McGraw-Edison

GALN Galleon II

Area / Site Luminaire

Typical Applications

Outdoor • Parking Lots • Walkways • Roadways • Building Areas

Interactive Menu

- Ordering Information page 2
- Mounting Details page 3
- Optical Distributions page 5
- Product Specifications page 5
- Energy and Performance Data page 6
- Control Options page 10

Product Certifications

Resources

LumenSafe Technology

Light ARchitect™

Quick Facts

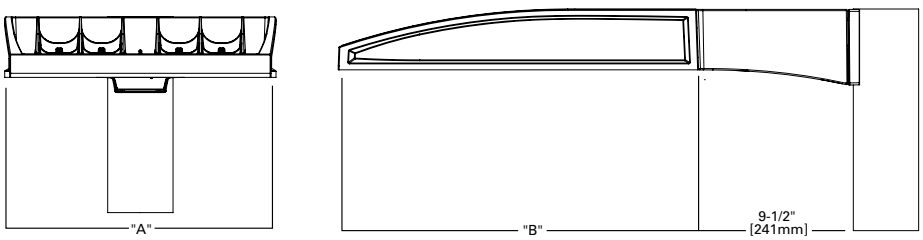
- Lumen packages range from 3,300 - 73,500 (33W - 552W)
- 16 optical distributions
- Efficacy up to 159 lumens per watt

Connected Systems

- WaveLinx Lite
- WaveLinx

Dimensional Details

Standard Arm



Number of Light Squares	Width "A"	Housing Length "B"	Weight with Standard or QM Arm	EPA with Standard or QM Arm
1-4	16"	22"	29 lb	0.95
5-6	22"	22"	39 lb	0.95
7-9	22"	28-1/8"	48 lb	1.1

NOTES:
For arm selection requirements and additional line art, see Mounting Details section.

McGraw-Edison

GALN Galleon II

Ordering Information

SAMPLE NUMBER: **GALN-SA4C-740-U-T4FT-GM**

Product Family [1, 2]	Light Engine		Color Temperature	Voltage	Distribution	Mounting	Finish
	Configuration	Drive Current					
GALN=Galleon II	**SA1**=1 Square **SA2**=2 Squares **SA3**=3 Squares **SA4**=4 Squares **SA5**=5 Squares **SA6**=6 Squares **SA7**=7 Squares **SA8**=8 Squares **SA9**=9 Squares	**A**=600mA **B**=800mA **C**=1000mA **D**=1200mA [4, 17]	**722**=70CRI, 2200K **727**=70CRI, 2700K **730**=70CRI, 3000K **735**=70CRI, 3500K **740**=70CRI, 4000K **750**=70CRI, 5000K **760**=70CRI, 6000K **827**=80CRI, 2700K **830**=80CRI, 3000K **AMB**=Amber, 590nm [15, 17]	**U**=120-277V **H**=347V-480V [7] **1**=120V **2**=208V **3**=240V **4**=277V **8**=480V [7] **9**=347V [7]	**T2**=Type II **T2R**=Type II Roadway **T3**=Type III **T3R**=Type III Roadway **T4FT**=Type IV Forward Throw **T4W**=Type IV Wide **5NQ**=Type V Narrow **5MQ**=Type V Square Medium **5WQ**=Type V Square Wide **SL2**=Type II w/Spill Control **SL3**=Type III w/Spill Control **SL4**=Type IV w/Spill Control **SLL**=90° Spill Light Eliminator Left **SLR**=90° Spill Light Eliminator Right **RW**=Rectangular Wide Type I **AFL**=Automotive Frontline	**[Blank]**=Standard Pole Mount Arm **QM**=Standard Pole Mount Arm with Quick Mount Adaptor **PA**=Pole Mount, Adjustable **SP**=Slipfitter, Adjustable [8] **MA**=Mast Arm, Fixed **WM**=Wall Mount, Fixed **WA**=Wall Mount, Adjustable **UP**=Upswept Arm	**AP**=Grey **BZ**=Bronze **BK**=Black **DP**=Dark Platinum **GM**=Graphite Metallic **WH**=White

Options (Add as Suffix)	Controls and Systems Options (Add as Suffix)	Accessories (Order Separately)
DIM=External 0-10V Dimming Leads [20] **F**=Single Fuse (120, 277 or 347V Specify Voltage) **FF**=Double Fuse (208, 240 or 480V Specify Voltage) **20K**=20kV UL 1449 fused surge protective device [10] **2L**=Two Circuits [10] **HA**=50°C High Ambient **HSS**=Installed House Side Shield [18] **GRSBK**=Glare Reducing Shield, Black [23] **GRSWH**=Glare Reducing Shield, White [23] **LCF**=Light Square Trim Painted to Match Housing [26] **MTH**=Tool-less Door Hardware [5] **CC**=Coastal Construction finish [3] **L90**=Optics Rotated 90° Left **R90**=Optics Rotated 90° Right **AHD145**=After Hours Dim, 5 Hours [22] **AHD245**=After Hours Dim, 6 Hours [22] **AHD255**=After Hours Dim, 7 Hours [22] **AHD355**=After Hours Dim, 8 Hours [22] **DALI**=DALI Drivers	**BPC**=Button Type Photocontrol [6] **PR**=NEMA 3-PIN Photocontrol Receptacle **PR7**=NEMA 7-PIN Photocontrol Receptacle [21] **SPB2**=Dimming Motion Sensor, 9'-20' mounting [24] **SPB4**=Dimming Motion Sensor, 21'-40' mounting [24] **SPB2/X**=Dimming Motion Sensor, limited square count, 9'-20' mounting [24] **SPB4/X**=Dimming Motion Sensor, limited square count, 21'-40' mounting [24] **ZW**=WaveLinx Module and 4-PIN Receptacle [19] **ZD**=WaveLinx Module with DALI driver and 4-PIN Receptacle [19] **ZW-SWPD4XX**=WaveLinx Sensor Only, 7-15ft [19, 12, 13] **ZW-SWPD5XX**=WaveLinx Sensor Only, 15-40ft [19, 12, 13] **ZW-WOBXX**=WaveLinx Sensor with Bluetooth, 7-15ft [19, 12, 13] **ZW-WOFXX**=WaveLinx Sensor with Bluetooth, 15-40ft [19, 12, 13] **ZD-SWPD4XX**=WaveLinx Sensor Only, 7-15ft [19, 12, 13] **ZD-SWPD5XX**=WaveLinx Sensor Only, 15-40ft [19, 12, 13] **ZD-WOBXX**=WaveLinx Sensor with Bluetooth, 7-15ft [19, 12, 13] **ZD-WOFXX**=WaveLinx Sensor with Bluetooth, 15-40ft [19, 12, 13] **DIM10-MS/DIM-L20**=Synapse Occupancy Sensor (9'-20' Mounting) [19] **DIM10-MS/DIM-L40**=Synapse Occupancy Sensor (21'-40' Mounting) [19]	**OA/RA1016**=NEMA Photocontrol Multi-Tap - 105-285V **OA/RA1027**=NEMA Photocontrol - 480V **OA/RA1201**=NEMA Photocontrol - 347V **OA/RA1013**=Photocontrol Shorting Cap **OA/RA1014**=120V Photocontrol **MA1252**=10kV Surge Module Replacement **MA1036-XX**=Single Tenon Adapter for 2-3/8" O.D. Tenon **MA1037-XX**=2@180° Tenon Adapter for 2-3/8" O.D. Tenon **MA1197-XX**=3@120° Tenon Adapter for 2-3/8" O.D. Tenon **MA1188-XX**=4@90° Tenon Adapter for 2-3/8" O.D. Tenon **MA1189-XX**=2@90° Tenon Adapter for 2-3/8" O.D. Tenon **MA1190-XX**=3@90° Tenon Adapter for 2-3/8" O.D. Tenon **MA1191-XX**=2@120° Tenon Adapter for 2-3/8" O.D. Tenon **MA1038-XX**=Single Tenon Adapter for 3-1/2" O.D. Tenon **MA1039-XX**=2@180° Tenon Adapter for 3-1/2" O.D. Tenon **MA1192-XX**=3@120° Tenon Adapter for 3-1/2" O.D. Tenon **MA1193-XX**=4@90° Tenon Adapter for 3-1/2" O.D. Tenon **MA1194-XX**=2@90° Tenon Adapter for 3-1/2" O.D. Tenon **MA1195-XX**=3@90° Tenon Adapter for 3-1/2" O.D. Tenon **LS/HSS**=Field Installed House Side Shield [9, 18] **LS/GRSBK**=Glare Reducing Shield, Black [9, 23] **LS/GRSWH**=Glare Reducing Shield, White [9, 23] **LS/PFS**=Perimeter Shield, Black [16] **WOLC-7P-10A**=WaveLinx Outdoor Control Module [11, 19] **WOA-XX**=WaveLinx Wireless Sensor, 7'–15' Mounting Height [12, 13, 14, 19] **WOE-XX**=WaveLinx Wireless Sensor, 15'–40' Mounting Height [12, 13, 14, 19]

NOTES:
1. Customer is responsible for engineering analysis to confirm pole and fixture compatibility for all applications. Refer to our white paper WP513001EN for additional support information.
2. DesignLights Consortium® Qualified. Refer to www.designlights.org Qualified Products List under Family Models for details.
3. Coastal construction finish salt spray tested to over 5,000-hours per ASTM B117, with a scribe rating of 9 per ASTM D1654. Not available with TH option.
4. Not available with color temperatures 722, 727 or 830.
5. TH option not 3G rated. Not available with Coastal Construction (CC) option.
6. Not available with voltage options H, 8 or 9.
7. Requires the use of an internal step down transformer when combined with sensor options. Not available with sensor at 1200mA. Not available in combination with the HA high ambient and sensor options at 1A.
8. Adjustable Slipfitter arm limited to vertical 3" tenon
9. One required for each Light Square.
10. 2L is not available with SPB at 347V or 480V. Not available with WaveLinx or Enlighted sensors, or 20kV surge option.
11. Requires PR7.
12. Replace XX with sensor color (WH, BZ or BK.)
13. WAC Gateway required to enable field-configurability: Order WAC-PoE and WPOE-120 (10V to PoE injector) power supply if needed. WAC not required for LC Bluetooth sensors.
14. Requires ZW or ZD receptacle.
15. Narrow-band 590nm +/- 5nm for wildlife and observatory use. Choose drive current A; supplied at 500mA drive current only. Available with 5WQ, 5MQ, SL2, SL3 and SL4 distributions. Can be used with HSS option.
16. Set of 4 pcs. One set required per Light Square.
17. Not available with HA option.
18. Not for use with 5NQ, 5MQ, 5WQ or RW optics. A black trim plate is used when HSS is selected.
19. Cannot be used with other control options.
20. Low voltage control lead brought out 18" outside fixture. Not available with DALI or integrated controls options
21. Not available if any SPB, LWR, or WaveLinx sensor is selected. Motion sensor has an integral photocell.
22. Requires the use of BPC photocontrol or the PR7 or PR photocontrol receptacle with photocontrol accessory.
23. Not for use with T4FT, T4W or SL4 optics. See IES files for details.
24. Sensor configuration mobile application required for configuration. See controls page for details.
25. Replace X with number of Light Squares controlled by the SPB, referencing the "SPB/X Availability Table" on the controls page.
26. Not available with HSS, GRSWH or GRSBK.

LumenSafe Integrated Network Security Camera Technology Options (Add as Suffix)

Product Family	Camera Type	Data Backhaul	
L=LumenSafe Technology	**D**=Standard Dome Camera **H**=Hi-Res Dome Camera **Z**=Remote PTZ Camera	**C**=Cellular, No SIM **A**=Cellular, AT&T **V**=Cellular, Verizon **S**=Cellular, Sprint	**R**=Cellular, Rogers **W**=Wi-Fi Networking w/ Omni-Directional Antenna **E**=Ethernet Networking

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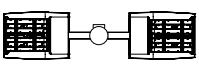
GALN Galleon II

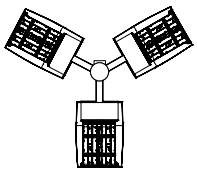
Mounting Details

Pole Configuration Options

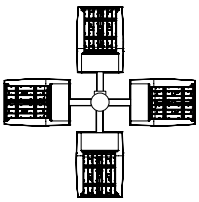
2 @ 180°



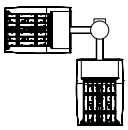
3 @ 120°
(Round poles only)



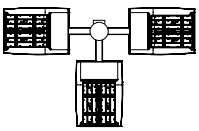
4 @ 90°



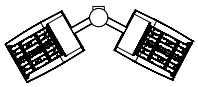
2 @ 90°



3 @ 90°
(Round or square poles only)

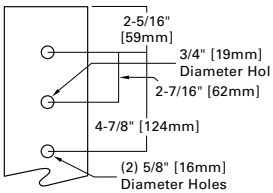


2 @ 120°
(Round poles only)

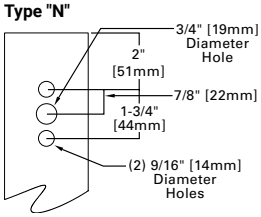


Pole Drilling Patterns

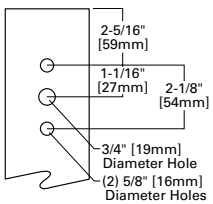
Type "M"



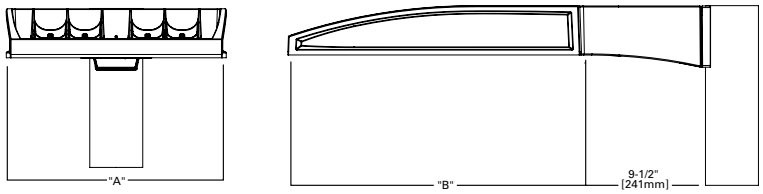
Type "N"



Type "R"

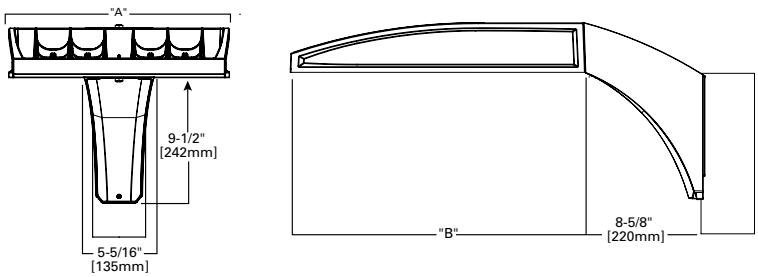


Quick Mount Arm (QM) *



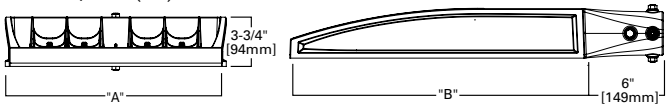
*NOTE: Use Type N drilling pattern

Upswept Arm (UP) *

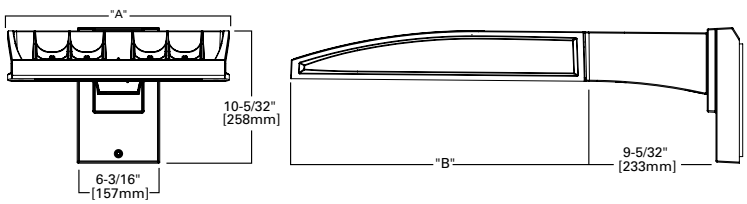


*NOTE: Use Type N, R or M drilling pattern

Mast Arm, Fixed (MA)



Wall Mount, Fixed (WM)



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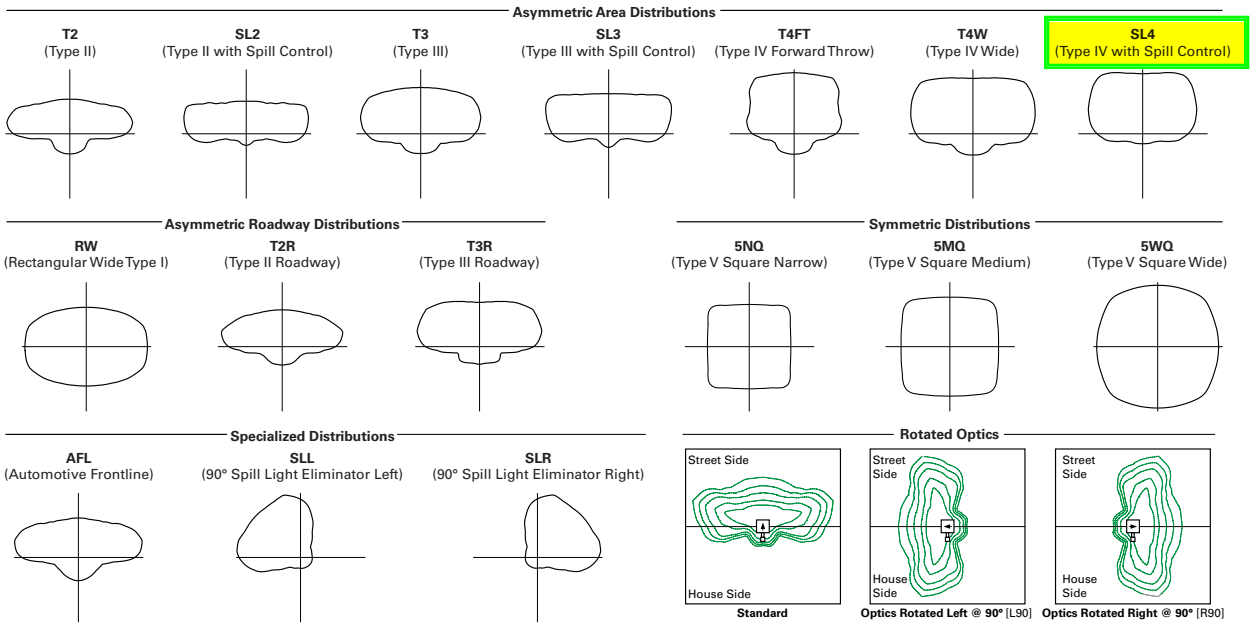
Optical Distributions



Product Specifications

Construction
- Die-cast aluminum housing and heat sink
- Three housing sizes, using 1 to 9 light squares

Optics
- High-efficiency injection-molded AccuLED Optics technology
- 16 optical distributions for area site and roadway applications
- 3 shielding options include HSS, GRS and PFS
- IDA certified (3000K CCT and warmer only, arms at 0° tilt)

Electrical
- Removable power tray assembly includes drivers, surge modules and control modules for ease of maintenance and serviceability
- Standard with 0-10V dimming
- Standard with 10kV surge module, optional 20kV surge module
- Suitable for operation in -40°C to 40°C ambient environments. Optional 50°C high ambient (HA) configuration

Mounting
- Arms are factory installed, enabling closed-housing installation
- All arms suitable for round or square pole installation
- All arms provide clearance for multiple fixture installations at 90°

Finish
- 6 standard finishes use super durable TGIC polyester powder coat paint, providing 2.5 mil nominal thickness and salt-spray tested to 3,000 hours per ASTM B117
- RAL and custom color matches available
- Coastal Construction (CC) option salt-spray tested to 5,000 hours per ASTM B117, achieving a scribe rating of 9 per ASTM D1654

Warranty
- Five year limited warranty

Energy and Performance Data

Lumen Maintenance (TM-21)

Drive Current	Ambient Temperature	25,000 hours*	50,000 hours*	60,000 hours*	100,000 hours**	Theoretical L70 hours**
Up to 1A	25°C	99.4%	99.0%	98.9%	98.3%	> 2.4M
	40°C	98.7%	98.3%	98.1%	97.4%	> 1.9M
	50°C	98.2%	97.2%	96.8%	95.2%	> 851,000
1.2A	25°C	99.4%	99.0%	98.9%	98.3%	> 2.4M
	40°C	98.5%	97.9%	97.7%	96.7%	> 1.3M

* Supported by IES TM-21 standards
** Theoretical values represent estimations commonly used; however, refer to the IES position on LED Product Lifetime Prediction, IES PS-10-18, explaining proper use of IES TM-21 and LM-80.

Lumen Multiplier

Ambient Temperature	Lumen Multiplier
0ºC	1.02
10ºC	1.01
25ºC	1.00
40ºC	0.99
50ºC	0.97

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GALN Galleon II

Performance Table, Drive Current "C" (1050mA)

Number of Light Squares		1	2	3	4	5	6	7	8	9
Nominal Power (Watts)		57	108	160	213	269	321	377	429	481
Input Current @ 120V		0.478	0.905	1.338	1.810	2.244	2.675	3.150	3.584	4.013
Input Current @ 208V		0.279	0.532	0.780	1.064	1.313	1.559	1.845	2.093	2.339
Input Current @ 240V		0.243	0.458	0.664	0.916	1.123	1.328	1.582	1.788	1.991
Input Current @ 277V		0.213	0.404	0.582	0.808	0.997	1.164	1.401	1.589	1.745
Input Current @ 347V		0.164	0.322	0.471	0.644	0.795	0.943	1.117	1.269	1.414
Input Current @ 480V		0.121	0.235	0.341	0.469	0.579	0.681	0.814	0.923	1.022
Optics										
T2	4000K Lumens	7,154	14,219	21,107	27,970	35,408	41,927	49,247	57,094	64,098
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
	Lumens per Watt	126	132	132	131	132	131	131	133	133
T2R	4000K Lumens	7,250	14,408	21,389	28,344	35,881	42,487	49,905	57,857	64,954
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5
	Lumens per Watt	127	133	134	133	133	132	132	135	135
T3	4000K Lumens	7,054	14,020	20,812	27,580	34,914	41,342	48,560	56,297	63,203
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B4-U0-G4	B4-U0-G5	B4-U0-G5	B4-U0-G5
	Lumens per Watt	124	130	130	129	130	129	129	131	131
T3R	4000K Lumens	7,280	14,468	21,477	28,461	36,029	42,663	50,111	58,096	65,222
	BUG Rating	B1-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
	Lumens per Watt	128	134	134	134	134	133	133	135	136
T4FT	4000K Lumens	7,098	14,107	20,941	27,751	35,130	41,598	48,860	56,646	63,594
	BUG Rating	B1-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
	Lumens per Watt	125	131	131	130	131	130	130	132	132
T4W	4000K Lumens	7,119	14,148	21,003	27,832	35,233	41,720	49,004	56,812	63,781
	BUG Rating	B1-U0-G1	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B4-U0-G4	B4-U0-G4	B4-U0-G5	B5-U0-G5
	Lumens per Watt	125	131	131	131	131	130	130	132	133
SL2	4000K Lumens	7,101	14,112	20,949	27,761	35,144	41,614	48,879	56,668	63,619
	BUG Rating	B1-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
	Lumens per Watt	125	131	131	130	131	130	130	132	132
SL3	4000K Lumens	7,051	14,013	20,802	27,566	34,897	41,321	48,535	56,269	63,172
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
	Lumens per Watt	124	130	130	129	130	129	129	131	131
SL4	4000K Lumens	6,963	13,839	20,543	27,223	34,463	40,808	47,932	55,569	62,386
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
	Lumens per Watt	122	128	128	128	128	127	127	130	130
5NQ	4000K Lumens	7,424	14,755	21,903	29,025	36,743	43,508	51,104	59,247	66,515
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4
	Lumens per Watt	130	137	137	136	137	136	136	138	138
5MQ	4000K Lumens	7,461	14,828	22,012	29,169	36,926	43,725	51,359	59,542	66,846
	BUG Rating	B3-U0-G1	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5
	Lumens per Watt	131	137	138	137	137	136	136	139	139
5WQ	4000K Lumens	7,445	14,797	21,966	29,108	36,849	43,633	51,250	59,417	66,705
	BUG Rating	B3-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5	B5-U0-G5	B5-U0-G5
	Lumens per Watt	131	137	137	137	137	136	136	139	139
SLL/ SLR	4000K Lumens	6,132	12,187	18,091	23,973	30,348	35,936	42,210	48,935	54,938
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
	Lumens per Watt	108	113	113	113	113	112	112	114	114
RW	4000K Lumens	7,340	14,587	21,653	28,694	36,325	43,013	50,522	58,573	65,757
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4
	Lumens per Watt	129	135	135	135	135	134	134	137	137
AFL	4000K Lumens	7,183	14,276	21,193	28,084	35,552	42,098	49,448	57,327	64,359
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B4-U0-G4
	Lumens per Watt	126	132	132	132	132	131	131	134	134

* Nominal data for 70 CRI. ** For additional performance data, please reference the Galleon Supplemental Performance Guide.

McGraw-Edison

GALN Galleon II

Control Options

0-10V (DIM)
This fixture is offered standard with 0-10V dimming driver(s). The DIM option provides 0-10V dimming wire leads for use with a lighting control panel or other control method.

Photocontrol (BPC, PR and PR7)
Optional button-type photocontrol (BPC) and photocontrol receptacles (PR and PR7) provide a flexible solution to enable "dusk-to-dawn" lighting by sensing light levels. Advanced control systems compatible with NEMA 7-pin standards can be utilized with the PR7 receptacle.

After Hours Dim (AHD)
This feature allows photocontrol-enabled luminaires to achieve additional energy savings by dimming during scheduled portions of the night. The dimming profile will automatically take effect after a "dusk-to-dawn" period has been calculated from the photocontrol input. Specify the desired dimming profile for a simple, factory-shipped dimming solution requiring no external control wiring. Reference the After Hours Dim supplemental guide for additional information.

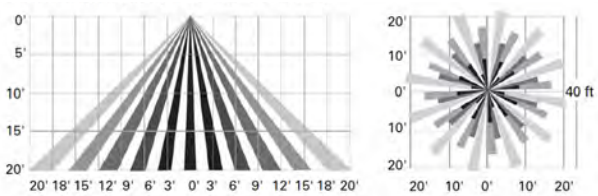
Dimming Occupancy Sensor (SPB)
These passive infrared (PIR) sensors are factory installed in the luminaire housing. When the SPB sensor option is selected, the occupancy sensor is connected to a dimming driver and the entire luminaire dims when no motion is detected. After a period of time, the luminaire turns off, and when motion is detected, the luminaire returns to full light output. The SPB sensor default parameters are listed in the table below, and can be configured utilizing the Sensor Configuration mobile application for iOS and Android devices. The SPB/X is configured to control only the specified number of light squares. An integral photocontrol can be activated with the app for "dusk-to-dawn" control or daylight harvesting - the factory default is off. Three sensor lenses are available to optimize the coverage pattern for mounting heights from 8'-40'. Four sensor colors are available; Bronze, Black, Gray and White, and are automatically selected based on the luminaire finish as indicated by the table below.

SPB sensor finish matched to luminaire finish		
Luminaire Finish		SPB Sensor Finish
WH	White	White
BK	Black	Black
GM	Graphite Metallic	Black
BZ	Bronze	Bronze
AP	Gray	Gray
DP	Dark Platinum	Gray

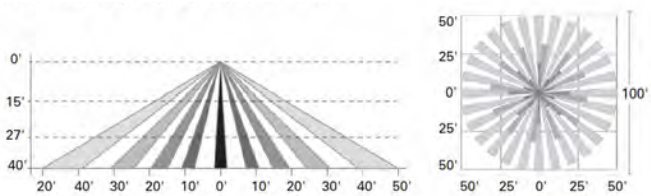
SPB/X Availability Table	
Fixture Square Count	Available SPB/X Square Count
1	Not Available
2	Not Available
3	Not Available
4	2
5	2 or 3
6	3
7	2, 3, 4 or 5
8	2, 3, 5 or 6
9	3 or 6

WaveLinx Wireless Control and Monitoring System
Operates on a wireless mesh network based on IEEE 802.15.4 standards enabling wireless control of outdoor lighting. WaveLinx and WaveLinx Lite sensors utilize the Zhaga Book 18 compliant 4-PIN receptacle (ZD or ZW), while the WOLC control module utilizes a 7-PIN receptacle. ZW option provides 4-PIN receptacle and control module to enable future installation of WaveLinx sensors. ZD option provides 4-PIN receptacle and sensor-ready (SR) driver to enable future installation of WaveLinx sensors, power monitoring, and advanced functionality. WaveLinx (SWPD4 to SWPD5) outdoor wireless sensors offer passive infrared (PIR) occupancy and photocell for closed loop daylight harvesting, and can be factory or field-installed. Sensors are factory preset to dim down to 50% after 15 minutes of no motion detected. Two lens options are available for mounting heights of 7' to 40'. Use the WaveLinx mobile application for set-up and configuration. At least one Wireless Area Controller (WAC) is required for full functionality and remote communication (including adjustment of any factory pre-sets). WaveLinx Lite (WOF and WOB) outdoor wireless sensors provide PIR occupancy and photocell for closed loop daylight harvesting, and can be factory or field-installed. Sensors are factory preset to dim down to 50% after 15 minutes of no motion detected. Two lens options are available for mounting heights of 7' to 40'. Use the WaveLinx Lite mobile application for set-up and configuration. WAC not required. WaveLinx Outdoor Control Module (WOLC-7P-10A) accessory provides a photocontrol enabling astronomic or time-based schedules to provide ON, OFF and dimming control of fixtures utilizing a 7-PIN receptacle. The out-of-box functionality is ON at dusk and OFF at dawn.

For mounting heights up to 15' (SWPD4 and WOB)



For mounting heights up to 40' (SWPD5 and WOF)



LumenSafe Integrated Network Security Camera (LD)
Cooper Lighting Solutions brings ease of camera deployment to a whole new level. No additional wiring is needed beyond providing line power to the luminaire. A variety of networking options allows security integrators to design the optimal solution for active surveillance. As the ideal solution to meet the needs for active surveillance, the LumenSafe integrated network camera is a streamlined, outdoor-ready fixed dome that provides HDTV 1080p video. This IP camera is optimally designed for deployment in the video management system or security software platform of choice.

Synapse (DIM10)
SimplySNAP integrated wireless controls system by Synapse. Includes factory installed DIM10 Synapse control module and MS/DC motion sensor; requires additional Synapse system components for operation. Contact Synapse at www.synapsewireless.com for product support, warranty and terms and conditions.

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Specifications and dimensions
subject to change without notice.

Submitted by Clarus Lighting & Controls

Job Name:
456 E. CADY STREET
Architect: O/X Studio (Ann Arbor)
General Contractor: Schonsheck Inc (Wixom)

Catalog Number:
SSS20B4-4-D190-BA

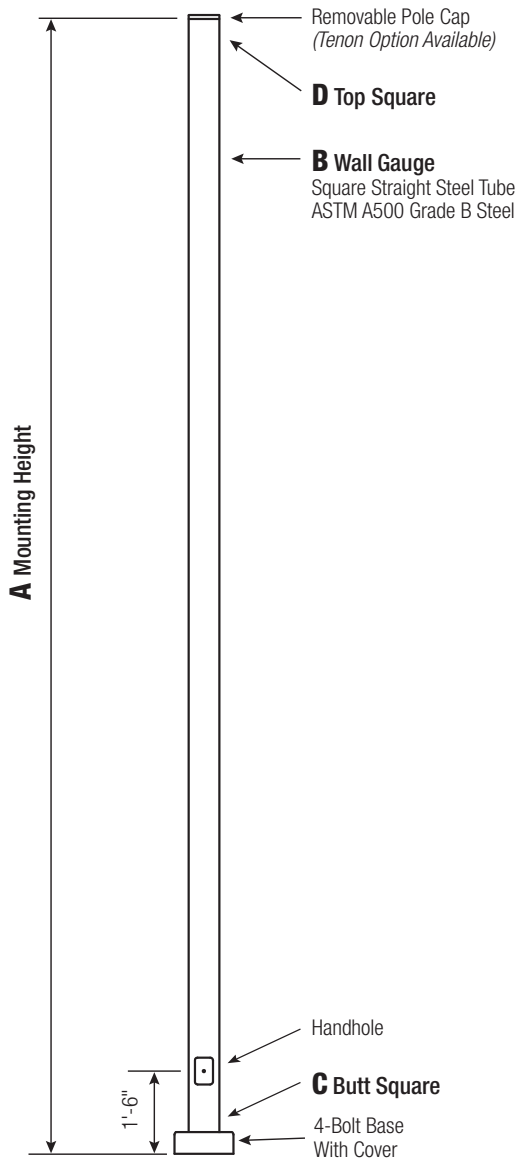
Notes:

Type:
SA2C-SL4-HSS-1

CLC21-87942

SSS

Square Straight Steel Pole
No Arm — 4-Bolt Base



Powder Coated, Galvanized or Powder Coated over Galvanized Finish Per Customer Specification.

C Butt Sq.	D Top Sq.	F Bolt Cir. Dia.	G Base Sq.	H Bolt Proj.	I Bolt Size
4 *(11 Gauge)*	4	8 - 9	8	3.75	.75 x 17 x 3
4 *(7 Gauge)*	4	8 - 9	8	3.75	.75 x 30 x 3
5 *(11 Gauge)**	5	10 - 12	11	4.875	.75 x 30 x 3
5 *(7 Gauge)*	5	10 - 12	11	4.875	1 x 36 x 4
6	6	11 - 13	12.5	4.875	1 x 36 x 4

**Requires the use of oversized washers (provided).*

Dimensions in Inches

Pole

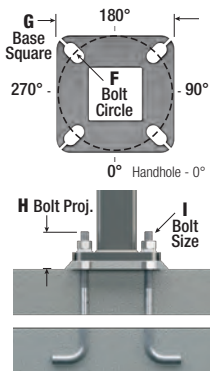
Pole shaft shall be weldable-grade, cold-rolled, commercial quality carbon steel tubing conforming to ASTM A500 Grade B. Options include 11 gauge and 7 gauge. All welds shall conform to AWS D1.1 using ER70S-6 electrodes.

Base Style

4-Bolt Steel Plate Base Flange of fabricated hot rolled carbon steel conforming to ASTM A36 or equivalent (36 ksi minimum yield) with 2-piece Base Cover and attaching hardware.

Anchorage

Anchorage Kit will include four (4) L-shaped Steel Anchor Bolts conforming to AASHTO M314-90 Grade 55. Ten inches (10") of threaded end will be galvanized per ASTM A153. Kits will contain eight (8) Hex Nuts, four (4) Lock Washers, and eight (8) Flat Washers (all components Galvanized Steel). A paper bolt circle template will be provided.



Handhole

Reinforced, 3" x 5" Handhole with cover, stainless steel screw and backbar. A grounding provision incorporating a tapped 1/2"-13NC hole will be provided.

Base Cover

Square ABS plastic Base Covers are standard on all SSS poles specified in BA-Black, BM-Dark Bronze and BH-White. SSS poles specified in all other colors will be manufactured of metal materials. *Custom specification of SSS square metal style Base Covers in BA, BM and BH powder coated finishes is available.*

Vibration Damper

If determined necessary by Hapco, or if specified by the customer, a first and/or second mode vibration damper will be provided.

WARNING: *Do not install light pole without luminaire.*

Submitted by Clarus Lighting & Controls

Job Name:
456 E. CADY STREET
Architect: O/X Studio (Ann Arbor)
General Contractor: Schonsheck Inc (Wixom)

Catalog Number:
SSS20B4-4-D190-BA

Notes:

Type:
SA2C-SL4-HSS-1

CLC21-87942

A Mtg. Hgt.	B Wall Gauge	C Butt Sq.	Total Lum. Weight	Maximum EPA 90	100	110	120	130	140	Catalog Number
10	11	4	320	25.2	20.0	18.6	15.3	12.7	10.6	SSS10B4-4-**
12	11	4	285	20.6	16.2	14.9	12.1	9.9	8.2	SSS12B4-4-**
14	11	4	255	17.0	13.2	12.1	9.7	7.8	6.3	SSS14B4-4-**
15	11	4	245	15.5	11.9	10.9	8.6	6.8	5.4	SSS15B4-4-**
15	7	4	305	23.4	18.4	17.0	13.8	11.4	9.4	SSS15D4-4-**
16	11	4	235	14.0	10.7	9.7	7.6	5.9	4.6	SSS16B4-4-**
16	7	4	290	21.5	16.8	15.5	12.5	10.2	8.4	SSS16D4-4-**
18	11	4	215	11.3	8.4	7.6	5.7	4.3	3.2	SSS18B4-4-**
18	7	4	265	18.0	13.9	12.8	10.2	8.2	6.6	SSS18D4-4-**
20	11	4	200	9.1	6.5	5.8	4.2	2.9	1.9	SSS20B4-4-**
20	11	5	235	14.1	10.3	9.2	6.8	4.9	3.4	SSS20B5-4-**
20	7	4	240	15.1	11.5	10.5	8.2	6.5	5.0	SSS20D4-4-**
20	7	5	330	26.3	20.3	18.6	14.8	11.9	9.6	SSS20D5-4-**
22	11	4	200	7.2	4.9	4.2	2.8	1.7	0.8	SSS22B4-4-**
22	11	5	215	11.4	8.0	7.1	4.9	3.2	1.9	SSS22B5-4-**
22	7	4	225	12.7	9.5	8.6	6.6	5.0	3.7	SSS22D4-4-**
22	7	5	300	22.4	17.1	15.6	12.2	9.6	7.5	SSS22D5-4-**
25	11	4	200	4.7	2.8	2.2	1.0	-	-	SSS25B4-4-**
25	11	5	200	8.0	5.1	4.3	2.4	1.0	-	SSS25B5-4-**
25	7	4	205	9.7	6.9	6.2	4.4	3.1	2.0	SSS25D4-4-**
25	7	5	260	17.7	13.2	11.9	9.0	6.7	4.9	SSS25D5-4-**
28	11	4	200	2.6	1.0	-	-	-	-	SSS28B4-4-**
28	11	5	200	5.1	2.6	1.9	-	-	-	SSS28B5-4-**
28	7	4	200	7.1	4.8	4.1	2.6	1.5	-	SSS28D4-4-**
28	7	5	235	13.9	9.9	8.8	6.3	4.3	2.7	SSS28D5-4-**
30	11	5	200	3.4	1.1	-	-	-	-	SSS30B5-4-**
30	7	4	200	5.6	3.5	2.9	1.6	-	-	SSS30D4-4-**
30	7	5	215	11.7	8.0	7.0	4.7	2.9	1.5	SSS30D5-4-**
30	7	6	275	19.2	13.7	12.2	8.7	5.9	3.8	SSS30D6-4-**
35	7	5	200	6.9	4.0	3.1	1.2	-	-	SSS35D5-4-**
35	7	6	220	12.6	8.0	6.8	3.9	1.6	-	SSS35D6-4-**
39	7	6	200	8.2	4.2	3.1	0.6	-	-	SSS39D6-4-**

Catalog Number System

The catalog number for Hapco poles utilizes the following identification system.

MOUNTING HEIGHT | BUTT SQ. | BASE STYLE | FINISH

S S S _ _ _ - 4 - _ _ _ - _ _

SHAFT ASSEMBLY | WALL GAUGE | TOP SQ. | ACCESORIES OPTIONS

Catalog Number Example -

SSS 20 D 5 - 4 – BA

Square Straight Steel, 20' Mounting Height, 7 Gauge, 5" Butt Square, No Taper, 4-Bolt Base, Black Powder Coat Finish.

EPA Notes:

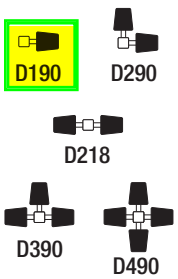
Effective Projected Area (EPA) in square feet. EPA's calculated using wind velocity (mph) indicated in accordance with 2009 AASHTO LTS-5 using a 25-year design life. Maximum EPA is based on the luminaire weight shown. Increased luminaire weight may reduce the maximum EPA. If weight is exceeded, or if other design life or code is required, please consult the factory.

