CITY OF WHEATON Illinois

ENGINEERING DEPARTMENT
303 W WESLEY STREET, WHEATON, IL, 60187
630.260.2065 | www.wheaton.il.us

MEMORANDUM

TO: The Honorable Mayor and City Council

FROM: Joseph Tebrugge, Director of Engineering

DATE: February 27, 2023

SUBJECT: **East Loop Road Corridor Traffic Study**

East Loop Road is an important Major Collector Road that provides connection between Naperville Road and Butterfield Road in southeast Wheaton. The corridor was last studied in 1994 and a study was required to ensure that cumulative traffic effects on the roadway would not cause negative impacts on City of Wheaton residents. The East Loop Road Corridor Traffic Study was required as per Ordinance O-2022-44, (attached as Exhibit A), which granted a special use permit for the planned unit development of a WashU car wash in the PUD on the northeast corner of East Loop Road and Butterfield Road.

The traffic study (attached as Exhibit B) was completed by Kenig, Lindgren, O'Hara, Aboona, Inc (KLOA). It analyzed existing traffic conditions, future 2028 traffic conditions with the car wash, and future 2028 traffic conditions with the car wash and a possible additional restaurant development on the north end of the car wash parking lot. All 2028 future conditions assume that the adjoining properties such as the Rice Lake Square shopping center and IIT are fully operating and no longer have any vacancies.

The East Loop Road Corridor Traffic Study also provided insight on the following possible changes to the corridor: 1) Adding a turn lane at East Loop Road and Butterfield, 2) Adding stop control or a traffic signal at East Loop Road and the Chic-Fil-A access drive, 3) Relocating the Chic-Fil-a access drive and/or adding an access drive, and 4) Attempting to alter the right turn traffic coming onto East Loop Road from Butterfield.

The results of the study illustrate that the corridor is designed well and works very well and as expected for a busy major collector road. No traffic signs or signals are warranted and access drives should not be moved or added.

The future 2028 condition shows that the East Loop Road Corridor has adequate reserve capacity to handle the increase in traffic even with all the adjoining properties fully operating. In fact, all of the intersections and turning movements continue to work very well with the

exception of the left hand turns out of the Chic-Fil-A access drive which start to experience an increased delay.

Should a potential future high traffic use development occur on the north part of the PUD containing the Chic-Fil-A/WashU businesses, the traffic flow on East Loop Road will remain unchanged. However, the traffic exiting the access drive out of the property would then break down into a very low level of service and would experience much longer queue times. To ensure that this does not occur, the owner of the WashU development has suggested to the City that the north parking lot can be deed restricted to only allow a use with low traffic volumes. This would not allow an establishment with high traffic volumes, such as a quick service restaurant, to be built.

Currently Ordinance O-2022-44 requires that some of the existing trees located at the southeast corner of East Loop Road and the Access Drive be removed and replaced with lower shrubs to improve the safety and visibility of this intersection. Should City Council desire any additional improvements, such as a deed restriction, the previous ordinance would have to be amended.

EXHIBIT A

ORDINANCE NO. O-2022-44

AN ORDINANCE AMENDING CITY OF WHEATON ORDINANCE NOS. E-3972, F-1471, F-1480, AND O-2021-09 "AN ORDINANCE CONDITIONALLY AMENDING THE WHEATON ZONING MAP AND CONDITIONALLY GRANTING A SPECIAL USE PERMIT FOR PLANNED UNIT DEVELOPMENT ON A CERTAIN PIECE OF PROPERTY COMMONLY LOCATED AT THE NORTHEAST CORNER OF EAST LOOP ROAD AND BUTTERFIELD GRADY'S/ COZYMEL'S RESTAURANTS"
(WASHU REAL ESTATE, LLC.)

WHEREAS, on March 21, 1994, the City of Wheaton, Illinois, ("City"), enacted City Ordinance No. E-3972 ("Original Ordinance"), which granted a special use permit for a planned unit development to allow the construction and use of two (2) restaurants, all on property commonly known as 301 and 311 East Loop Road, Wheaton, Illinois 60189; and

WHEREAS, on February 1, 2010, the City enacted City Ordinance No. F-1471 ("First Amended Ordinance"), which amended the special use permit for a planned unit development to allow the demolition of the existing restaurant on the property commonly known as 301 East Loop Road in order to construct a new restaurant with a drive-thru lane; and

WHEREAS, on April 19, 2010, the City enacted City Ordinance No. F-1480 ("Second Amended Ordinance"), which further amended the special use permit for a planned unit development to revise the drive-thru lane configuration (to allow a multi-point ordering layout) on property commonly 301 East Loop Road; and

WHEREAS, on March 1, 2021, the City enacted City Ordinance No. O-2021-09 ("Third Amended Ordinance"), which further amended the special use permit for a planned unit development to allow the construction of a dual lane drive-thru configuration (which necessitated the construction of a small addition on the rear of the restaurant, face-to-face order, delivery canopies and several other site plan modifications) on property commonly 301 East Loop Road; and

WHEREAS, an application has been submitted to further amend the special use permit for a planned unit development approved in the: Original Ordinance; First Amended Ordinance; Second Amended Ordinance; and Third Amended Ordinance to allow the demolition of the existing vacant restaurant on the property commonly known as 311 East Loop Road in order to construct a car wash; and

WHEREAS, pursuant to notice as required by the Illinois Municipal Code and the Wheaton Zoning Ordinance, a public hearing was conducted by the Wheaton Planning and Zoning Board on July 26, 2022, August 9, 2022, and August 23, 2022, to consider the issuance of an amendment to the special use permit for a planned unit development; and the Board has recommended the issuance of the special use permit for a planned unit development; and

WHEREAS, the City Council has reviewed the public hearing record before the Wheaton Planning and Zoning Board, as well as the exhibits for the proposed car wash, and considered a staff recommendation, and has concluded in its legislative judgment that the information and testimony presented at the public hearing was inadequate to properly determine what, if any, traffic congestion minimizing efforts may be necessary, or prudent, as conditions to be imposed on the special use permit for this specific car wash in a manner consistent with the public safety, health and welfare; and

WHEREAS, the law provides that a special use permit, allowed in a zoning ordinance for a business, is tantamount to a permitted use, subject to imposition of lawful conditions. *Paul v. County of Ogle*, 218 Ill. App. 2d 170696, 422 Ill. Dec. 453 (2nd Dist. 2018); and

WHEREAS, for the City Council to determine what lawful special use permit conditions for the proposed car wash are necessary or prudent, the City Council has concluded a more detailed traffic study and report than what has been submitted to date is necessary.

NOW, THEREFORE BE IT ORDAINED by the City Council of the City of Wheaton, DuPage County, Illinois, pursuant to its home rule powers, as follows:

Section 1: The following described property has been, and continues to be, zoned and classified in the C-5 Planned Commercial District zoning classification:

LOT 2 IN DANADA FARMS EAST UNIT 4, BEING A SUBDIVISION OF LOT 11 IN DANADA FARMS EAST UNIT 1, BEING A SUBDIVISION OF PART OF SECTION 28, AND THE NORTH 1/2 OF SECTION 33, IN TOWNSHIP 39 NORTH, RANGE 10 EAST OF THE THIRD PRINCIPAL MERIDIAN, ACCORDING TO THE PLAT THEREOF RECORDED APRIL 10, 1996 AS DOCUMENT R96-058160, IN DUPAGE COUNTY, ILLINOIS.

TOGETHER WITH THOSE CERTAIN NON-EXCLUSIVE EASEMENTS AS GRANTED AND MORE FULLY SET FORTH IN MUTUAL EASEMENT AND USE AGREEMENT DATED DECEMBER 21, 1995 AND RECORDED JUNE 21, 1996 AS DOCUMENT R96-103888, MADE BY AND BETWEEN PACIFIC INDUSTRIAL PROPERTIES HOLDINGS, INC. AND GRADY'S AMERICAN GRILL RESTAURANT CORPORATION.