Mounting Options

Side Drill Mount
Includes removable pole cap.
NOTE: A luminaire drilling template must be supplied at time of order.

Tenon Mount
For Tenon Mount applications specify both Tenon diameter and length.

Drill Mount Options



Electrical Box

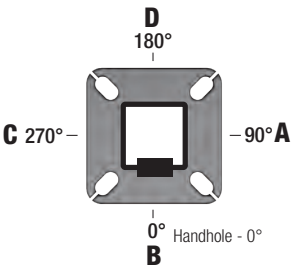
Box Only

GF1
Duplex GFI Receptacle *with Cover*

GF2
Duplex GFI *with In-Use Cover*

Note: *GFI Options must be specified in Accessories.*

Pole Orientation



SSS _ _ _ _ - 4 - _ _ _ _ - _ _ - _ _ - _ _

SSS- Square Straight Steel Pole

Height	Gauge	Butt Sq.	Top Sq.	Base Style
10 = 10' **12** = 12' **14** = 14' **16** = 16' **18** = 18' **20** = 20' **22** = 22' **25** = 25' **28** = 28' **30** = 30' **35** = 35' **39** = 39'	**B** = 11 Gauge **D** = 7 Gauge	**4** = 4" **5** = 5" **6** = 6"	"-"= No Taper	**4** = 4-Bolt Base

Mounting Options

DRILL MOUNT
D000 - No Drilling
D190 - Std. "A"
D290 - Std. "A" & "D"
D218 - Std. "A" & "C"
D390 - Std. "A", "D", & "C"
D490 - Std. "A", "B", "C", & "D"
DCUS - Custom*

TENON
T204 - 2-3/8" O.D. x 4"
T304 - 2-7/8" O.D. x 4"
T356 - 3-1/2" O.D. x 6"
T406 - 4" O.D. x 6"
TCUS - Custom Tenon**

** Specify Number and Orientation*
*** Specify O.D. and Height*

Electrical Box*

FA - 30" Up, "D"
FB - 30" Up, "B"
FC - 30" Up, "A"
FD - 30" Up, "C"
FE - 36" Up, "D"
FF - 36" Up, "B"
FG - 36" Up, "A"
FH - 36" Up, "C"
FI - 24" Up, "D"
FK - 24" Up, "A"
FL - 24" Up, "C"
FZ - Custom**

** GFI Receptacle Options Available (Specify in Accessories)*
*** Specify Height and Orientation*

Accessories/Options*

C12 - Threaded 1/2" Coupling**
C34 - Threaded 3/4" Coupling**
C10 - Threaded 1" Coupling**
EHH - Extra Handhole**
GF1 - Duplex GFI Receptacle *(WR) with Cover*
GF2 - Duplex GFI *(WR) with In-Use Cover*
LAB - Less Anchor Bolts
LPC - Less Pole Cap
PAB - Pre-shipped Anchor Bolts
VD1 - Vib. Damper - 1st Mode
VD2 - Vib. Damper - 2nd Mode

** Add all that apply (Example: CPL-LAB-VD1)*
*** Specify Location*

Finish

POWDER COAT COLORS
BA - Black Powder Coat
BH - White Powder Coat
BM - Dark Bronze Powder Coat
BV - Dark Green Powder Coat
GC - Gray Powder Coat
XX - Special Colors*

GALVANIZED
1Q - Galvanized Only
1C - Black PC Over Galv.
1D - White PC Over Galv.
1B - D. Bronze PC Over Galv.
1Y - D. Green PC Over Galv.
1J - Gray PC Over Galv.
XX - Special PC Over Galv.*

** Provide RAL # or Sample Color Chip*

SSS- Square Straight Steel Pole | No Arm | 4-Bolt Base

Project		Catalog #		Type	
Prepared by		Notes		Date	

McGraw-Edison

GWC Galleon Wall

Wall Mount Luminaire

Typical Applications

Exterior Wall • Walkway

Interactive Menu

- Ordering Information page 2
- Product Specifications page 2
- Optical Configurations page 3
- Energy and Performance Data page 4
- Control Options page 6

Product Certifications

DLC LISTED · DLC QPL PREMIUM · ISO 9001 CERTIFIED · UL CERTIFIED · FC CLASS A · IP66 · ida DARK SKY APPROVED · 5 YEAR LIMITED WARRANTY · Light ARchitect™

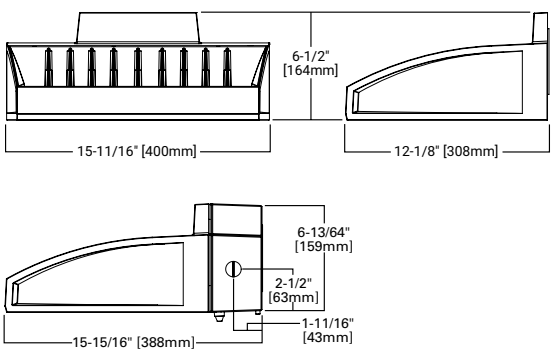
Quick Facts

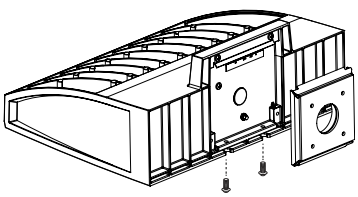
- Choice of thirteen high-efficiency, patented AccuLED Optics™
- Downward and inverted wall mounting configurations
- Eight lumen packages from 3,215 up to 17,056
- Efficacies up to 154 lumens per watt

Connected Systems

- WaveLinx
- Enlighted

Dimensional Details





McGraw-Edison — GWC Galleon Wall

Ordering Information

SAMPLE NUMBER: **GWC-SA2C-740-U-T4FT-GM**

Product Family [1]	Light Engine: Configuration	Light Engine: Drive Current	Color Temperature	Voltage	Distribution	Finish
GWC=Galleon Wall	**SA1**=1 Square **SA2**=2 Squares [2]	**A**=615mA **B**=800mA **C**=1000mA **D**=1200mA [4]	**722**=70CRI, 2200K **727**=70CRI, 2700K **730**=70CRI, 3000K **735**=70CRI, 3500K **740**=70CRI, 4000K **750**=70CRI, 5000K **760**=70CRI, 6000K **827**=80CRI, 2700K **830**=80CRI, 3000K **AMB**=Amber, 590nm [3, 4]	**U**=120-277V **1**=120V **2**=208V **3**=240V **4**=277V **8**=480V [6,7] **9**=347V [6]	**T2**=Type II **T3**=Type III **T4FT**=Type IV Forward Throw **T4W**=Type IV Wide **SL2**=Type II w/Spill Control **SL3**=Type III w/Spill Control **SL4**=Type IV w/Spill Control **SLL**=90° Spill Light Eliminator Left **SLR**=90° Spill Light Eliminator Right **RW**=Rectangular Wide Type I **5NQ**=Type V Square Narrow **5MQ**=Type V Square Medium **5WQ**=Type V Square Wide	**AP**=Grey **BZ**=Bronze **BK**=Black **DP**=Dark Platinum **GM**=Graphite Metallic **WH**=White

Options (Add as Suffix)	**Controls and Systems Options** (Add as Suffix)	**Accessories** (Order Separately)
F=Single Fused (120, 277 or 347V. Must Specify Voltage) **FF**=Double Fused (208, 240 or 480V. Must Specify Voltage) **10K**=10kV Surge Module **20K**=Series 20kV UL 1449 Surge Protective Device **DIM**=External 0-10V Dimming Leads [9, 10] **CBP**=Battery Pack with Back Box, Cold Weather Rated [2, 4, 14, 33] **CBP-CEC**=Battery Pack with Back Box, Cold Weather Rated, CEC compliant [2, 4, 14] **L90**=Optics Rotated 90° Left **R90**=Optics Rotated 90° Right **HSS**=Factory Installed House Side Shield [23] **GRSBK**=Factory Installed Glare Shield, BK [4, 27] **GRSWH**=Factory Installed Glare Shield, WH [4, 27] **UPL**=Uplight Housing [13] **HA**=50°C High Ambient [12] **LCF**=Light Square Trim Plate Painted to Match Housing [22] **MT**=Factory Installed Mesh Top **CC**=Coastal Construction finish [5] **CE**=CE Marking and Small Terminal Block [24] **AHD145**=After Hours Dim, 5 Hours [16] **AHD245**=After Hours Dim, 6 Hours [16] **AHD255**=After Hours Dim, 7 Hours [16] **AHD355**=After Hours Dim, 8 Hours [16] **DALI**=DALI Driver [11]	**BPC**=Button Type Photocontrol (120, 208, 240 or 277V. Must Specify Voltage) **PR**=NEMA 3-PIN Twistlock Photocontrol Receptacle **PR7**=NEMA 7-PIN Twistlock Photocontrol Receptacle [15] **SPB1**=Dimming Occupancy Sensor with Bluetooth Interface, <8' Mounting [19,34] **SPB2**=Dimming Occupancy Sensor with Bluetooth Interface, 8' - 20' Mounting [19,34] **SPB4**=Dimming Occupancy Sensor with Bluetooth Interface, 21' - 40' Mounting [19,34] **MS-LXX**=Motion Sensor for On/Off Operation [17, 18, 19] **MS/DIM-LXX**=Motion Sensor for Dimming Operation [17, 18, 19] **ZW**=WaveLinx-enabled 4-PIN Twistlock Receptacle [29, 30] **ZD**=WaveLinx Module with DALI driver and 4-PIN Receptacle [29, 30] **SWPD4XX**=WaveLinx Sensor Only, 7'-15' [31, 32] **SWPD5XX**=WaveLinx Sensor Only, 15'-40' [31, 32] **WOBXX**=WaveLinx Sensor with Bluetooth, 7'-15' [31, 32] **WOFXX**=WaveLinx Sensor with Bluetooth, 15'-40' [31, 32] **LWR-LW**=Enlighted Wireless Sensor, Wide Lens for 8'-16' Mounting Height [19, 20, 21] **LWR-LN**=Enlighted Wireless Sensor, Narrow Lens for 16'-40' Mounting Height [19, 20, 21]	**OA/RA1013**=Photocontrol Shorting Cap [28] **OA/RA1016**=NEMA Photocontrol - Multi-Tap 105-285V [28] **OA/RA1201**=NEMA Photocontrol - 347V [28] **OA/RA1027**=NEMA Photocontrol - 480V [28] **MA1252**=10kV Circuit Module Replacement **MA1059XX**=Thru-branch Back Box (Must Specify Color) **LS/HSS**=Field Installed House Side Shield [23, 25] **LS/GRSBK**=Glare Shield, Black [8, 25, 27] **LS/GRSWH**=Glare Shield, White [8, 25, 27] **LS/PFS**=Perimeter Shield, Black **FSIR-100**=Wireless Configuration Tool for Occupancy Sensor [17] **WOLC-7P-10A**=WaveLinx Outdoor Control Module (7-pin) [26, 29] **SWPD4-XX**=Wavelinx Wireless Sensor, 7' – 15' Mounting Height [29, 30, 31, 32] **SWPD5-XX**=Wavelinx Wireless Sensor, 15' – 40' Mounting Height [29, 30, 31, 32]

NOTES:

1. DesignLight Consortium® Qualified. Refer to www.designlights.org, Qualified Products List under Family Models for details.
2. Two light squares with CBP options limited to 25°C. Not available in combination with sensor options at 1200mA.
3. Narrow-band 590nm +/- 5nm for wildlife and observatory use. Choose drive current A; supplied at 500mA drive current only. Available with 5WQ, 5MQ, SL2, SL3 and SL4 distributions. Can be used with HSS option.
4. Not available with HA option.
5. Coastal construction finish salt spray tested to over 5,000-hours per ASTM B117, with a scribe rating of 9 per ASTM D1654.
6. Require the use of a step down transformer. Not available in combination with sensor options at 1200mA.
7. 480V must use Wye system only. Per NEC, not for use with ungrounded systems, impedance grounded systems or corner grounded systems (commonly known as Three Phase Three Wire Delta, Three Phase High Leg Delta and Three Phase Corner Grounded Delta systems).
8. Reserved.
9. Cannot be used with other control options.
10. Low voltage control leads extended 18" from fixture.
11. Not available in 1200mA. When used with CBP or HA options, only available with single light square.
12. Not available in 1200mA, UPL or CBP options. Available with single light square.
13. Not available with SL2, SL3, SL4, HA, CBP, PR or PR7 options.
14. Operates a single light square only. Operates at -20°C to +40°C. Backbox is non-IP rated. Control option limited to BPC.
15. Compatible with standard 3-PIN photocontrols, 5-PIN or 7-PIN ANSI controls.
16. Requires the use of BPC photocontrol or the PR7 or PR photocontrol receptacle with photocontrol accessory. See After Hours Dim supplemental guide for additional information.
17. The FSIR-100 configuration tool is required to adjust parameters such as high and low modes, sensitivity, time delay and cutoff. Consult your lighting representative at Cooper Lighting Solutions for more information.
18. Replace LXX with L08 (<8' mounting), L20 (8'-20' mounting) or L40W (21'-40' mounting.)
19. Includes integral photosensor.
20. Enlighted wireless sensors are factory installed requiring network components in appropriate quantities.
21. White sensor shipped on all housing color options.
22. Not available with HSS or GRS options.
23. Not for use with 5NQ, 5MQ, 5WQ or RW optics. The light square trim plate is painted black when the HSS option is selected.
24. CE is not available with the 1200, DALI, LWR, MS, MS/DIM, BPC, PR or PR7 options. Available in 120-277V only.
25. One required for each light square.
26. Requires PR7.
27. Not for use with T4FT, T4W or SL4 optics.
29. Cannot be used in conjunction with additional photocontrol or other controls systems (BPC, PR, PR7, MS, LWR).
30. WAC Gateway required to enable field-configurability: Order WAC-PoE and WPOE-120 (10V to PoE injector) power supply if needed.
31. Requires ZW or ZD receptacle.
32. Replace XX with sensor color (WH, BZ, or BK).
33. Specify 120V or 277V.
34. Smart device with mobile application required to change system defaults. See controls section for details.

Product Specifications

Construction
- Driver enclosure thermally isolated from optics for optimal thermal performance
- Die-cast aluminum heat sinks
- IP66 rated housing
- 1.5G vibration rated

Optics
- Patented, high-efficiency injection-molded AccuLED Optics technology
- 13 optical distributions
- IDA Certified (3000K CCT and warmer only)

Electrical
- LED driver assembly mounted for ease of maintenance
- Standard with 0-10V dimming
- Optional 10kV or 20kV surge module
- Suitable for operation in -40C to 40C ambient environments. Optional 50C high ambient (HA) configuration.

Mounting
- Gasketed and zinc plated rigid steel mounting attachment
- "Hook-N-Lock" mechanism for easy installation

Finish
- Housing finished in super durable TGIC polyester powder coat paint, 2.5 mil nominal thickness
- Heat sink is powder coated black
- RAL and custom color matches available
- Coastal Construction (CC) option available

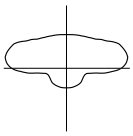
Warranty
- Five-year warranty

McGraw-Edison — GWC Galleon Wall

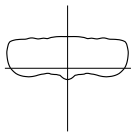
Optical Distributions

Asymmetric Area Distributions

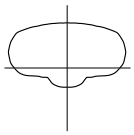
T2 (Type II)



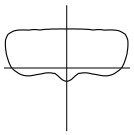
SL2 (Type II with Spill Control)



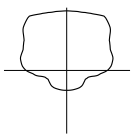
T3 (Type III)



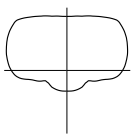
SL3 (Type III with Spill Control)



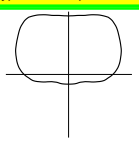
T4FT (Type IV Forward Throw)



T4W (Type IV Wide)

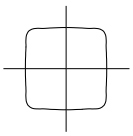


SL4 (Type IV with Spill Control)

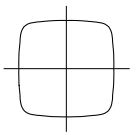


Symmetric Distributions

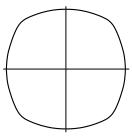
5NQ (Type V Square Narrow)



5MQ (Type V Square Medium)

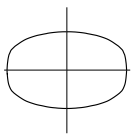


5WQ (Type V Square Wide)

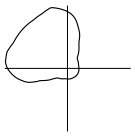


Specialized Distributions

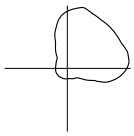
RW (Rectangular Wide Type I)



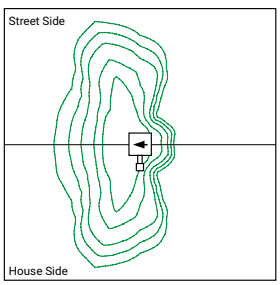
SLL (90° Spill Light Eliminator Left)



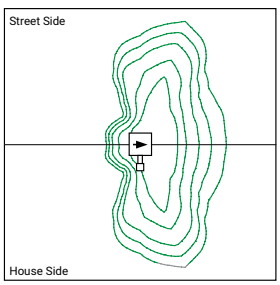
SLR (90° Spill Light Eliminator Right)



Optic Orientation



Optics Rotated Left @ 90° [L90]



Optics Rotated Right @ 90° [R90]

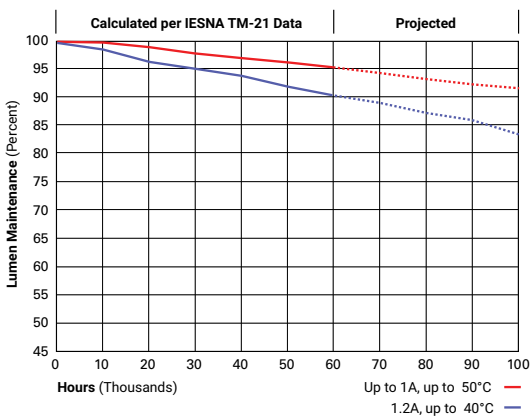
Energy and Performance Data

Lumen Multiplier

Ambient Temperature	Lumen Multiplier
0ºC	1.02
10ºC	1.01
25ºC	1.00
40ºC	0.99
50ºC	0.97

Lumen Maintenance

Drive Current	Ambient Temperature	TM-21 Lumen Maintenance (60,000 Hours)	Projected L70 (Hours)
Up to 1A	Up to 50°C	> 95%	> 416,000
1.2A	Up to 40°C	> 90%	> 205,000



McGraw-Edison — GWC Galleon Wall

Energy and Performance Data

View GWC Galleon Wall IES files

4000K/5000K/6000K CCT, 70 CRI

Number of Light Squares		1				2			
Drive Current		615mA	800mA	1050mA	1.2A	615mA	800mA	1050mA	1.2A
Nominal Power (Watts)		34	44	59	67	66	86	113	129
Input Current @ 120V (A)		0.30	0.39	0.51	0.58	0.58	0.77	1.02	1.16
Input Current @ 208V (A)		0.17	0.22	0.29	0.33	0.34	0.44	0.56	0.63
Input Current @ 240V (A)		0.15	0.19	0.26	0.29	0.30	0.38	0.48	0.55
Input Current @ 277V (A)		0.14	0.17	0.23	0.25	0.28	0.36	0.42	0.48
Input Current @ 347V (A)		0.11	0.15	0.17	0.20	0.19	0.24	0.32	0.39
Input Current @ 480V (A)		0.08	0.11	0.14	0.15	0.15	0.18	0.24	0.30
Optics									
T2	Lumens	4,883	5,989	7,412	8,131	9,543	11,703	14,485	15,891
	BUG Rating	B1-U0-G1	B1-U0-G2	B1-U0-G2	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G3	B2-U0-G3
	Lumens per Watt	144	136	126	121	145	136	128	123
T3	Lumens	4,978	6,105	7,556	8,288	9,729	11,929	14,764	16,196
	BUG Rating	B1-U0-G1	B1-U0-G2	B1-U0-G2	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G3
	Lumens per Watt	146	139	128	124	147	139	131	126
T4FT	Lumens	5,008	6,140	7,599	8,337	9,783	11,998	14,850	16,290
	BUG Rating	B1-U0-G2	B1-U0-G2	B1-U0-G3	B1-U0-G3	B2-U0-G3	B2-U0-G3	B2-U0-G3	B2-U0-G3
	Lumens per Watt	147	140	129	124	148	140	131	126
T4W	Lumens	4,942	6,060	7,502	8,229	9,658	11,843	14,658	16,080
	BUG Rating	B1-U0-G2	B1-U0-G2	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3
	Lumens per Watt	145	138	127	123	146	138	130	125
SL2	Lumens	4,874	5,979	7,399	8,117	9,528	11,684	14,461	15,863
	BUG Rating	B1-U0-G2	B1-U0-G2	B1-U0-G2	B2-U0-G3	B2-U0-G3	B2-U0-G3	B2-U0-G3	B3-U0-G3
	Lumens per Watt	143	136	125	121	144	136	128	123
SL3	Lumens	4,976	6,104	7,555	8,287	9,727	11,927	14,763	16,194
	BUG Rating	B1-U0-G2	B1-U0-G2	B1-U0-G2	B1-U0-G3	B1-U0-G3	B2-U0-G3	B2-U0-G3	B2-U0-G3
	Lumens per Watt	146	139	128	124	147	139	131	126
SL4	Lumens	4,729	5,799	7,178	7,873	9,239	11,333	14,025	15,387
	BUG Rating	B1-U0-G2	B1-U0-G2	B1-U0-G3	B1-U0-G3	B1-U0-G3	B1-U0-G3	B2-U0-G4	B2-U0-G4
	Lumens per Watt	139	132	122	118	140	132	124	119
5NQ	Lumens	5,134	6,296	7,793	8,547	10,033	12,303	15,226	16,704
	BUG Rating	B2-U0-G1	B2-U0-G1	B3-U0-G1	B3-U0-G1	B3-U0-G1	B3-U0-G1	B3-U0-G2	B3-U0-G2
	Lumens per Watt	151	143	132	128	152	143	135	129
5MQ	Lumens	5,228	6,412	7,935	8,705	10,216	12,529	15,508	17,011
	BUG Rating	B3-U0-G1	B3-U0-G1	B3-U0-G2	B3-U0-G2	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2
	Lumens per Watt	154	146	134	130	155	146	137	132
5WQ	Lumens	5,242	6,428	7,956	8,728	10,244	12,563	15,548	17,056
	BUG Rating	B3-U0-G1	B3-U0-G2	B3-U0-G2	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2
	Lumens per Watt	154	146	135	130	155	146	138	132
SLL/SLR	Lumens	4,373	5,365	6,640	7,283	8,547	10,481	12,973	14,231
	BUG Rating	B1-U0-G2	B1-U0-G2	B1-U0-G2	B1-U0-G3	B1-U0-G3	B2-U0-G3	B2-U0-G3	B2-U0-G3
	Lumens per Watt	129	122	113	109	130	122	115	110
RW	Lumens	5,087	6,238	7,721	8,472	9,941	12,190	15,088	16,553
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G1	B3-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2
	Lumens per Watt	150	142	131	126	151	142	134	128

*** Nominal lumen data for 70 CRI. BUG rating for 4000K/5000K. Refer to IES files for 3000K BUG ratings.**

McGraw-Edison — GWC Galleon Wall

Control Options

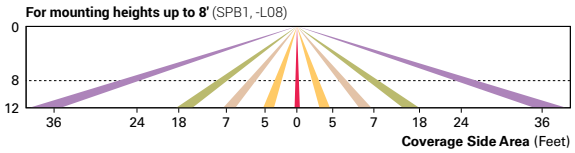
0-10V This fixture is offered standard with 0-10V dimming driver(s). The DIM option provides 0-10V dimming wire leads for use with a lighting control panel or other control method.

Photocontrol (BPC, PR, and PR7) Optional button-type photocontrol (BPC) and photocontrol receptacles (PR and PR7) provide a flexible solution to enable "dusk-to-dawn" lighting by sensing light levels. Advanced control systems compatible with NEMA 7-pin standards can be utilized with the PR7 receptacle.

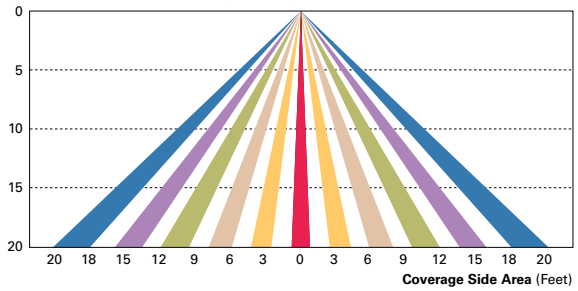
After Hours Dim (AHD) This feature allows photocontrol-enabled luminaires to achieve additional energy savings by dimming during scheduled portions of the night. The dimming profile will automatically take effect after a "dusk-to-dawn" period has been calculated from the photocontrol input. Specify the desired dimming profile for a simple, factory-shipped dimming solution requiring no external control wiring. Reference the After Hours Dim supplemental guide for additional information.

Dimming Occupancy Sensor (SPB, MS/DIM-LXX and MS-LXX) These sensors are factory installed in the luminaire housing. When the SPB or MS/DIM sensor options are selected, the occupancy sensor is connected to a dimming driver and the entire luminaire dims when there is no activity detected. When activity is detected, the luminaire returns to full light output. The MS/DIM sensor is factory preset to dim down to approximately 50 percent power with a time delay of five minutes. The MS-LXX sensor is factory preset to turn the luminaire off after five minutes of no activity. SPB motion sensors require the Sensor Configuration mobile application by Wattstopper to change factory default dimming level, time delay, sensitivity and other parameters. Available for iOS and Android devices. The SPB sensor is factory preset to dim down to approximately 10% power with a time delay of five minutes. The MS/DIM occupancy sensors require the FSIR-100 programming tool to adjust factory defaults.

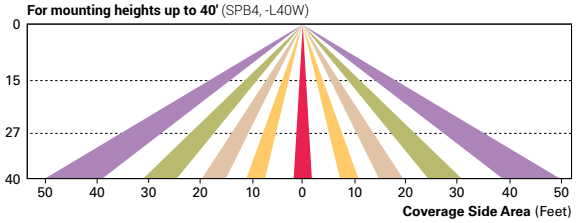
For mounting heights up to 8' (SPB1, -L08)



For mounting heights up to 20' (SPB2, -L20)

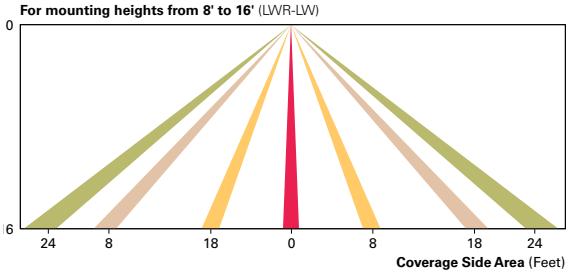


For mounting heights up to 40' (SPB4, -L40W)

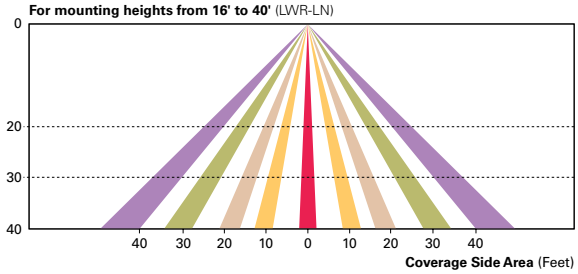


Enlighted Wireless Control and Monitoring System (LWR-LW and LWR-LN) The Enlighted control system is a connected lighting solution, combining LED luminaires with an integrated wireless sensor system. The sensor controls the lighting system in compliance with the latest energy codes while collecting valuable data about building performance and use. Software applications utilizing energy dashboards maximize data inputs to help optimize the use of other resources beyond lighting.

For mounting heights from 8' to 16' (LWR-LW)



For mounting heights from 16' to 40' (LWR-LN)



WaveLinx Wireless Outdoor Lighting Control Module (WOLC-7P-10A) The 7-pin wireless outdoor lighting control module enables WaveLinx to control outdoor area, site and flood lighting. WaveLinx controls outdoor lighting using schedules to provide ON, OFF and dimming controls based on astronomic or time schedules based on a 7 day week.

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Specifications and dimensions subject to change without notice.

From: Mike Domine
To: Dianne Massa
Subject: Fwd: 456 Cady, Foundry Flask, Enviro Letter No STM Infiltration
Date: Wednesday, December 15, 2021 4:34:18 PM

Thanks,
Mike Domine

Begin forwarded message:

> **From:** Mike Domine <mdomine@ci.northville.mi.us>
> **Date:** December 14, 2021 at 2:09:50 PM EST
> **To:** Nicholas Bayley <Nicholas.Bayley@ohm-advisors.com>
> **Cc:** George Tsakoff <George.Tsakoff@ohm-advisors.com>
> **Subject: Re: 456 Cady, Foundry Flask, Enviro Letter No STM Infiltration**
>
> Sounds good! Thanks!
>
> Thanks,
> Mike Domine
>
>> On Dec 14, 2021, at 9:00 AM, Nicholas Bayley <Nicholas.Bayley@ohm-advisors.com> wrote:
>>
>> Hello Mike
>>
>> I don't believe that Wayne County will require infiltration on this site given the environmental soil contamination. A letter from Wayne DPS would confirm this. I don't believe a letter from OHM representing the City will provide much additional information to the Planning Commission.
>>
>> I trust that the Brownfield Redevelopment Committee will be provided a copy of the proposed environmental cleanup plan outlining what remediation effort if any will be undertaken prior to construction.
>>
>> Sincerely;
>>
>> **NICHOLAS** BAYLEY | **OHM** Advisors®
>> PROJECT MANAGER

D (734) 466-4538 **C** (734) 709-9392 **O** (734) 522-6711
nicholas.bayley@ohm-advisors.com | OHM-Advisors.com

From: Dianne Massa <dmassa@ci.northville.mi.us>
Sent: Tuesday, December 14, 2021 8:45 AM
To: Bob Emerine <be@seiberkeast.com>
Cc: selmiger <selmiger@cwaplan.com>; Nicholas Bayley <Nicholas.Bayley@ohm-advisors.com>; Mike Domine <mdomine@ci.northville.mi.us>
Subject: RE: Foundry Flask

This Message originated outside your organization.

Greetings:

This letter was not included in the paper packet submission OR the electronic files provided. We will add to the packets and files. I have printed the letter so 15 copies are not needed.

Mike and Nicholas: Does this letter require a review memo from OHM? If yes, I will need that memo by 8am Dec 16 (Thursday).

Thanks!

Sincerely,

Dianne Massa

Dianne Massa, CMC
City Clerk

City of Northville
215 W. Main Street
Northville, MI 48167
Phone: 248-349-1300
Fax: 248-305-2891

Sign up for City News, a weekly e-newsletter for the community. https://tinyurl.com/tld3opr

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From: Bob Emerine <be@seiberkeast.com>
Sent: Monday, December 13, 2021 5:22 PM
To: Dianne Massa <dmassa@ci.northville.mi.us>
Cc: selmiger <selmiger@cwaplan.com>; Nicholas Bayley <Nicholas.Bayley@ohm-advisors.com>; Mike Domine

<mdomine@ci.northville.mi.us>
Subject: Foundry Flask

Hi Dianne,

I was just speaking with Sally about the Foundry Flask submittal, and she noted a letter from the Environmental Consultant, ASTI, appeared to be missing from her submittal package. I sent her the attached letter that discussed why we cannot infiltrate water in the underground detention basin. Can you see if it was included in the packet you have on file? If not, can you forward this letter to those who need it for review?

I have included OMH, Nicolas Baily and Mike Domine on this email as well in case their packets did not contain this letter.

If I need to submit 15 hard copies of this letter, please let me know and I will drop them by. Hopefully, it was just missed in Sally's packet.

Regards,
Bob Emerine

Robert J. Emerine, PE
Partner
<image001.jpg>

39205 Country Club Drive, Suite C-8
Farmington Hills, MI 48331
Office: 248.308.3331
C: 248.639.9442

<Letter on Infiltration Basin.pdf>

ASTI ENVIRONMENTAL

Assessment • Remediation • Compliance
Restoration • Incentives

10448 Citation Drive, Suite 100
Brighton, MI 48116

800 395-ASTI
Fax: 810.225.3800

www.asti-env.com

Sent Via Email Only

November 4, 2021

Mr. Kevin Schonsheck
456 Cady, LLC
50555 Pontiac Trail
Wixom, MI 48393

RE: Infiltration Basin at 456 E Cady, Northville, MI (ASTI Project 4-11777)

Dear Mr. Schonsheck:

At your request, ASTI has reviewed use of a stormwater infiltration basin on the property located at 456 E Cady Street, Northville, MI (the Property) as it relates to know contamination. The Property is a former industrial site and investigations to date indicate that impacts of various compounds exceed the generic residential clean-up criteria in soils and fill soils (including Direct Contact Criteria (DC), Particulate Soil Inhalation Criteria (PSIC), Groundwater Surface Water Interface Criteria (GSI), Drinking Water Protection (DWP), and Volatilization to Indoor Air Pathway Screening Levels (VIAP)), and therefore the Property is a facility as defined by Part 201 of Michigan's NREPA, 1994 PA 451, as Amended (Part 201). The Property is overlaid by fill soil up to sixteen feet deep, with groundwater at approximately seven feet below ground surface, and impacts to fill soil have been identified from 1 to 11 feet below ground surface. As such, the fill soils are assumed to heterogeneous, and the identified impacts are not necessarily limited to the locations identified, but are assumed to exist throughout the Property.

Because the Property is a facility, the owner and operator are required to implement due care measures to protect the health and safety of people using the Property . These measures will be addressed by implementation of engineered, administrative, or institution controls and will be documented in a Due Care Plan that is being prepared. But owners and operators have additional affirmative obligations including, but not limited to, preventing exacerbation of existing contamination. This obligation applies to liable and non-liable owners and operators. Depending on the specific site conditions, one example of exacerbation is to increase mobility of contaminates.

According to Part 201, “"Exacerbation" means the occurrence of either of the following caused by an activity undertaken by the person who owns or operates the property, with respect to contamination for which the person is not liable: (i)

Migration of contamination beyond the boundaries of the property that is the source of the release at levels above cleanup criteria for unrestricted residential use…(ii) A change in facility conditions that increases response activity costs" (324.20101 (1)(r)). In addition, "A person who owns or operates property that he or she has knowledge is a facility shall do all of the following with respect to hazardous substances at the facility: (a) Undertake measures as are necessary to prevent exacerbation…" (324.20107a(1)). The reason that this is significant is that "A person who violates subsection (1) who is not otherwise liable under this part for the release at the facility is liable for response activity costs and natural resource damages attributable to any exacerbation…" (324.20107a(3)).

Because of the presence of contaminated fill soils, operation of a stormwater infiltration basin could cause increased mobility of contaminants in those fill soils resulting in increased groundwater impacts and therefore migration off-site, especially where those contaminants exceed GSI or DW criteria. Therefore, we do not recommend use of a stormwater infiltration basin on this Property unless additional investigation, remediation, and documentation are completed. For example, if contaminants in and around the area of the proposed infiltration basin are adequately delineated (including groundwater upgradient and downgradient), no groundwater impacts exist in or downgradient of that area, all impacted fill material is removed from beneath and adjacent to that area (because of changes in EGLE criteria we recommend removing all impacts not just exceedances of criteria, possibly down to native soils), and verification sampling is completed, then sufficient documentation could exist to indicate that exacerbation is unlikely from operation of a stormwater infiltration basin in that specific area of the Property.

I hope that this provides sufficient information to evaluate the impacts of a stormwater infiltration basin to existing contamination on this Property in order to prevent exacerbation. If you have any questions or comments, please do not hesitate to call me at **800.395.ASTI**. We greatly appreciate the opportunity to work with you on this project.

Sincerely yours,

ASTI ENVIRONMENTAL

Thomas Wackerman
President

Warren C. Evans
Wayne County Executive

November 24, 2021

Jim Long
456 Cady, Llc
190 E. Main Street
Northville, MI 48167

RE: **Permit Application for 21-008 456 CADY STREET**
Plan Review Number: R 21-816

Dear Applicant,

The Wayne County Department of Public Services received 3 sets of plans for the above referenced project on Cady in the city of Northville.

A Cashier's Check (# 1616208143) in the amount of $2,500.00, issued from BANK OF AMERICA and dated November 22, 2021, has been received by this office as deposit for plan review costs associated with this project.

Your project has been assigned to Anthony Amaro for review. If you have further questions regarding this review, please contact Mr. Amaro at (734) 858-2768.

Please refer to Plan Review Number: R 21-816 when calling or sending correspondence.

Sincerely,

Wayne County
Department of Public Services

Permit Office

cc: Plan Review File

Permit Assistant v 1.0

FOUNDRY FLASK

456 E. CADY STREET TRAFFIC IMPACT STUDY

NORTHVILLE, MICHIGAN

REVISED OCTOBER 12, 2021

PREPARED BY:

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

27725 STANSBURY BLVD., SUITE 195
FARMINGTON HILLS, MI 48334

F&V Project #851320

© October 2021

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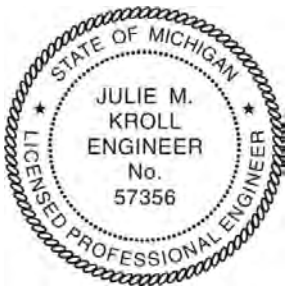
The opinions, findings, and conclusions expressed herein are those of Fleis & VandenBrink Engineering, Inc. and do not necessarily reflect the official views or policy of City of Northville or the Wayne County Department of Public Service (WCDPS), which makes no warranty, either implied or expressed, for the information contained in this document; neither does it assume legal liability or responsibility for the accuracy, completeness or usefulness of this information. Any products, manufacturers or trademarks referenced in this document are used solely for reference purposes.



I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Michigan.

Agency Review	Date	Comments
City of Northville / OHM	10/4/2021	Review Letter Provided

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AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO). (2018). *A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS.* WASHINGTON DC.

FEDERAL HIGHWAY ADMINISTRATION, MICHIGAN DEPARTMENT OF TRANSPORATION, MICHIGAN STATE POLICE. (2011). *MICHIGAN MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.*

INSTITUTE OF TRANSPORTATION ENGINEERS. (2017). *TRIP GENERATION MANUAL, 10TH EDITION.* WASHINGTON DC.

NATIONAL RESEARCH COUNCIL (U.S.) TRANSPORTATION RESEARCH BOARD. (2016). *HIGHWAY CAPACITY MANUAL, 6TH EDITION (HCM6).* WASHINGTON, D.C.: TRANSPORTATION RESEARCH BOARD.

PAPACOSTAS, & PREVEDOUROS. (2001). *TRANSPORTATION ENGINEERING AND PLANNING.*

STOVER, V. G., & KOEPKE, F. J. (2006). *TRANSPORTATION AND LAND DEVELOPMENT* (VOL. 2ND EDITION). WASHINGTON DC: INSTITUTE OF TRANSPORTATION ENGINEERS (ITE).

EXECUTIVE SUMMARY

This report presents the results of a Traffic Impact Study (TIS) for the proposed mixed-use retail and multi-family residential development in City of Northville, Michigan. The project site is located at 456 E. Cady Street, generally in the southeast quadrant of the Cady Street and Griswold Street intersection, on the property that was previously occupied by Foundry Flask site, as shown on **Figure E1**. The proposed development includes the construction of a mixed-use retail and multi-family residential development. Site access is proposed via two (2) driveways on Cady Street, which is under the jurisdiction of the City of Northville.