PIN: 05-28-403-029

Section 2: An amendment to the Original Ordinance, First Amended Ordinance, Second Amended Ordinance, and Third Amended Ordinance to allow the demolition of the existing restaurant on the property commonly known as 311 East Loop Road in order to construct a new car wash is granted in full compliance with the following plans: "WashU Wheaton – Preliminary Engineering Plans," prepared by Merit Corp, Aurora, IL, sheets 1-11, dated June 30, 2022; "WashU Wheaton – Bold Curb Exhibit", prepared by Merit Corp, Aurora, IL, sheet 1-1, dated August 11, 2022; "Peak Times Proposed Traffic Flow Patterns", prepared by KLOA, Rosemont, IL, sheet 1-1, dated August 21, 2022, "WashU Car Wash", prepared by Design Perspectives, Naperville, IL, sheets TP 100, LP 101, 102, 103, 500, 501, 502, and 503, dated July 1, 2022, "WashU Elevations and Floor Plan", prepared by WashU, sheets 1-2; and "WashU Sign Package, prepared by Midwest Sign Company, Wayland, MI, sheets 1-4, dated May 16, 2022, subject to the following conditions:

1. Additional shrubs shall be added in the landscaping area between Chick-fil-A and the car wash.
2. Some of the existing trees located at the southeast corner of East Loop and the access drive shall be removed (and replaced with lower shrubs) to improve safety and visibility as depicted on the revised land swap exhibit, subject to approval by the Director of Planning of Economic Development.
3. The drive lanes shall be reconfigured to improve outbound queuing as depicted on the revised land swap exhibit, subject to approval by the Director of Engineering.
4. Even though the northern portion of the property is not being redeveloped at this time, the parking lot lights, and the light remnant shall be replaced with new lights to match the parking lot lights for the car wash.

5. A mainline water valve shall be installed by the applicant east of the proposed water connection to improve the City of Wheaton system and the costs of the material and installation shall be paid for by the applicant; the City shall maintain the installed mainline water valve.
6. The preliminary engineering plan shall be subject to further staff review prior to the issuance of a site development permit.
7. An independent traffic study and report, contracted by the City, evaluating and recommending possible, necessary, or prudent improvements, to protect the public health, safety, and welfare by minimizing ingress and egress traffic congestion at the property's current intersection with East Loop Road, shall be completed prior to the final determination of what conditions should be imposed on the special use permit. The cost of this independent traffic report shall be divided equally between the applicant and the City.
8. A precondition to approval of the special use permit shall also include the applicant's agreement to pay one hundred percent (100%) of the recommended traffic improvements exclusive to the property proposed by the independent traffic report and a proportionate share of the costs not exclusive to the property recommended by the independent traffic report, that are necessary or prudent to minimize the negative traffic impacts.
9. The Corporate Authorities shall determine whether said improvements, or no improvements, recommended by the independent traffic study to minimize traffic congestion satisfy the standards for issuance of a special use permit as set forth in Section 5.10D of the Wheaton Zoning Ordinance.

Section 3: In all other respects, the terms and provisions of the Original Ordinance, First Amended Ordinance, Second Amended Ordinance, and Third Amended Ordinance are ratified and remain in full force and effect.

Section 4: All ordinances and parts of ordinances in conflict with these provisions are hereby repealed.

Section 5: This ordinance shall become effective after its passage, approval, and publication in pamphlet form in the manner prescribed by law. The special use permit shall not become effective until the conditions imposed by this ordinance are fully satisfied.

Philip J Suess
Mayor

ATTEST:
Andrea Rosedale
City Clerk

Roll Call Vote

Ayes: Councilman Weller
Councilwoman Bray-Parker
Councilman Barbier
Councilman Brown
Mayor Suess
Councilwoman Robbins

Nays: None

Absent: Councilwoman Fitch

Motion Carried Unanimously

Passed: October 17, 2022
Published: October 18, 2022

WASH-U WHEATON

PRELIMINARY ENGINEERING PLANS

311 E. LOOP ROAD

WHEATON, DUPAGE COUNTY, ILLINOIS

MASTER NOTES

1. ALL ITEMS OF THIS PROJECT SHALL BE GOVERNED BY SPECIFICATIONS INCLUDED IN THE DOCUMENTS LISTED BELOW

A. "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION" PREPARED BY THE DEPARTMENT OF TRANSPORTATION OF THE STATE OF ILLINOIS AND ADOPTED BY SAID DEPARTMENT (LATEST REVISION") AND HEREINAFTER REFERRED TO AS THE "STANDARD SPECIFICATIONS"
B. "SUPPLEMENTAL SPECIFICATIONS AND RECURRING SPECIAL PROVISIONS" ADOPTED BY THE ILLINOIS DEPARTMENT OF TRANSPORTATION
C. "ILLINOIS URBAN MANUAL" (LATEST REVISION") BY ASSOCIATION OF ILLINOIS SOIL & WATER CONSERVATION DISTRICTS
D. "STANDARD SPECIFICATIONS FOR WATER AND SEWER MAIN CONSTRUCTION IN ILLINOIS". BY ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
E. "ILLINOIS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS & HIGHWAYS" BY ILLINOIS DEPARTMENT OF TRANSPORTATION
F. "ILLINOIS ACCESSIBILITY CODE", (LATEST EDITION")
G. "CODE OF ORDINANCES CITY OF WHEATON, ILLINOIS" (LATEST EDITION)
H. WHEATON SANITARY DISTRICT

*LATEST REVISION IN EFFECT ON THE DATE OF THESE PLANS

2. PRIOR TO BID, THE CONTRACTOR SHALL VERIFY CONFORMANCE BETWEEN PLANS AND THE ABOVE REFERENCED CODES. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES PRIOR TO BID

3. IN THE EVENT OF A CONFLICT BETWEEN THESE VARIOUS STANDARDS, MUNICIPAL STANDARDS SHALL APPLY

4. ALL TRAFFIC CONTROL AND OTHER ADVISORY SIGNS NEEDED FOR CONSTRUCTION ARE TO BE FURNISHED BY THE CONTRACTOR IN ACCORDANCE WITH SECTION 701 OF THE STANDARD SPECIFICATIONS.

5. ALL WORK PERFORMED SHALL COMPLY WITH ALL APPLICABLE RULES AND REGULATIONS OF OSHA

6. THE CONTRACTOR IS RESPONSIBLE FOR NOTIFYING JULIE 1-800-892-8123 AT LEAST 48 HOURS IN ADVANCE OF CONSTRUCTION OPERATIONS. ALL UTILITIES MUST BE STAKED/LOCATED BEFORE CONSTRUCTION

7. THE CONTRACTOR IS RESPONSIBLE FOR NOTIFYING THE MUNICIPALITY PUBLIC WORKS DEPARTMENT 630-260-2110 A MINIMUM OF 48 HOURS BEFORE CONSTRUCTION ACTIVITIES. A 48-HOUR NOTICE MUST BE PROVIDED FOR INSPECTIONS AND TESTS. CITY STAFF MUST OPERATE ALL WATERMAIN VALVES AND HYDRANTS ONLY

8. THE CONTRACTOR SHALL PROTECT AND PRESERVE ALL SURVEYING MONUMENTS UNTIL THE OWNER, THEIR AGENT OR A LICENSED SURVEYOR HAS WITNESSED OR OTHERWISE REFERENCED THEIR LOCATIONS.

9. THE CONTRACTOR SHALL BE AWARE OF POTENTIAL CONFLICTS WITH EXISTING UTILITIES AS MAY BE INDICATED ON THE PLANS. THESE AREAS SHALL BE EXCAVATED TO DETERMINE ELEVATIONS BEFORE BEGINNING CONSTRUCTION. CONTRACTOR SHALL NOTIFY ENGINEER OF ANY DISCREPANCIES

10. SAWING OF REMOVAL ITEMS AS NOTED IN THE PLANS OR AS REQUIRED BY THE ENGINEER SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT OF THE ITEM BEING REMOVED AND NO EXTRA COMPENSATION WILL BE ALLOWED

11. ALL ROAD SIGNS, STREET SIGNS AND TRAFFIC SIGNS WHICH NEED TO BE RELOCATED OR MOVED DUE TO CONSTRUCTION SHALL BE TAKEN DOWN AND STORED BY THE CONTRACTOR AT HIS OWN EXPENSE EXCEPT THOSE WHICH THE PERMIT AGENCY SHALL REQUIRE TO BE TEMPORARILY RESET UNTIL COMPLETION OF CONSTRUCTION OPERATIONS. AFTER COMPLETION OF THE WORK, THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, RESET ALL SAID SIGNS AT THE LOCATIONS DESIGNATED BY THE PERMIT AGENCY ENGINEER

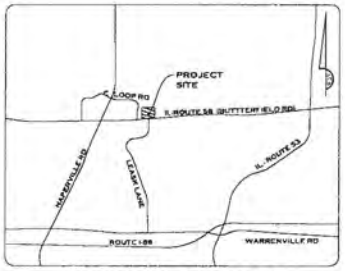
12. THE CONTRACTOR SHALL PRESERVE ALL CONSTRUCTION STAKES UNTIL THEY ARE NO LONGER NEEDED. ANY STAKES DESTROYED BY THE CONTRACTOR PRIOR TO THEIR USE SHALL BE RESET BY THE OWNER'S ENGINEER AT A COST TO BE BORNE BY THE CONTRACTOR THAT DESTROYED THE STAKES

13. CONTRACTOR SHALL USE CARE NEAR ANY AND ALL EXISTING ITEMS WHICH ARE NOT INDICATED TO BE REMOVED OR MODIFIED. ANY DAMAGE DONE TO THESE ITEMS BY CONTRACTORS OPERATIONS SHALL BE REPAIRED AND/OR RESTORED BY THE CONTRACTOR AT THE CONTRACTORS OWN EXPENSE

14. THE CONTRACTOR SHALL INDEMNIFY AND SAVE HARMLESS THE OWNER, THE PERMIT AGENCY AND ITS OFFICERS, EMPLOYEES, AND AGENTS, AND THE OWNER'S ENGINEERS, FROM AND AGAINST ALL LOSSES, CLAIMS, DEMANDS, PAYMENTS, SUITS, ACTIONS, RECOVERIES AND JUDGMENT OF EVERY NATURE AND DESCRIPTION BROUGHT OR RECOVERED AGAINST THEM BY REASON OF ANY ACT OR OMISSION OF SAID CONTRACTOR, HIS AGENTS OR EMPLOYEES, IN THE EXECUTION OF THE WORK OR IN THE GUARDING OF IT

15. BURNING ON THE SITE IS NOT PERMITTED.

16. ALL IMPROVEMENTS SHOWN ON THE PLANS ARE THE RESPONSIBILITY OF THE CONTRACTOR



VICINITY MAP

(NOT TO SCALE)

SYMBOL LEGEND

(PROPOSED)		(EXISTING)
	PROPERTY LINE	
	RIGHT-OF-WAY/SETBACK LINE	
	EASEMENT LINE	
	DEPRESSED CURB	
-S-	STORM SEWER	
-S-	SANITARY SEWER	
-W-	WATER MAIN	
-G-	GAS LINE	
-E-	ELECTRIC LINE	
-T-	TELEPHONE LINE	
-OH-	OVERHEAD WIRES	
	FENCE LINE	
SF	SILT FENCE	
720	CHASING CONTOUR	
	MANHOLE	
	STORM CURB FRAME & GRATE	
	STORM MANHOLE	
	STORM CATCH BASIN	
	STORM FLARED END SECTION	
	SANITARY MANHOLE	
	VALVE VAULT	
	FIRE HYDRANT	
	BUFFALO BOX	
	GAS VALVE	
	ELECTRIC STRUCTURE	
	TRANSFORMER	
	POWER POLE	
	UTILITY PED.	
	TRAFFIC SIGNAL MANHOLE	
	DRAINAGE FLOW ARROW	
	OVERFLOW ROUTE	
	AIR CONDITIONER	
	SINGLE POLE SIGN	
	DOUBLE POLE SIGN	
	STREET LIGHT	
BD.	BOLLARD	
C.O.	CLEAN OUT	
D.S.	DOWN SPOUT	
	TREE	
	EROSION CONTROL BLANKET (SEE DETAIL SHEET)	
	FINAL STABILIZATION (SEE DETAIL SHEET)	
	CONCRETE SIDEWALK	
	NEW HEAVY DUTY ASPHALT PAVEMENT (SEE DETAIL SHEET)	
	STANDARD DUTY ASPHALT PAVEMENT (SEE DETAIL SHEET)	
	DETECTABLE WARNINGS (SEE DETAIL SHEET)	

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PROJECT TEAM

WASHU REAL ESTATE LLC
P.O. BOX 1384
ELMHURST, ILLINOIS 60126

MeritCorp Group, LLC
4222 MERIDIAN PARKWAY STE 112
AURORA, IL 60504
Ph (630)554.6655

NOTE

1. DETAILS AND NOTES WITHIN THESE PLANS, ALONG WITH NOTATIONS TO SUPPLEMENT SAME ARE CRUCIAL TO THE PROPER CONSTRUCTION OF THE DESIGN CONTAINED HEREIN.

2. CONTRACTOR SHALL VISIT THE SITE TO FAMILIARIZE HIMSELF WITH ALL CONDITIONS PRIOR TO ENGAGING IN A CONTRACT TO PERFORM WORK AS PROPOSED HEREIN.

3. PLANS ARE NOT VALID WITHOUT ORIGINAL SIGNATURE AND SEAL OF THE ENGINEER.

SITE BENCHMARKS

ELEVATIONS SHOWN ARE RELATIVE TO NAVD88

SITE BM #1:
NE UPPER FLANGE BOLT ON FIRE HYDRANT NEAR SOUTHERLY LIMITED OF TOPOGRAPHIC COVERAGE, AS NOTED HEREON
ELEV=743.12'