FIGURE E1: SITE LOCATION

BACKGROUND DATA

The existing weekday turning movement traffic volume data were collected by F&V subconsultant Traffic Data Collection, Inc. (TDC) on Tuesday, May 15, 2018, and Thursday, October 18, 2018 at the following intersections.

- Cady Street & Griswold Street
- Main Street & Griswold Street
- Beal Street & Northville Road
- Beal Street & River Street

An annual growth rate of 0.2% was applied to the 2018 traffic volume data, in order to determine the existing baseline 2021 volumes. Additionally, F&V collected turning movement traffic volume data at the intersection of Main Street and Cady Street on Thursday, August 12, 2021. Due to the impact of COVID-19, the current traffic

volume data is not representative of "typical" operations. Therefore, following COVID adjustment factors were applied to the 2021 turning movement counts at the intersection of Main Street and Cady Street to determine an existing baseline 2021 data.

COVID Traffic Volume Adjustment Factors

Intersection	AM Peak Hour	PM Peak Hour
Cady Street & Main Street	+34%	+44%

In addition, the following background developments identified by the City of Northville were included in the analysis:

- Cady Project – 6-unit condominium (South side of Cady Street, east of Center Street)
- 355 E. Cady St. - 3-story mixed-use building; first floor Retail, office above
- 455 E. Cady St "Hanger Building"- office space

TRIP GENERATION

The number of peak hour (AM and PM), and daily vehicle trips that would be generated by the proposed developments were forecast based on data published in the Institute of Transportation Engineers (ITE) *Trip Generation Manual 10th Edition* and the ITE *Trip Generation Handbook, 3rd Edition*. The trip generation is summarized in **Table E1**. *Note: Pass-by trip reductions were not included in this study to provide a conservative analysis.*

Table E1: Trip Generation Summary

Land Use	ITE Code	Amount	Units	Average Daily Traffic (vpd)	AM Peak Hour (vph)			PM Peak Hour (vph)		
					In	Out	Total	In	Out	Total
Shopping Center	820	10,000	S.F.	1,256	6	3	9	48	51	99
Multi-Family Housing (Mid-Rise)	221	78	D.U.	423	7	20	27	21	14	35
			Total	1,679	13	23	36	69	65	134

A trip generation comparison was performed between the previously proposed Northville Downs Planned Unit Development (PUD) and the Foundry Flask. **Table E2** shows the trip generation comparison and indicates that the proposed development is expected to generate approximately 24% of the overall traffic generated by Northville Downs PUD.

Table E2: Trip Generation Comparison

Development	Average Daily Traffic (vpd)	AM Peak Hour (vph)			PM Peak Hour (vph)		
		In	Out	Total	In	Out	Total
Foundry Flask	1,679	13	23	36	69	65	134
Northville Downs	5,188	58	154	212	183	132	315
Total Trips	*6,867*	*71*	*177*	*248*	*252*	*197*	*449*
Foundry Flask Percentage of Total Trips	24%	18%	13%	15%	27%	33%	30%

SITE TRIP DISTRIBUTION

The vehicular trips that would be generated by the proposed development were assigned to the study roads based on existing peak hour traffic patterns in the adjacent roadway network and the methodologies published by ITE. Separate trip distributions were determined for the commercial (retail) and residential portions of the proposed development. The trip distributions used in this study is summarized in **Table E3**.

Table E3: Trip Distribution

Commercial		To/From	via	Residential	
AM	PM			AM	PM
26%	33%	West	Main Street	29%	22%
18%	5%		Cady Street	6%	10%
22%	32%	North	Griswold Street	35%	28%
34%	30%	South	Northville Road	30%	40%
100%	100%	Total		100%	100%

CONCLUSIONS

The existing peak hour vehicle delays and Levels of Service (LOS) were calculated at the study intersections using Synchro (Version 11) traffic analysis software. The results of the analysis are summarized below.

1. **Existing Conditions:** All study intersection approaches and movements currently operate acceptably at a LOS D or better during both peak periods. A review of SimTraffic network simulations indicates generally acceptable operation during both peak periods; however, microsimulation during the PM peak hour indicate the southbound approach of the intersection of Main Street and Griswold Street experiences occasional periods of long vehicle queues. Mitigation measures were evaluated to reduce the existing vehicle queueing and signal timing optimization was found to be adequate to reduce queues on the southbound approach during the PM peak hour.

2. **Background (2023) Growth:** An annual growth rate of 0.2% per year was determined based on SEMCOG economic and population data. In addition, the following background developments were identified by the City of Northville and were included in this analysis:

   - Cady Project – 6-unit condominium (South side of Cady Street, east of Center Street)
   - 355 E. Cady St. - 3-story mixed-use building; first floor Retail, office above
   - 455 E. Cady St "Hanger Building"- office space

   Background (2023) Conditions: With the addition of the 2023 background traffic, all study intersection approaches and movements are expected to continue operating in a manner similar to existing conditions with occasional periods of long vehicle queues at the southbound approach of Main Street and Griswold Street intersection during the PM peak hour. A review of network simulations indicates that signal timing optimization was observed to reduce vehicle queues on the southbound approach during the PM peak hour in background conditions.

3. **Trip Generation Comparison:** The trip generation of the previously proposed Northville Downs PUD was compared with the proposed Foundry Flask development. The proposed development is expected to generate approximately 24% of the overall traffic generated by Northville Downs PUD.

4. **Future Conditions:** With the addition of the site-generated traffic, all study intersection approaches and movements are expected to continue operating in a manner similar to background conditions. A review of SimTraffic network simulations also indicates similar operations to those observed under existing and background conditions with occasional periods of long vehicle queues at the southbound approach of Main Street and Griswold Street intersection during the PM peak hour.

   However, the signal timing optimization was found to be adequate to reduce vehicle queues on the southbound approach of the Main Street and Griswold Street intersection during the PM peak hour.

RECOMMENDATIONS

1. Optimize the signal timing at the intersection of Main Street and Griswold Street.

1 INTRODUCTION

This report presents the results of a Traffic Impact Study (TIS) for the proposed mixed-use retail and multi-family residential development in the City of Northville, Michigan. The project site is located at 456 E. Cady Street, generally in the southeast quadrant of the Cady Street and Griswold Street intersection, on the property that was previously occupied by Foundry Flask site, as shown in **Figure 1**. The proposed development includes the construction of a mixed-use retail and multi-family residential development. Site access is proposed via two (2) driveways on Cady Street, which is under the jurisdiction of the City of Northville. The developer has provided a Traffic Impact Study (TIS) for the project as part of the site plan approval process.

The purpose of this study is to identify the traffic related impacts, if any, of the proposed development project on the adjacent road network. Specific tasks undertaken for this study include the following:

1. **Study Area**
   a. Provide a description of the study area including: intersection and roadway geometries, speed limits, functional classifications and traffic volume data (where available). In addition, a study area site map showing the site location and the study intersections will also be provided.
2. **Proposed Land Use**
   a. Obtain and review the proposed site plan which includes the proposed land uses, densities, and desired site access locations. A description of the current and proposed land use will be accompanied with a complete project site plan (with buildings identified as to proposed use). A schedule for construction of the development and proposed development stages (if any) will also be provided.
3. **Existing Conditions**
   a. Provide an analysis of the traffic-related impacts of the proposed development at the following study intersections:
      - Cady Street & Griswold Street
      - Cady Street & Main Street
      - Main Street & Griswold Street
      - Beal Street & Northville Road
      - Beal Street & River Street
      - Cady Street & Site Drives (2 locations)
   b. Due to the impact of COVID-19, current traffic volume data is not representative of “typical” operations. Therefore, the data collection necessary for this study is proposed as follows:
      - Use pre-COVID (2018) turning movement count data collected by F&V at the study intersections, where available and apply a background growth rate to calculate the ‘existing’ 2021 traffic volumes for use in the study.
      - Collect existing AM (7:00AM to 9:00 AM) and PM (4:00 to 6:00 PM) peak period turning movement count data at Cady Street & Main Street (not collected in 2018).
      - Compare the existing traffic volumes collected with the historical (2018) traffic volumes. Calculate a COVID adjustment factor to determine the baseline existing 2021 traffic volumes for use in the study.
      - Apply the COVID adjustment factor to existing 2021 traffic volumes to determine the ‘existing’ 2021 traffic volumes at Cady Street & Main Street.
   c. Calculate the **Existing** vehicle delays, LOS, and vehicle queues at the study intersections during the AM and PM peak hours. Intersection analysis shall include LOS determination for all approaches and movements. The LOS will be based on the procedures outlined in the HCM 6th Edition, the latest edition of Transportation Research Board’s Highway Capacity Manual.

FIGURE 1: SITE LOCATION

4. Background Conditions

b. Calculate the future background traffic volumes based on an appropriate traffic growth determined from local or statewide data to the project build-out year and/or any applicable background developments (not included in the 2018 traffic counts) in the vicinity of this project as identified by the City of Northville.

- Cady Project – 6-unit condominium (South side of Cady Street, east of Center Street)
- 355 E. Cady St. - 3-story mixed-use building; first floor Retail, office above
- 455 E. Cady St "Hanger Building"- office space

c. Calculate the **Background (*without the proposed development*)** vehicle delays, LOS, and vehicle queues at the study intersections during the AM and PM peak periods. Intersection analysis shall include LOS determination for all approaches and movements. The LOS will be based on the procedures outlined in the HCM 6th Edition, the latest edition of Transportation Research Board's Highway Capacity Manual.

d. Any state, local, or private transportation improvement projects in the project study area that will be underway in the build-out year as identified by the City of Northville and/or WCDPS will be included as background conditions.

5. Trip Generation

a. Forecast the number of Weekday AM and PM peak hour trips and daily trips that would be generated by the proposed development based on data published by the Institute of Transportation Engineers (ITE) in Trip Generation, 10th Edition and the ITE Trip Generation Handbook, *3rd Edition*.

b. A table will be provided in the report outlining the categories and quantities of land uses, with the corresponding trip generation rates or equations, and the resulting number of trips. The trip generation will be submitted to the Township for review and approval prior to use in the analysis.

c. Provide a trip generation summary of the previously considered Northville Downs PUD and the additional trip generation associated with the Foundry Flask project. Provide a quantitative and qualitative impact summary of the impact of Foundry Flask as compared to the overall development plan for the area.

6. Trip Distribution and Traffic Assignment

a. Assign the trips that would be generated by the proposed development to the adjacent road network based on existing traffic patterns and methodologies outlined in the ITE *Transportation* and *Land Development, 2nd Edition*.

b. The distribution percentages with the corresponding volumes will be provided in a graphical format to include in the report and the basis will be explained.

c. Combine the site-generated traffic assignments with the background traffic forecasts to establish the Future AM and PM peak hour traffic volumes.

7. Future Conditions

a. Calculate the **Future (with the proposed development)** vehicle delays, LOS, and vehicle queues at the study intersections. Intersection analysis shall include LOS determination for all approaches and movements. The LOS will be based on the procedures outlined in the HCM 6th Edition, the latest edition of Transportation Research Board's Highway Capacity Manual.

b. Identify improvements (if any) for the study road network that would be required to accommodate the site-generated traffic volumes.

The scope of this study was developed based on Fleis & VandenBrink's (F&V) knowledge of the study area, understanding of the development program, accepted traffic engineering practices and information published by the Institute of Transportation Engineers (ITE). The study analyses were completed using Synchro/SimTraffic (Version 11). Sources of data for this study include F&V subconsultant Traffic Data Collection, Inc. (TDC), information provided by Michigan Department of Transportation (MDOT), the Southeast Michigan Council of Governments (SEMCOG) and ITE. All background information is provided in **Appendix A**.

2 BACKGROUND

2.1 EXISTING ROAD NETWORK

Vehicle transportation for the study area is provided by Griswold Street, Main Street, Northville Road, and Cady Street. The lane uses and traffic control at the study intersections are shown on **Figure 2** and the study roadways are further described below. For the purposes of this study, all minor streets and driveways are assumed to have an operating speed of 25 miles per hour (mph).

Main Street generally runs in the east and west directions, north of the project site. The roadway is classified as a *Minor Arterial* and is under the jurisdiction of the City of Northville. The roadway has a posted speed limit of 25 mph and an Average Annual Daily Traffic (AADT) of 11,800 vehicles per day (SEMCOG 2016). The roadway geometry has a typical two-lane cross section, with one lane in each direction and has on-street parking west of Griswold Street. The section of roadway east of Griswold Street becomes S. Main Street; for the purposes of this report S. Main Street is labeled Northville Road.

Northville Road generally runs in the north and south directions adjacent to the east side of the proposed development. The roadway is classified as a *Minor Arterial* and is under the jurisdiction of the Wayne County Department of Public Service (WCDPS). Northville Road has a posted speed limit of 35 mph, and an AADT of 12,100 vehicles per day (SEMCOG 2016). The roadway geometry is a four-lane cross-section with two lanes in each direction; the roadway begins undivided then, splits and becomes median separated just south of Beal Street.

Griswold Street generally runs in the north and south directions, west of the project site. The roadway is classified as a *Minor Arterial* and is under the jurisdiction of the Wayne County Department of Public Service (WCDPS) and has a posted speed limit of 35 mph. The roadway has an AADT volume of 6,700 vehicles per day (SEMCOG 2016) and has a typical two-lane cross section, with one lane in each direction.

Cady Street generally runs in the east and west directions adjacent to the east side of the proposed development. The roadway is classified as a *Local Road* and is under the jurisdiction of the City of Northville. Cady Street has a posted speed limit of 25 mph and has a typical two-lane cross section, with one lane in each direction and has on-street parking west of Griswold Street.

2.2 EXISTING TRAFFIC VOLUMES

F&V subconsultant Traffic Data Collection, Inc. (TDC) performed weekday AM (7:00 AM to 9:00 AM) and PM (4:00 PM to 6:00 PM) turning movement counts at the following study intersections on Tuesday, May 15, 2018 and Thursday, October 18, 2018.

- Cady Street & Griswold Street
- Main Street & Griswold Street
- Beal Street & Northville Road
- Beal Street & River Street

An annual growth rate of **0.2%** was applied to the 2018 traffic volumes to get a baseline 2021 traffic volumes at the abovementioned study intersections. Additionally, F&V performed weekday AM (7:00 AM to 9:00 AM) and PM (4:00 PM to 6:00 PM) turning movement counts at Cady Street & Main Street on Thursday, August 12, 2021. However, due to the impact of COVID-19 and the subsequent closure of businesses and schools, current 2021 traffic volume data is not representative of "typical" operations. Therefore, COVID adjustment factors were applied to the collected traffic counts at the intersection of Cady Street & Main Street. Pre-COVID 2018 traffic volume data at the adjacent intersections were reviewed and compared with the 2021 traffic volume data in order to calculate COVID adjustment factors shown below.

COVID Traffic Volume Adjustment Factors

Intersection	AM Peak Hour	PM Peak Hour
Cady Street & Main Street	+34%	+44%

The existing 2021 traffic volumes are shown on **Figure 3**.

FIGURE 2: EXISTING LANE USE AND TRAFFIC CONTROL

FIGURE 1

SITE LOCATION

FOUNDRY FLASK TIS - NORTHVILLE, MI

LEGEND

SITE — SITE LOCATION

NORTH

SCALE: NOT TO SCALE

3 EXISTING CONDITIONS

3.1 EXISTING OPERATIONS

The existing AM and PM peak hour vehicle delays and Levels of Service (LOS) were calculated at the study intersections using Synchro (Version 11) traffic analysis software. The results of the analysis of existing conditions were based on the existing lane use and traffic control shown on **Figure 2**, the existing traffic volumes shown on **Figure 3**, and the methodologies presented in the Highway Capacity Manual 6th Edition (HCM6).

Descriptions of LOS "A" through "F", as defined in the HCM, are provided in **Appendix B** for signalized and unsignalized intersections. Typically, LOS D is considered acceptable, with LOS A representing minimal delay, and LOS F indicating failing conditions. Microsimulations were also conducted at the study intersections using SimTraffic to further evaluate the network performance. The results of the analysis of existing conditions are presented in **Appendix B** and are summarized in **Table 1**.

Table 1: Existing Intersection Operations

Intersection		Control	Approach	Existing Conditions			
				AM Peak		PM Peak	
				Delay (s/veh)	LOS	Delay (s/veh)	LOS
1	Main Street & Griswold Street	Signalized	EBTL	12.3	B	15.7	B
			EBTR	10.3	B	11.6	B
			WBTL	10.4	B	12.0	B
			WBTR	10.7	B	12.7	B
			NB	15.1	B	16.4	B
			SB	17.0	B	32.0	C
			Overall	12.8	B	18.3	B
2	Main Street & Cady Street	Stop (Minor)	EB	Free		Free	
			WBL	7.9	A	8.9	A
			NB	9.8	A	14.3	B
3	Griswold Street & Cady Street	Stop (Minor)	EB	10.8	B	14.2	B
			WB	9.5	A	10.6	B
			NBL	7.4	A	7.6	A
			SBL	7.3	A	7.4	A
4	Beal Street & River Street	Stop (Minor)	EB	Free		Free	
			WBL	7.3	A	7.5	A
			NB	9.1	A	9.8	A
5	Northville Road & Beal Street	Stop (Minor)	EB	10.6	B	12.5	B
			NBL	8.0	A	8.6	A
			SB	Free		Free	

The results of the existing conditions analysis indicate that all study intersection approaches and movements currently operate acceptably at LOS D or better during both peak periods. A review of SimTraffic network simulations showed generally acceptable operation during both peak periods; however, the southbound approach of the intersection of Main Street and Griswold Street experiences occasional periods of long vehicle queues.

3.2 EXISTING IMPROVEMENTS

In order to improve the vehicle queuing associated with the southbound approach to the Main Street & Griswold Street intersection during the PM peak hour, mitigation measures were evaluated.

3.2.1 Main Street and Griswold Street

A review of network simulations indicates that signal timing was found to be adequate to reduce vehicle queues on the southbound approach of the intersection of Main Street and Griswold Street during the PM Peak. Intersection operations and vehicle queues with the recommended improvements are summarized in **Table 2**.

Table 2: Existing Intersection Operations with Improvements

Intersection		Control	Approach	PM Peak Hour Operation											
				Existing Conditions				Existing Conditions (with Improvements)				Difference			
				Delay (s/veh)	LOS	Avg. Que.	95th Que.	Delay (s/veh)	LOS	Avg. Que.	95th Que.	Delay (s/veh)	LOS	Avg. Que.	95th Que.
1	Main Street & Griswold Street	Signalized	EBTL	15.7	B	85	129	26.9	C	102	152	11.2	B→C	17	23
			EBTR	11.6	B	67	117	17.3	B	83	138	5.7	-	16	21
			WBTL	12.0	B	70	112	17.9	B	85	137	5.9	-	15	25
			WBTR	12.7	B	105	165	19.7	B	125	200	7.0	-	20	35
			NB	16.4	B	84	136	11.2	B	72	122	-5.2	-	-12	-14
			SB	32.0	C	506	1016	17.4	B	171	301	-14.6	C→B	-335	-715
			Overall	18.3	B	-	-	18.0	B	-	-	-0.3	-	-	-

4 BACKGROUND CONDITIONS

In order to determine the applicable traffic growth rate for the existing 2021 conditions to background 2023 conditions, historical population and economic profile data was obtained for the City of Northville from Southeast Michigan Council of Governments (SEMCOG). Population and employment projections from 2020 to 2045 were reviewed which show an average annual growth of 0.20% and 0.07%, respectively. Therefore, a background growth rate of **0.2%** per year was applied to the existing 2021 traffic volumes to forecast the background 2023 traffic volume conditions ***without the proposed development,*** as shown on **Figure 4**.

In addition to background growth, it is important to account for traffic that will be generated by approved developments within the vicinity of the study area that have yet to be constructed or are currently under construction. The following developments were identified by the City of Northville:

- Cady Project – 6-unit condominium (South side of Cady Street, east of Center Street)
- 355 E. Cady St. - 3-story mixed-use building; first floor Retail, office above
- 455 E. Cady St "Hanger Building"- office space

4.1 BACKGROUND (2023) OPERATIONS

The background peak hour vehicle delays and LOS ***without the proposed development*** were calculated based on the existing lane use and traffic control shown on **Figure 2**, the background traffic volumes shown on **Figure 4**, and the methodologies presented in the HCM6. The results of the analysis of background conditions are presented in **Appendix C** and are summarized in **Table 3**.

Table 3: Background Intersection Operations

	Intersection	Control	Approach	Existing Conditions				Background Conditions				Difference			
				AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
				Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
1	Main Street & Griswold Street	Signalized	EBTL	12.3	B	15.7	B	12.3	B	15.9	B	0.0	-	0.2	-
			EBTR	10.3	B	11.6	B	10.4	B	11.6	B	0.1	-	0.0	-
			WBTL	10.4	B	12.0	B	10.4	B	12.1	B	0.0	-	0.1	-
			WBTR	10.7	B	12.7	B	10.8	B	12.8	B	0.1	-	0.1	-
			NB	15.1	B	16.4	B	15.1	B	17.2	B	0.0	-	0.8	-
			SB	17.0	B	32.0	C	17.1	B	35.0	D	0.1	-	3.0	C→D
			Overall	12.8	B	18.3	B	12.8	B	19.2	B	0.0	-	0.9	-
2	Main Street & Cady Street	Stop (Minor)	EB	Free		Free		Free		Free		Free		Free	
			WBL	7.9	A	8.9	A	8.0	A	8.9	A	0.1	-	0.0	-
			NB	9.8	A	14.3	B	10.0	B	15.1	C	0.2	A→B	0.8	B→C
3	Griswold Street & Cady Street	Stop (Minor)	EB	10.8	B	14.2	B	10.9	B	14.6	B	0.1	-	0.4	-
			WB	9.5	A	10.6	B	9.5	A	10.7	B	0.0	-	0.1	-
			NBL	7.4	A	7.6	A	7.4	A	7.6	A	0.0	-	0.0	-
			SBL	7.3	A	7.4	A	7.3	A	7.4	A	0.0	-	0.0	-
4	Beal Street & River Street	Stop (Minor)	EB	Free		Free		Free		Free		Free		Free	
			WBL	7.3	A	7.5	A	7.3	A	7.5	A	0.0	-	0.0	-
			NB	9.1	A	9.8	A	9.1	A	9.9	A	0.0	-	0.1	-
5	Northville Road & Beal Street	Stop (Minor)	EB	10.6	B	12.5	B	10.6	B	12.6	B	0.0	-	0.1	-
			NBL	8.0	A	8.6	A	8.0	A	8.6	A	0.0	-	0.0	-
			SB	Free		Free		Free		Free		Free		Free	

The results of the background conditions analysis indicates that all study intersection approaches and movements will continue to operate acceptably, in a manner similar to existing conditions. A review of SimTraffic network simulations indicated periods of long vehicle queues for the southbound approach of the intersection of Main Street and Griswold Street during the PM peak hour.

4.2 Background (2023) Improvements

In order to improve the vehicle queuing associated with the southbound approach to the Main Street & Griswold Street intersection during the PM peak hour, mitigation measures evaluated in existing conditions were applied to background conditions.

4.2.1 Main Street and Griswold Street

A review of network simulations indicates that signal timing optimization were observed to reduce vehicle queues on the southbound approach of the Main Street and Griswold Street intersection during the PM peak hour. Intersection operations and vehicle queues with the recommended improvements are summarized in **Table 4**.

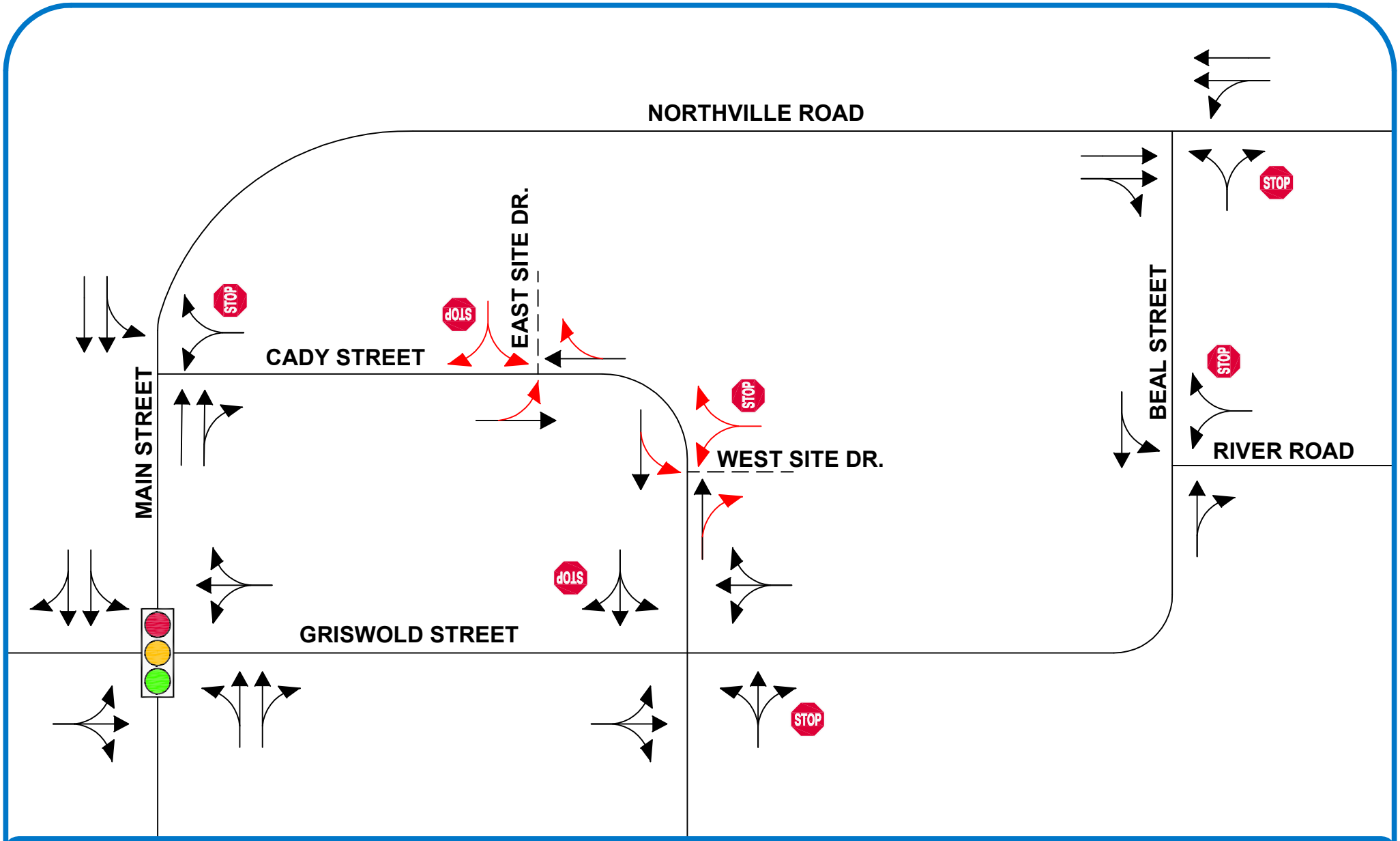

FIGURE 2

LANE USE AND TRAFFIC CONTROL

FOUNDRY FLASK TIS - NORTHVILLE, MI

LEGEND

- ROADS
- PROPOSED ROADS
- LANE USE
- PROPOSED LANE USE
- SIGNALIZED INTERSECTION
- UNSIGNALIZED INTERSECTION
- ROUNDABOUT INTERSECTION

NORTH

Table 4: Background Intersection Operations with Improvements

Intersection		Control	Approach	PM Peak Hour Operation											
				Background Condition				Background Conditions (with Improvements)				Difference			
				Delay (s/veh)	LOS	Avg. Que.	95th Que.	Delay (s/veh)	LOS	Avg. Que.	95th Que.	Delay (s/veh)	LOS	Avg. Que.	95th Que.
1	Main Street & Griswold Street	Signalized	EBTL	15.9	B	88	136	27.4	C	103	151	11.5	B→C	15	15
			EBTR	11.6	B	66	115	17.5	B	85	137	5.9	-	19	22
			WBTL	12.1	B	75	121	18.1	B	86	129	6.0	-	11	8
			WBTR	12.8	B	110	169	19.9	B	125	188	7.1	-	15	19
			NB	17.2	B	92	144	11.6	B	79	135	-5.6	-	-13	-9
			SB	35.0	D	846	1631	17.6	B	190	361	-17.4	D→B	-656	-1270
			Overall	19.2	B	-	-	18.2	B	-	-	-1.0	-	-	-

5 Site Trip Generation

The number of peak hour (AM and PM), and daily vehicle trips that would be generated by the proposed development were forecast based on data published in the Institute of Transportation Engineers (ITE) Trip Generation Manual 10th Edition and the ITE Trip Generation Handbook, 3rd Edition. The trip generation is summarized in **Table 5**. *Note: Pass-by trip reductions were not included in this study to provide a conservative analysis.*

Table 5: Trip Generation Summary

Land Use	ITE Code	Amount	Units	Average Daily Traffic (vpd)	AM Peak Hour (vph)			PM Peak Hour (vph)		
					In	Out	Total	In	Out	Total
Shopping Center-Small	820	10,000	S.F.	1,256	6	3	9	48	51	99
Multi-Family Housing (Mid-Rise)	221	78	D.U.	423	7	20	27	21	14	35
			Total	1,679	13	23	36	69	65	134

In addition, a trip generation comparison was performed between the previously proposed Northville Downs PUD and the proposed Foundry Flask site. **Table 6** shows the trips generations comparison and indicates that the Foundry Flask site expected to generate approximately 24% of the overall traffic generated by Northville Downs PUD.

Table 6: Trip Generation Comparison

Development	Average Daily Traffic (vpd)	AM Peak Hour (vph)			PM Peak Hour (vph)		
		In	Out	Total	In	Out	Total
Foundry Flask	1,679	13	23	36	69	65	134
Northville Downs	5,188	58	154	212	183	132	315
Total Trips	*6,867*	*71*	*177*	*248*	*252*	*197*	*449*
Foundry Flask Percentage of Total Trips	24%	18%	13%	15%	27%	33%	30%

6 Site Trip Distribution

The vehicular trips that would be generated by the proposed development were assigned to the study roads based on the proposed site access plan, the existing peak hour traffic patterns in the adjacent roadway network, and the methodologies published by ITE. The adjacent street traffic volumes were used to develop the trip distribution. Separate trip distributions were determined for the commercial and residential components of the proposed development. It is assumed that the residential traffic in the AM are home-to-work based trips and are work-to-home trips in the PM. Therefore, the residential trip distribution is based on residents exiting the

study network in the AM and entering the study network in the PM. The commercial (retail) trip distribution is based on employees entering the study network in the AM and exiting the study network in the PM. The site trip distributions used in the analysis are summarized in **Table 7**.

Table 7: Site Trip Distribution

Commercial		To/From	via	Residential	
AM	PM			AM	PM
26%	33%	West	Main Street	29%	22%
18%	5%		Cady Street	6%	10%
22%	32%	North	Griswold Street	35%	28%
34%	30%	South	Northville Road	30%	40%
100%	100%	Total		100%	100%

The vehicular traffic volumes shown in **Table 4** were distributed to the roadway network according to the distribution shown in **Table 5**. The site generated trips are shown on **Figure 5** and were added to the background traffic volumes shown on **Figure 4** to calculate the future peak hour traffic volumes shown on **Figure 6**.

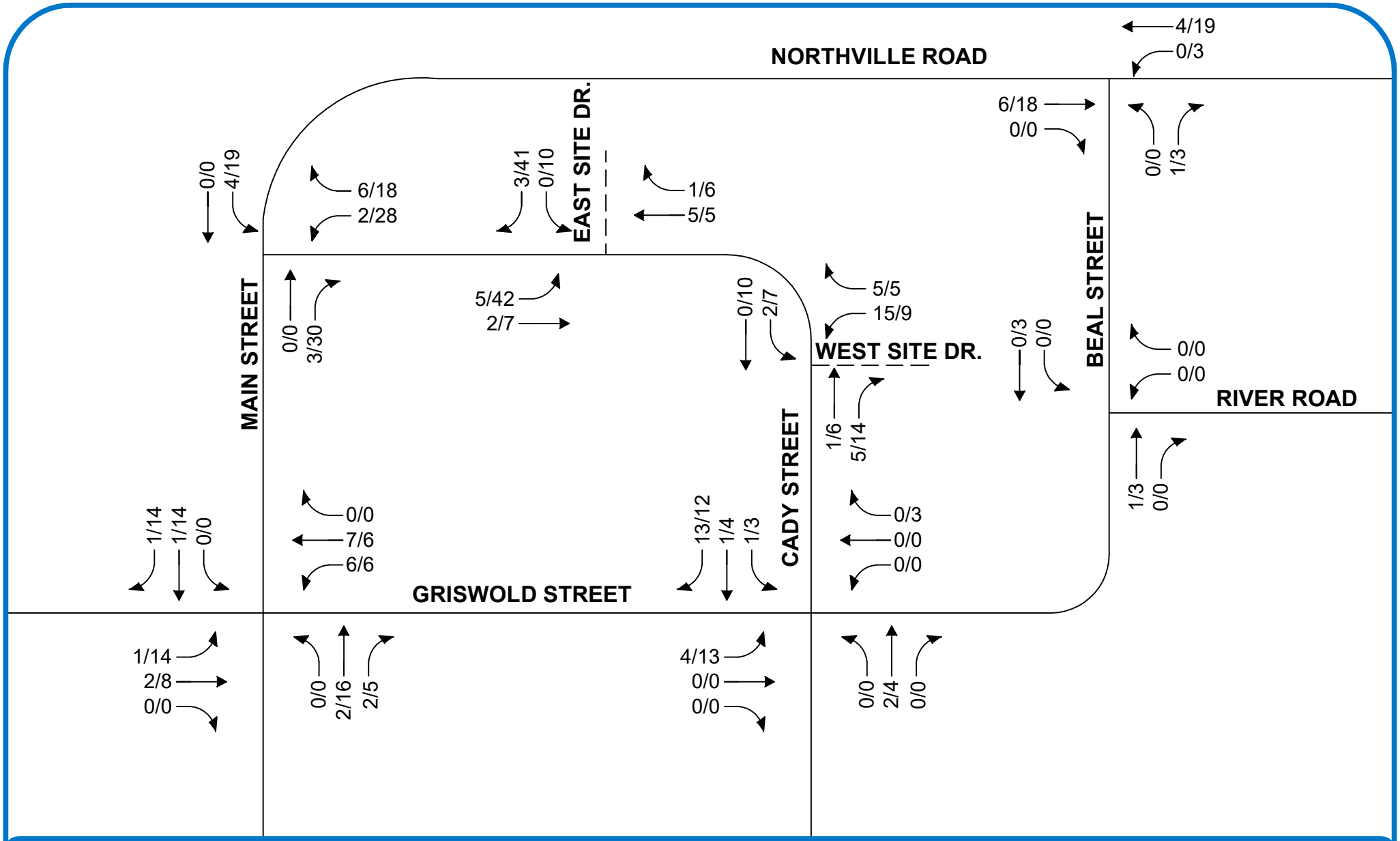

FIGURE 5

SITE-GENERATED TRAFFIC VOLUMES

FOUNDRY FLASK TIS - NORTHVILLE, MI

LEGEND

ROADS

PROPOSED ROADS

TRAFFIC VOLUMES (AM/PM)

NORTH

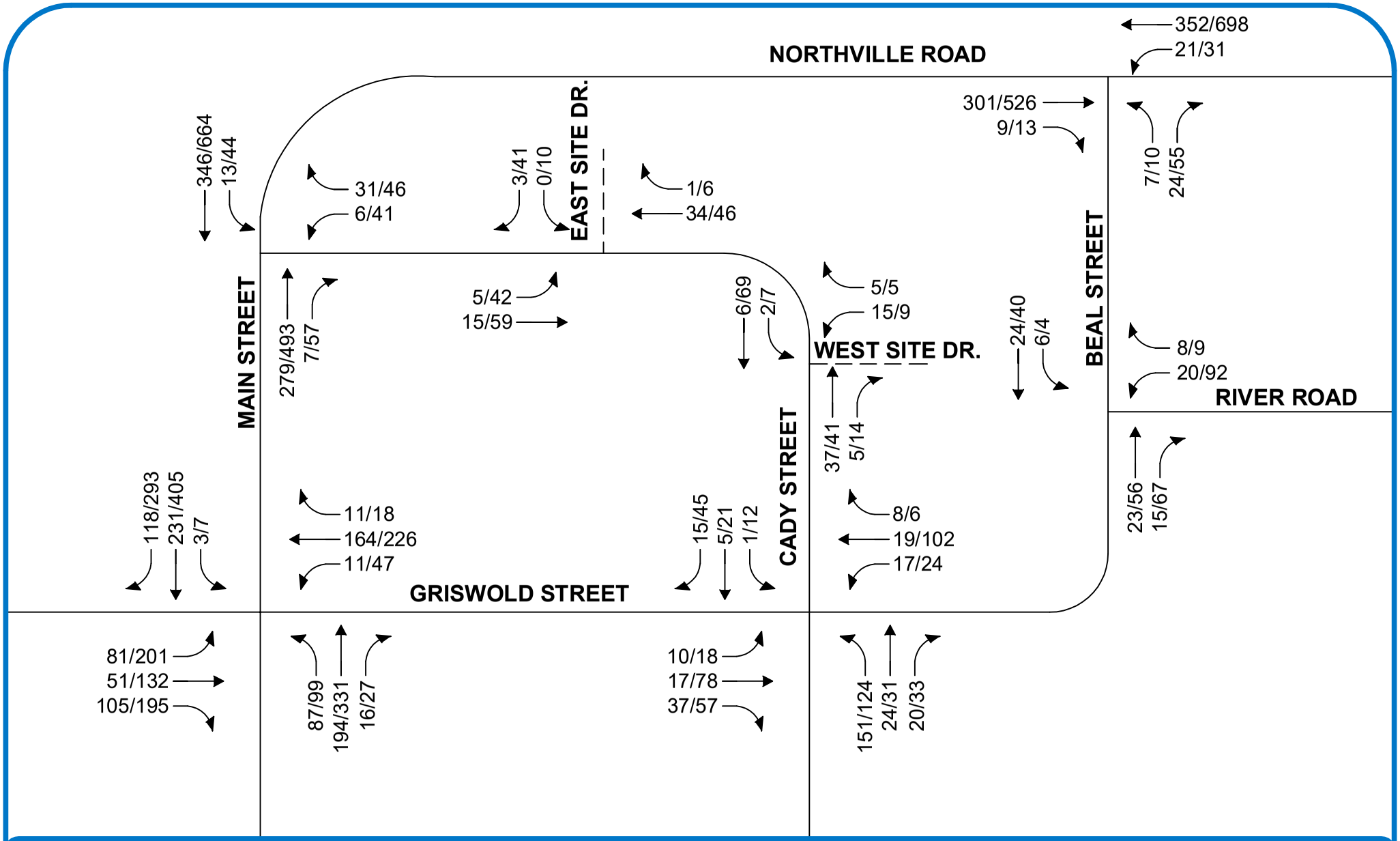

FIGURE 6

FUTURE TRAFFIC VOLUMES

FOUNDRY FLASK TIS - NORTHVILLE, MI

LEGEND

ROADS

PROPOSED ROADS

TRAFFIC VOLUMES (AM/PM)

NORTH

7 FUTURE CONDITIONS

7.1 FUTURE OPERATIONS

Future peak hour vehicle delays and LOS ***with the proposed development*** were calculated based on the current lane use shown on **Figure 2**, the proposed site access plan, the future traffic volumes shown on **Figure 6**, and the methodologies presented in the HCM6. The results of the future conditions analysis are presented in **Appendix D** and are summarized in **Table 8.**

Table 8: Future Intersection Operations

Intersection		Control	Approach	Background Conditions				Future Conditions				Difference			
				AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
				Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
1	Main Street & Griswold Street	Signalized	EBTL	12.3	B	15.9	B	12.2	B	16.3	B	-0.1*	-	0.4	-
			EBTR	10.4	B	11.6	B	10.4	B	11.9	B	0.0	-	0.3	-
			WBTL	10.4	B	12.1	B	10.4	B	12.3	B	0.0	-	0.2	-
			WBTR	10.8	B	12.8	B	10.8	B	13.1	B	0.0	-	0.3	-
			NB	15.1	B	17.2	B	15.3	B	17.5	B	0.2	-	0.3	-
			SB	17.1	B	35.0	D	17.1	B	42.1	D	0.0	-	7.1	-
			Overall	12.8	B	19.2	B	12.9	B	21.3	C	0.1	-	2.1	B→C
2	Main Street & Cady Street	Stop (Minor)	EB	Free		Free		Free		Free		Free		Free	
			WBL	8.0	A	8.9	A	8.0	A	9.2	A	0.0	-	0.3	-
			NB	10.0	B	15.1	C	10.2	B	23.3	C	0.2	-	8.2	-
3	Griswold Street & Cady Street	Stop (Minor)	EB	10.9	B	14.6	B	11.4	B	16.2	C	0.5	-	1.6	B→C
			WB	9.5	A	10.7	B	9.0	A	11.1	B	-0.5*	-	0.4	-
			NBL	7.4	A	7.6	A	7.4	A	7.6	A	0.0	-	0.0	-
			SBL	7.3	A	7.4	A	7.3	A	7.5	A	0.0	-	0.1	-
4	Beal Street & River Street	Stop (Minor)	EB	Free		Free		Free		Free		Free		Free	
			WBL	7.3	A	7.5	A	7.3	A	7.5	A	0.0	-	0.0	-
			NB	9.1	A	9.9	A	9.1	A	9.9	A	0.0	-	0.0	-
5	Northville Road & Beal Street	Stop (Minor)	EB	10.6	B	12.6	B	10.6	B	12.8	B	0.0	-	0.2	-
			NBL	8.0	A	8.6	A	8.0	A	8.7	A	0.0	-	0.1	-
			SB	Free		Free		Free		Free		Free		Free	
6	Cady Street & W. Site Dr.	Stop (Minor)	EB	N/A		N/A		Free		Free		N/A		N/A	
			WBL					7.3	A	7.3	A				
			NB					8.8	A	9.1	A				
7	Cady Street & E. Site Dr.	Stop (Minor)	WB	N/A		N/A		8.5	A	9.0	A	N/A		N/A	
			NB					Free		Free					
			SBL					7.3	A	7.4	A				

*Decreased delays are due to HCM methodologies

The results of the future conditions analysis indicates that all study intersection approaches and movements will continue to operate acceptably, in a manner similar to background conditions. A review of SimTraffic network simulations indicated periods of long vehicle queues for the southbound approach of the intersection of Main Street and Griswold Street during the PM peak hour.

7.2 FUTURE IMPROVEMENTS

In order to improve the vehicle queuing associated with the southbound approach to the Main Street & Griswold Street intersection during the PM peak hour. The mitigation measures evaluated for existing and background conditions were applied to the future conditions and determined to be adequate to improve the intersection operations.

7.2.1 Main Street and Griswold Street

A review of network simulations indicates that signal timing optimization would reduce vehicle queues on the southbound approach of the Main Street and Griswold Street intersection during the PM peak hour. Intersection operations and vehicle queues with the recommended improvements are summarized in **Table 9**.

Table 9: Future Intersection Operations with Improvements

Intersection		Control	Approach	PM Peak Hour Operation											
				Future Condition				Future Conditions (with Improvements)				Difference			
				Delay (s/veh)	LOS	Avg. Que.	95th Que.	Delay (s/veh)	LOS	Avg. Que.	95th Que.	Delay (s/veh)	LOS	Avg. Que.	95th Que.
1	Main Street & Griswold Street	Signalized	EBTL	16.3	B	83	132	29.0	C	107	154	12.7	B→C	24	22
			EBTR	11.9	B	60	110	17.9	B	92	147	6.0	-	32	37
			WBTL	12.3	B	74	117	18.5	B	90	138	6.2	-	16	21
			WBTR	13.1	B	109	172	20.5	C	131	200	7.4	B→C	22	28
			NB	17.5	B	96	148	11.8	B	78	129	-5.7	-	-18	-19
			SB	42.1	D	451	590	18.9	B	214	401	-23.2	D→B	-237	-189
			Overall	21.3	C	-	-	18.9	B	-	-	-2.4	**C→B**	-	-

8 CONCLUSIONS

The conclusions of this TIS are as follows:

1. **Existing Conditions:** All study intersection approaches and movements currently operate acceptably at a LOS D or better during both peak periods. A review of SimTraffic network simulations indicates generally acceptable operation during both peak periods; however, microsimulation during the PM peak hour indicate the southbound approach of the intersection of Main Street and Griswold Street experiences occasional periods of long vehicle queues. Mitigation measures were evaluated to reduce the projected vehicle queueing and signal timing optimization was found to be adequate to reduce queues on the southbound approach during the PM peak hour.
2. **Background (2023) Growth:** An annual growth rate of 0.2% per year was determined based on SEMCOG economic and population data. In addition, the following background developments were identified by the City of Northville and were included in this analysis:
    a. Cady Project – 6-unit condominium (South side of Cady Street, east of Center Street)
    b. 355 E. Cady St. - 3-story mixed-use building; first floor Retail, office above
    c. 455 E. Cady St "Hanger Building"- office space
3. **Background (2023) Conditions:** With the addition of the 2023 background traffic, all study intersection approaches and movements are expected to continue operating in a manner similar to existing conditions with occasional periods of long vehicle queues at the southbound approach of Main Street and Griswold Street intersection during the PM peak hour. A review of network simulations indicates that signal timing optimization was observed to reduce vehicle queues on the southbound approach during the PM peak hour in background conditions.
4. **Trip Generation Comparison:** The trip generation of the previously proposed Northville Downs PUD was compared with the proposed Foundry Flask development. The proposed development is expected to generate approximately 24% of the overall traffic generated by Northville Downs PUD.

5. **Future Conditions:** With the addition of the site-generated traffic, all study intersection approaches and movements are expected to continue operating in a manner similar to background conditions. A review of SimTraffic network simulations also indicates similar operations to those observed under existing and background conditions with occasional periods of long vehicle queues at the southbound approach of Main Street and Griswold Street intersection during the PM peak hour.

   However, the signal timing optimization was found to be adequate to reduce vehicle queues on the southbound approach of the Main Street and Griswold Street intersection during the PM peak hour.

9 RECOMMENDATIONS

1. Optimize the signal timing at the intersection of Main Street and Griswold Street.

Appendix A

BACKGROUND INFORMATION

Traffic Data Collection, LLC

www:tdccounts.com

Phone: 586.786-5407

Traffic Study Performed For:

Fleis & Vandenbrink

Project: Northville Traffic Impact Study
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 50's
Count By Miovision Video VCU 24L SE

File Name : TMC_1 Northville & Beal_10-18-18
Site Code : TMC_1
Start Date : 10/18/2018
Page No : 1

4 Hour traffic study was conducted during typical weekday (Tuesday-Thursday) from 7:00 AM - 9:00 AM morning & 4:00 PM - 6:00 PM afternoon peak hours, while school was in session.

Groups Printed- Pass Cars - Single Units - Heavy Trucks - Peds

	Northville Road Southbound				Northville Road Northbound				7 Mile Road Eastbound				
Start Time	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
07:00 AM	4	62	0	66	34	0	0	34	2	0	0	2	102
07:15 AM	3	52	0	55	50	2	0	52	6	2	0	8	115
07:30 AM	2	58	0	60	55	1	0	56	7	0	0	7	123
07:45 AM	0	66	0	66	81	3	0	84	6	1	0	7	157
Total	9	238	0	247	220	6	0	226	21	3	0	24	497
08:00 AM	2	63	0	65	67	2	0	69	3	1	0	4	138
08:15 AM	1	74	0	75	79	2	0	81	5	1	0	6	162
08:30 AM	2	71	0	73	87	4	0	91	7	4	0	11	175
08:45 AM	0	81	0	81	93	3	0	96	6	0	0	6	183
Total	5	289	0	294	326	11	0	337	21	6	0	27	658
*** BREAK ***													
04:00 PM	3	96	0	99	137	5	0	142	12	0	3	15	256
04:15 PM	1	86	0	87	155	1	0	156	10	1	0	11	254
04:30 PM	1	93	0	94	170	2	0	172	10	1	1	12	278
04:45 PM	3	124	0	127	156	4	0	160	8	1	1	10	297
Total	8	399	0	407	618	12	0	630	40	3	5	48	1085
05:00 PM	1	126	0	127	156	3	0	159	12	2	1	15	301
05:15 PM	1	123	0	124	181	4	0	185	12	4	1	17	326
05:30 PM	1	118	0	119	172	1	0	173	12	2	0	14	306
05:45 PM	1	110	0	111	170	0	0	170	0	0	0	0	281
Total	4	477	0	481	679	8	0	687	36	8	2	46	1214
Grand Total	26	1403	0	1429	1843	37	0	1880	118	20	7	145	3454
Apprch %	1.8	98.2	0		98	2	0		81.4	13.8	4.8		
Total %	0.8	40.6	0	41.4	53.4	1.1	0	54.4	3.4	0.6	0.2	4.2	
Pass Cars	26	1390	0	1416	1815	37	0	1852	117	19	0	136	3404
% Pass Cars	100	99.1	0	99.1	98.5	100	0	98.5	99.2	95	0	93.8	98.6
Single Units	0	11	0	11	22	0	0	22	1	1	0	2	35
% Single Units	0	0.8	0	0.8	1.2	0	0	1.2	0.8	5	0	1.4	1
Heavy Trucks	0	2	0	2	6	0	0	6	0	0	0	0	8
% Heavy Trucks	0	0.1	0	0.1	0.3	0	0	0.3	0	0	0	0	0.2
Peds	0	0	0	0	0	0	0	0	0	0	7	7	7
% Peds	0	0	0	0	0	0	0	0	0	0	100	4.8	0.2

TDC Traffic Comments: Non-signalized intersection. Northville Road is a divided roadway. Video VCU camera was located within SE intersection quadrant. Note: Peds. are excluded from peak hour reports. Traffic study was performed for Northville Traffic Impact Study for Fleis & Vandenbrink.

Traffic Data Collection, LLC

www:tdccounts.com

Phone: 586.786-5407

Traffic Study Performed For:

Fleis & Vandenbrink

Project: Northville Traffic Impact Study
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 50's
Count By Miovision Video VCU 24L SE

File Name : TMC_1 Northville & Beal_10-18-18
Site Code : TMC_1
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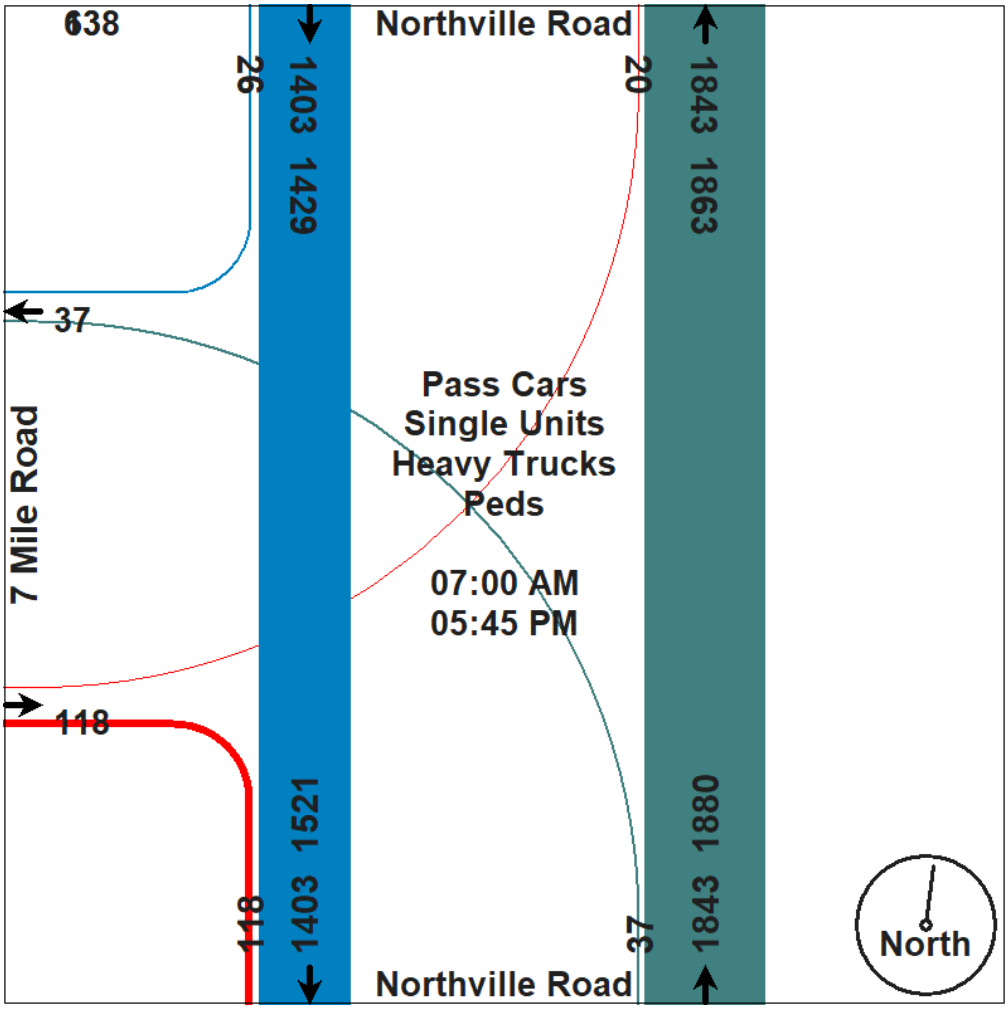
Page No : 2



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Phone: 586.786-5407

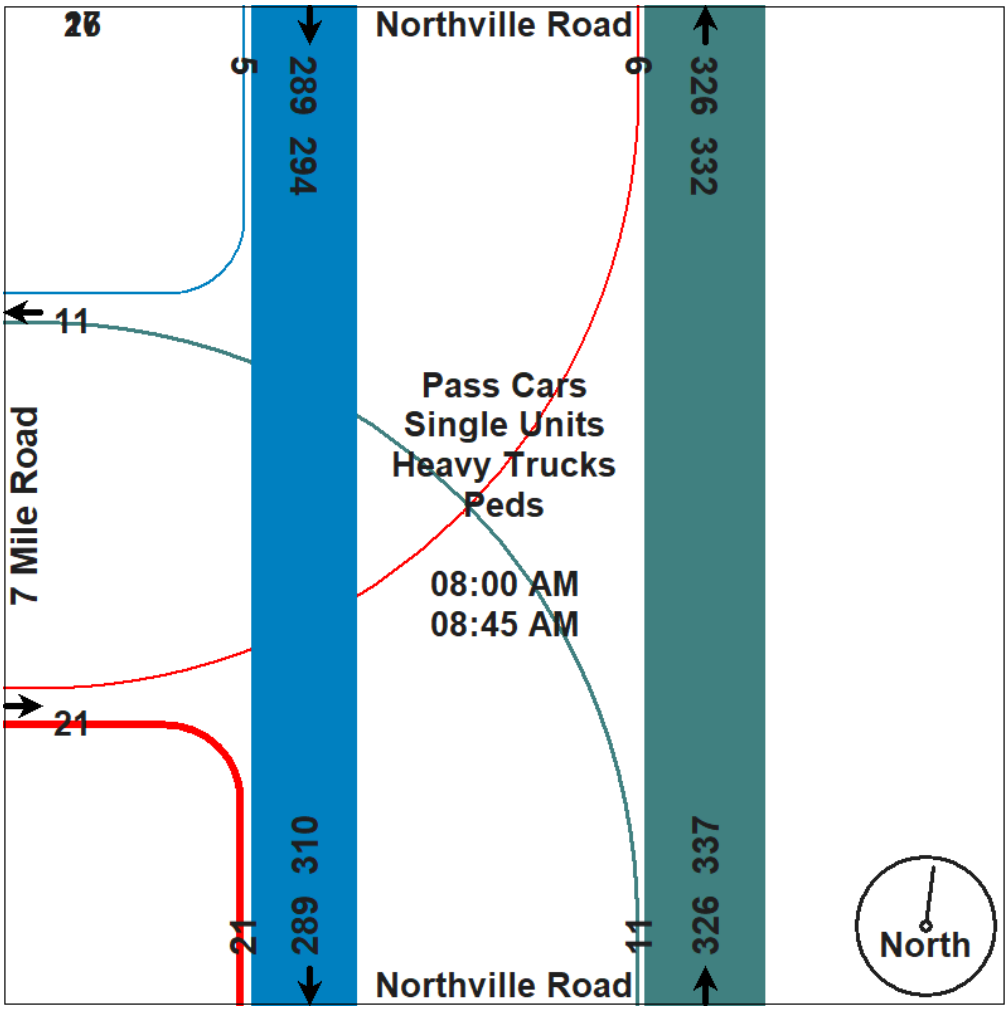
Traffic Study Performed For:

Fleis & Vandenbrink

Project: Northville Traffic Impact Study
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 50's
Count By Miovision Video VCU 24L SE

File Name : TMC_1 Northville & Beal_10-18-18
Site Code : TMC_1
Start Date : 10/18/2018
Page No : 3

	Northville Road Southbound			Northville Road Northbound			7 Mile Road Eastbound			
Start Time	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00 AM										
08:00 AM	**2**	63	65	67	2	69	3	1	4	138
08:15 AM	1	74	75	79	2	81	5	1	6	162
08:30 AM	2	71	73	87	**4**	91	**7**	**4**	**11**	175
08:45 AM	0	**81**	**81**	**93**	3	**96**	6	0	6	**183**
Total Volume	5	289	294	326	11	337	21	6	27	658
% App. Total	1.7	98.3		96.7	3.3		77.8	22.2		
PHF	.625	.892	.907	.876	.688	.878	.750	.375	.614	.899
Pass Cars	5	284	289	316	11	327	21	5	26	642
% Pass Cars	100	98.3	98.3	96.9	100	97.0	100	83.3	96.3	97.6
Single Units	0	5	5	9	0	9	0	1	1	15
% Single Units	0	1.7	1.7	2.8	0	2.7	0	16.7	3.7	2.3
Heavy Trucks	0	0	0	1	0	1	0	0	0	1
% Heavy Trucks	0	0	0	0.3	0	0.3	0	0	0	0.2
Peds	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0



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Traffic Study Performed For:

Fleis & Vandenbrink

Project: Northville Traffic Impact Study
Study:4 Hr. Video Turning Movement Count
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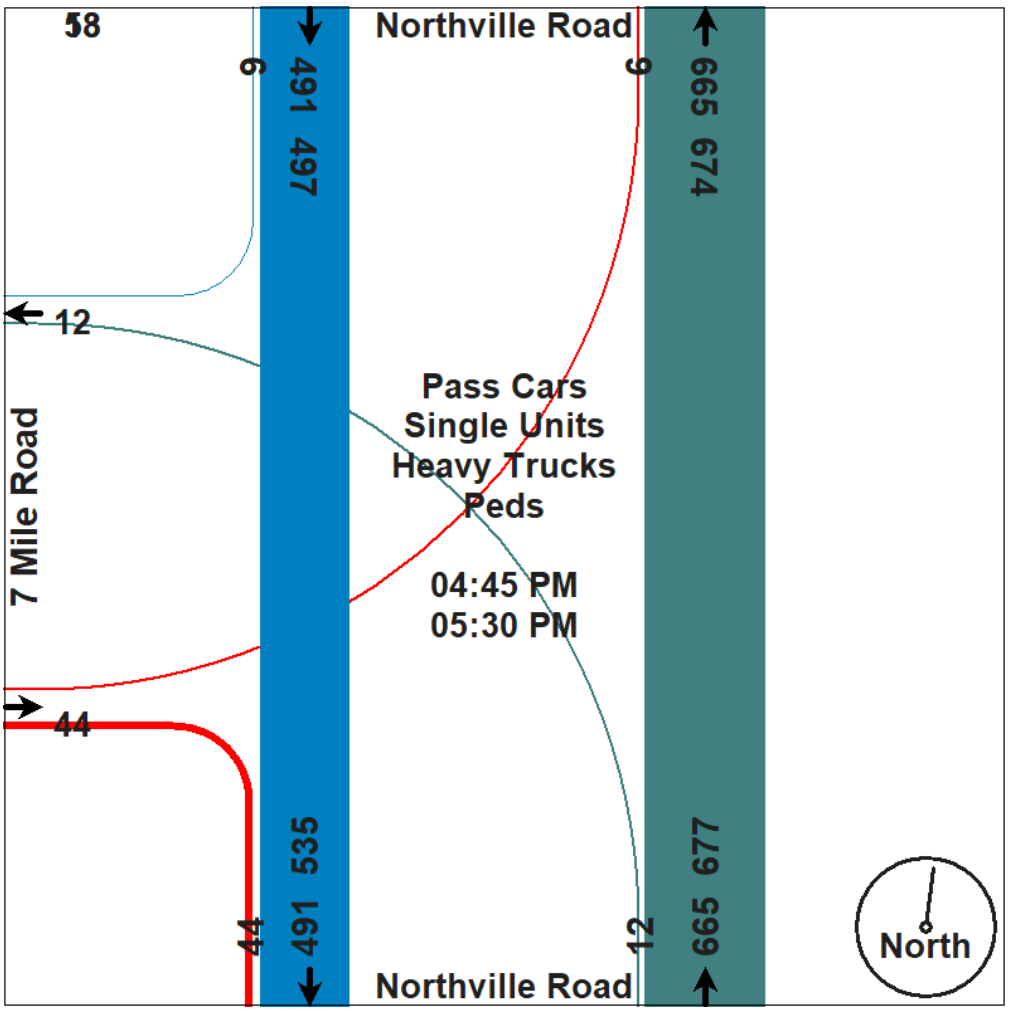
File Name : TMC_1 Northville & Beal_10-18-18
Site Code : TMC_1
Start Date : 10/18/2018
Page No : 4

	Northville Road Southbound			Northville Road Northbound			7 Mile Road Eastbound			
Start Time	Right	Thru	App. Total	Thru	Left	App. Total	Right	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	**3**	124	**127**	156	**4**	160	8	1	9	296
05:00 PM	1	**126**	127	156	3	159	**12**	2	14	300
05:15 PM	1	123	124	**181**	4	**185**	12	**4**	**16**	**325**
05:30 PM	1	118	119	172	1	173	12	2	14	306
Total Volume	6	491	497	665	12	677	44	9	53	1227
% App. Total	1.2	98.8		98.2	1.8		83	17		
PHF	.500	.974	.978	.919	.750	.915	.917	.563	.828	.944
Pass Cars	6	486	492	660	12	672	44	9	53	1217
% Pass Cars	100	99.0	99.0	99.2	100	99.3	100	100	100	99.2
Single Units	0	3	3	4	0	4	0	0	0	7
% Single Units	0	0.6	0.6	0.6	0	0.6	0	0	0	0.6
Heavy Trucks	0	2	2	1	0	1	0	0	0	3
% Heavy Trucks	0	0.4	0.4	0.2	0	0.1	0	0	0	0.2
Peds	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0



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Traffic Study Performed For:

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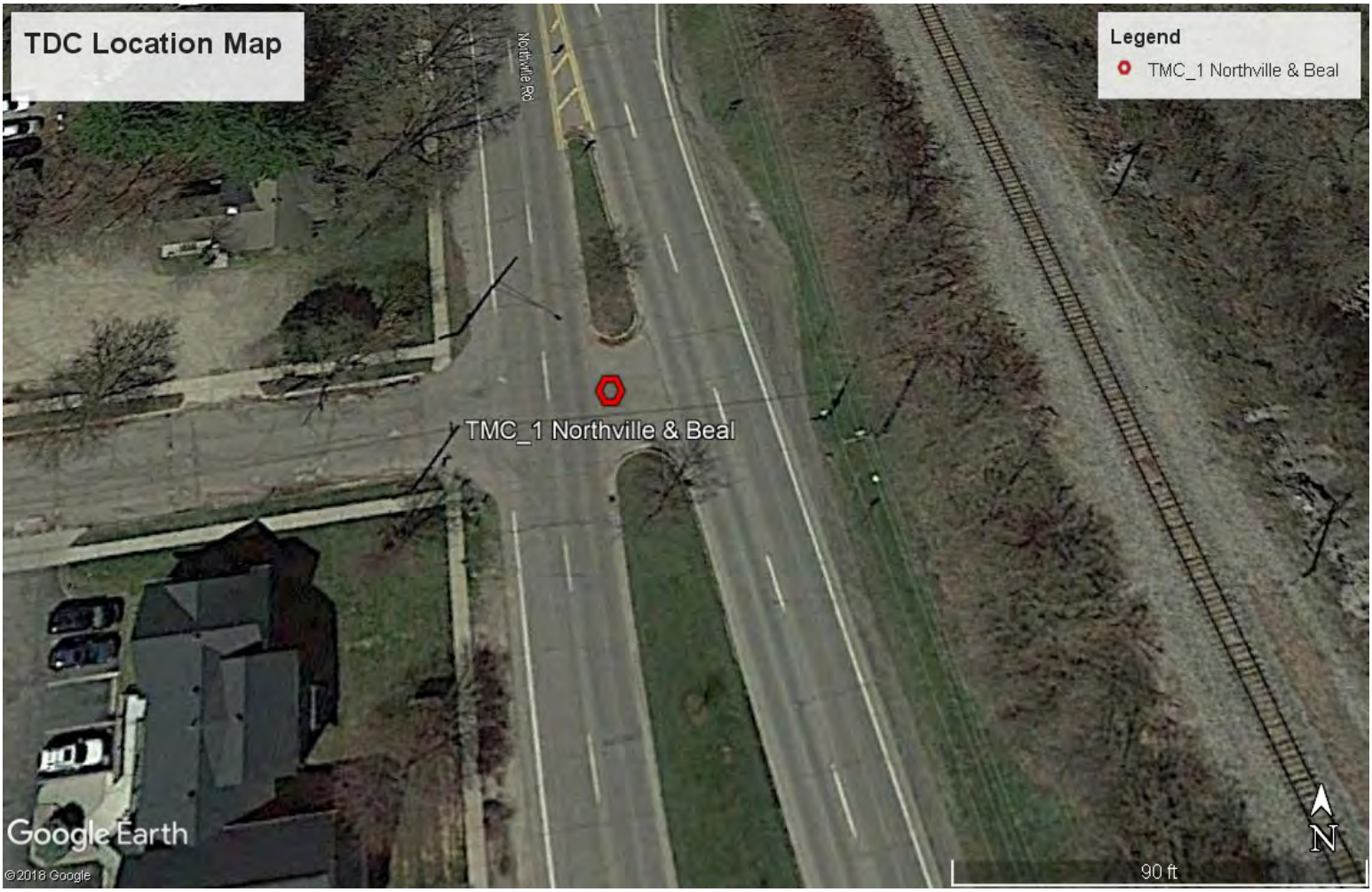
Project: Northville Traffic Impact Study
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 50's
Count By Miovision Video VCU 24L SE

File Name : TMC_1 Northville & Beal_10-18-18
Site Code : TMC_1
Start Date : 10/18/2018
Page No : 5

Aerial Photo



Traffic Data Collection, LLC

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Phone: 586.786-5407

Traffic Study Performed For:

Fleis &VandenBrink

Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 24L NE

File Name : TMC_3 Main & Griswold_5-15-18
Site Code : TMC_3
Start Date : 5/15/2018
Page No : 1

4 Hour traffic study was conducted during typical weekday (Tuesday-Thursday) from 7:00 AM - 9:00 AM morning & 4:00 PM - 6:00 PM afternoon peak hours, while school was in session.

Groups Printed- Pass Cars - Single Units - Heavy Trucks - Peds

	Griswold Street Southbound					Main Street Westbound					Griswold Street Northbound					Main Street Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	17	10	13	0	40	15	22	0	0	37	3	16	2	3	24	0	26	12	2	40	141
07:15 AM	23	13	21	0	57	18	28	1	0	47	1	21	3	3	28	0	36	20	4	60	192
07:30 AM	30	8	23	0	61	21	34	0	0	55	0	42	6	2	50	2	33	19	2	56	222
07:45 AM	29	17	21	0	67	33	35	0	0	68	1	36	3	1	41	1	44	14	2	61	237
Total	99	48	78	0	225	87	119	1	0	207	5	115	14	9	143	3	139	65	10	217	792
08:00 AM	22	10	18	1	51	28	41	0	0	69	3	43	1	1	48	3	46	21	0	70	238
08:15 AM	28	9	14	0	51	27	39	1	0	67	1	40	0	0	41	0	36	23	2	61	220
08:30 AM	30	11	19	0	60	29	46	0	1	76	3	38	2	0	43	2	32	16	1	51	230
08:45 AM	24	10	28	0	62	32	59	0	0	91	3	31	1	0	35	5	48	26	1	80	268
Total	104	40	79	1	224	116	185	1	1	303	10	152	4	1	167	10	162	86	4	262	956
*** BREAK ***																					
04:00 PM	31	15	35	0	81	42	96	3	0	141	2	23	9	3	37	5	63	19	2	89	348
04:15 PM	29	15	41	0	85	49	67	1	0	117	3	31	7	0	41	4	47	25	0	76	319
04:30 PM	38	10	37	0	85	55	89	4	0	148	7	46	5	3	61	2	44	14	1	61	355
04:45 PM	44	16	49	0	109	52	101	0	4	157	5	34	10	3	52	2	63	22	4	91	409
Total	142	56	162	0	360	198	353	8	4	563	17	134	31	9	191	13	217	80	7	317	1431
05:00 PM	53	18	40	0	111	57	96	0	1	154	3	55	9	2	69	9	68	23	1	101	435
05:15 PM	47	21	46	0	114	76	81	2	0	159	2	56	8	0	66	1	54	20	0	75	414
05:30 PM	39	27	57	2	125	70	92	0	0	162	6	47	6	3	62	4	71	32	4	111	460
05:45 PM	54	30	42	2	128	72	84	0	1	157	0	45	10	2	57	4	54	23	1	82	424
Total	193	96	185	4	478	275	353	2	2	632	11	203	33	7	254	18	247	98	6	369	1733
Grand Total	538	240	504	5	1287	676	1010	12	7	1705	43	604	82	26	755	44	765	329	27	1165	4912
Apprch %	41.8	18.6	39.2	0.4		39.6	59.2	0.7	0.4		5.7	80	10.9	3.4		3.8	65.7	28.2	2.3		
Total %	11	4.9	10.3	0.1	26.2	13.8	20.6	0.2	0.1	34.7	0.9	12.3	1.7	0.5	15.4	0.9	15.6	6.7	0.5	23.7	
Pass Cars	533	237	491	0	1261	649	1003	12	0	1664	43	599	82	0	724	44	759	324	0	1127	4776
% Pass Cars	99.1	98.8	97.4	0	98	96	99.3	100	0	97.6	100	99.2	100	0	95.9	100	99.2	98.5	0	96.7	97.2
Single Units	5	3	11	0	19	26	7	0	0	33	0	4	0	0	4	0	6	5	0	11	67
% Single Units	0.9	1.2	2.2	0	1.5	3.8	0.7	0	0	1.9	0	0.7	0	0	0.5	0	0.8	1.5	0	0.9	1.4
Heavy Trucks	0	0	2	0	2	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	4
% Heavy Trucks	0	0	0.4	0	0.2	0.1	0	0	0	0.1	0	0.2	0	0	0.1	0	0	0	0	0	0.1
Peds	0	0	0	5	5	0	0	0	7	7	0	0	0	26	26	0	0	0	27	27	65
% Peds	0	0	0	100	0.4	0	0	0	100	0.4	0	0	0	100	3.4	0	0	0	100	2.3	1.3

TDC Traffic Comments: Signalized intersection with push button ped. signals for all quadrants. Video VCU camera was located within SE intersection quadrant. Note: Peds. are excluded from peak hour reports.

Traffic Data Collection, LLC

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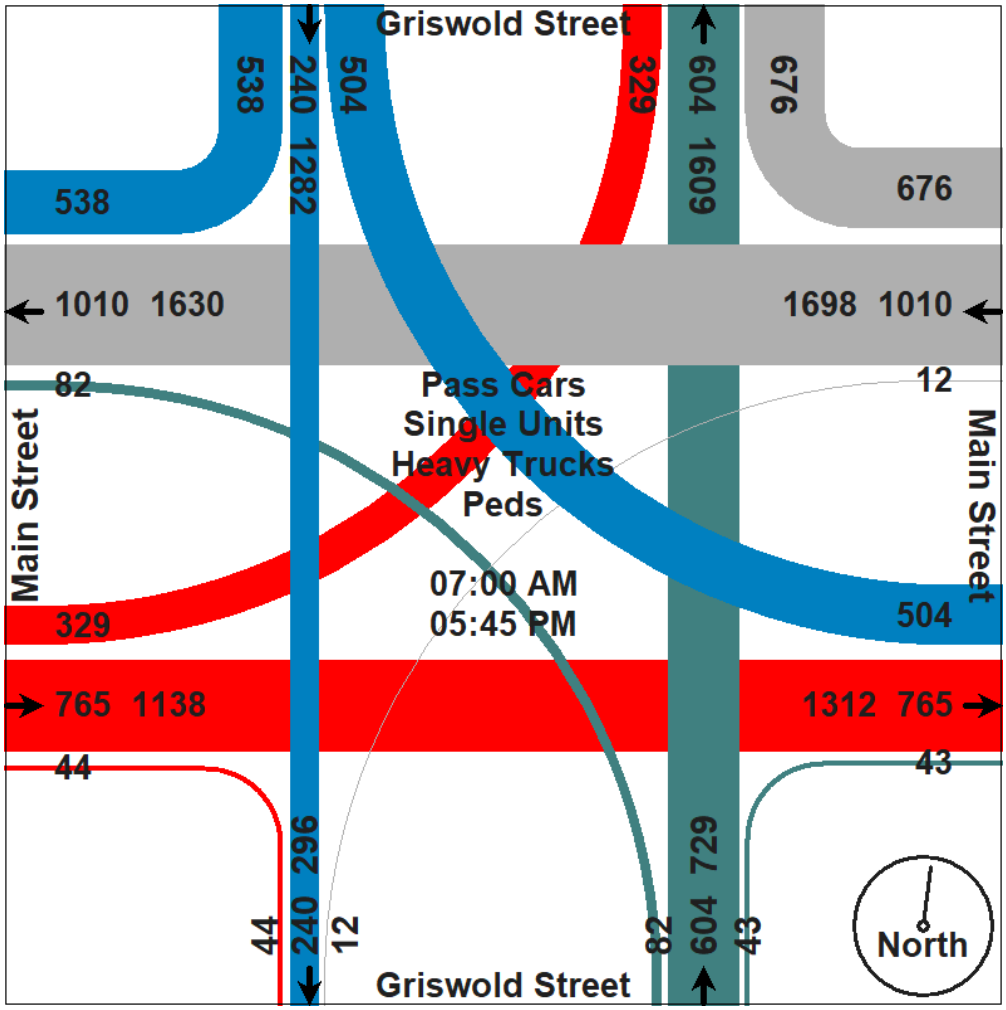
Phone: 586.786-5407

Traffic Study Performed For:

Fleis &VandenBrink

Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 24L NE

File Name : TMC_3 Main & Griswold_5-15-18
Site Code : TMC_3
Start Date : 5/15/2018
Page No : 2



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Traffic Study Performed For:

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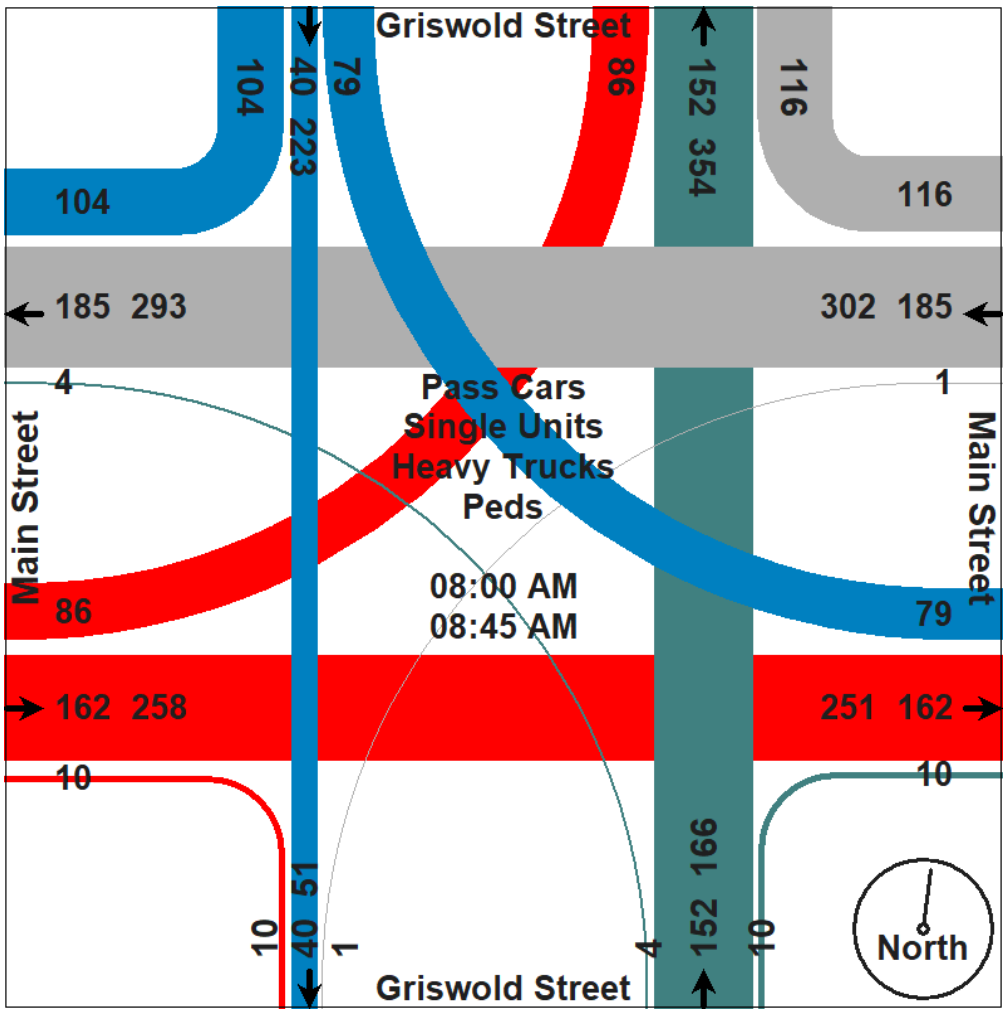
Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 24L NE

File Name : TMC_3 Main & Griswold_5-15-18
Site Code : TMC_3
Start Date : 5/15/2018
Page No : 3