SITE BM #2:
NE UPPER FLANGE BOLT ON FIRE HYDRANT SOUTHWEST OF THE EXISTING BUILDING AT 311 E. LOOP RD, AS NOTED HEREON

ABBREVIATIONS

ADS	ADDENDA (PLAN)	F.H.	FACE TO FACE	R	RADIUS		
ALT	ALTERNATE	F.S.	FLARE END SECTION	RCP	REINFORCED CONCRETE PIPE		
B.M.	BY. REC. MARK	F.F.	FINISHED FLOOR	R.O.W.	RIGHT OF WAY		
B.S.	BACK TO BACK	F.G.	FINISHED GRADE	RD	ROOF DRAIN		
BFH	BUFFALO BOX	FL	FLOWLINE (INVERT	SAN	SANITARY		
BW	BOTTOM OF WALL	GAL	GALVANIZED	SMH	STORM MANHOLE		
BVC	BEGIN VERTICAL CURVE	HDPE	HIGH DENSITY POLYETHYLENE	STM	STORM		
BVI	BEGIN VERTICAL INTERSECTION	HW	HEADWALL	SV	SOD VALVE		
BY	BY OTHERS	HYD	HYDRANT	SVH	SERVICE HEAD		
BW	BOTTOM OF WALL	INV	INVERT	SW	SIDEWALK		
BW	BOTTOM OF WALL	LF	LINEAR FEET	TBR	TO BE REMOVED		
CB	CATCH BASIN	LP	LIGHT POLE	TC	TOP OF CURB		
CATV	CABLE TELEVISION	MH	MANHOLE	TOC	TOP OF CONCRETE		
CL	CENTER LINE	MW	MONUMENT	TOF	TOP OF FOUNDATION		
CMP	CORRUGATED METAL PIPE	NIC	NOT IN CONTRACT	TOP	TOP OF PIPE		
CO	CLEAN OUT	N.W.L.	NORMAL WATER LEVEL	TOW	TOP OF WALL		
CONC	CONCRETE	PC	POINT OF CURVE	TYP	TYPICAL		
D.I.	DUCTILE IRON WATER MAIN	PCC	POINT OF COMPOUND CURVE	UG	UNDERGROUND		
D.S.	DOWN SPOUT	PI	POINT OF INTERSECTION	V	VALVE VAULT		
DW	DRIVEWAY	PRC	POINT OF REVERSE CURVE	W	WATER MAIN		
E.P.	EDGE OF PAVEMENT	PT	POINT OF TANGENCY				
E.C.O.	EXISTING CLEAN OUT	PVC	POINT OF VERTICAL CURVE				
ELEV	ELEVATION	PVI	POINT OF VERTICAL INTERSECTION				
E.S.	EDGE OF STONE	PVT	POINT OF VERTICAL TANGENCY				
E.W.	EDGE OF WALK	PL	PROPERTY LINE				
EW	EXISTING	PP	POWER POLE				
		PVC	POLYVINYL CHLORIDE PIPE				

DATE:	DESCRIPTION:
06/30/2022	ISSUED FOR REVIEW

MeritCorp
4222 Meridian Parkway, Suite 112
Aurora, IL 60504
Office 630.554.6655
Lic. No. 184.005860
www.meritcorp.com
Other Office Locations:
Gurnee, IL

WASH-U WHEATON
311 E. LOOP ROAD
WHEATON, ILLINOIS 60189

PRELIMINARY ENGINEERING PLANS

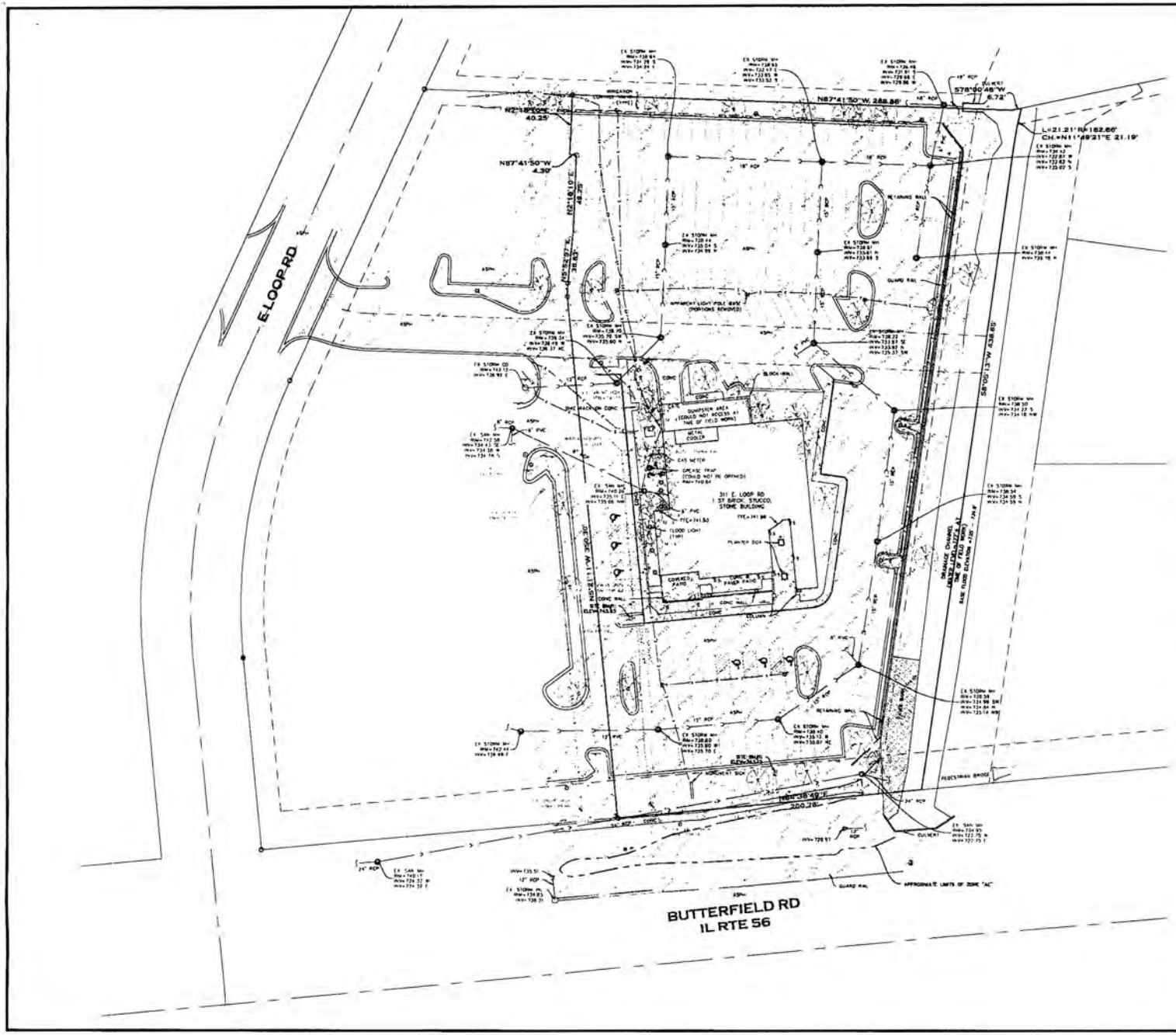
COVER SHEET

PROJECT NO. M21180

DRAWN BY: ZDS & JDS

CHECKED BY: CLS

SHEET NO. 1 / 11



SURVEYOR NOTES

1. FIELD WORK COMPLETED ON APRIL 4, 2022
2. THIS PROFESSIONAL SERVICE CONFORMS TO THE CURRENT ILLINOIS MINIMUM STANDARDS FOR TOPOGRAPHIC SURVEYS
3. SEE CURRENT PLAT OF SURVEY FOR ADDITIONAL INFORMATION.
4. SURFACE INDICATIONS OF UTILITIES HAVE BEEN SHOWN, INCLUDING OVERHEAD WIRES AND UTILITY POLES (IF ANY) - HOWEVER THEIR FUNCTION AND DIMENSIONS HAVE NOT BEEN SHOWN. PUBLIC AND/OR PRIVATE RECORDS HAVE NOT BEEN SEARCHED TO PROVIDED ADDITIONAL INFORMATION EXCEPT WHERE OTHERWISE NOTED HEREON.
5. OTHER THAN VISIBLE OBSERVATIONS NOTED HEREON, THIS SURVEY MAKES NO STATEMENT REGARDING THE ACTUAL PRESENCE OR ABSENCE OF ANY SERVICE OR UTILITY LINE. CONTROLLED UNDERGROUND EXPLORATORY EFFORT TOGETHER WITH "JULIE" OR "DIGGER" MARKINGS IS RECOMMENDED TO DETERMINE THE FULL EXTENT OF UNDERGROUND SERVICE AND UTILITY LINES. "JULIE" WILL NOT MARK UTILITIES FOR LAND SURVEYORS FOR THE PURPOSE OF TOPOGRAPHIC SURVEYS IN ILLINOIS
6. SURVEY COMPLETED FOR
WASH-U REAL ESTATE
PO BOX 1384
ELMHURST, IL 60126
7. ONLY TREES OVER 6" SHOWN HEREON
8. COMMUNICATION LINES WERE MARKED IN ORANGE PAINT OR FLAGS WITHOUT INDICATION OF TELEPHONE, CABLE, OR FIBER OPTIC UNDERGROUND COMMUNICATION LINES ARE TO BE VERIFIED AND MAY DIFFER FROM HEREON

SITE BENCHMARKS

ELEVATIONS SHOWN ARE RELATIVE TO NAVD'88.