	Griswold Street Southbound				Main Street Westbound				Griswold Street Northbound				Main Street Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	22	10	18	50	28	41	0	69	**3**	**43**	1	**47**	3	46	21	70	236
08:15 AM	28	9	14	51	27	39	**1**	67	1	40	0	41	0	36	23	59	218
08:30 AM	**30**	**11**	19	60	29	46	0	75	3	38	**2**	43	2	32	16	50	228
08:45 AM	24	10	**28**	**62**	**32**	**59**	0	**91**	3	31	1	35	**5**	**48**	**26**	**79**	**267**
Total Volume	104	40	79	223	116	185	1	302	10	152	4	166	10	162	86	258	949
% App. Total	46.6	17.9	35.4		38.4	61.3	0.3		6	91.6	2.4		3.9	62.8	33.3		
PHF	.867	.909	.705	.899	.906	.784	.250	.830	.833	.884	.500	.883	.500	.844	.827	.816	.889
Pass Cars	102	38	76	216	108	182	1	291	10	151	4	165	10	160	85	255	927
% Pass Cars	98.1	95.0	96.2	96.9	93.1	98.4	100	96.4	100	99.3	100	99.4	100	98.8	98.8	98.8	97.7
Single Units	2	2	3	7	8	3	0	11	0	1	0	1	0	2	1	3	22
% Single Units	1.9	5.0	3.8	3.1	6.9	1.6	0	3.6	0	0.7	0	0.6	0	1.2	1.2	1.2	2.3
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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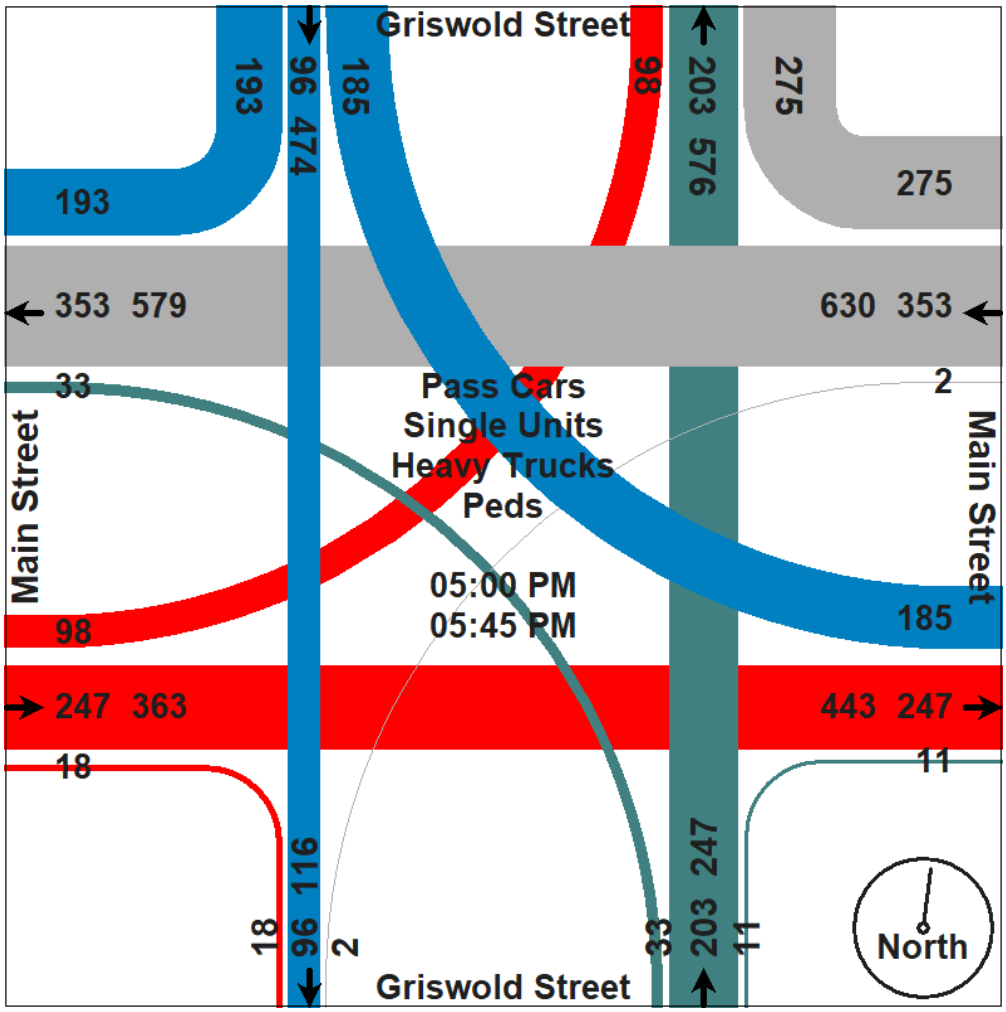
Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 24L NE

File Name : TMC_3 Main & Griswold_5-15-18
Site Code : TMC_3
Start Date : 5/15/2018
Page No : 4

	Griswold Street Southbound				Main Street Westbound				Griswold Street Northbound				Main Street Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	53	18	40	111	57	**96**	0	153	3	55	9	**67**	**9**	68	23	100	431
05:15 PM	47	21	46	114	**76**	81	**2**	159	2	**56**	8	66	1	54	20	75	414
05:30 PM	39	27	**57**	123	70	92	0	**162**	**6**	47	6	59	4	**71**	**32**	**107**	**451**
05:45 PM	**54**	**30**	42	**126**	72	84	0	156	0	45	**10**	55	4	54	23	81	418
Total Volume	193	96	185	474	275	353	2	630	11	203	33	247	18	247	98	363	1714
% App. Total	40.7	20.3	39		43.7	56	0.3		4.5	82.2	13.4		5	68	27		
PHF	.894	.800	.811	.940	.905	.919	.250	.972	.458	.906	.825	.922	.500	.870	.766	.848	.950
Pass Cars	192	96	182	470	272	352	2	626	11	201	33	245	18	244	97	359	1700
% Pass Cars	99.5	100	98.4	99.2	98.9	99.7	100	99.4	100	99.0	100	99.2	100	98.8	99.0	98.9	99.2
Single Units	1	0	3	4	3	1	0	4	0	2	0	2	0	3	1	4	14
% Single Units	0.5	0	1.6	0.8	1.1	0.3	0	0.6	0	1.0	0	0.8	0	1.2	1.0	1.1	0.8
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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Traffic Study Performed For:

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Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 24L NE

File Name : TMC_3 Main & Griswold_5-15-18
Site Code : TMC_3
Start Date : 5/15/2018
Page No : 5

Aerial Photo

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Traffic Study Performed For:

Fleis &VandenBrink

Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 4SY NW

File Name : TMC_6 Cady & Griswold_5-15-18
Site Code : TMC_6
Start Date : 5/15/2018
Page No : 1

4 Hour traffic study was conducted during typical weekday (Tuesday-Thursday) from 7:00 AM - 9:00 AM morning & 4:00 PM - 6:00 PM afternoon peak hours, while school was in session.

Groups Printed- Pass Cars - Single Units - Heavy Trucks - Peds

	Griswold Street Southbound					Cady Street Westbound					Griswold Street Northbound					Cady Street Eastbound					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	8	1	1	0	10	0	0	0	0	0	0	7	2	0	9	2	4	11	1	18	37
07:15 AM	8	5	0	0	13	0	1	1	0	2	0	5	1	0	6	6	2	21	0	29	50
07:30 AM	5	4	0	0	9	0	0	0	1	1	0	9	2	0	11	6	1	39	0	46	67
07:45 AM	10	3	0	0	13	0	0	0	0	0	0	4	2	0	6	6	5	35	1	47	66
Total	31	13	1	0	45	0	1	1	1	3	0	25	7	0	32	20	12	106	2	140	220
08:00 AM	6	9	1	0	16	1	2	0	0	3	0	4	3	0	7	6	4	41	1	52	78
08:15 AM	7	0	1	4	12	0	1	0	0	1	1	8	1	0	10	5	2	35	0	42	65
08:30 AM	11	2	0	1	14	1	1	0	0	2	2	3	7	0	12	4	3	39	1	47	75
08:45 AM	13	5	0	0	18	0	0	0	0	0	3	3	6	0	12	4	9	34	1	48	78
Total	37	16	2	5	60	2	4	0	0	6	6	18	17	0	41	19	18	149	3	189	296
*** BREAK ***																					
04:00 PM	7	11	0	0	18	1	3	0	0	4	1	9	6	0	16	9	2	16	0	27	65
04:15 PM	11	12	2	0	25	2	2	1	0	5	2	18	2	0	22	8	5	17	0	30	82
04:30 PM	9	13	1	0	23	2	3	0	0	5	0	24	4	0	28	9	3	31	1	44	100
04:45 PM	7	12	2	0	21	1	4	1	0	6	0	15	7	0	22	7	5	30	1	43	92
Total	34	48	5	0	87	6	12	2	0	20	3	66	19	0	88	33	15	94	2	144	339
05:00 PM	13	18	0	0	31	2	1	0	0	3	0	26	4	0	30	12	3	34	0	49	113
05:15 PM	11	16	2	0	29	3	1	3	0	7	1	30	5	0	36	7	2	30	0	39	111
05:30 PM	17	22	1	0	40	2	2	0	0	4	2	21	8	0	31	7	2	32	0	41	116
05:45 PM	16	15	1	0	32	3	2	0	0	5	0	23	7	0	30	5	2	26	3	36	103
Total	57	71	4	0	132	10	6	3	0	19	3	100	24	0	127	31	9	122	3	165	443
Grand Total	159	148	12	5	324	18	23	6	1	48	12	209	67	0	288	103	54	471	10	638	1298
Apprch %	49.1	45.7	3.7	1.5		37.5	47.9	12.5	2.1		4.2	72.6	23.3	0		16.1	8.5	73.8	1.6		
Total %	12.2	11.4	0.9	0.4	25	1.4	1.8	0.5	0.1	3.7	0.9	16.1	5.2	0	22.2	7.9	4.2	36.3	0.8	49.2	
Pass Cars	158	146	12	0	316	18	23	5	0	46	12	209	67	0	288	103	54	466	0	623	1273
% Pass Cars	99.4	98.6	100	0	97.5	100	100	83.3	0	95.8	100	100	100	0	100	100	100	98.9	0	97.6	98.1
Single Units	1	2	0	0	3	0	0	1	0	1	0	0	0	0	0	0	0	5	0	5	9
% Single Units	0.6	1.4	0	0	0.9	0	0	16.7	0	2.1	0	0	0	0	0	0	0	1.1	0	0.8	0.7
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peds	0	0	0	5	5	0	0	0	1	1	0	0	0	0	0	0	0	0	10	10	16
% Peds	0	0	0	100	1.5	0	0	0	100	2.1	0	0	0	0	0	0	0	0	100	1.6	1.2

TDC Traffic Comments: Non-signalized intersection. Cady St. is stop controlled for Griswold St. Video VCU camera was located within NW intersection quadrant. Note: Peds. are excluded from peak hour reports.

Traffic Data Collection, LLC

www:tdccounts.com

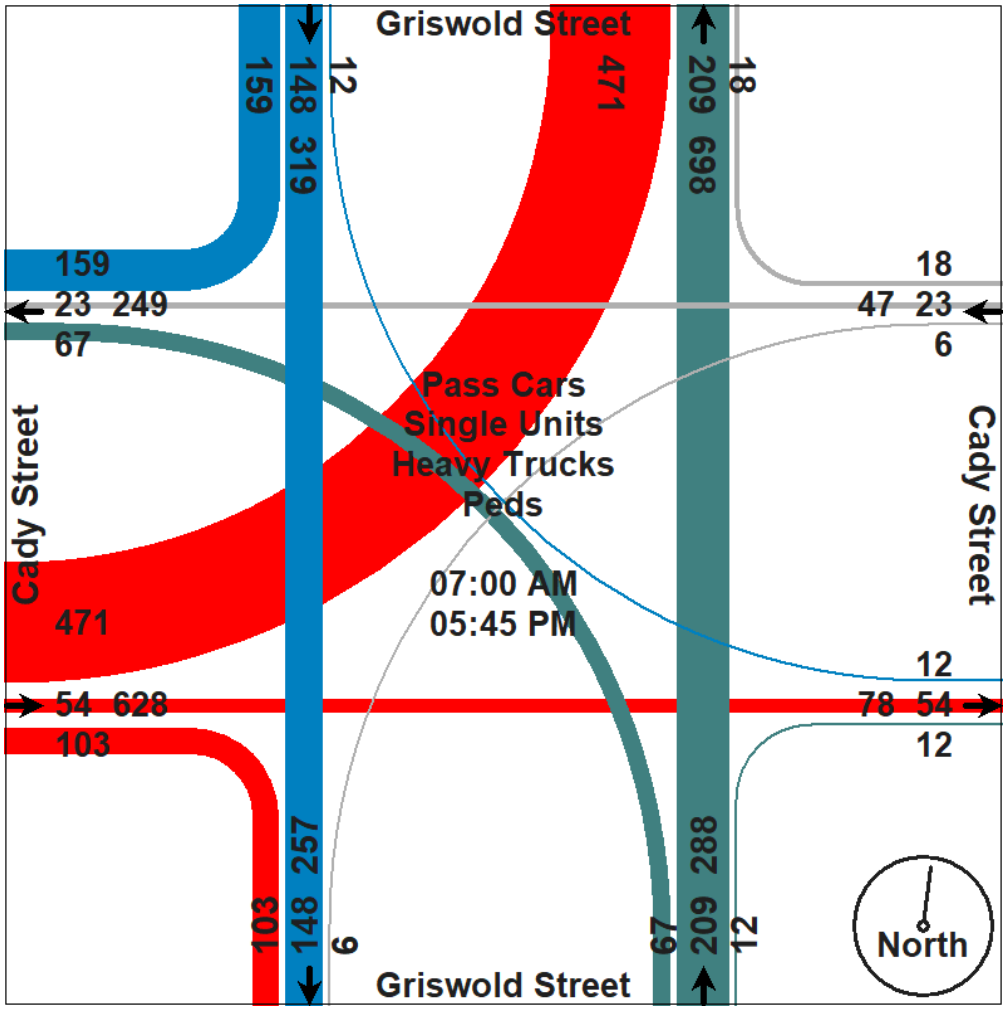
Phone: 586.786-5407

Traffic Study Performed For:

Fleis &VandenBrink

Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 4SY NW

File Name : TMC_6 Cady & Griswold_5-15-18
Site Code : TMC_6
Start Date : 5/15/2018
Page No : 2



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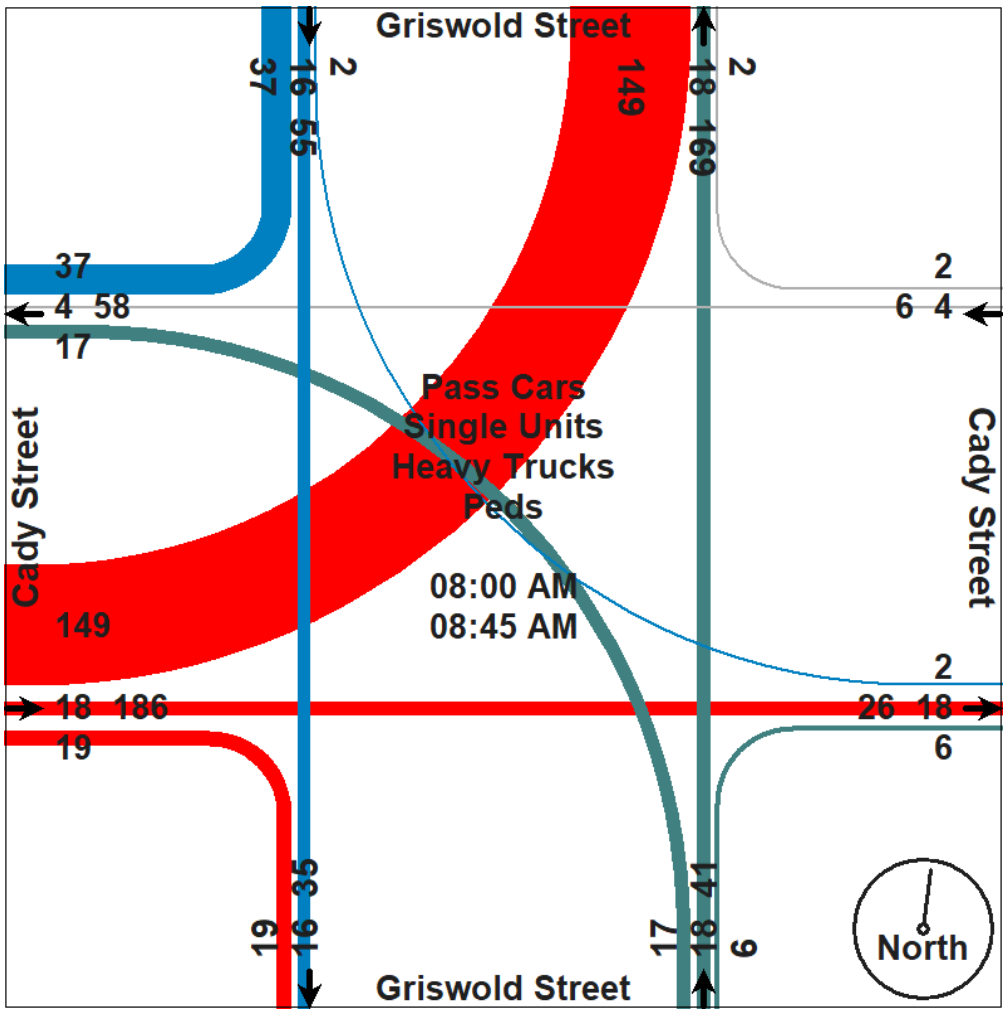
File Name : TMC_6 Cady & Griswold_5-15-18
Site Code : TMC_6
Start Date : 5/15/2018
Page No : 3

	Griswold Street Southbound				Cady Street Westbound				Griswold Street Northbound				Cady Street Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	6	**9**	**1**	16	**1**	**2**	0	**3**	0	4	3	7	**6**	4	**41**	**51**	**77**
08:15 AM	7	0	1	8	0	1	0	1	1	**8**	1	10	5	2	35	42	61
08:30 AM	11	2	0	13	1	1	0	2	2	3	**7**	**12**	4	3	39	46	73
08:45 AM	**13**	5	0	**18**	0	0	0	0	**3**	3	6	12	4	**9**	34	47	77
Total Volume	37	16	2	55	2	4	0	6	6	18	17	41	19	18	149	186	288
% App. Total	67.3	29.1	3.6		33.3	66.7	0		14.6	43.9	41.5		10.2	9.7	80.1		
PHF	.712	.444	.500	.764	.500	.500	.000	.500	.500	.563	.607	.854	.792	.500	.909	.912	.935
Pass Cars	36	15	2	53	2	4	0	6	6	18	17	41	19	18	148	185	285
% Pass Cars	97.3	93.8	100	96.4	100	100	0	100	100	100	100	100	100	100	99.3	99.5	99.0
Single Units	1	1	0	2	0	0	0	0	0	0	0	0	0	0	1	1	3
% Single Units	2.7	6.3	0	3.6	0	0	0	0	0	0	0	0	0	0	0.7	0.5	1.0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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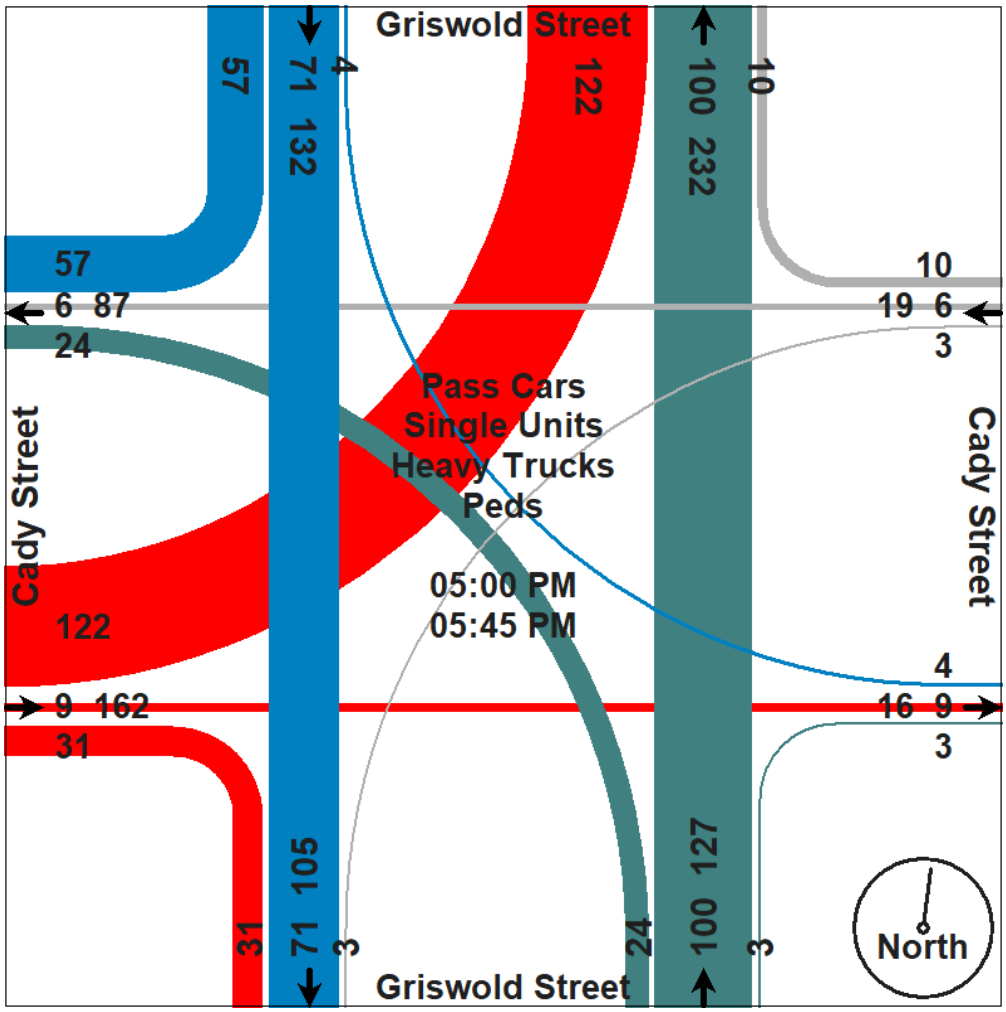
Traffic Study Performed For:

Fleis &VandenBrink

Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 4SY NW

File Name : TMC_6 Cady & Griswold_5-15-18
Site Code : TMC_6
Start Date : 5/15/2018
Page No : 4

	Griswold Street Southbound				Cady Street Westbound				Griswold Street Northbound				Cady Street Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	13	18	0	31	2	1	0	3	0	26	4	30	**12**	**3**	**34**	**49**	113
05:15 PM	11	16	**2**	29	**3**	1	**3**	**7**	1	**30**	5	**36**	7	2	30	39	111
05:30 PM	**17**	**22**	1	**40**	2	**2**	0	4	**2**	21	**8**	31	7	2	32	41	**116**
05:45 PM	16	15	1	32	3	2	0	5	0	23	7	30	5	2	26	33	100
Total Volume	57	71	4	132	10	6	3	19	3	100	24	127	31	9	122	162	440
% App. Total	43.2	53.8	3		52.6	31.6	15.8		2.4	78.7	18.9		19.1	5.6	75.3		
PHF	.838	.807	.500	.825	.833	.750	.250	.679	.375	.833	.750	.882	.646	.750	.897	.827	.948
Pass Cars	57	71	4	132	10	6	3	19	3	100	24	127	31	9	120	160	438
% Pass Cars	100	100	100	100	100	100	100	100	100	100	100	100	100	100	98.4	98.8	99.5
Single Units	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2
% Single Units	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.6	1.2	0.5
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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Traffic Study Performed For:

Fleis &VandenBrink

Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 4SY NW

File Name : TMC_6 Cady & Griswold_5-15-18
Site Code : TMC_6
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Page No : 5

Aerial Photo

Traffic Data Collection, LLC

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Traffic Study Performed For:

Fleis &VandenBrink

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Count By Miovision Video VCU 3CU NW

File Name : TMC_8 Beal & River_5-15-18
Site Code : TMC_8
Start Date : 5/15/2018
Page No : 1

4 Hour traffic study was conducted during typical weekday (Tuesday-Thursday) from 7:00 AM - 9:00 AM morning & 4:00 PM - 6:00 PM afternoon peak hours, while school was in session.

Groups Printed- Pass Cars - Single Units - Heavy Trucks - Peds

	Beal Street Westbound				River Street Northbound				Beal Street Eastbound				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
07:00 AM	2	0	0	2	1	6	0	7	0	3	0	3	12
07:15 AM	2	1	0	3	1	4	0	5	7	5	0	12	20
07:30 AM	6	1	0	7	1	5	0	6	1	9	0	10	23
07:45 AM	3	0	0	3	1	2	1	4	2	6	0	8	15
Total	13	2	0	15	4	17	1	22	10	23	0	33	70
08:00 AM	2	0	0	2	3	4	0	7	6	9	1	16	25
08:15 AM	7	2	0	9	1	5	0	6	2	4	0	6	21
08:30 AM	6	3	0	9	4	6	0	10	4	3	0	7	26
08:45 AM	5	1	1	7	0	5	0	5	3	6	0	9	21
Total	20	6	1	27	8	20	0	28	15	22	1	38	93
*** BREAK ***													
04:00 PM	5	2	0	7	2	7	0	9	7	11	0	18	34
04:15 PM	6	2	0	8	1	11	1	13	10	15	2	27	48
04:30 PM	5	1	1	7	1	16	1	18	9	15	0	24	49
04:45 PM	5	0	3	8	0	13	0	13	9	7	0	16	37
Total	21	5	4	30	4	47	2	53	35	48	2	85	168
05:00 PM	3	1	3	7	4	24	0	28	14	16	0	30	65
05:15 PM	4	2	0	6	1	25	0	26	18	11	0	29	61
05:30 PM	3	1	0	4	2	24	0	26	13	14	0	27	57
05:45 PM	5	0	3	8	2	18	1	21	17	9	0	26	55
Total	15	4	6	25	9	91	1	101	62	50	0	112	238
*** BREAK ***													
Grand Total	69	17	11	97	25	175	4	204	122	143	3	268	569
Apprch %	71.1	17.5	11.3		12.3	85.8	2		45.5	53.4	1.1		
Total %	12.1	3	1.9	17	4.4	30.8	0.7	35.9	21.4	25.1	0.5	47.1	
Pass Cars	68	17	0	85	24	174	0	198	120	141	0	261	544
% Pass Cars	98.6	100	0	87.6	96	99.4	0	97.1	98.4	98.6	0	97.4	95.6
Single Units	1	0	0	1	1	1	0	2	2	2	0	4	7
% Single Units	1.4	0	0	1	4	0.6	0	1	1.6	1.4	0	1.5	1.2
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0
Peds	0	0	11	11	0	0	4	4	0	0	3	3	18
% Peds	0	0	100	11.3	0	0	100	2	0	0	100	1.1	3.2

TDC Traffic Comments: Non-signalized "T" intersection. River St.is stop controlled for Beal St. Video VCU camera was located within NW intersection quadrant. Note: Peds. are excluded from peak hour reports.

Traffic Data Collection, LLC

www:tdccounts.com

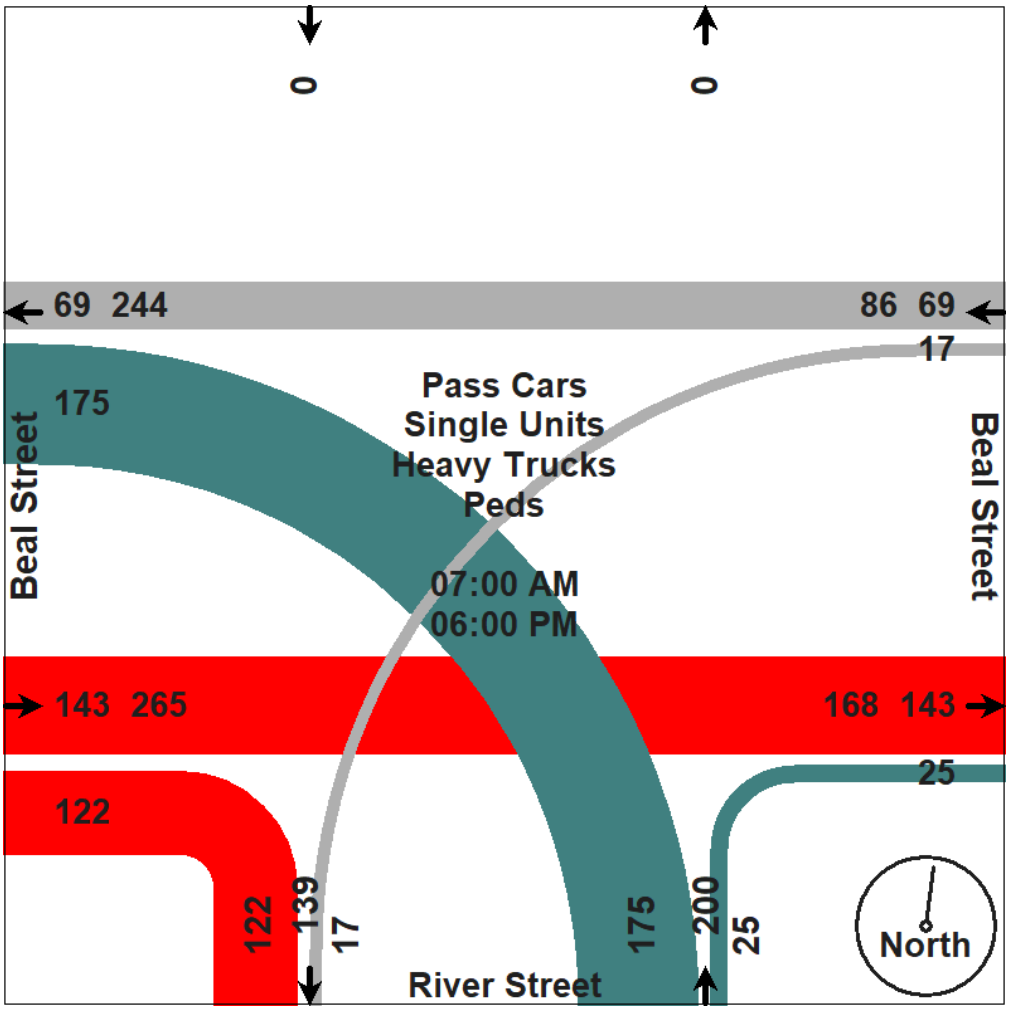
Phone: 586.786-5407

Traffic Study Performed For:

Fleis &VandenBrink

Project: Northville Down TIS
Study:4 Hr. Video Turning Movement Count
Weather: Sunny/Cldy. Dry Deg's 70's
Count By Miovision Video VCU 3CU NW

File Name : TMC_8 Beal & River_5-15-18
Site Code : TMC_8
Start Date : 5/15/2018
Page No : 2



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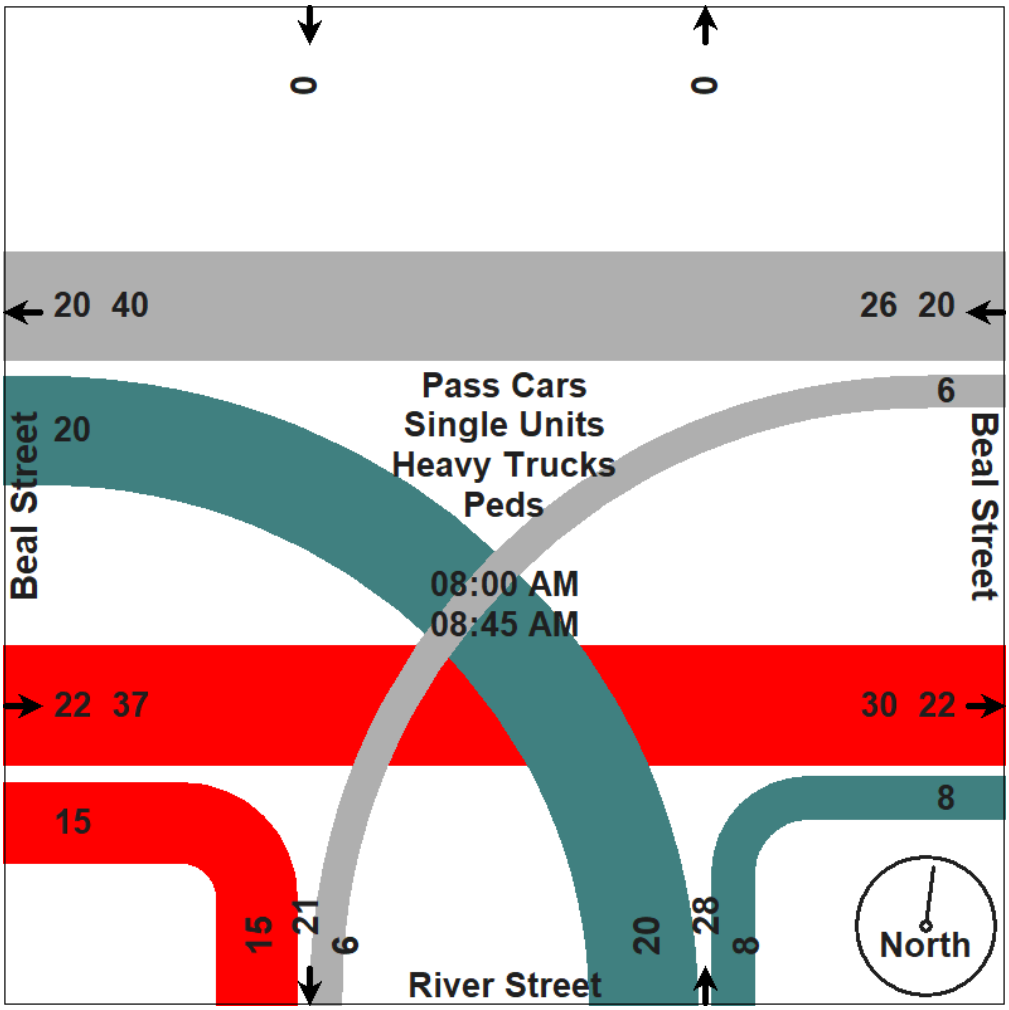
File Name : TMC_8 Beal & River_5-15-18
Site Code : TMC_8
Start Date : 5/15/2018
Page No : 3

	Beal Street Westbound			River Street Northbound			Beal Street Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00 AM										
08:00 AM	2	0	2	3	4	7	**6**	**9**	**15**	24
08:15 AM	**7**	2	**9**	1	5	6	2	4	6	21
08:30 AM	6	**3**	9	**4**	**6**	**10**	4	3	7	**26**
08:45 AM	5	1	6	0	5	5	3	6	9	20
Total Volume	20	6	26	8	20	28	15	22	37	91
% App. Total	76.9	23.1		28.6	71.4		40.5	59.5		
PHF	.714	.500	.722	.500	.833	.700	.625	.611	.617	.875
Pass Cars	20	6	26	7	19	26	14	21	35	87
% Pass Cars	100	100	100	87.5	95.0	92.9	93.3	95.5	94.6	95.6
Single Units	0	0	0	1	1	2	1	1	2	4
% Single Units	0	0	0	12.5	5.0	7.1	6.7	4.5	5.4	4.4
Heavy Trucks	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0
Peds	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0



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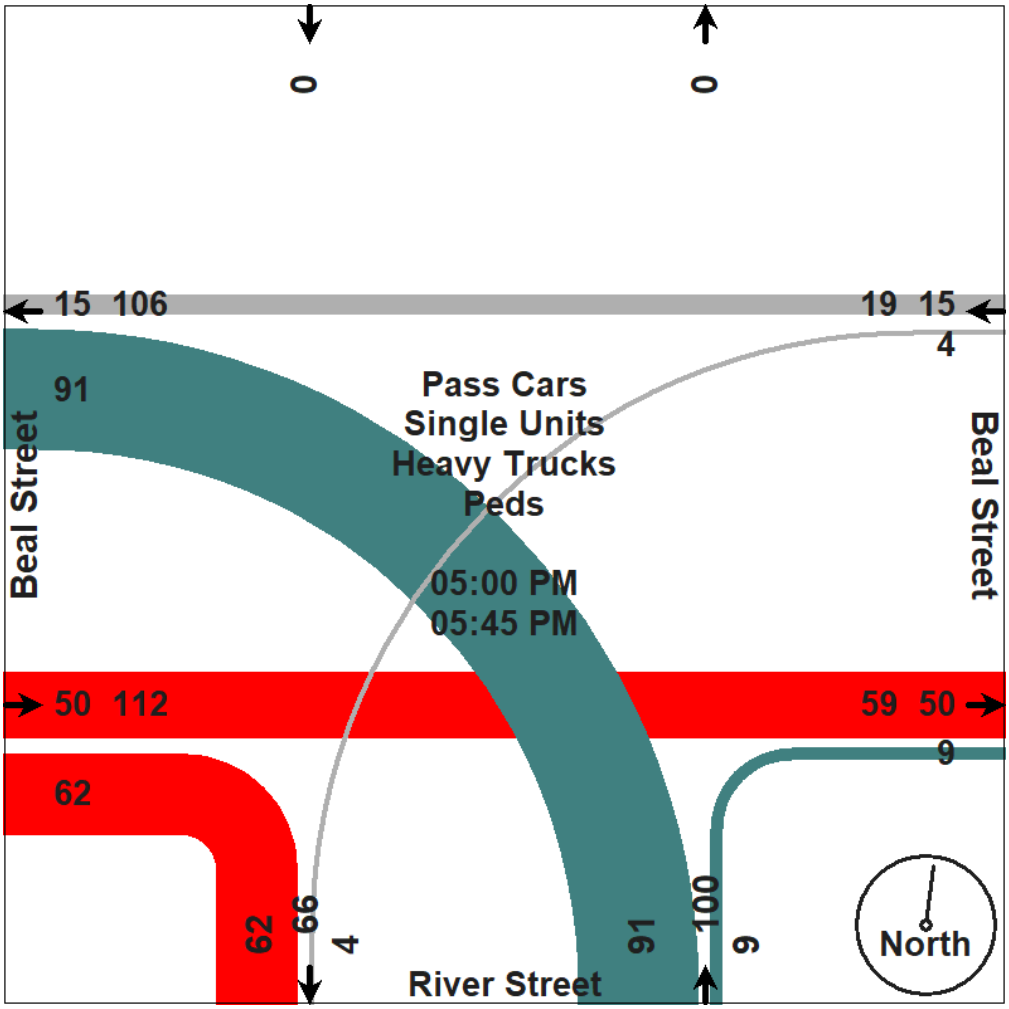
File Name : TMC_8 Beal & River_5-15-18
Site Code : TMC_8
Start Date : 5/15/2018
Page No : 4

	Beal Street Westbound			River Street Northbound			Beal Street Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	3	1	4	**4**	24	**28**	14	**16**	**30**	**62**
05:15 PM	4	**2**	**6**	1	**25**	26	**18**	11	29	61
05:30 PM	3	1	4	2	24	26	13	14	27	57
05:45 PM	**5**	0	5	2	18	20	17	9	26	51
Total Volume	15	4	19	9	91	100	62	50	112	231
% App. Total	78.9	21.1		9	91		55.4	44.6		
PHF	.750	.500	.792	.563	.910	.893	.861	.781	.933	.931
Pass Cars	15	4	19	9	91	100	62	50	112	231
% Pass Cars	100	100	100	100	100	100	100	100	100	100
Single Units	0	0	0	0	0	0	0	0	0	0
% Single Units	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0
Peds	0	0	0	0	0	0	0	0	0	0
% Peds	0	0	0	0	0	0	0	0	0	0