SITE BM #1
NE UPPER FLANGE BOLT ON FIRE HYDRANT NEAR SOUTHERLY LIMITED OF TOPOGRAPHIC COVERAGE, AS NOTED HEREON
ELEV=743.12'

SITE BM #2
NE UPPER FLANGE BOLT ON FIRE HYDRANT SOUTHWEST OF THE EXISTING BUILDING AT 311 E. LOOP RD. AS NOTED HEREON.
ELEV=743.83'

DATE:	DESCRIPTION:
06/30/2022	ISSUED FOR REVIEW

MeritCorp
4222 Meridian Parkway Suite 112
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Other Office Locations:
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WASH-U WHEATON
311 E. LOOP ROAD
WHEATON, ILLINOIS 60189

PRELIMINARY ENGINEERING PLANS

EXISTING CONDITIONS PLAN

PROJECT NO. M21180
DRAWN BY: ZDS & JDS
CHECKED BY: CLS
SHEET NO. 2/11

WASH-U WHEATON
311 E. LOOP ROAD
WHEATON, ILLINOIS 60189

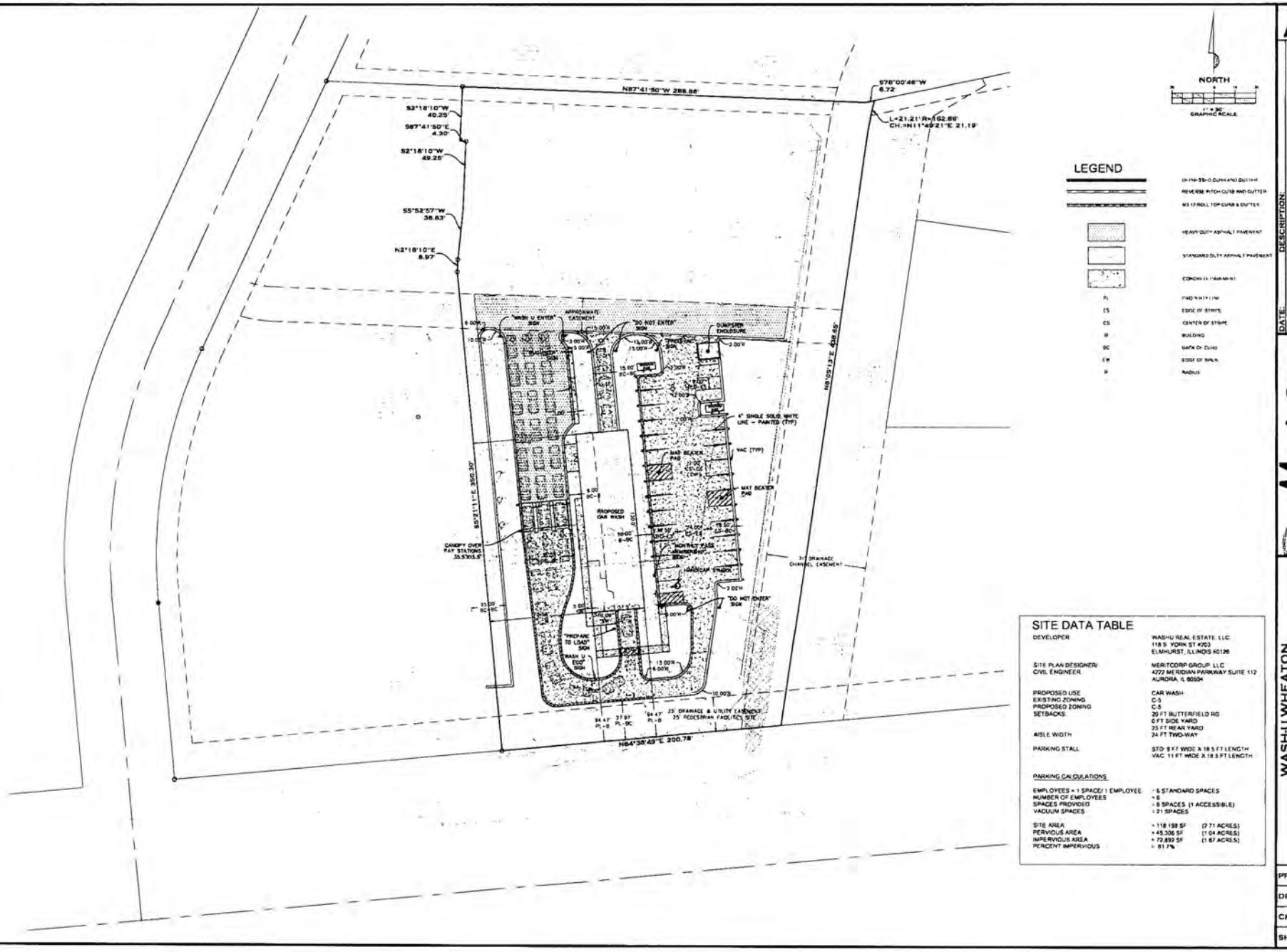
PRELIMINARY ENGINEERING PLANS

DEMOLITION PLAN

MeritCorp
4222 Meridian Parkway, Suite 112
Aurora, IL 60504
Office 630.554.6655
Lic. No. 184.005860
www.meritcorp.com
Other Office Locations:
Gurnee, IL

DATE:	DESCRIPTION:
06/30/2022	ISSUED FOR REVIEW

PROJECT NO: M21180
DRAWN BY: ZDS & JDS
CHECKED BY: CLS
SHEET NO. 3/11



SITE DATA TABLE

DEVELOPER	WASHU REAL ESTATE, LLC 118 S. YORK ST #203 ELMHURST, ILLINOIS 60126
SITE PLAN DESIGNER/ CIVIL ENGINEER	MERITCORP GROUP, LLC 4222 MERIDIAN PARKWAY SUITE 112 AURORA, IL 60504
PROPOSED USE	CAR WASH
EXISTING ZONING	C-3
PROPOSED ZONING	C-3
SETBACKS	20 FT BUTTERFIELD RD 0 FT SIDE YARD 25 FT REAR YARD
AISLE WIDTH	24 FT TWO-WAY
PARKING STALL	STD: 9 FT WIDE X 18.5 FT LENGTH VAC: 11 FT WIDE X 18.5 FT LENGTH

PARKING CALCULATIONS

EMPLOYEES + 1 SPACE/ 1 EMPLOYEE	= 5 STANDARD SPACES	
NUMBER OF EMPLOYEES	= 5	
SPACES PROVIDED	= 8 SPACES (1 ACCESSIBLE)	
VACUUM SPACES	= 21 SPACES	
SITE AREA	= 118,198 SF	(2.71 ACRES)
PERVIOUS AREA	= 45,306 SF	(1.04 ACRES)
IMPERVIOUS AREA	= 72,892 SF	(1.67 ACRES)
PERCENT IMPERVIOUS	= 61.7%	

DATE:	DESCRIPTION:
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Gurnee, IL