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File Name : TMC_8 Beal & River_5-15-18
Site Code : TMC_8
Start Date : 5/15/2018
Page No : 5

Aerial Photo

	Main Street Westbound		Cady Street Northbound		Main Street Eastbound		
Start Time	Left	Thru	Left	Right	Thru	Right	**Total**
7:00 AM	0	28	0	2	25	0	**55**
7:15 AM	0	40	0	4	22	0	**66**
7:30 AM	2	30	0	1	34	0	**67**
7:45 AM	1	57	0	1	43	1	**103**
8:00 AM	1	44	0	3	39	1	**88**
8:15 AM	0	64	1	4	37	0	**106**
8:30 AM	1	68	1	6	49	0	**125**
8:45 AM	2	70	2	5	46	0	**125**

Peak Hour

Total	**4**	**246**	**4**	**18**	**171**	**1**	**444**
PHF	0.87		0.79		0.88		
HV	14		1		6		

4:00 PM	4	94	1	6	78	6	**189**
4:15 PM	1	88	2	9	73	10	**183**
4:30 PM	2	96	1	7	69	2	**177**
4:45 PM	5	120	4	4	88	4	**225**
5:00 PM	3	113	2	5	75	6	**204**
5:15 PM	3	101	2	6	76	4	**192**
5:30 PM	4	114	0	1	63	2	**184**
5:45 PM	7	114	3	5	96	5	**230**

Peak Hour

Total	**17**	**442**	**7**	**17**	**310**	**17**	**810**
PHF	0.95		0.75		0.81		
HV	6		1		6		

SEMCOG | Southeast Michigan Council of Governments

Community Profiles

YOU ARE VIEWING DATA FOR:

City of Northville

215 W Main St
Northville, MI 48167-1599
http://www.ci.northville.mi.us/

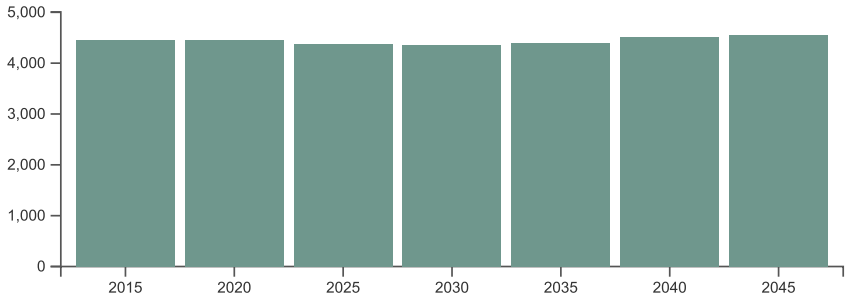
SEMCOG MEMBER

Census 2010 Population: 5,970
Area: 2 square miles

Economy & Jobs

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

Forecasted Jobs



Source: **SEMCOG 2045 Regional Development Forecast**

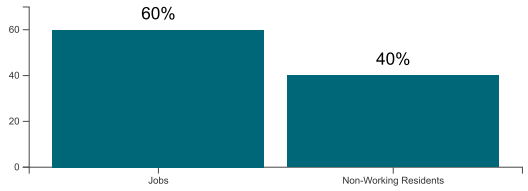
Forecasted Jobs by Industry Sector

Forecasted Jobs By Industry Sector	2015	2020	2025	2030	2035	2040	2045	Change 2015-2045	Pct Change 2015-2045
Natural Resources, Mining, & Construction	98	103	97	99	100	102	101	3	3.1%
Manufacturing	120	110	90	83	79	69	59	-61	-50.8%
Wholesale Trade	67	64	68	62	64	63	67	0	0%
Retail Trade	330	307	297	283	267	279	283	-47	-14.2%
Transportation, Warehousing, & Utilities	135	102	86	74	65	60	55	-80	-59.3%
Information & Financial Activities	881	863	822	811	792	849	839	-42	-4.8%
Professional and Technical Services & Corporate HQ	500	501	514	522	549	564	568	68	13.6%
Administrative, Support, & Waste Services	277	287	290	293	301	309	314	37	13.4%
Education Services	486	499	496	494	496	502	506	20	4.1%
Healthcare Services	487	524	536	551	582	617	651	164	33.7%
Leisure & Hospitality	511	529	527	529	535	551	558	47	9.2%
Other Services	432	434	428	424	425	424	419	-13	-3%
Public Administration	136	132	132	132	132	132	132	-4	-2.9%
Total Employment Numbers	4,460	4,455	4,383	4,357	4,387	4,521	4,552	92	2.1%

Source: **SEMCOG 2045 Regional Development Forecast**

Daytime Population

Daytime Population	SEMCOG and ACS 2015
Jobs	4,460
Non-Working Residents	2,984
Age 15 and under	1,014
Not in labor force	1,724
Unemployed	246
Daytime Population	7,444



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

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

SEMCOG | Southeast Michigan Council of Governments

Community Profiles

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City of Northville

215 W Main St
Northville, MI 48167-1599
http://www.ci.northville.mi.us/

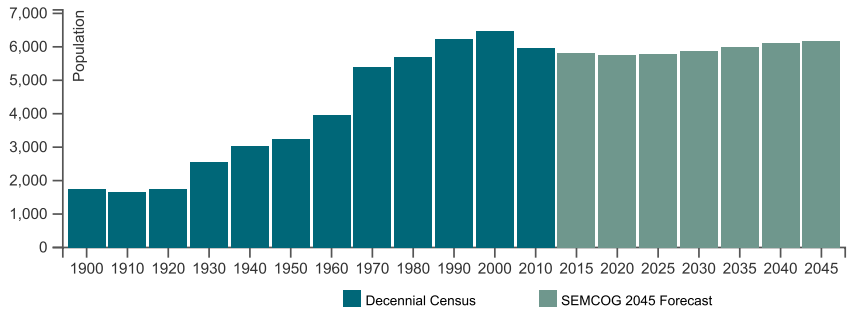
SEMCOG MEMBER

Census 2010 Population: 5,970
Area: 2 square miles

Population and Households

Link to American Community Survey (ACS) Profiles: **Select a Year** 2012-2016 ▼ **Social** | **Demographic**
Population and Household Estimates for Southeast Michigan, 2017

Population Forecast



Note for City of Northville : Incorporated as a city in 1955 from Village of Northville. Village of Northville incorporated in 1867. Oakland County portion of the Village of Northville was annexed into the village in the early 1900s but not reported separately in the Census until 1930. Population numbers prior to 1955 are of the village.

Population and Households

Population and Households	Census 2010	Change 2000-2010	Pct Change 2000-2010	SEMCOG Jul 2017	SEMCOG 2045
Total Population	5,970	-489	-7.6%	5,835	6,183
Group Quarters Population	34	-4	-10.5%	34	36
Household Population	5,936	-485	-7.6%	5,801	6,147
Housing Units	2,767	-34	-1.2%	2,648	-
Households (Occupied Units)	2,596	-124	-4.6%	2,495	2,602
Residential Vacancy Rate	6.2%	3.3%	-	5.8%	-
Average Household Size	2.29	-0.07	-	2.33	2.36

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

Components of Population Change

Components of Population Change	2000-2005 Avg.	2006-2010 Avg.	2011-2015 Avg.
Natural Increase (Births - Deaths)	109	90	33
Births	231	230	130
Deaths	122	140	97
Net Migration (Movement In - Movement Out)	-157	-140	-61
Population Change (Natural Increase + Net Migration)	-48	-50	-28

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

SEMCOG | Southeast Michigan Council of Governments

Crash and Road Data

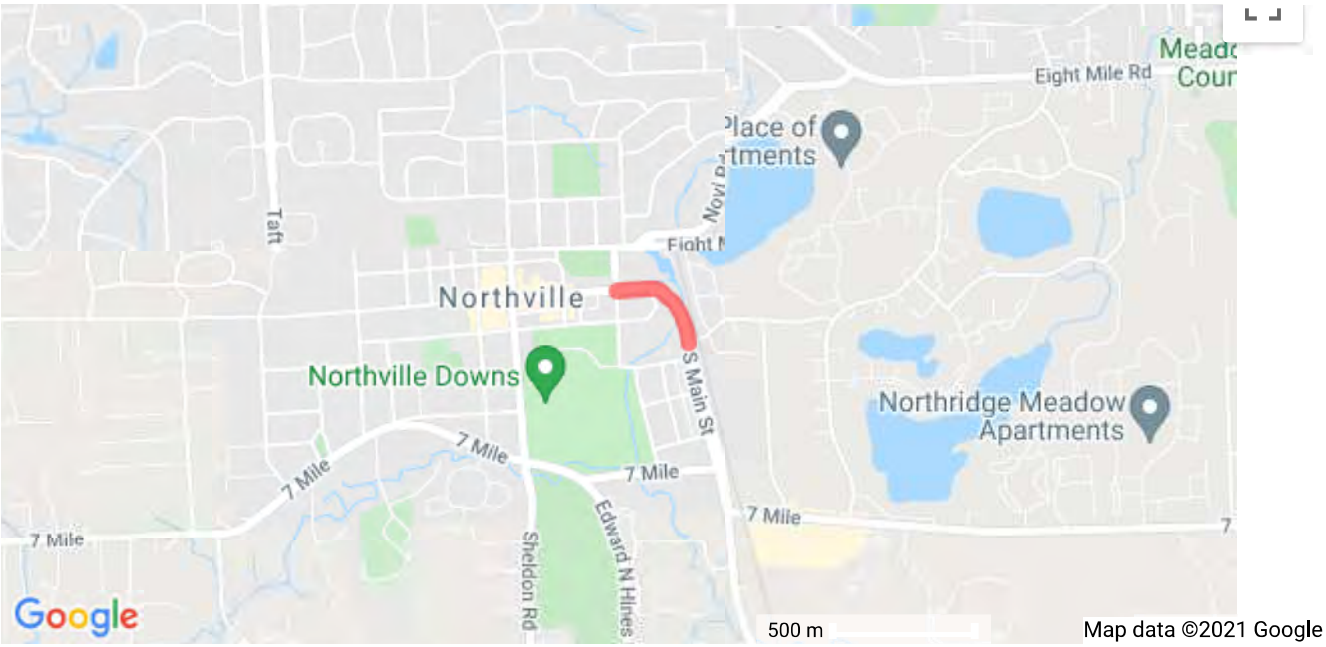
Road Segment Report

Main St E, (PR Number 1680704)

From:	Griswold St 1.712 BMP
To:	Main St S 1.946 EMP
FALINK ID:	15974
Community:	City of Northville (Wayne County)
County:	Wayne
Functional Class:	4 - Minor Arterial
Direction:	1 Way
Length:	0.234 miles
Number of Lanes:	4
Posted Speed:	25 (source: TCO)
Route Classification:	Not a route
Annual Crash Average 2016-2020:	2
Traffic Volume (2016)*:	11,800 (Observed AADT)
Pavement Type (2018):	Asphalt
Pavement Rating (2018):	Poor
Short Range (TIP) Projects:	No TIP projects for this segment.
Long Range (RTP) Projects:	No long-range projects for this segment.

* AADT values are derived from **Traffic Counts**

Street View


Eight Mile Rd
Taft
Northville
Northville Downs
S Main St
Northridge Meadow Apartments
7 Mile
Sheldon Rd
Edward N Hines
500 m
Map data ©2021 Google

SEMCOG | Southeast Michigan Council of Governments

Crash and Road Data

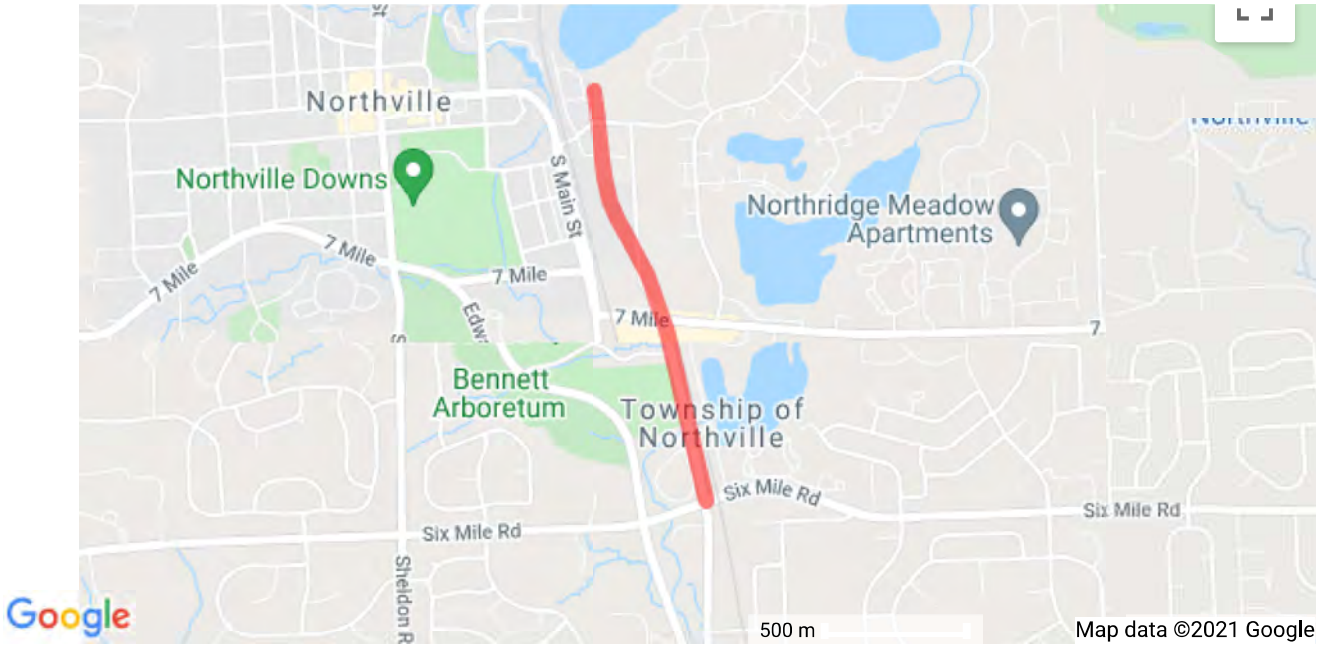
Road Segment Report

Northville Rd, (PR Number 1679402)

From:	6 Mile Rd 1.975 BMP
To:	7 Mile Rd 2.913 EMP
FALINK ID:	15863
Community:	Northville Township
County:	Wayne
Functional Class:	4 - Minor Arterial
Direction:	1 Way
Length:	0.938 miles
Number of Lanes:	2
Posted Speed:	40 (source: TCO)
Route Classification:	Not a route
Annual Crash Average 2016-2020:	11
Traffic Volume (2016)*:	12,100 (Observed AADT)
Pavement Type (2018):	Asphalt
Pavement Rating (2018):	Poor
Short Range (TIP) Projects:	No TIP projects for this segment.
Long Range (RTP) Projects:	No long-range projects for this segment.

* AADT values are derived from **Traffic Counts**

Street View


Northville
Northville Downs
S Main St
Northridge Meadow Apartments
7 Mile
7 Mile
7 Mile
7 Mile
7 Mile
Bennett Arboretum
Township of Northville
Six Mile Rd
Six Mile Rd
Six Mile Rd
Sheldon R
Google
500 m
Map data ©2021 Google

SEMCOG | Southeast Michigan Council of Governments

Crash and Road Data

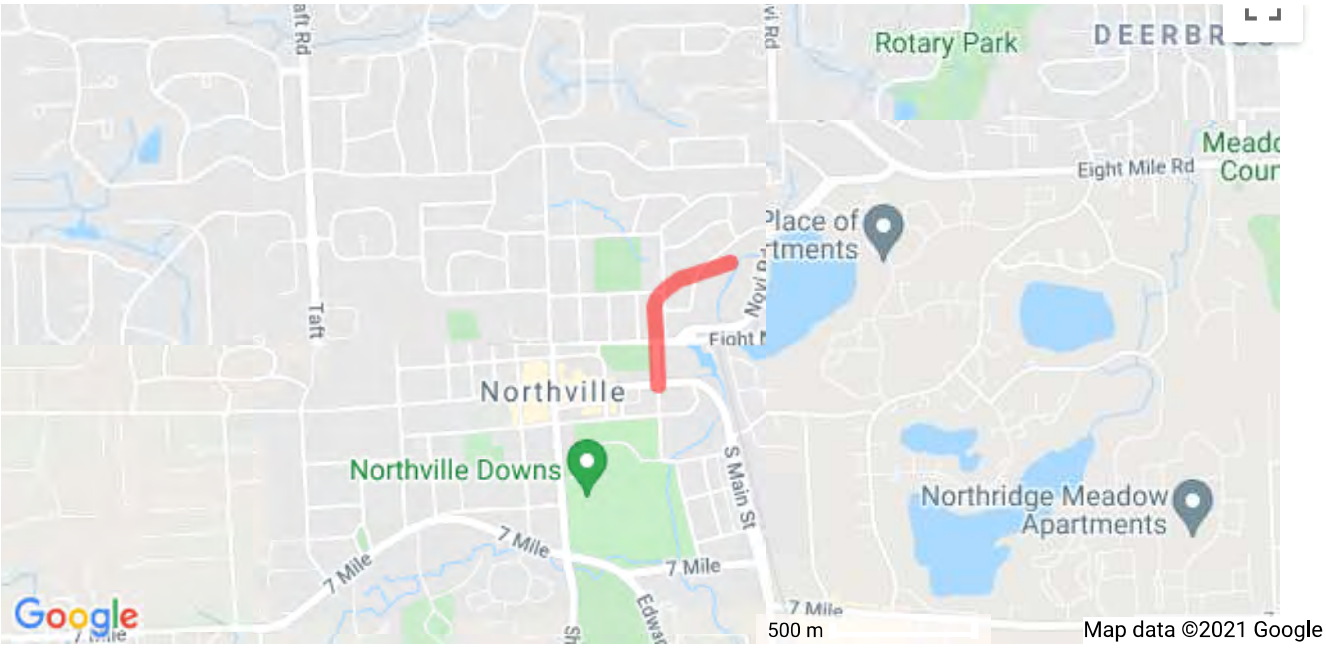
Road Segment Report

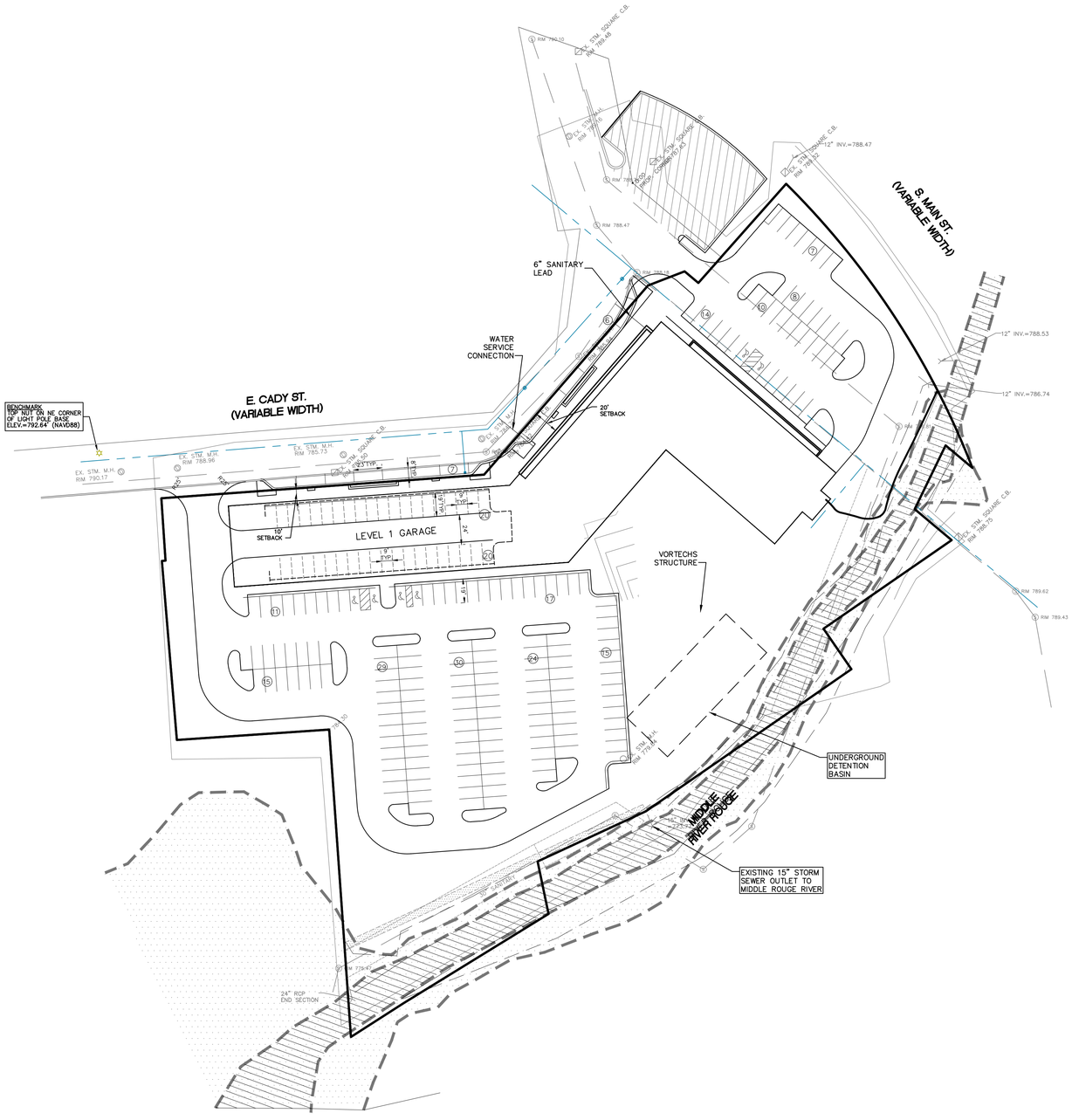
Griswold St, (PR Number 1680204)

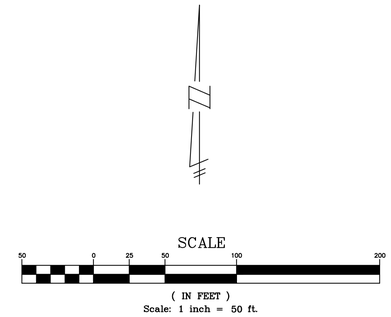
From:	Main St E 0.165 BMP
To:	Griswold St 0.533 EMP
FALINK ID:	15869
Community:	City of Northville (Wayne County)
County:	Wayne
Functional Class:	4 - Minor Arterial
Direction:	1 Way
Length:	0.368 miles
Number of Lanes:	2
Posted Speed:	25 (source: TCO)
Route Classification:	Not a route
Annual Crash Average 2016-2020:	2
Traffic Volume (2016)*:	6,700 (Observed AADT)
Pavement Type (2018):	Concrete
Pavement Rating (2018):	Fair
Short Range (TIP) Projects:	No TIP projects for this segment.
Long Range (RTP) Projects:	No long-range projects for this segment.

* AADT values are derived from **Traffic Counts**

Street View


Rotary Park
Eight Mile Rd
Taft
Northville
Northville Downs
S Main St
Northridge Meadow Apartments
7 Mile
Google
500 m
Map data ©2021 Google





SITE SUMMERY

SITE AREA	4.71 AC.
EXISTING UNDERLYING ZONING	PR-1
EXISTING OVERLAY ZONING	CSO
APPARTMENT UNITS	78 UNITS
COMMERCIAL AREA	8,000-10,000 S.F.

PARKING PROVIDED SUMMARY

CADY STREET	=	13 SPACES	
RESIDENTIAL PARKING	=	141 SPACES	
PUBLIC COMMERCIAL	=	~~40~~ SPACES	39
LEVEL 1 GARAGE	=	40 SPACES	
TOTAL	=	~~234~~ SPACES	233

LEGEND

EXISTING	PROPOSED	
		PAVEMENT (ASPHALT)
		SIDE WALK (CONCRETE)
		CONCRETE CURB AND GUTTER
		STORM SEWER
		SANITARY SEWER
		WATER MAIN
		MANHOLE
		CATCH BASIN
		CURB INLET W/SILT SAC
		END SECTION
		GATE VALVE
		HYDRANT
		FLOOD PLAIN
1000	1000	CONTOURS
+ 1000.0	1000.00 T/C	SPOT ELEVATION
		SURFACE DRAINAGE
		OVERFLOW ROUTE
		TREE FENCE
		SILT FENCE
		PROPOSED DRIVEWAY LOCATION
		LIMIT OF DISTURBANCE

456 CADY STREET

SECTION 3, TOWN 1 SOUTH, RANGE 8 EAST
CITY OF NORTHVILLE, WAYNE COUNTY, MICHIGAN

REVISIONS

NO.	ITEM	DATE

UTILITY WARNING

UNDERGROUND UTILITY LOCATIONS AS SHOWN ON THE PLAN, WERE OBTAINED FROM UTILITY OWNER AND NOT FIELD LOCATED.

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

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF AND/OR RELOCATION OF ALL UTILITIES THAT MAY INTERFERE WITH CONSTRUCTION.

DATE: 07-08-21 | DESIGNED BY: A.A. | CHECKED BY: B.E. | JOB NUMBER: 21-008 | DRAWING FILE:210080A.dwg

OVERALL SITEPLAN

SEIBER, KEAST ENGINEERING, L.L.C.
CONSULTING ENGINEERS
100 MAINCENTRE • SUITE 10 • NORTHVILLE, MI • 48167
PHONE: 248.308.3331 EMAIL: info@seiberkeast.com

SHEET 2

Appendix B

EXISTING TRAFFIC CONDITIONS

Level of Service Criteria for Stop Sign Controlled Intersections

The level of service criteria are given in Exhibit 20-2. As used here, control delay is defined as the total elapsed time from the time a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position, including deceleration of vehicles from free-flow speed to the speed of vehicles in queue.

The average total delay for any particular controlled movement is a function three (capacity) factors: distribution of gaps in the major-street traffic stream, driver judgment in selecting gaps through which to execute the desired maneuvers, and the follow-up headways required by each driver in a queue.

The basic capacity model assumes gaps in the conflicting movements are randomly distributed. When traffic signals are present on the major street, upstream of the subject intersection, flows may not be random but will likely have some platoon structure. Although the procedures in this chapter provide a method for approximating the operations of a TWSC intersection with an upstream signal, the operations of such an intersection is arguably best handled by including it in a complete simulation

Exhibit 20-2. Level of Service Criteria for Stop-Controlled Intersections (Motor Vehciles)

LEVEL OF SERVICE	AVERAGE CONTROL DELAY (sec/veh)
A	≤ 10
B	> 10 and ≤ 15
C	> 15 and ≤ 25
D	> 25 and ≤ 35
E	> 35 and ≤ 50
F	> 50

Average total delay less than 10 sec/veh is defined as Level of Service (LOS) A. Follow-up times of less than 5 sec have been measured when there is no conflicting traffic for a minor street movement, so control delays of less than 10 sec/veh are appropriate for low flow conditions. A total delay of 50 sec/veh is assumed as the break point between LOS E and F.

The LOS criteria for TWSC intersections differ somewhat from the criteria used in Chapter 19 for signalized intersections, primarily because user perceptions differ among transportation facility types. The expectation is that a signalized intersection is designed to carry higher traffic volumes and will present greater delay than an unsignalized intersection. Additionally, several driver behavior considerations combine to make delays at signalized intersections less onerous than at unsignalized intersections. For example, drivers at signalized intersections are able to relax during the red interval, where drivers on the minor approaches to unsignalized intersections must remain attentive to the task of identifying acceptable gaps and vehicle conflicts. Also, there is often much more variability in the amount of delay experienced by individual drivers at unsignalized than signalized intersections. For these reasons, it is considered that the total delay threshold for any given level of service is less for an unsignalized intersection than for a signalized intersection.

LOS F exists when there are insufficient gaps of suitable size to allow a side street demand to cross safely through a major street traffic stream. This level of service is generally evident from extremely long total delays experienced by side street traffic and by queueing on the minor approaches. The method, however, is based on a constant critical gap size - that is, the critical gap remains constant, no matter how long the side street motorist waits. LOS F may also appear in the form of side street vehicles' selecting smaller-than-usual gaps. In such cases, safety may be a problem and some disruption to the major traffic stream may result. It is important to note that LOS F may not always result in long queues but may result in adjustments to normal gap acceptance behavior. The latter is more difficult to observe on the field than queueing, which is more obvious.

Source: Highway Capacity Manual, 6th Edition. Transportation Research Board, National Research Council

Level of Service for Signalized Intersections

Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. LOS can be characterized for the entire intersection, each intersection approach, and each lane group. Specifically, level-of-service (LOS) criteria are stated in terms of the average stopped delay per vehicle. The criteria are given in Exhibit 19-8. Delay may be measured in the field or estimated using procedures presented later in this chapter. Delay is a complex measure and is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group in question.

LOS A describes operations with a control delay of 10 s/veh or less. This level is typically assigned when the volume-to-capacity ratio is low and either progression is extremely favorable or the cycle length is very short. If LOS A is the result of favorable progression, most vehicles arrive during a green indication and travel through the intersection without stopping.

LOS B describes operations with control delay between 10 and 20 s/veh. This level is typically assigned when the volume-to-capacity ratio is low and either progression is highly favorable or the cycle length is short. More vehicles stop than with LOS A.

Exhibit 19.8. Level-of-Service Criteria for Signalized Intersections (Motorized Vehicles)

LEVEL OF SERVICE	STOPPED DELAY PER VEHICLE (SEC)
A	≤10.0
B	> 10.0 and ≤20.0
C	> 20.0 and ≤ 35.0
D	> 35.0 and ≤ 55.0
E	> 55.0 and ≤ 80.0
F	>80.0

1. If the v/c ratio for a lane group exceeds 1.0, a LOS F is assigned to the individual lane group. LOS for approach-based and intersection-wide assessments are determined solely by the control delay.

LOS C describes operations with control delay between 20 and 35 s/veh. This level is typically assigned when progression is favorable or the cycle length is moderate. Individual *cycle failures* (i.e. one or more queued vehicles are not able to depart as a result of insufficient capacity during the cycle) may begin to appear at this level. The number if vehicle stopping is significant, although many vehicles still pass through the intersection without stopping.

LOS D describes operations with control delay between 35 and 55 s/veh. This level is typically assigned when when the volume-to-capacity ratio is high and either progression is ineffective or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable.

LOS E describes operations with control delay between 55 and 80 s/veh. This level is typically assigned when when the volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.

LOS F describes operations with control delay exceeding 80 s/veh or a volume-to-capacity ratio greater than 1.0. This level, considered to be unacceptable to most drivers, often occurs with over-saturation, that is, when arrival flow rates exceed the capacity of the intersection. This level is typically assigned when the volume-to-capacity ratio is high, progression is very poor, and the cycle length is long. Most cycles fail to clear the queue.

Source: Highway Capacity Manual, 6th Edition. Transportation Research Board, National Research Council

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	87	189	10	1	228	117	4	156	10	79	45	105
Future Volume (veh/h)	87	189	10	1	228	117	4	156	10	79	45	105
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	1984	1984	1984	1938	1938	1938	1984	1984	1984	1953	1953	1953
Adj Flow Rate, veh/h	106	230	12	1	275	141	5	177	11	88	50	117
Peak Hour Factor	0.82	0.82	0.82	0.83	0.83	0.83	0.88	0.88	0.88	0.90	0.90	0.90
Percent Heavy Veh, %	1	1	1	4	4	4	1	1	1	3	3	3
Cap, veh/h	405	959	52	61	1081	534	66	635	39	229	145	248
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.35	0.35	0.35	0.35	0.35	0.35
Sat Flow, veh/h	658	2070	113	1	2332	1153	13	1832	111	427	418	716
Grp Volume(v), veh/h	159	0	189	228	0	189	193	0	0	255	0	0
Grp Sat Flow(s),veh/h/ln	1056	0	1785	1937	0	1550	1956	0	0	1561	0	0
Q Serve(g_s), s	3.8	0.0	3.8	0.0	0.0	4.5	0.0	0.0	0.0	2.7	0.0	0.0
Cycle Q Clear(g_c), s	8.3	0.0	3.8	4.3	0.0	4.5	4.3	0.0	0.0	7.0	0.0	0.0
Prop In Lane	0.67		0.06	0.00		0.74	0.03		0.06	0.35		0.46
Lane Grp Cap(c), veh/h	589	0	827	958	0	718	740	0	0	622	0	0
V/C Ratio(X)	0.27	0.00	0.23	0.24	0.00	0.26	0.26	0.00	0.00	0.41	0.00	0.00
Avail Cap(c_a), veh/h	589	0	827	958	0	718	740	0	0	622	0	0
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.2	0.0	9.7	9.8	0.0	9.8	14.2	0.0	0.0	15.0	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	0.6	0.6	0.0	0.9	0.9	0.0	0.0	2.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	0.0	1.5	1.8	0.0	1.5	1.8	0.0	0.0	2.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.3	0.0	10.3	10.4	0.0	10.7	15.1	0.0	0.0	17.0	0.0	0.0
LnGrp LOS	B	A	B	B	A	B	B	A	A	B	A	A
Approach Vol, veh/h		348			417			193			255	
Approach Delay, s/veh		11.2			10.5			15.1			17.0	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	33.4	26.6	33.4	26.6
Change Period (Y+Rc), s	5.6	* 5.8	5.6	* 5.8
Max Green Setting (Gmax), s	27.8	* 21	27.8	* 21
Max Q Clear Time (g_c+I1), s	10.3	9.0	6.5	6.3
Green Ext Time (p_c), s	2.2	1.2	2.6	0.8

Intersection Summary	
HCM 6th Ctrl Delay	12.8
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	277	1	5	343	3	24
Future Vol, veh/h	277	1	5	343	3	24
Conflicting Peds, #/hr	0	1	1	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	88	88	87	87	79	79
Heavy Vehicles, %	1	1	3	3	5	5
Mvmt Flow	315	1	6	394	4	30

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	317	0	526	159
Stage 1	-	-	-	-	317	-
Stage 2	-	-	-	-	209	-
Critical Hdwy	-	-	4.16	-	6.9	7
Critical Hdwy Stg 1	-	-	-	-	5.9	-
Critical Hdwy Stg 2	-	-	-	-	5.9	-
Follow-up Hdwy	-	-	2.23	-	3.55	3.35
Pot Cap-1 Maneuver	-	-	1233	-	474	849
Stage 1	-	-	-	-	702	-
Stage 2	-	-	-	-	797	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1232	-	471	848
Mov Cap-2 Maneuver	-	-	-	-	471	-
Stage 1	-	-	-	-	701	-
Stage 2	-	-	-	-	792	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	9.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	779	-	-	1232	-
HCM Lane V/C Ratio	0.044	-	-	0.005	-
HCM Control Delay (s)	9.8	-	-	7.9	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	7.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	150	19	20	0	4	2	17	18	6	2	17	37
Future Vol, veh/h	150	19	20	0	4	2	17	18	6	2	17	37
Conflicting Peds, #/hr	0	0	3	3	0	0	5	0	0	0	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
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	60	60	60	85	85	85	76	76	76
Heavy Vehicles, %	1	1	1	0	0	0	0	0	0	4	4	4
Mvmt Flow	165	21	22	0	7	3	20	21	7	3	22	49

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	128	126	55	142	147	25	76	0	0	28	0	0
Stage 1	58	58	-	65	65	-	-	-	-	-	-	-
Stage 2	70	68	-	77	82	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.1	6.5	6.2	4.1	-	-	4.14	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.5	4	3.3	2.2	-	-	2.236	-	-
Pot Cap-1 Maneuver	848	766	1015	832	748	1057	1536	-	-	1573	-	-
Stage 1	956	849	-	951	845	-	-	-	-	-	-	-
Stage 2	942	840	-	937	831	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	826	751	1007	785	733	1057	1529	-	-	1573	-	-
Mov Cap-2 Maneuver	826	751	-	785	733	-	-	-	-	-	-	-
Stage 1	939	843	-	939	834	-	-	-	-	-	-	-
Stage 2	919	829	-	890	825	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.8	9.5	3.1	0.3
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1529	-	-	833	816	1573	-	-
HCM Lane V/C Ratio	0.013	-	-	0.249	0.012	0.002	-	-
HCM Control Delay (s)	7.4	0	-	10.8	9.5	7.3	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1	0	0	-	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	22	15	6	21	20	8
Future Vol, veh/h	22	15	6	21	20	8
Conflicting Peds, #/hr	0	1	1	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	62	62	72	72	70	70
Heavy Vehicles, %	5	5	0	0	7	7
Mvmt Flow	35	24	8	29	29	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	60	0	93	48
Stage 1	-	-	-	-	48	-
Stage 2	-	-	-	-	45	-
Critical Hdwy	-	-	4.1	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	-	-	2.2	-	3.563	3.363
Pot Cap-1 Maneuver	-	-	1556	-	895	1007
Stage 1	-	-	-	-	962	-
Stage 2	-	-	-	-	965	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1555	-	890	1006
Mov Cap-2 Maneuver	-	-	-	-	890	-
Stage 1	-	-	-	-	961	-
Stage 2	-	-	-	-	960	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.6	9.1
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	920	-	-	1555	-
HCM Lane V/C Ratio	0.043	-	-	0.005	-
HCM Control Delay (s)	9.1	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	7	23	18	341	292	9
Future Vol, veh/h	7	23	18	341	292	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	61	61	88	88	91	91
Heavy Vehicles, %	4	4	3	3	2	2
Mvmt Flow	11	38	20	388	321	10

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	560	166	331	0	-	0
Stage 1	326	-	-	-	-	-
Stage 2	234	-	-	-	-	-
Critical Hdwy	6.88	6.98	4.16	-	-	-
Critical Hdwy Stg 1	5.88	-	-	-	-	-
Critical Hdwy Stg 2	5.88	-	-	-	-	-
Follow-up Hdwy	3.54	3.34	2.23	-	-	-
Pot Cap-1 Maneuver	454	843	1218	-	-	-
Stage 1	698	-	-	-	-	-
Stage 2	777	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	444	843	1218	-	-	-
Mov Cap-2 Maneuver	444	-	-	-	-	-
Stage 1	683	-	-	-	-	-
Stage 2	777	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.6	0.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1218	-	697	-	-
HCM Lane V/C Ratio	0.017	-	0.071	-	-
HCM Control Delay (s)	8	0.1	10.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	99	313	18	2	387	277	33	206	11	186	117	194
Future Volume (veh/h)	99	313	18	2	387	277	33	206	11	186	117	194
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	116	368	21	2	407	292	36	224	12	198	124	206
Peak Hour Factor	0.85	0.85	0.85	0.95	0.95	0.95	0.92	0.92	0.92	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	283	972	59	61	954	674	113	567	28	270	143	212
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.35	0.35	0.35	0.35	0.35	0.35
Sat Flow, veh/h	409	2098	126	1	2059	1455	130	1635	81	542	413	611
Grp Volume(v), veh/h	209	0	296	393	0	308	272	0	0	528	0	0
Grp Sat Flow(s),veh/h/ln	851	0	1782	1983	0	1533	1847	0	0	1567	0	0
Q Serve(g_s), s	6.3	0.0	6.4	0.0	0.0	8.1	0.0	0.0	0.0	13.5	0.0	0.0
Cycle Q Clear(g_c), s	14.4	0.0	6.4	8.0	0.0	8.1	6.3	0.0	0.0	19.8	0.0	0.0
Prop In Lane	0.55		0.07	0.01		0.95	0.13		0.04	0.37		0.39
Lane Grp Cap(c), veh/h	488	0	826	979	0	710	708	0	0	626	0	0
V/C Ratio(X)	0.43	0.00	0.36	0.40	0.00	0.43	0.38	0.00	0.00	0.84	0.00	0.00
Avail Cap(c_a), veh/h	488	0	826	979	0	710	708	0	0	626	0	0
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	13.0	0.0	10.4	10.8	0.0	10.8	14.9	0.0	0.0	18.9	0.0	0.0
Incr Delay (d2), s/veh	2.7	0.0	1.2	1.2	0.0	1.9	1.6	0.0	0.0	13.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.0	2.5	3.4	0.0	2.8	2.8	0.0	0.0	8.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.7	0.0	11.6	12.0	0.0	12.7	16.4	0.0	0.0	32.0	0.0	0.0
LnGrp LOS	B	A	B	B	A	B	B	A	A	C	A	A
Approach Vol, veh/h		505			701			272			528	
Approach Delay, s/veh		13.3			12.3			16.4			32.0	
Approach LOS		B			B			B			C	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	33.4	26.6	33.4	26.6
Change Period (Y+Rc), s	5.6	* 5.8	5.6	* 5.8
Max Green Setting (Gmax), s	27.8	* 21	27.8	* 21
Max Q Clear Time (g_c+I1), s	16.4	21.8	10.1	8.3
Green Ext Time (p_c), s	2.8	0.0	4.5	1.2

Intersection Summary	
HCM 6th Ctrl Delay	18.3
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	484	26	24	656	10	24
Future Vol, veh/h	484	26	24	656	10	24
Conflicting Peds, #/hr	0	2	2	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	81	81	95	95	75	75
Heavy Vehicles, %	1	1	1	1	0	0
Mvmt Flow	598	32	25	691	13	32

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	632	0	1012	317
Stage 1	-	-	-	-	616	-
Stage 2	-	-	-	-	396	-
Critical Hdwy	-	-	4.12	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.21	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	953	-	239	685
Stage 1	-	-	-	-	507	-
Stage 2	-	-	-	-	655	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	951	-	228	684
Mov Cap-2 Maneuver	-	-	-	-	228	-
Stage 1	-	-	-	-	506	-
Stage 2	-	-	-	-	627	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	14.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	431	-	-	951	-
HCM Lane V/C Ratio	0.105	-	-	0.027	-
HCM Control Delay (s)	14.3	-	-	8.9	0.2
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-

Intersection	
Int Delay, s/veh	6.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	123	27	33	8	16	26	24	101	3	4	76	57
Future Vol, veh/h	123	27	33	8	16	26	24	101	3	4	76	57
Conflicting Peds, #/hr	0	0	3	3	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	68	68	68	88	88	88	83	83	83
Heavy Vehicles, %	1	1	1	0	0	0	0	0	0	0	0	0
Mvmt Flow	148	33	40	12	24	38	27	115	3	5	92	69

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	339	309	130	347	342	117	161	0	0	118	0	0
Stage 1	137	137	-	171	171	-	-	-	-	-	-	-
Stage 2	202	172	-	176	171	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	617	607	922	611	583	941	1430	-	-	1483	-	-
Stage 1	869	785	-	836	761	-	-	-	-	-	-	-
Stage 2	802	758	-	831	761	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	563	592	919	548	569	941	1430	-	-	1483	-	-
Mov Cap-2 Maneuver	563	592	-	548	569	-	-	-	-	-	-	-
Stage 1	852	782	-	819	746	-	-	-	-	-	-	-
Stage 2	730	743	-	757	758	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.2	10.6	1.4	0.2
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1430	-	-	610	711	1483	-	-
HCM Lane V/C Ratio	0.019	-	-	0.361	0.103	0.003	-	-
HCM Control Delay (s)	7.6	0	-	14.2	10.6	7.4	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1.6	0.3	0	-	-

Intersection	
Int Delay, s/veh	4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	50	67	4	36	92	9
Future Vol, veh/h	50	67	4	36	92	9
Conflicting Peds, #/hr	0	0	0	0	0	1
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	93	93	79	79	89	89
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	54	72	5	46	103	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	126	0	146	91
Stage 1	-	-	-	-	90	-
Stage 2	-	-	-	-	56	-
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	-	-	1473	-	851	972
Stage 1	-	-	-	-	939	-
Stage 2	-	-	-	-	972	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1473	-	848	971
Mov Cap-2 Maneuver	-	-	-	-	848	-
Stage 1	-	-	-	-	939	-
Stage 2	-	-	-	-	969	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	9.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	858	-	-	1473	-
HCM Lane V/C Ratio	0.132	-	-	0.003	-
HCM Control Delay (s)	9.8	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	10	49	27	670	495	13
Future Vol, veh/h	10	49	27	670	495	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	92	92	95	95
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	12	59	29	728	521	14

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	950	268	535	0	-	0
Stage 1	528	-	-	-	-	-
Stage 2	422	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.12	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.21	-	-	-
Pot Cap-1 Maneuver	262	736	1036	-	-	-
Stage 1	562	-	-	-	-	-
Stage 2	635	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	250	736	1036	-	-	-
Mov Cap-2 Maneuver	250	-	-	-	-	-
Stage 1	536	-	-	-	-	-
Stage 2	635	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.5	0.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1036	-	554	-	-
HCM Lane V/C Ratio	0.028	-	0.128	-	-
HCM Control Delay (s)	8.6	0.2	12.5	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-

Intersection: 1: Griswold Street & Main Street

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	122	86	90	113	123	160
Average Queue (ft)	61	35	46	57	59	79
95th Queue (ft)	100	72	75	99	104	140
Link Distance (ft)	132	132	367	367	103	1931
Upstream Blk Time (%)	0	0			1	
Queuing Penalty (veh)	0	0			1	
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Cady Street & Main Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	15	54
Average Queue (ft)	1	18
95th Queue (ft)	8	44
Link Distance (ft)	714	162
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Griswold Street & Cady Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	80	32	14	3
Average Queue (ft)	45	5	1	0
95th Queue (ft)	70	23	8	3
Link Distance (ft)	231	116	456	154
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: River Street & Beal Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	6	57
Average Queue (ft)	0	20
95th Queue (ft)	4	48
Link Distance (ft)	610	549
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Northville Road & Beal Street

Movement	EB	NB	SB
Directions Served	LR	LT	T
Maximum Queue (ft)	55	49	4
Average Queue (ft)	19	5	0
95th Queue (ft)	46	26	3
Link Distance (ft)	610	637	196
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 2

Intersection: 1: Griswold Street & Main Street

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	139	133	131	184	142	885
Average Queue (ft)	85	67	70	105	84	506
95th Queue (ft)	129	117	112	165	136	1016
Link Distance (ft)	132	132	367	367	103	1931
Upstream Blk Time (%)	1	0			4	
Queuing Penalty (veh)	3	1			11	
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Cady Street & Main Street

Movement	EB	WB	WB	NB
Directions Served	TR	LT	T	LR
Maximum Queue (ft)	4	45	9	39
Average Queue (ft)	0	11	0	19
95th Queue (ft)	4	38	9	42
Link Distance (ft)	367	714	714	162
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Griswold Street & Cady Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	89	60	37	19
Average Queue (ft)	48	26	4	1
95th Queue (ft)	75	52	20	10
Link Distance (ft)	231	116	456	154
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: River Street & Beal Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	12	67
Average Queue (ft)	1	34
95th Queue (ft)	7	53
Link Distance (ft)	610	549
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Northville Road & Beal Street

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	63	66	4
Average Queue (ft)	30	12	0
95th Queue (ft)	52	46	3
Link Distance (ft)	610	637	196
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 14

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	99	313	18	2	387	277	33	206	11	186	117	194
Future Volume (veh/h)	99	313	18	2	387	277	33	206	11	186	117	194
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	116	368	21	2	407	292	36	224	12	198	124	206
Peak Hour Factor	0.85	0.85	0.85	0.95	0.95	0.95	0.92	0.92	0.92	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	205	735	45	61	734	518	132	749	38	320	194	276
Arrive On Green	0.36	0.36	0.36	0.36	0.36	0.36	0.45	0.45	0.45	0.45	0.45	0.45
Sat Flow, veh/h	314	2060	127	2	2057	1454	141	1653	83	523	427	608
Grp Volume(v), veh/h	210	0	295	394	0	307	272	0	0	528	0	0
Grp Sat Flow(s),veh/h/ln	719	0	1782	1983	0	1530	1877	0	0	1559	0	0
Q Serve(g_s), s	8.3	0.0	7.7	0.0	0.0	9.7	0.0	0.0	0.0	10.6	0.0	0.0
Cycle Q Clear(g_c), s	18.0	0.0	7.7	9.6	0.0	9.7	5.3	0.0	0.0	15.9	0.0	0.0
Prop In Lane	0.55		0.07	0.01		0.95	0.13		0.04	0.37		0.39
Lane Grp Cap(c), veh/h	350	0	635	767	0	546	919	0	0	789	0	0
V/C Ratio(X)	0.60	0.00	0.46	0.51	0.00	0.56	0.30	0.00	0.00	0.67	0.00	0.00
Avail Cap(c_a), veh/h	350	0	635	767	0	546	919	0	0	789	0	0
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	19.5	0.0	14.9	15.5	0.0	15.5	10.4	0.0	0.0	12.9	0.0	0.0
Incr Delay (d2), s/veh	7.4	0.0	2.4	2.4	0.0	4.2	0.8	0.0	0.0	4.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	0.0	3.3	4.5	0.0	3.7	2.1	0.0	0.0	5.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.9	0.0	17.3	17.9	0.0	19.7	11.2	0.0	0.0	17.4	0.0	0.0
LnGrp LOS	C	A	B	B	A	B	B	A	A	B	A	A
Approach Vol, veh/h		505			701			272			528	
Approach Delay, s/veh		21.3			18.7			11.2			17.4	
Approach LOS		C			B			B			B	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	27.0	33.0	27.0	33.0
Change Period (Y+Rc), s	5.6	* 5.8	5.6	* 5.8
Max Green Setting (Gmax), s	21.4	* 27	21.4	* 27
Max Q Clear Time (g_c+I1), s	20.0	17.9	11.7	7.3
Green Ext Time (p_c), s	0.5	2.5	3.3	1.5

Intersection Summary	
HCM 6th Ctrl Delay	18.0
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection: 1: Griswold Street & Main Street

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	145	144	170	235	140	353
Average Queue (ft)	102	83	85	125	72	171
95th Queue (ft)	152	138	137	200	122	301
Link Distance (ft)	132	132	367	367	103	1235
Upstream Blk Time (%)	9	1			2	
Queuing Penalty (veh)	19	3			5	
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Appendix C

BACKGROUND TRAFFIC CONDITIONS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	87	192	14	3	230	117	5	157	11	80	49	105
Future Volume (veh/h)	87	192	14	3	230	117	5	157	11	80	49	105
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	1984	1984	1984	1938	1938	1938	1984	1984	1984	1953	1953	1953
Adj Flow Rate, veh/h	106	234	17	4	277	141	6	178	12	89	54	117
Peak Hour Factor	0.82	0.82	0.82	0.83	0.83	0.83	0.88	0.88	0.88	0.90	0.90	0.90
Percent Heavy Veh, %	1	1	1	4	4	4	1	1	1	3	3	3
Cap, veh/h	398	948	72	64	1083	529	68	630	41	227	152	244
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.35	0.35	0.35	0.35	0.35	0.35
Sat Flow, veh/h	645	2045	156	6	2338	1141	16	1817	120	423	438	704
Grp Volume(v), veh/h	163	0	194	230	0	192	196	0	0	260	0	0
Grp Sat Flow(s),veh/h/ln	1069	0	1777	1933	0	1552	1953	0	0	1565	0	0
Q Serve(g_s), s	3.8	0.0	3.9	0.0	0.0	4.5	0.0	0.0	0.0	2.8	0.0	0.0
Cycle Q Clear(g_c), s	8.3	0.0	3.9	4.3	0.0	4.5	4.3	0.0	0.0	7.1	0.0	0.0
Prop In Lane	0.65		0.09	0.02		0.74	0.03		0.06	0.34		0.45
Lane Grp Cap(c), veh/h	594	0	823	957	0	719	739	0	0	623	0	0
V/C Ratio(X)	0.27	0.00	0.24	0.24	0.00	0.27	0.27	0.00	0.00	0.42	0.00	0.00
Avail Cap(c_a), veh/h	594	0	823	957	0	719	739	0	0	623	0	0
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.1	0.0	9.7	9.8	0.0	9.9	14.2	0.0	0.0	15.0	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	0.7	0.6	0.0	0.9	0.9	0.0	0.0	2.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	0.0	1.5	1.8	0.0	1.6	1.9	0.0	0.0	2.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.3	0.0	10.4	10.4	0.0	10.8	15.1	0.0	0.0	17.1	0.0	0.0
LnGrp LOS	B	A	B	B	A	B	B	A	A	B	A	A
Approach Vol, veh/h		357			422			196			260	
Approach Delay, s/veh		11.2			10.6			15.1			17.1	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	33.4	26.6	33.4	26.6
Change Period (Y+Rc), s	5.6	* 5.8	5.6	* 5.8
Max Green Setting (Gmax), s	27.8	* 21	27.8	* 21
Max Q Clear Time (g_c+I1), s	10.3	9.1	6.5	6.3
Green Ext Time (p_c), s	2.2	1.2	2.7	0.8

Intersection Summary	
HCM 6th Ctrl Delay	12.8
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	279	4	9	346	4	25
Future Vol, veh/h	279	4	9	346	4	25
Conflicting Peds, #/hr	0	1	1	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	88	88	87	87	79	79
Heavy Vehicles, %	1	1	3	3	5	5
Mvmt Flow	317	5	10	398	5	32

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	323	0	540	162
Stage 1	-	-	-	-	321	-
Stage 2	-	-	-	-	219	-
Critical Hdwy	-	-	4.16	-	6.9	7
Critical Hdwy Stg 1	-	-	-	-	5.9	-
Critical Hdwy Stg 2	-	-	-	-	5.9	-
Follow-up Hdwy	-	-	2.23	-	3.55	3.35
Pot Cap-1 Maneuver	-	-	1226	-	465	845
Stage 1	-	-	-	-	699	-
Stage 2	-	-	-	-	787	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1225	-	460	844
Mov Cap-2 Maneuver	-	-	-	-	460	-
Stage 1	-	-	-	-	698	-
Stage 2	-	-	-	-	779	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	10
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	757	-	-	1225	-
HCM Lane V/C Ratio	0.048	-	-	0.008	-
HCM Control Delay (s)	10	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Int Delay, s/veh	7.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	151	22	20	0	4	2	17	19	8	6	17	37
Future Vol, veh/h	151	22	20	0	4	2	17	19	8	6	17	37
Conflicting Peds, #/hr	0	0	3	3	0	0	5	0	0	0	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
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	60	60	60	85	85	85	76	76	76
Heavy Vehicles, %	1	1	1	0	0	0	0	0	0	4	4	4
Mvmt Flow	166	24	22	0	7	3	20	22	9	8	22	49

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	140	139	55	156	159	27	76	0	0	31	0	0
Stage 1	68	68	-	67	67	-	-	-	-	-	-	-
Stage 2	72	71	-	89	92	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.1	6.5	6.2	4.1	-	-	4.14	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.5	4	3.3	2.2	-	-	2.236	-	-
Pot Cap-1 Maneuver	832	754	1015	815	737	1054	1536	-	-	1569	-	-
Stage 1	945	840	-	948	843	-	-	-	-	-	-	-
Stage 2	940	838	-	923	823	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	809	737	1007	764	720	1054	1529	-	-	1569	-	-
Mov Cap-2 Maneuver	809	737	-	764	720	-	-	-	-	-	-	-
Stage 1	928	832	-	936	832	-	-	-	-	-	-	-
Stage 2	917	827	-	870	815	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.9	9.5	2.9	0.7
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1529	-	-	817	805	1569	-	-
HCM Lane V/C Ratio	0.013	-	-	0.26	0.012	0.005	-	-
HCM Control Delay (s)	7.4	0	-	10.9	9.5	7.3	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1	0	0	-	-

Intersection	
Int Delay, s/veh	3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	22	15	6	24	20	8
Future Vol, veh/h	22	15	6	24	20	8
Conflicting Peds, #/hr	0	1	1	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	62	62	72	72	70	70
Heavy Vehicles, %	5	5	0	0	7	7
Mvmt Flow	35	24	8	33	29	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	60	0	97	48
Stage 1	-	-	-	-	48	-
Stage 2	-	-	-	-	49	-
Critical Hdwy	-	-	4.1	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	-	-	2.2	-	3.563	3.363
Pot Cap-1 Maneuver	-	-	1556	-	890	1007
Stage 1	-	-	-	-	962	-
Stage 2	-	-	-	-	961	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1555	-	885	1006
Mov Cap-2 Maneuver	-	-	-	-	885	-
Stage 1	-	-	-	-	961	-
Stage 2	-	-	-	-	956	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	916	-	-	1555	-
HCM Lane V/C Ratio	0.044	-	-	0.005	-
HCM Control Delay (s)	9.1	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	7	23	21	348	295	9
Future Vol, veh/h	7	23	21	348	295	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	61	61	88	88	91	91
Heavy Vehicles, %	4	4	3	3	2	2
Mvmt Flow	11	38	24	395	324	10

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	575	167	334	0	-	0
Stage 1	329	-	-	-	-	-
Stage 2	246	-	-	-	-	-
Critical Hdwy	6.88	6.98	4.16	-	-	-
Critical Hdwy Stg 1	5.88	-	-	-	-	-
Critical Hdwy Stg 2	5.88	-	-	-	-	-
Follow-up Hdwy	3.54	3.34	2.23	-	-	-
Pot Cap-1 Maneuver	444	842	1215	-	-	-
Stage 1	695	-	-	-	-	-
Stage 2	766	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	433	842	1215	-	-	-
Mov Cap-2 Maneuver	433	-	-	-	-	-
Stage 1	678	-	-	-	-	-
Stage 2	766	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.6	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1215	-	690	-	-
HCM Lane V/C Ratio	0.02	-	0.071	-	-
HCM Control Delay (s)	8	0.1	10.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	99	315	22	7	391	279	41	220	18	187	124	195
Future Volume (veh/h)	99	315	22	7	391	279	41	220	18	187	124	195
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	116	371	26	7	412	294	45	239	20	199	132	207
Peak Hour Factor	0.85	0.85	0.85	0.95	0.95	0.95	0.92	0.92	0.92	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	278	961	71	65	956	667	122	529	41	264	146	206
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.35	0.35	0.35	0.35	0.35	0.35
Sat Flow, veh/h	400	2075	154	8	2063	1440	152	1526	118	526	422	593
Grp Volume(v), veh/h	213	0	300	400	0	313	304	0	0	538	0	0
Grp Sat Flow(s),veh/h/ln	851	0	1777	1976	0	1535	1797	0	0	1541	0	0
Q Serve(g_s), s	6.4	0.0	6.6	0.0	0.0	8.3	0.0	0.0	0.0	13.6	0.0	0.0
Cycle Q Clear(g_c), s	14.6	0.0	6.6	8.1	0.0	8.3	7.2	0.0	0.0	20.8	0.0	0.0
Prop In Lane	0.55		0.09	0.02		0.94	0.15		0.07	0.37		0.38
Lane Grp Cap(c), veh/h	487	0	823	977	0	711	692	0	0	616	0	0
V/C Ratio(X)	0.44	0.00	0.36	0.41	0.00	0.44	0.44	0.00	0.00	0.87	0.00	0.00
Avail Cap(c_a), veh/h	487	0	823	977	0	711	692	0	0	616	0	0
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	13.0	0.0	10.4	10.8	0.0	10.9	15.2	0.0	0.0	19.3	0.0	0.0
Incr Delay (d2), s/veh	2.8	0.0	1.3	1.3	0.0	2.0	2.0	0.0	0.0	15.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.0	2.5	3.5	0.0	2.9	3.2	0.0	0.0	9.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.9	0.0	11.6	12.1	0.0	12.8	17.2	0.0	0.0	35.0	0.0	0.0
LnGrp LOS	B	A	B	B	A	B	B	A	A	D	A	A
Approach Vol, veh/h		513			713			304			538	
Approach Delay, s/veh		13.4			12.4			17.2			35.0	
Approach LOS		B			B			B			D	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	33.4	26.6	33.4	26.6
Change Period (Y+Rc), s	5.6	* 5.8	5.6	* 5.8
Max Green Setting (Gmax), s	27.8	* 21	27.8	* 21
Max Q Clear Time (g_c+I1), s	16.6	22.8	10.3	9.2
Green Ext Time (p_c), s	2.8	0.0	4.6	1.3

Intersection Summary	
HCM 6th Ctrl Delay	19.2
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	493	27	25	664	13	28
Future Vol, veh/h	493	27	25	664	13	28
Conflicting Peds, #/hr	0	2	2	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	81	81	95	95	75	75
Heavy Vehicles, %	1	1	1	1	0	0
Mvmt Flow	609	33	26	699	17	37

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	644	0	1030	323
Stage 1	-	-	-	-	628	-
Stage 2	-	-	-	-	402	-
Critical Hdwy	-	-	4.12	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.21	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	944	-	233	679
Stage 1	-	-	-	-	500	-
Stage 2	-	-	-	-	650	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	942	-	222	678
Mov Cap-2 Maneuver	-	-	-	-	222	-
Stage 1	-	-	-	-	499	-
Stage 2	-	-	-	-	621	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	15.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	411	-	-	942	-
HCM Lane V/C Ratio	0.133	-	-	0.028	-
HCM Control Delay (s)	15.1	-	-	8.9	0.2
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0.1	-

Intersection	
Int Delay, s/veh	7.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	124	27	33	9	17	33	24	102	3	5	78	57
Future Vol, veh/h	124	27	33	9	17	33	24	102	3	5	78	57
Conflicting Peds, #/hr	0	0	3	3	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	68	68	68	88	88	88	83	83	83
Heavy Vehicles, %	1	1	1	0	0	0	0	0	0	0	0	0
Mvmt Flow	149	33	40	13	25	49	27	116	3	6	94	69

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	350	314	132	352	347	118	163	0	0	119	0	0
Stage 1	141	141	-	172	172	-	-	-	-	-	-	-
Stage 2	209	173	-	180	175	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	607	603	920	607	580	939	1428	-	-	1482	-	-
Stage 1	864	782	-	835	760	-	-	-	-	-	-	-
Stage 2	795	758	-	826	758	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	546	589	917	544	566	939	1428	-	-	1482	-	-
Mov Cap-2 Maneuver	546	589	-	544	566	-	-	-	-	-	-	-
Stage 1	847	779	-	818	745	-	-	-	-	-	-	-
Stage 2	714	743	-	752	755	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.6	10.7	1.4	0.3
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1428	-	-	596	722	1482	-	-
HCM Lane V/C Ratio	0.019	-	-	0.372	0.12	0.004	-	-
HCM Control Delay (s)	7.6	0	-	14.6	10.7	7.4	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1.7	0.4	0	-	-

Intersection	
Int Delay, s/veh	3.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	53	67	4	37	92	9
Future Vol, veh/h	53	67	4	37	92	9
Conflicting Peds, #/hr	0	0	0	0	0	1
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	93	93	79	79	89	89
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	57	72	5	47	103	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	129	0	150	94
Stage 1	-	-	-	-	93	-
Stage 2	-	-	-	-	57	-
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	-	-	1469	-	847	968
Stage 1	-	-	-	-	936	-
Stage 2	-	-	-	-	971	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1469	-	844	967
Mov Cap-2 Maneuver	-	-	-	-	844	-
Stage 1	-	-	-	-	936	-
Stage 2	-	-	-	-	968	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	9.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	854	-	-	1469	-
HCM Lane V/C Ratio	0.133	-	-	0.003	-
HCM Control Delay (s)	9.9	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	10	52	28	679	508	13
Future Vol, veh/h	10	52	28	679	508	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	92	92	95	95
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	12	63	30	738	535	14

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	971	275	549	0	-	0
Stage 1	542	-	-	-	-	-
Stage 2	429	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.12	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.21	-	-	-
Pot Cap-1 Maneuver	254	729	1024	-	-	-
Stage 1	553	-	-	-	-	-
Stage 2	630	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	241	729	1024	-	-	-
Mov Cap-2 Maneuver	241	-	-	-	-	-
Stage 1	525	-	-	-	-	-
Stage 2	630	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.6	0.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1024	-	550	-	-
HCM Lane V/C Ratio	0.03	-	0.136	-	-
HCM Control Delay (s)	8.6	0.2	12.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.5	-	-

Intersection: 1: Griswold Street & Main Street

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	121	86	90	121	125	186
Average Queue (ft)	64	36	48	59	58	78
95th Queue (ft)	103	72	78	101	104	142
Link Distance (ft)	132	132	367	367	103	1931
Upstream Blk Time (%)	0				1	
Queuing Penalty (veh)	0				2	
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Cady Street & Main Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	35	59
Average Queue (ft)	3	19
95th Queue (ft)	19	46
Link Distance (ft)	714	162
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Griswold Street & Cady Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	73	30	18	14
Average Queue (ft)	42	6	1	1
95th Queue (ft)	66	25	10	8
Link Distance (ft)	231	116	456	154
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: River Street & Beal Street

Movement	NB
Directions Served	LR
Maximum Queue (ft)	50
Average Queue (ft)	19
95th Queue (ft)	47
Link Distance (ft)	549
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: Northville Road & Beal Street

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	52	50
Average Queue (ft)	17	5
95th Queue (ft)	44	27
Link Distance (ft)	610	637
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 2

Intersection: 1: Griswold Street & Main Street

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	142	131	143	185	142	1309
Average Queue (ft)	88	66	75	110	92	846
95th Queue (ft)	136	115	121	169	144	1631
Link Distance (ft)	132	132	367	367	103	1931
Upstream Blk Time (%)	2	0			7	2
Queuing Penalty (veh)	5	1			19	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Cady Street & Main Street

Movement	EB	WB	WB	NB
Directions Served	TR	LT	T	LR
Maximum Queue (ft)	4	51	6	49
Average Queue (ft)	0	9	0	24
95th Queue (ft)	3	36	6	47
Link Distance (ft)	367	714	714	162
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Griswold Street & Cady Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	97	51	34	14
Average Queue (ft)	47	27	3	1
95th Queue (ft)	77	49	20	10
Link Distance (ft)	231	116	456	154
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: River Street & Beal Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	16	59
Average Queue (ft)	1	34
95th Queue (ft)	7	51
Link Distance (ft)	610	549
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Northville Road & Beal Street

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	66	74	4
Average Queue (ft)	29	14	0
95th Queue (ft)	54	51	3
Link Distance (ft)	610	637	196
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 24

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	99	315	22	7	391	279	41	220	18	187	124	195
Future Volume (veh/h)	99	315	22	7	391	279	41	220	18	187	124	195
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	116	371	26	7	412	294	45	239	20	199	132	207
Peak Hour Factor	0.85	0.85	0.85	0.95	0.95	0.95	0.92	0.92	0.92	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	201	726	55	64	735	513	143	708	55	317	201	273
Arrive On Green	0.36	0.36	0.36	0.36	0.36	0.36	0.45	0.45	0.45	0.45	0.45	0.45
Sat Flow, veh/h	304	2034	154	9	2060	1439	165	1561	122	519	444	602
Grp Volume(v), veh/h	214	0	299	400	0	313	304	0	0	538	0	0
Grp Sat Flow(s),veh/h/ln	716	0	1776	1975	0	1532	1847	0	0	1565	0	0
Q Serve(g_s), s	8.5	0.0	7.8	0.0	0.0	9.9	0.0	0.0	0.0	10.1	0.0	0.0
Cycle Q Clear(g_c), s	18.4	0.0	7.8	9.7	0.0	9.9	6.0	0.0	0.0	16.1	0.0	0.0
Prop In Lane	0.54		0.09	0.02		0.94	0.15		0.07	0.37		0.38
Lane Grp Cap(c), veh/h	348	0	634	766	0	547	906	0	0	791	0	0
V/C Ratio(X)	0.61	0.00	0.47	0.52	0.00	0.57	0.34	0.00	0.00	0.68	0.00	0.00
Avail Cap(c_a), veh/h	348	0	634	766	0	547	906	0	0	791	0	0
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	19.6	0.0	14.9	15.6	0.0	15.6	10.6	0.0	0.0	13.0	0.0	0.0
Incr Delay (d2), s/veh	7.9	0.0	2.5	2.5	0.0	4.3	1.0	0.0	0.0	4.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	0.0	3.3	4.6	0.0	3.8	2.4	0.0	0.0	5.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.4	0.0	17.5	18.1	0.0	19.9	11.6	0.0	0.0	17.6	0.0	0.0
LnGrp LOS	C	A	B	B	A	B	B	A	A	B	A	A
Approach Vol, veh/h		513			713			304			538	
Approach Delay, s/veh		21.6			18.9			11.6			17.6	
Approach LOS		C			B			B			B	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	27.0	33.0	27.0	33.0
Change Period (Y+Rc), s	5.6	* 5.8	5.6	* 5.8
Max Green Setting (Gmax), s	21.4	* 27	21.4	* 27
Max Q Clear Time (g_c+I1), s	20.4	18.1	11.9	8.0
Green Ext Time (p_c), s	0.4	2.5	3.3	1.7

Intersection Summary	
HCM 6th Ctrl Delay	18.2
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection: 1: Griswold Street & Main Street

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	143	148	140	209	145	447
Average Queue (ft)	103	85	86	125	79	190
95th Queue (ft)	151	137	129	188	135	361
Link Distance (ft)	132	132	367	367	103	1235
Upstream Blk Time (%)	5	1			3	
Queuing Penalty (veh)	12	2			8	
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Appendix D

Future Traffic Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	87	194	16	3	231	118	11	164	11	81	51	105
Future Volume (veh/h)	87	194	16	3	231	118	11	164	11	81	51	105
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	1984	1984	1984	1938	1938	1938	1984	1984	1984	1953	1953	1953
Adj Flow Rate, veh/h	106	237	20	4	278	142	12	186	12	90	57	117
Peak Hour Factor	0.82	0.82	0.82	0.83	0.83	0.83	0.88	0.88	0.88	0.90	0.90	0.90
Percent Heavy Veh, %	1	1	1	4	4	4	1	1	1	3	3	3
Cap, veh/h	393	942	83	64	1082	530	77	620	38	227	157	241
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.35	0.35	0.35	0.35	0.35	0.35
Sat Flow, veh/h	636	2033	180	6	2335	1143	40	1789	111	422	452	696
Grp Volume(v), veh/h	166	0	197	231	0	193	210	0	0	264	0	0
Grp Sat Flow(s),veh/h/ln	1077	0	1772	1933	0	1552	1940	0	0	1571	0	0
Q Serve(g_s), s	3.8	0.0	4.0	0.0	0.0	4.6	0.0	0.0	0.0	2.4	0.0	0.0
Cycle Q Clear(g_c), s	8.3	0.0	4.0	4.4	0.0	4.6	4.7	0.0	0.0	7.1	0.0	0.0
Prop In Lane	0.64		0.10	0.02		0.74	0.06		0.06	0.34		0.44
Lane Grp Cap(c), veh/h	597	0	821	957	0	719	736	0	0	625	0	0
V/C Ratio(X)	0.28	0.00	0.24	0.24	0.00	0.27	0.29	0.00	0.00	0.42	0.00	0.00
Avail Cap(c_a), veh/h	597	0	821	957	0	719	736	0	0	625	0	0
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.1	0.0	9.7	9.8	0.0	9.9	14.3	0.0	0.0	15.0	0.0	0.0
Incr Delay (d2), s/veh	1.2	0.0	0.7	0.6	0.0	0.9	1.0	0.0	0.0	2.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	0.0	1.5	1.8	0.0	1.6	2.0	0.0	0.0	2.8	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.2	0.0	10.4	10.4	0.0	10.8	15.3	0.0	0.0	17.1	0.0	0.0
LnGrp LOS	B	A	B	B	A	B	B	A	A	B	A	A
Approach Vol, veh/h		363			424			210			264	
Approach Delay, s/veh		11.2			10.6			15.3			17.1	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	33.4	26.6	33.4	26.6
Change Period (Y+Rc), s	5.6	* 5.8	5.6	* 5.8
Max Green Setting (Gmax), s	27.8	* 21	27.8	* 21
Max Q Clear Time (g_c+I1), s	10.3	9.1	6.6	6.7
Green Ext Time (p_c), s	2.3	1.2	2.7	0.9

Intersection Summary	
HCM 6th Ctrl Delay	12.9
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	279	7	13	346	6	31
Future Vol, veh/h	279	7	13	346	6	31
Conflicting Peds, #/hr	0	1	1	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	88	88	87	87	79	79
Heavy Vehicles, %	1	1	3	3	5	5
Mvmt Flow	317	8	15	398	8	39

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	326	0	551	164
Stage 1	-	-	-	-	322	-
Stage 2	-	-	-	-	229	-
Critical Hdwy	-	-	4.16	-	6.9	7
Critical Hdwy Stg 1	-	-	-	-	5.9	-
Critical Hdwy Stg 2	-	-	-	-	5.9	-
Follow-up Hdwy	-	-	2.23	-	3.55	3.35
Pot Cap-1 Maneuver	-	-	1223	-	457	842
Stage 1	-	-	-	-	698	-
Stage 2	-	-	-	-	778	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1222	-	449	841
Mov Cap-2 Maneuver	-	-	-	-	449	-
Stage 1	-	-	-	-	697	-
Stage 2	-	-	-	-	766	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	10.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	737	-	-	1222	-
HCM Lane V/C Ratio	0.064	-	-	0.012	-
HCM Control Delay (s)	10.2	-	-	8	0.1
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Int Delay, s/veh	7.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	151	24	20	1	5	15	17	19	8	10	17	37
Future Vol, veh/h	151	24	20	1	5	15	17	19	8	10	17	37
Conflicting Peds, #/hr	0	0	3	3	0	0	5	0	0	0	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
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	60	60	60	85	85	85	76	76	76
Heavy Vehicles, %	1	1	1	0	0	0	0	0	0	4	4	4
Mvmt Flow	166	26	22	2	8	25	20	22	9	13	22	49

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	161	149	55	167	169	27	76	0	0	31	0	0
Stage 1	78	78	-	67	67	-	-	-	-	-	-	-
Stage 2	83	71	-	100	102	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.1	6.5	6.2	4.1	-	-	4.14	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.5	4	3.3	2.2	-	-	2.236	-	-
Pot Cap-1 Maneuver	807	744	1015	802	728	1054	1536	-	-	1569	-	-
Stage 1	933	832	-	948	843	-	-	-	-	-	-	-
Stage 2	928	838	-	911	815	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	764	724	1007	748	708	1054	1529	-	-	1569	-	-
Mov Cap-2 Maneuver	764	724	-	748	708	-	-	-	-	-	-	-
Stage 1	916	820	-	936	832	-	-	-	-	-	-	-
Stage 2	885	827	-	852	804	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.4	9	2.9	1.1
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1529	-	-	778	928	1569	-	-
HCM Lane V/C Ratio	0.013	-	-	0.275	0.038	0.008	-	-
HCM Control Delay (s)	7.4	0	-	11.4	9	7.3	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.1	0.1	0	-	-

Intersection	
Int Delay, s/veh	3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	23	15	6	24	20	8
Future Vol, veh/h	23	15	6	24	20	8
Conflicting Peds, #/hr	0	1	1	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	62	62	72	72	70	70
Heavy Vehicles, %	5	5	0	0	7	7
Mvmt Flow	37	24	8	33	29	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	62	0	99	50
Stage 1	-	-	-	-	50	-
Stage 2	-	-	-	-	49	-
Critical Hdwy	-	-	4.1	-	6.47	6.27
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	-	-	2.2	-	3.563	3.363
Pot Cap-1 Maneuver	-	-	1554	-	888	1004
Stage 1	-	-	-	-	960	-
Stage 2	-	-	-	-	961	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1553	-	883	1003
Mov Cap-2 Maneuver	-	-	-	-	883	-
Stage 1	-	-	-	-	959	-
Stage 2	-	-	-	-	956	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	914	-	-	1553	-
HCM Lane V/C Ratio	0.044	-	-	0.005	-
HCM Control Delay (s)	9.1	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	7	24	21	352	301	9
Future Vol, veh/h	7	24	21	352	301	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	61	61	88	88	91	91
Heavy Vehicles, %	4	4	3	3	2	2
Mvmt Flow	11	39	24	400	331	10

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	584	171	341	0	-	0
Stage 1	336	-	-	-	-	-
Stage 2	248	-	-	-	-	-
Critical Hdwy	6.88	6.98	4.16	-	-	-
Critical Hdwy Stg 1	5.88	-	-	-	-	-
Critical Hdwy Stg 2	5.88	-	-	-	-	-
Follow-up Hdwy	3.54	3.34	2.23	-	-	-
Pot Cap-1 Maneuver	438	837	1208	-	-	-
Stage 1	690	-	-	-	-	-
Stage 2	764	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	427	837	1208	-	-	-
Mov Cap-2 Maneuver	427	-	-	-	-	-
Stage 1	672	-	-	-	-	-
Stage 2	764	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.6	0.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1208	-	688	-	-
HCM Lane V/C Ratio	0.02	-	0.074	-	-
HCM Control Delay (s)	8	0.1	10.6	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Intersection	
Int Delay, s/veh	2.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	37	5	2	6	15	5
Future Vol, veh/h	37	5	2	6	15	5
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	40	5	2	7	16	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	45	0	54	43
Stage 1	-	-	-	-	43	-
Stage 2	-	-	-	-	11	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1563	-	954	1027
Stage 1	-	-	-	-	979	-
Stage 2	-	-	-	-	1012	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1563	-	953	1027
Mov Cap-2 Maneuver	-	-	-	-	953	-
Stage 1	-	-	-	-	979	-
Stage 2	-	-	-	-	1011	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.8	8.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	970	-	-	1563	-
HCM Lane V/C Ratio	0.022	-	-	0.001	-
HCM Control Delay (s)	8.8	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	3	34	1	5	15
Future Vol, veh/h	0	3	34	1	5	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	3	37	1	5	16