WASHU WHEATON
311 E. LOOP ROAD
WHEATON, ILLINOIS 60189

PRELIMINARY ENGINEERING PLANS

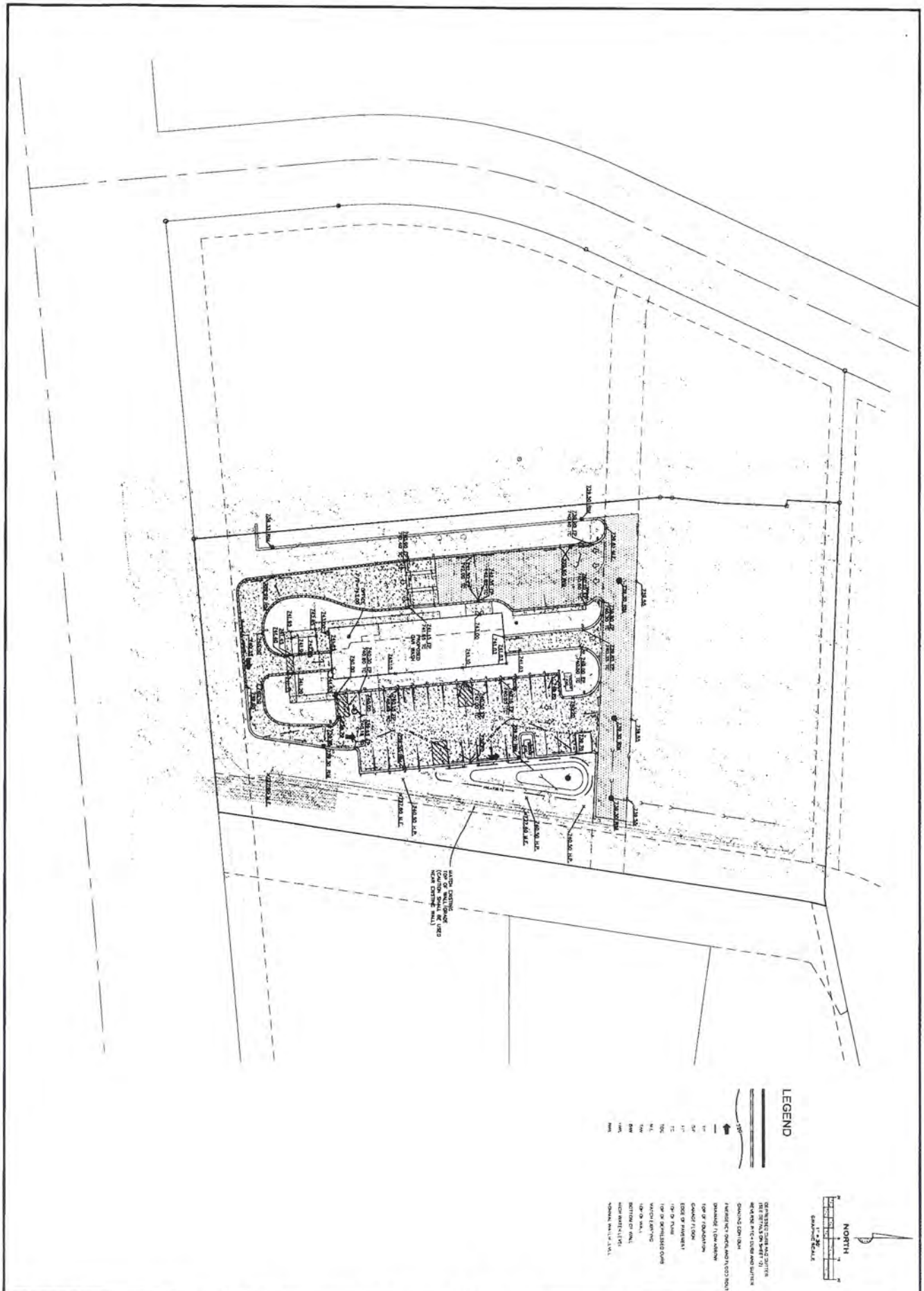
GEOMETRIC PLAN

PROJECT NO. M21180

DRAWN BY: ZDS & JDS

CHECKED BY: CLS

SHEET NO. 4/11



WASH-U WHEATON
311 E. LOOP ROAD
WHEATON, ILLINOIS 60189

PRELIMINARY ENGINEERING PLANS

GRADING PLAN

PROJECT NO. M21180
DRAWN BY: ZDS & JDS
CHECKED BY: CLS
SHEET NO. 5/11

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DATE:	DESCRIPTION:
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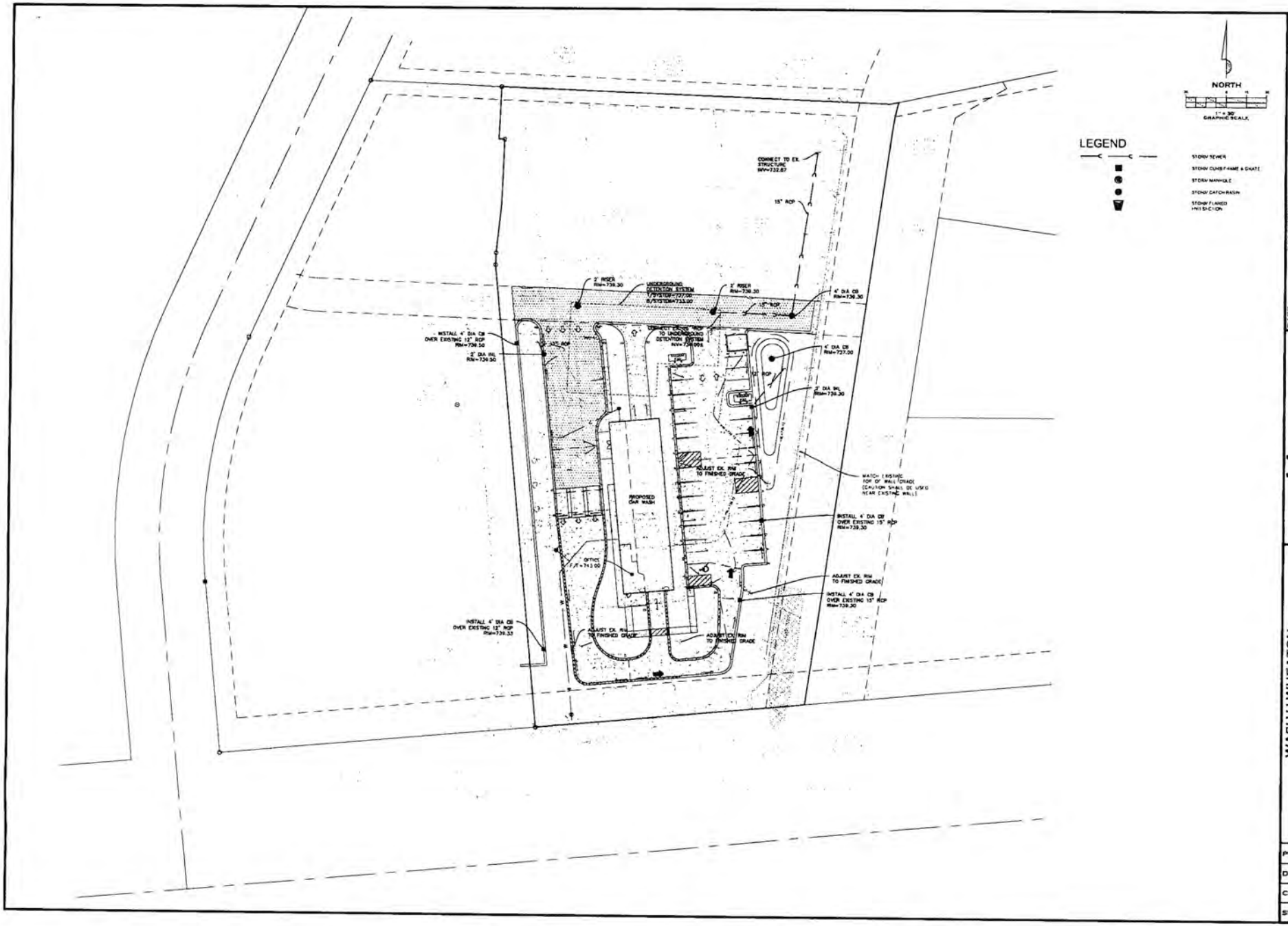