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	64	38	0	0	38	0
Stage 1	38	-	-	-	-	-
Stage 2	26	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	942	1034	-	-	1572	-
Stage 1	984	-	-	-	-	-
Stage 2	997	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	939	1034	-	-	1572	-
Mov Cap-2 Maneuver	939	-	-	-	-	-
Stage 1	984	-	-	-	-	-
Stage 2	994	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.5	0	1.8
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1034	1572	-
HCM Lane V/C Ratio	-	-	0.003	0.003	-
HCM Control Delay (s)	-	-	8.5	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	99	331	27	7	405	293	47	226	18	201	132	195
Future Volume (veh/h)	99	331	27	7	405	293	47	226	18	201	132	195
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	116	389	32	7	426	308	51	246	20	214	140	207
Peak Hour Factor	0.85	0.85	0.85	0.95	0.95	0.95	0.92	0.92	0.92	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	265	957	83	65	949	673	129	517	39	270	143	193
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.35	0.35	0.35	0.35	0.35	0.35
Sat Flow, veh/h	375	2065	180	8	2049	1453	171	1493	112	540	414	558
Grp Volume(v), veh/h	222	0	315	416	0	325	317	0	0	561	0	0
Grp Sat Flow(s),veh/h/ln	848	0	1772	1976	0	1533	1776	0	0	1511	0	0
Q Serve(g_s), s	6.6	0.0	7.0	0.0	0.0	8.7	0.0	0.0	0.0	13.2	0.0	0.0
Cycle Q Clear(g_c), s	15.3	0.0	7.0	8.5	0.0	8.7	7.6	0.0	0.0	20.8	0.0	0.0
Prop In Lane	0.52		0.10	0.02		0.95	0.16		0.06	0.38		0.37
Lane Grp Cap(c), veh/h	484	0	821	977	0	710	685	0	0	607	0	0
V/C Ratio(X)	0.46	0.00	0.38	0.43	0.00	0.46	0.46	0.00	0.00	0.92	0.00	0.00
Avail Cap(c_a), veh/h	484	0	821	977	0	710	685	0	0	607	0	0
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	13.2	0.0	10.5	10.9	0.0	11.0	15.3	0.0	0.0	20.0	0.0	0.0
Incr Delay (d2), s/veh	3.1	0.0	1.4	1.4	0.0	2.1	2.2	0.0	0.0	22.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	0.0	2.7	3.7	0.0	3.0	3.4	0.0	0.0	10.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.3	0.0	11.9	12.3	0.0	13.1	17.5	0.0	0.0	42.1	0.0	0.0
LnGrp LOS	B	A	B	B	A	B	B	A	A	D	A	A
Approach Vol, veh/h		537			741			317			561	
Approach Delay, s/veh		13.7			12.6			17.5			42.1	
Approach LOS		B			B			B			D	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		33.4		26.6		33.4		26.6				
Change Period (Y+Rc), s		5.6		* 5.8		5.6		* 5.8				
Max Green Setting (Gmax), s		27.8		* 21		27.8		* 21				
Max Q Clear Time (g_c+I1), s		17.3		22.8		10.7		9.6				
Green Ext Time (p_c), s		2.9		0.0		4.8		1.4				

Intersection Summary			
HCM 6th Ctrl Delay		21.3	
HCM 6th LOS		C	

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	2.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	493	57	44	664	41	46
Future Vol, veh/h	493	57	44	664	41	46
Conflicting Peds, #/hr	0	2	2	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	81	81	95	95	75	75
Heavy Vehicles, %	1	1	1	1	0	0
Mvmt Flow	609	70	46	699	55	61

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	681	0	1088	342
Stage 1	-	-	-	-	646	-
Stage 2	-	-	-	-	442	-
Critical Hdwy	-	-	4.12	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.21	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	914	-	213	660
Stage 1	-	-	-	-	489	-
Stage 2	-	-	-	-	621	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	912	-	195	659
Mov Cap-2 Maneuver	-	-	-	-	195	-
Stage 1	-	-	-	-	488	-
Stage 2	-	-	-	-	570	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	23.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	311	-	-	912	-
HCM Lane V/C Ratio	0.373	-	-	0.051	-
HCM Control Delay (s)	23.3	-	-	9.2	0.3
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1.7	-	-	0.2	-

Intersection	
Int Delay, s/veh	7.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	124	31	33	12	21	45	24	102	6	18	78	57
Future Vol, veh/h	124	31	33	12	21	45	24	102	6	18	78	57
Conflicting Peds, #/hr	0	0	3	3	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	68	68	68	88	88	88	83	83	83
Heavy Vehicles, %	1	1	1	0	0	0	0	0	0	0	0	0
Mvmt Flow	149	37	40	18	31	66	27	116	7	22	94	69

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	395	350	132	388	381	120	163	0	0	123	0	0
Stage 1	173	173	-	174	174	-	-	-	-	-	-	-
Stage 2	222	177	-	214	207	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	567	576	920	574	555	937	1428	-	-	1477	-	-
Stage 1	831	758	-	833	759	-	-	-	-	-	-	-
Stage 2	783	755	-	793	734	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	490	555	917	505	534	937	1428	-	-	1477	-	-
Mov Cap-2 Maneuver	490	555	-	505	534	-	-	-	-	-	-	-
Stage 1	814	745	-	816	744	-	-	-	-	-	-	-
Stage 2	684	740	-	706	722	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.2	11.1	1.4	0.9
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1428	-	-	545	702	1477	-	-
HCM Lane V/C Ratio	0.019	-	-	0.416	0.163	0.015	-	-
HCM Control Delay (s)	7.6	0	-	16.2	11.1	7.5	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	2	0.6	0	-	-

Intersection	
Int Delay, s/veh	3.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	56	67	4	40	92	9
Future Vol, veh/h	56	67	4	40	92	9
Conflicting Peds, #/hr	0	0	0	0	0	1
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	93	93	79	79	89	89
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	60	72	5	51	103	10

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	132	0	157	97
Stage 1	-	-	-	-	96	-
Stage 2	-	-	-	-	61	-
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	-	-	1466	-	839	965
Stage 1	-	-	-	-	933	-
Stage 2	-	-	-	-	967	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1466	-	836	964
Mov Cap-2 Maneuver	-	-	-	-	836	-
Stage 1	-	-	-	-	933	-
Stage 2	-	-	-	-	963	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	9.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	846	-	-	1466	-
HCM Lane V/C Ratio	0.134	-	-	0.003	-
HCM Control Delay (s)	9.9	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	10	55	31	698	526	13
Future Vol, veh/h	10	55	31	698	526	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	92	92	95	95
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	12	66	34	759	554	14

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1009	284	568	0	-	0
Stage 1	561	-	-	-	-	-
Stage 2	448	-	-	-	-	-
Critical Hdwy	6.8	6.9	4.12	-	-	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.21	-	-	-
Pot Cap-1 Maneuver	240	719	1007	-	-	-
Stage 1	540	-	-	-	-	-
Stage 2	616	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	226	719	1007	-	-	-
Mov Cap-2 Maneuver	226	-	-	-	-	-
Stage 1	509	-	-	-	-	-
Stage 2	616	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.8	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1007	-	538	-	-
HCM Lane V/C Ratio	0.033	-	0.146	-	-
HCM Control Delay (s)	8.7	0.2	12.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.5	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	41	14	7	69	9	5
Future Vol, veh/h	41	14	7	69	9	5
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	45	15	8	75	10	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	60	0	144	53
Stage 1	-	-	-	-	53	-
Stage 2	-	-	-	-	91	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1544	-	849	1014
Stage 1	-	-	-	-	970	-
Stage 2	-	-	-	-	933	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1544	-	845	1014
Mov Cap-2 Maneuver	-	-	-	-	845	-
Stage 1	-	-	-	-	970	-
Stage 2	-	-	-	-	928	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	9.1
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	898	-	-	1544	-
HCM Lane V/C Ratio	0.017	-	-	0.005	-
HCM Control Delay (s)	9.1	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	3.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	41	46	6	42	59
Future Vol, veh/h	10	41	46	6	42	59
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	45	50	7	46	64

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	210	54	0	0	57	0
Stage 1	54	-	-	-	-	-
Stage 2	156	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	778	1013	-	-	1547	-
Stage 1	969	-	-	-	-	-
Stage 2	872	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	754	1013	-	-	1547	-
Mov Cap-2 Maneuver	754	-	-	-	-	-
Stage 1	969	-	-	-	-	-
Stage 2	845	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	3.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	949	1547	-
HCM Lane V/C Ratio	-	-	0.058	0.03	-
HCM Control Delay (s)	-	-	9	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection: 1: Griswold Street & Main Street

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	115	94	88	110	130	162
Average Queue (ft)	62	38	47	55	65	81
95th Queue (ft)	100	79	75	94	113	145
Link Distance (ft)	132	132	368	368	103	2707
Upstream Blk Time (%)	0	0			1	
Queuing Penalty (veh)	0	0			2	
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Cady Street & Main Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	32	50
Average Queue (ft)	3	21
95th Queue (ft)	20	47
Link Distance (ft)	714	162
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Griswold Street & Cady Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	83	33	20	9
Average Queue (ft)	45	15	1	1
95th Queue (ft)	70	39	12	7
Link Distance (ft)	231	116	456	154
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: River Street & Beal Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	3	58
Average Queue (ft)	0	19
95th Queue (ft)	3	48
Link Distance (ft)	610	549
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Northville Road & Beal Street

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	50	56
Average Queue (ft)	19	7
95th Queue (ft)	46	34
Link Distance (ft)	610	637
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: West Site Drive & Cady Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	3	36
Average Queue (ft)	0	15
95th Queue (ft)	3	39
Link Distance (ft)	136	185
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Cady Street & East Site Drive

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	29	3
Average Queue (ft)	3	0
95th Queue (ft)	18	3
Link Distance (ft)	146	162
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 3

Intersection: 1: Griswold Street & Main Street

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	144	132	152	205	144	1683
Average Queue (ft)	92	73	75	116	94	1050
95th Queue (ft)	138	121	122	180	146	2006
Link Distance (ft)	132	132	368	368	103	2707
Upstream Blk Time (%)	2	0			7	
Queuing Penalty (veh)	5	1			21	
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Cady Street & Main Street

Movement	EB	EB	WB	NB
Directions Served	T	TR	LT	LR
Maximum Queue (ft)	8	9	57	74
Average Queue (ft)	0	0	17	33
95th Queue (ft)	6	6	47	58
Link Distance (ft)	368	368	714	162
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Griswold Street & Cady Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	96	57	30	18
Average Queue (ft)	46	32	4	2
95th Queue (ft)	76	51	19	12
Link Distance (ft)	231	116	456	154
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: River Street & Beal Street

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (ft)	3	12	57
Average Queue (ft)	0	0	32
95th Queue (ft)	3	6	53
Link Distance (ft)	143	610	549
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Northville Road & Beal Street

Movement	EB	NB	NB	SB
Directions Served	LR	LT	T	TR
Maximum Queue (ft)	61	78	3	4
Average Queue (ft)	29	15	0	0
95th Queue (ft)	52	53	3	3
Link Distance (ft)	610	637	637	196
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: West Site Drive & Cady Street

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	15	32
Average Queue (ft)	0	11
95th Queue (ft)	6	34
Link Distance (ft)	136	185
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Cady Street & East Site Drive

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	61	24
Average Queue (ft)	27	2
95th Queue (ft)	52	13
Link Distance (ft)	146	162
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 27

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	99	331	27	7	405	293	47	226	18	201	132	195
Future Volume (veh/h)	99	331	27	7	405	293	47	226	18	201	132	195
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984	1984
Adj Flow Rate, veh/h	116	389	32	7	426	308	51	246	20	214	140	207
Peak Hour Factor	0.85	0.85	0.85	0.95	0.95	0.95	0.92	0.92	0.92	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	191	721	64	64	730	518	152	689	52	327	199	259
Arrive On Green	0.36	0.36	0.36	0.36	0.36	0.36	0.45	0.45	0.45	0.45	0.45	0.45
Sat Flow, veh/h	279	2021	181	9	2045	1451	183	1520	115	538	439	572
Grp Volume(v), veh/h	223	0	314	416	0	325	317	0	0	561	0	0
Grp Sat Flow(s),veh/h/ln	709	0	1771	1975	0	1530	1817	0	0	1549	0	0
Q Serve(g_s), s	8.8	0.0	8.3	0.0	0.0	10.4	0.0	0.0	0.0	11.4	0.0	0.0
Cycle Q Clear(g_c), s	19.2	0.0	8.3	10.2	0.0	10.4	6.3	0.0	0.0	17.7	0.0	0.0
Prop In Lane	0.52		0.10	0.02		0.95	0.16		0.06	0.38		0.37
Lane Grp Cap(c), veh/h	344	0	632	766	0	546	894	0	0	785	0	0
V/C Ratio(X)	0.65	0.00	0.50	0.54	0.00	0.60	0.35	0.00	0.00	0.71	0.00	0.00
Avail Cap(c_a), veh/h	344	0	632	766	0	546	894	0	0	785	0	0
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	19.8	0.0	15.1	15.7	0.0	15.8	10.7	0.0	0.0	13.4	0.0	0.0
Incr Delay (d2), s/veh	9.2	0.0	2.8	2.8	0.0	4.7	1.1	0.0	0.0	5.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	0.0	3.6	4.8	0.0	4.0	2.5	0.0	0.0	6.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.0	0.0	17.9	18.5	0.0	20.5	11.8	0.0	0.0	18.9	0.0	0.0
LnGrp LOS	C	A	B	B	A	C	B	A	A	B	A	A
Approach Vol, veh/h		537			741			317			561	
Approach Delay, s/veh		22.5			19.4			11.8			18.9	
Approach LOS		C			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		27.0		33.0		27.0		33.0				
Change Period (Y+Rc), s		5.6		* 5.8		5.6		* 5.8				
Max Green Setting (Gmax), s		21.4		* 27		21.4		* 27				
Max Q Clear Time (g_c+I1), s		21.2		19.7		12.4		8.3				
Green Ext Time (p_c), s		0.1		2.3		3.3		1.8				

Intersection Summary	
HCM 6th Ctrl Delay	18.9
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection: 1: Griswold Street & Main Street

Movement	EB	EB	WB	WB	NB	SB
Directions Served	LT	TR	LT	TR	LTR	LTR
Maximum Queue (ft)	145	152	160	233	138	444
Average Queue (ft)	107	92	90	131	78	214
95th Queue (ft)	154	147	138	200	129	401
Link Distance (ft)	132	132	367	367	103	468
Upstream Blk Time (%)	10	3			3	3
Queuing Penalty (veh)	22	6			9	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

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December 9, 2021

VIA EMAIL kevin@schonsheck.com

Mr. Kevin Schonsheck
456 Cady, LLC
50555 Pontiac Trail
Wixom, MI 48393

RE: Foundry Flask TIS-Additional Information

Fleis & VandenBrink (F&V) staff has completed this letter in response to comments and questions from the planning commission (PC) as noted at the November 16, 2021 meeting regarding the F&V Traffic Impact Study (TIS) dated August 31, 2021.

Revised Traffic Study

F&V submitted a revised TIS dated October 12, 2021 that addressed the comments provided by OHM in their October 4, 2021 review letter. The revised TIS was included in the November 16, 2021 PC packet, however to date we have not received any further comments from OHM regarding the updated TIS.

Traffic Study Requirements

In accordance with City *Zoning Ordinance Article 19.05.j a traffic study is required for a proposed development which generates one hundred (100) or more directional vehicle trips (in bound or outbound) during the peak hour*. Review of the trip generation for this site shows that this development is below these thresholds. However, a TIS was performed for this site for information purposes and not as a requirement of site plan approval.

Land Use	ITE Code	Amount	Units	Average Daily Traffic (vpd)	AM Peak Hour (vph)			PM Peak Hour (vph)		
					In	Out	Total	In	Out	Total
Shopping Center	820	10,000	S.F.	1,256	6	3	9	48	51	99
Multi-Family Housing (Mid-Rise)	221	78	D.U.	423	7	20	27	21	14	35
			Total	1,679	13	23	36	69	65	134
				Northville Threshold	100	100		100	100	
				Meets?	No	No		No	No	

Existing Operations

The existing 2021 conditions on the adjacent roadway network have been impacted by several factors, including COVID traffic volumes and road closures in downtown Northville. Pursuant to the scope of work that was verified with the City, the evaluation included the impact of the Foundry Flask development on the adjacent roadway network, prior to COVID and road closures. This analysis considered 2023 impacts at site building, not current conditions, with the assumption that pre-COVID conditions would return in 2023.

However, F&V does understand that the road closures have impacted the operations at several adjacent intersections. The evaluation of the existing 2021 operations is currently under evaluation as part of the Northville Downs study. This evaluation will include recommendations (if any) to mitigate the existing operations

27725 Stansbury Boulevard, Suite 195
Farmington Hills, MI 48334
P: 248.536.0080
F: 248.536.0079
www.fveng.com

that can be implemented to accommodate the existing traffic operations regardless of the development of the Foundry Flask site or the Northville Downs site.

TRAFFIC VOLUME IMPACTS

The two intersections that will see the highest percentage increase in traffic volumes associated with the Foundry Flask Development are the Cady Street intersections with Main Street and Griswold Street. These intersections are summarized below to show the relative percentage increase in traffic volumes and the resulting peak hour Level of Service (LOS). This data shows that the adjacent roadway network can adequately accommodate the projected traffic volumes generated by the proposed Foundry Flash development.

	Main Street & Cady Street		Griswold Street & Cady Street	
	AM Peak	PM Peak	AM Peak	PM Peak
Site Generated Traffic (vph)	15	95	21	39
Background Traffic (vph)	667	1,250	303	512
Future Traffic (vph)	682	1,345	324	551
% Increase	2%	7%	6%	7%
Future LOS	B	C	B	B

SUMMARY

- Review of the trip generation for this site shows that this development is below these thresholds. However, a TIS was performed for this site for information purposes and not as a requirement of site plan approval.
- The existing 2021 conditions on the adjacent roadway network have been impacted by several factors, including COVID traffic volumes and road closures in downtown Northville. F&V does understand that the road closures have impacted the operations at several adjacent intersections. The evaluation of the existing 2021 operations is currently under evaluation and will include recommendations (if any) to mitigate the existing operations that can be implemented to accommodate the existing traffic operations regardless of the development of the Foundry Flask site or the Northville Downs site.
- The result of the traffic study concluded that the adjacent roadway network can adequately accommodate the projected traffic volumes generated by the proposed Foundry Flash development

Please let me know if there are any further questions or comments related to the letter.

Sincerely,

FLEIS & VANDENBRINK

Julie M. Kroll

Julie M. Kroll, PE, PTOE
Traffic Engineering Services Manager

memorandum

Date: December 10, 2021

To: Nicholas Bayley, PE
CC:
From: Stephen Dearing, PE, PTOE

Re: Northville 456 Cady Foundry Flask
Traffic Impact Study Review

We have reviewed the traffic impact study for the proposed mixed-use retail and multi-family residential development study in City of Northville, Michigan. The project site is located at 456 E. Cady Street, generally in the southeast quadrant of the Cady Street and Griswold Street intersection, on the property that was previously occupied by Foundry Flask site. The proposed development includes the construction of a mixed-use retail and multi-family residential development. Site access is proposed via two (2) driveways on Cady Street, which is under the jurisdiction of the City of Northville.

The traffic impact study was prepared by Fleis & VandenBrink Engineering, Inc., and revised October 12, 2021. Synchro traffic modeling files were also provided for review. This revision has addressed all of OHM's previous review comments and corrected all of the issues we had noted.

OHM recommends approval of the traffic impact study and its recommendations.

We await the TIS and its associated modeling for the Northville Downs property for evaluating the cumulative impacts for the study area.

OHM Advisors
34000 PLYMOUTH ROAD
LIVONIA, MICHIGAN 48150
T 734.522.6711
F 734.522.6427
OHM-Advisors.com

INTERNAL SITE PLAN REVIEW

DATE: Dec. 1, 2021

SITE: 456 E. CADY ST. – FINAL SITE PLAN REVIEW

REVIEWED BY:	**DATE:**
BUILDING: [illegible]	12/8/21
D.P.W./ENGINEERING:	
FIRE:	
POLICE:	
ASSESSOR:	
DDA: (If applicable)	

ADDITIONAL COMMENTS: No comments at this time

PLEASE RETURN REVIEW AND APPLICATION/PLANS TO THE BUILDING DEPT. BY 10:00 A.M. WEDNESDAY, DEC. 8, 2021.

INTERNAL SITE PLAN REVIEW

DATE: Dec. 1, 2021

SITE: 456 E. CADY ST. – FINAL SITE PLAN REVIEW

REVIEWED BY:	**DATE:**
BUILDING:	
D.P.W./ENGINEERING: MD	12/9/21
FIRE:	
POLICE:	
ASSESSOR:	
DDA: (If applicable)	

ADDITIONAL COMMENTS:

OHM to Review Engineering after final Review.

OHM REVIEW TIS.

PLEASE RETURN REVIEW AND APPLICATION/PLANS TO THE BUILDING DEPT. BY 10:00 A.M. WEDNESDAY, DEC. 8, 2021.

INTERNAL SITE PLAN REVIEW

DATE: Dec. 1, 2021

SITE: 456 E. CADY ST. – FINAL SITE PLAN REVIEW

REVIEWED BY:	**DATE:**
BUILDING:	
D.P.W./ENGINEERING:	
FIRE:	12/7/21
POLICE:	
ASSESSOR:	
DDA: (If applicable)	

ADDITIONAL COMMENTS: _____

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INTERNAL SITE PLAN REVIEW

DATE: Dec. 1, 2021

SITE: 456 E. CADY ST. – FINAL SITE PLAN REVIEW

REVIEWED BY:	**DATE:**
BUILDING:	
D.P.W./ENGINEERING:	
FIRE:	
POLICE:	12/8/21
ASSESSOR:	
DDA: (If applicable)	

ADDITIONAL COMMENTS: No Additional Comments

PLEASE RETURN REVIEW AND APPLICATION/PLANS TO THE BUILDING DEPT. BY 10:00 A.M. WEDNESDAY, DEC. 8, 2021.

INTERNAL SITE PLAN REVIEW

DATE: Dec. 1, 2021

SITE: 456 E. CADY ST. – FINAL SITE PLAN REVIEW

REVIEWED BY:	**DATE:**
BUILDING:	
D.P.W./ENGINEERING:	
FIRE:	
POLICE:	
ASSESSOR:	12/3/20
DDA: (If applicable)	

ADDITIONAL COMMENTS:

PLEASE RETURN REVIEW AND APPLICATION/PLANS TO THE BUILDING DEPT. BY 10:00 A.M. WEDNESDAY, DEC. 8, 2021.

INTERNAL SITE PLAN REVIEW

DATE: Dec. 1, 2021

SITE: 456 E. CADY ST. – FINAL SITE PLAN REVIEW

REVIEWED BY:	**DATE:**
BUILDING:	
D.P.W./ENGINEERING:	
FIRE:	
POLICE:	
ASSESSOR:	
DDA: (If applicable) Not within DDA	12/2/21

ADDITIONAL COMMENTS:

PLEASE RETURN REVIEW AND APPLICATION/PLANS TO THE BUILDING DEPT. BY 10:00 A.M. WEDNESDAY, DEC. 8, 2021.

Carlisle | Wortman
ASSOCIATES, INC.
117 NORTH FIRST STREET SUITE 70 ANN ARBOR, MI 48104 734.662.2200 734.662.1935 FAX

Date: November 8, 2021
Rev.: December 15, 2021

Final Site Plan Review
For
City of Northville, Michigan

Applicant:	456 Cady LLC Represented by Jim Long 190 E. Main St. Northville, MI 48167
Project Name:	456 E. Cady St. – Foundry Flask
Plan Date:	October 26, 2021
Latest Revision:	November 30, 2021
Location:	South side of E. Cady St., between Griswold and S. Main St.
Zoning:	PR-1, Performance Regulated Industrial District No. 1 CSO, Cady Street Overlay District
Action Requested:	Final Site Plan Approval
Required Information:	As noted within this review

PROJECT AND SITE DESCRIPTION

The applicant is proposing to demolish the existing one-story building on the site, and construct a 3-story, mixed-use building. The new building will contain commercial uses in 12,000 s.f. of first floor space (grocery/market), and 79 one-, two-, and three-bedroom residential units. Seven (7) residential units will be located on the first floor at the rear of the building, and the remaining units will be located on the upper two floors. The grocery/market will be located on the northeast front corner of the building (oriented toward Cady St. and S. Main St.).

An aerial of the subject site is shown on the next page.

Google Maps

The applicant attended an electronic pre-application meeting on July 28, 2021 to discuss the project concept. The project was then brought before the Planning Commission on September 21, 2021, where the Commissioners considered the project, and set a Public Hearing for the Special Land Use (upper floor residential).

The Public Hearing was held at the October 19 meeting. The Commissioners moved to approve the Special Land Use, and condition approval of the Preliminary Site Plan on the following:

A. The Planning Commission:
   1. Will allow the reduction of three (3) street trees along E. Cady St. frontage to accommodate on-street parking spaces.
   2. Will allow the retention of existing trees along S. Center St., rather than require new trees, to meet the street tree planting requirement along this frontage.

B. The Planning Commission defers evaluation of the following to:
   1. Location of the westerly drive, and proposed utilities, to the DPW Director and City Engineer.
   2. Vehicular access and circulation of emergency vehicles to the City Fire Chief.

C. Upon Final Site Plan, applicant to provide:
   1. Lighting Information
   2. Landscaping Information
   3. Tree survey addressing removal of protected trees (if any) per Tree Preservation Ordinance
   4. Receive HDC Approval for the project.

D. The developer and the City shall discuss and collaboratively resolve use of a Riverwalk Property via a public easement access through the property to the Riverwalk along the Rouge River.

E. Information on environmental issues that would be part of brownfield disclosure be provided at earliest opportunity but in no case later that final site plan approval.

The applicant submitted a Final Site Plan review for consideration at the November 16, 2021 Planning Commission meeting. At that meeting, the applicant responded to the comments in the CWA review (dated November 8, 2021), as well as the City Engineer's comments (dated November 11, 2021). The Planning Commission moved to refer the project back to the applicant to give them time to address the following items:

A. How does contamination on the property affect the site design? Share information on the brownfield issues that can be shared publicly.
B. Modify landscape plan to show most recent site design.
C. Have Wayne County weigh in on the approach to stormwater management.
D. Revise the current traffic study to reflect the Main Street closure.
E. Specifically state what the intention is along the riverfront. This can be illustrated with "space" for a Riverwalk easement and indicated with notes.
F. Revise site plan with comments in CWA review, and the minor issues identified in the OHM review.

This review evaluates the remaining issues on the Final Site Plan.

NATURAL RESOURCES

The conditions for the Preliminary Site Plan included two topics regarding "natural resources." The first topic is tree removal from the site, and the second is information that can be publicly shared regarding the brownfield.

Tree Removal
Our previous review evaluated tree removal and required mitigation. The proposed landscape plan meets the tree replacement requirements.

Brownfield
Regarding the brownfield, the applicant explained at the November 16 meeting that the City has just contracted with a brownfield consultant, and that the project team will work with the Brownfield Authority and the consultant to meet the requirements for addressing contamination on site.

The Planning Commission motion at the November 16 meeting requested that applicant respond to the question of how the contamination of the property could affect the site design. The most recent submission includes a memo from ASTI Environmental, that provides an opinion about one aspect of the

site design, or the stormwater basin. This memo states that the contaminants are assumed to exist throughout the property (vs. limited to the locations identified). It goes on to state that they would not recommend a stormwater infiltration basin on this property unless additional investigation, remediation, and documentation are completed. The City Engineer, OHM, also opined on this subject, and it is their opinion that Wayne County will not require stormwater infiltration into contaminated soils.

The Planning Commission also asked that the applicant share information on the brownfield issues that can be shared publicly. In a response memo from the applicant (dated November 30, 2021), the memo states that they have submitted their brownfield application to the City of Northville, and had a meeting with the Michigan Department of Environment, Great Lakes, and Energy (EGLE), the City, and its environmental consultant on November 22. The applicant should be prepared to discuss this issue in further detail at the upcoming meeting.

Items to be Addressed: *Status on brownfield issue, if available, discussed at upcoming meeting.*

BUILDING LOCATION AND SITE ARRANGEMENT

Riverwalk
In the Planning Commission's motion, they asked the applicant to clearly specify their intent regarding space for a Riverwalk along the Rouge River. (Note that the zoning ordinance does not have a requirement for a Riverwalk.)

In our view, the applicant has clarified their intent for inclusion of a Riverwalk as follows:

1. The Final Site Plan shows both a 15-foot wide easement and a 20-foot wide easement as two options for this feature. A note on the plans indicates that the future Riverwalk would be constructed "by others," and not the applicant.
2. At the November 16 Planning Commission meeting, the applicant explained that the plans are showing two options in case the City chooses to purchase a smaller easement (at a smaller cost).
3. The November 30 response memo states that they are currently negotiating with the City on the Riverwalk easement.

Since there are no zoning requirements for a Riverwalk, the Planning Commission does not have the authority to require it, as this project is not a Planned Unit Development. However, the applicant is clearly offering space for a future Riverwalk if the City chooses to obtain the easement and build the walkway. These decisions are ultimately up to City Council.

Dumpster Screen
The revised plans have shifted the proposed dumpster screen to the end of the maneuvering lane in front of the commercial façade of the building. We consider this a better location than the previous plans, as the screen has been moved outside of the potential Riverwalk easement, and creates direct accessibility by a refuse hauler.

The ordinance states that locating a dumpster screen in the front yard is prohibited; however, it also gives the Planning Commission the ability to modify the location, subject to site characteristics, building orientation or screening.

Items to be Addressed: *Planning Commission to determine if location of dumpster in the E. Main St. front yard is acceptable.*

SITE ACCESS AND CIRCULATION

Traffic
The revised submission includes a memo from the City's traffic engineer, OHM. This memo explains that OHM has reviewed the revised traffic study (dated October 12, 2021), and states that the revised study has addressed all of OHM's previous review comments and corrected all of the issues they had noted.

The revised submission also includes a memo from the project traffic engineer (F&V). This memo first points out that a traffic study is not required for this project, as the Zoning Ordinance only requires a study if the project generates more than 100 trips during a peak hour. The traffic generated by this use equals 69 inbound and 65 outbound (total 134) in the afternoon peak hour. The traffic engineer is interpreting the Zoning Ordinance to only count "one direction" to determine if a traffic study is required; we interpreted the ordinance to look at both directions during the peak hour.

In any event, the applicant provided a traffic study that indicates that the adjacent roadway network can adequately accommodate the projected traffic volumes generated by the project. The City's traffic engineers agree with the conclusions of the revised study.

Regarding the desire to incorporate the N. Center/Main St. traffic closures into the traffic study, F&V's memo states that they have done this work as part of The Downs traffic impact study. (Available on the City's website https://www.ci.northville.mi.us/cms/one.aspx?pageId=14141984.) Per F&V's memo, The Down study shows how the impacts of the road closures have currently affected nearby intersections without any new development, and what can be done to mitigate these impacts. The new study also includes Foundry Flask as "background traffic" when evaluating the traffic impacts of The Downs. Regarding the amount of traffic generated by the Foundry Flask proposal, the memo also shows that the percent increase in traffic at the subject intersections due to the Foundry Flask project are relatively small (2-7%), and are not significant enough to require any mitigation techniques at these intersections on their own.

Site Access and Circulation
The City Engineer made a few comments regarding additional width of the Cady St. right-of-way, the proposed drive approach to the commercial building, sidewalks through the driveway approaches, and vehicular access to the parking garage. The site plans have been updated to provide the information requested, or agree to work with the City Engineer to work out details during preparation and review of the construction documents.

Items to be Addressed: *None.*

LOADING

A revised loading/unloading area is shown along the east-facing commercial façade of the building. The configuration of the space has been modified to meet the required size of 10' x 50'. Its proposed location is in the six parking spaces along the curb directly in front of the building. The space will be signed with

"loading/unloading space" during specific times of day; however, the loading times have not been specified at this time. We would suggest that this area transition to regular parking at 10am, which is consistent with other similar loading zones located in regular parking spaces in Northville.

In our previous review, we also requested that the applicant describe the types of vehicles that are anticipated to use the loading/unloading space, if known. At the November 16 meeting, the applicant's representative stated that the commercial space will be used as a specialty market, and will receive their products via box-type trucks. This is confirmed in the applicant's response memo (dated November 16, 2021). In reviewing the plans with turning templates necessary for box-type trucks, we agree that the easterly lot's design is adequate to accommodate this type of truck.

Items to be Addressed: *Recommend Planning Commission condition any approval on the loading/unloading zone to transition to regular parking at 10am daily.*

LANDSCAPING

Landscaping information is required upon Final Site Plan Review. We reviewed this information previously, and had the following questions/comments. How the applicant has responded is provided after each:

1. The Planning Commission included in their previous motion to modify the Landscape Plan to match the current site plan. The Landscape Plan reflects the most current site plan design.

2. We considered the turf grass along S. Main St. to be landscaping, and stated that it should be provided with irrigation in our last review. The applicant's response memo states that this area will be irrigated.

3. In our last review, we asked what the decorative paving in the pedestrian plaza will look like. The applicant states in their response memo that it will complement the architecture and address ADA accessibility. Note that the applicant attended the Historic District Commission meeting this evening, and received approval for the new project.

4. Lastly, we asked if the tree grates identified along E. Cady St. sidewalk will be consistent with the DDA's Secondary Street Guidelines. The applicant states in their response memo that the DDA specified tree grate will be used; and the applicant will work with the DDA Director on this selection if conditions warrant a different shape.

With this information, we consider the landscaping on site to meet ordinance requirements.

Items to be Addressed: *None.*

LIGHTING

Lighting information is required upon Final Site Plan Review. A photometric plan has been provided, showing the location, intensity, and height of the proposed fixtures. The plan shows pole-mounted parking lot lighting, and some building-mounted light fixtures on the south side of the parking garage. The

applicant has confirmed that the east parking lot lights will provide the lighting for the façade facing S. Main St.

The response memo also states that "public" light fixtures will be used along E. Cady St. frontage. The HDC submission also shows downward facing building-mounted light fixtures on all of the pillars along the Cady St. façade. The Cady Street Overlay (CSO) District requires streetscape amenities, such as decorative/pedestrian-scaled lighting to be incorporated along all frontages along Cady Street. This project is outside of the DDA; therefore, we don't believe the DDA would install public light fixtures along this stretch of the road. Given the configuration of the on-street parking, the only clear space for pole-mounted light fixtures would be on the applicant's property; therefore, if pole-mounted lights were to be used, they would need to be installed by the applicant on their property. In any event, some lighting needs to be installed along Cady St. (either pole-mounted or building-mounted) to ensure safe use of the sidewalk and on-street parking spots. The applicant should address this issue.

All light fixtures must be shielded or otherwise positioned (such as downward facing) to not adversely affect driver or pedestrian visibility. In addition, any point source shall not be visible from adjacent properties, roadways, or public sidewalks. Manufacturer cut sheets of the proposed fixtures have been provided. The parking lot light fixture is downward facing. The single-head fixtures (which are located on the exterior of both parking lots) have house-side shields; however, the double-head fixtures (5WQ) cannot accommodate a house-side shield. The applicant should address what could be done if an adjacent neighbor complained about the double-headed fixture.

The ordinance permits maximum light levels of 0.3 foot candles at property lines abutting residential uses, 0.5 foot candles at property lines abutting non-residential uses, with a minimum of one (1) foot candle at the surface of all parking areas. The photometric plan shows the proposed lighting levels across the site. In our previous review, we asked if these light levels considered the proposed vegetative screen along the south side of the west parking lot. The applicant stated that they did not, and that the screening would reduce the light levels along the south property line from what is shown on the photometric plan.

Light fixtures may be up to 25-feet tall, or the height of the building whichever is less. The proposed height of the parking lot fixtures is 22.5 feet tall, meeting ordinance requirements.

Items to be Addressed: *1) Applicant to address lighting along E. Cady Street frontage. 2) Applicant to address what could be done to address a neighbor complaint regarding the double-headed, pole-mounted fixtures (since these fixtures can't accommodate a house-side shield).*

UTILITIES

A full engineering review will be required for this project once the Planning Commission has made its decision on the site plan.

Note that the CSO District calls for using low-impact development techniques to manage stormwater. The project includes an underground detention basin under the westerly parking lot. As requested, the project engineer described that stormwater would enter a pre-treatment area, and then enter the underground detention basin before being outlet at a slow rate to the Rouge River. Due to the brownfield status and contamination in the soils on site, the development cannot infiltrate stormwater into the ground. This

has been confirmed by ASTI Environmental (memo dated November 4, 2021). OHM also commented on this situation, and thinks Wayne County will not require infiltration due to the contamination in the existing soils. Wayne County has jurisdiction over stormwater management in the City of Northville. Their review is done as a component of detailed engineering review after the Planning Commission has approved the site plan.

Regarding the minor changes to the site plan, based on the City Engineer's review memo, the applicant's response indicates that these changes have been made. If options exist for specific comments, the applicant will work with the City Engineer and DPW Director during detailed engineering review to make adjustments to the utilities or other engineering topics. As mentioned above, this step follows the Planning Commission's decision on every site plan.

We defer evaluation of the utilities and remaining items in the City Engineer's review to the detailed engineering process conducted by the DPW Director and City Engineer, working with the project engineer.

***Items to be Addressed**: Detailed engineering review conducted by DPW Director, City Engineer, and project engineer.*

RECOMMENDATIONS

The main issues brought up by the Planning Commission at its previous discussion include traffic, brownfield conditions, and the Riverwalk. To summarize, the traffic questions by the City's Traffic Engineer have been answered to their satisfaction in the updated Traffic Impact Study. The site contamination could be discussed by the applicant at the upcoming meeting, as they have submitted information to the City for review by the Brownfield Authority. Lastly, since the Riverwalk is not an ordinance requirement, it is out of the Planning Commission's purview to require it; however, the applicant is working with the City to determine if an agreement with City Council can be struck to ensure there is space for a future Riverwalk. The remaining issues, in our opinion, are minor or are part of the required reviews conducted before building permits are issued.

A. **Site Arrangement.** Planning Commission to determine if location of dumpster in the E. Main St. front yard is acceptable.

B. **Loading.** Recommend Planning Commission condition any approval on the loading/unloading zone to transition to regular parking at 10am daily.

C. **Lighting.** 1) Applicant to address lighting along E. Cady Street frontage. 2) Applicant to address what could be done to address a neighbor complaint regarding the double-headed, pole-mounted fixtures (since these fixtures can't accommodate a house-side shield).

D. Detailed engineering review conducted by DPW Director, City Engineer, and project engineer.

CARLISLE/WORTMAN ASSOC., INC.
Sally M. Elmiger, AICP, LEED AP
Principal

cc: Pat Sullivan
Shari Allen
Brent Strong
Jim Long jrlong@longmechanical.com
Doug Brinkman dr.ofelation@gmail.com
Robb Burroughs robb@oxstudioinc.com
Bob Emerine be@seiberkeast.com

456 E. Cady St.

Draft Motions

Approval – Final Site Plan

Based on the information received from the applicant, and reflected in the minutes of this meeting, the Planning Commission finds that the proposal at 456 E. Cady St., dated November 30, 2021, meets the required standards and findings for Final Site Plan approval (Section 19.05) of the Zoning Ordinance and approves the Final Site Plan, with the following conditions:

A. Site Arrangement. The Planning Commission determines that the location of the dumpster in the E. Main St. front yard is acceptable.

B. **Loading.** The loading/unloading zone is signed to transition to regular parking at 10am daily.

C. **Lighting.** The applicant provides revised lighting information to the Building Official before building permits are issued to ensure 1) Lighting along E. Cady Street frontage provides adequate illumination levels for pedestrians and motorists, as required by the ordinance. 2) The double-headed, pole-mounted fixtures can be shielded in case light intrusion is an issue for neighboring properties.

D. Detailed engineering review conducted by DPW Director, City Engineer, and project engineer.

-OR-

Refer Back to the Applicant – Final Site Plan

Move to refer the request for Final Site Plan approval proposed at 456 E. Cady St., dated November 30, 2021, back to the applicant, to allow the applicant time to address the following items:

A. _____

B. _____

C. _____

-OR-

Denial – Final Site Plan

Based on the information received from the applicant, and reflected in the minutes of this meeting, the Planning Commission finds that the proposal at 456 E. Cady St., dated November 30, 2021, does not meet the required standards and findings for Final Site Plan approval (Section 19.05) of the Zoning Ordinance and denies the Final Site Plan.

This action is also based on the fact that the request is not in compliance with…

A. _____

B. _____

C. _____