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PRELIMINARY ENGINEERING PLANS

STORM SEWER PLAN

PROJECT NO. M21180
DRAWN BY: ZDS & JDS
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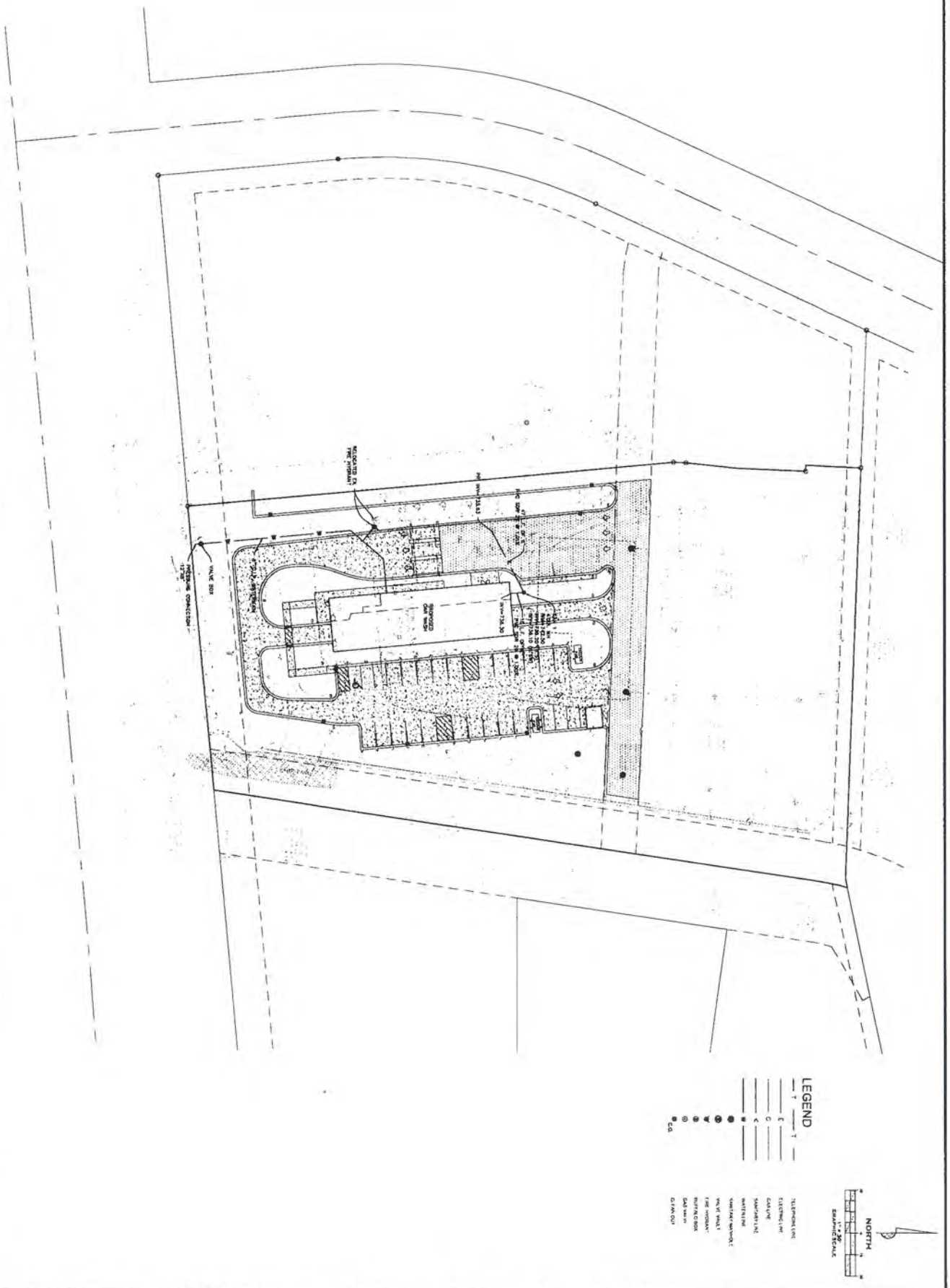
SHEET NO. 6/11



WASH-U WHEATON
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PRELIMINARY ENGINEERING PLANS

UTILITY PLAN

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PROJECT NO: M21180
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SHEET NO. 7/11

GENERAL SITE IMPROVEMENTS

[illegible]

23. ALL IMPROVEMENTS SHOWN ON THE PLANS ARE THE RESPONSIBILITY OF THE CONTRACTOR.

EARTHWORK

[illegible]

GENERAL PAVING AND SURFACING

[illegible]

STORMWATER DISTRIBUTION SYSTEM

[illegible]

SANITARY DISTRIBUTION SYSTEM NOTES

[illegible]

WATER DISTRIBUTION SYSTEM

[illegible]

DATE:	DESCRIPTION:
06/30/2022	ISSUED FOR REVIEW

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PRELIMINARY ENGINEERING PLANS

STANDARD CONSTRUCTION NOTES

PROJECT NO. M21180
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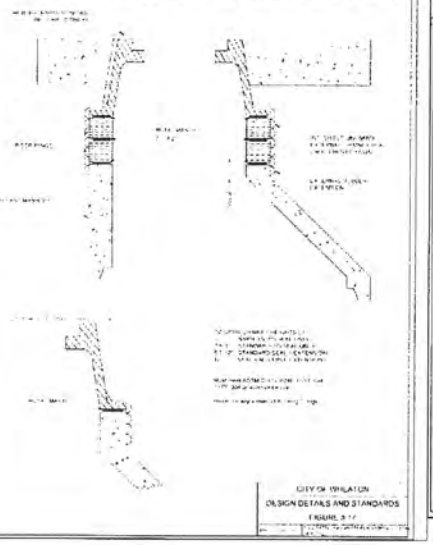
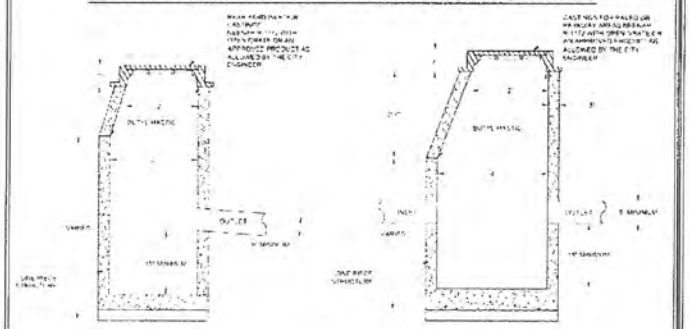
SANITARY MANHOLE EXTERNAL CHIMNEY SEAL



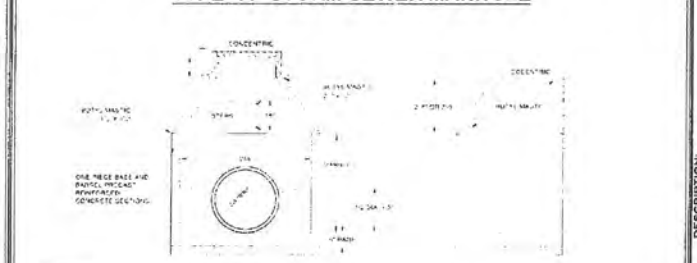
CITY OF WHEATON
DESIGN DETAILS AND STANDARDS
FIGURE # 17

CATCH BASIN WITH FRAME AND GRATE FOR INLET



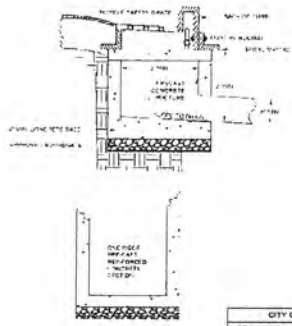
CITY OF WHEATON
DESIGN DETAILS AND STANDARDS
FIGURE # 25

TYPE "A" STORM SEWER MANHOLE



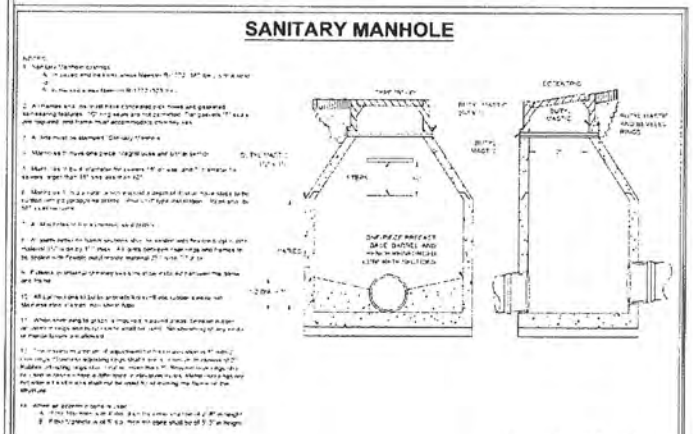
CITY OF WHEATON
DESIGN DETAILS AND STANDARDS
FIGURE # 21

CURBLINE INLET OR CATCH BASIN



CITY OF WHEATON
DESIGN DETAILS AND STANDARDS
FIGURE # 5

SANITARY MANHOLE



CITY OF WHEATON
DESIGN DETAILS AND STANDARDS
FIGURE # 16

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PRELIMINARY ENGINEERING PLANS

STANDARD CONSTRUCTION DETAILS

PROJECT NO. M21180
DRAWN BY: ZDS & JDS
CHECKED BY: CLS
SHEET NO. 9/11

VALVE BOX SETTER

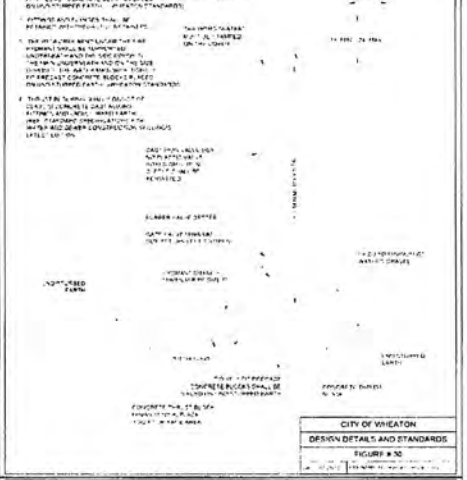
Valve Box Adaptor II

ADVANTAGES

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

CITY OF WHEATON
DESIGN DETAILS AND STANDARDS
FIGURE # 32

FIRE HYDRANT AND VALVE DETAIL



CITY OF WHEATON
DESIGN DETAILS AND STANDARDS
FIGURE # 30

DEPRESSED CORNER FOR SIDEWALKS

VALVE BOX SETTER

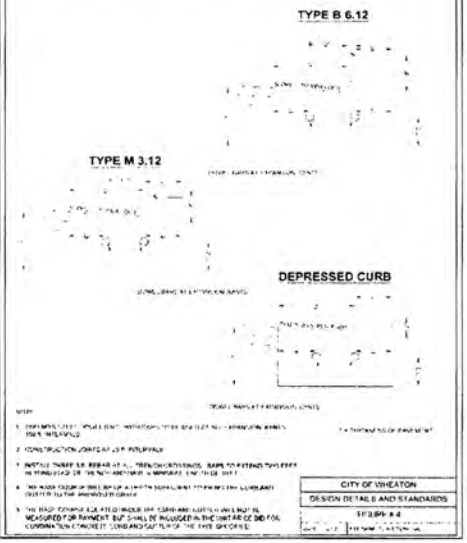
Valve Box Adaptor II

AMERICAN MADE PRODUCTS

WWW.ADAPTORINC.COM

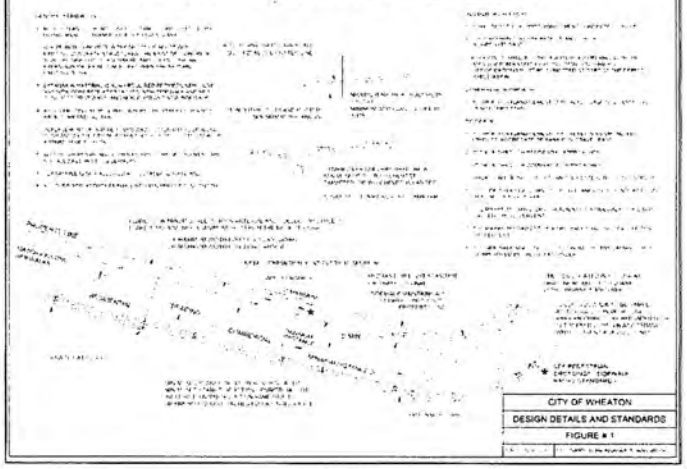
CITY OF WHEATON
DESIGN DETAILS AND STANDARDS
FIGURE # 33

CURB & GUTTER SPECIFICATIONS



CITY OF WHEATON
DESIGN DETAILS AND STANDARDS
FIGURE # 4

DRIVE APPROACH & SIDEWALK SPECIFICATIONS



CITY OF WHEATON
DESIGN DETAILS AND STANDARDS
FIGURE # 1

DATE	DESCRIPTION
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WASHU WHEATON
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PRELIMINARY ENGINEERING PLANS

STANDARD CONSTRUCTION DETAILS

PROJECT NO. M21180
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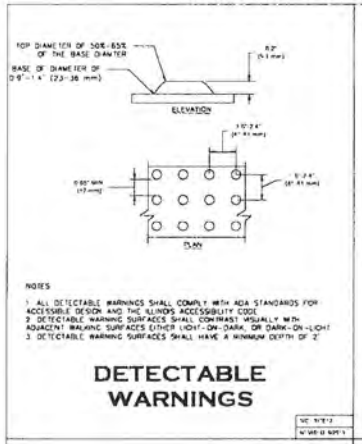
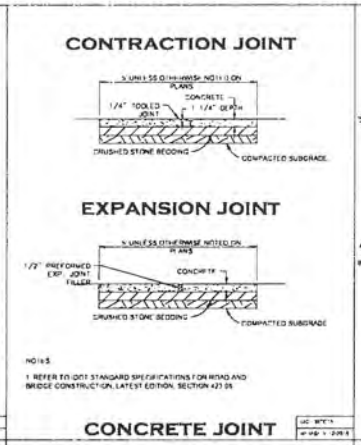
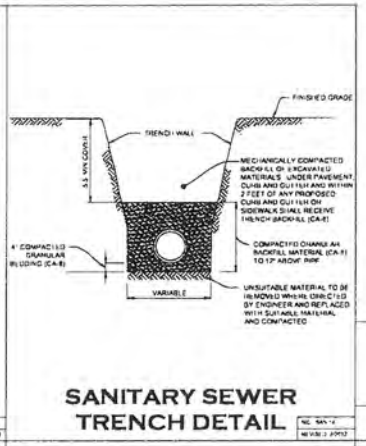


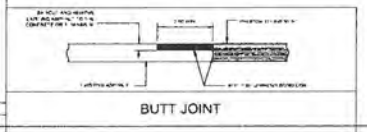
DETECTABLE WARNINGS



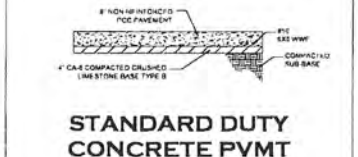
CONCRETE JOINT



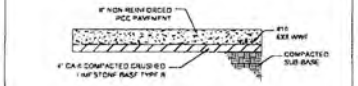
SANITARY SEWER TRENCH DETAIL



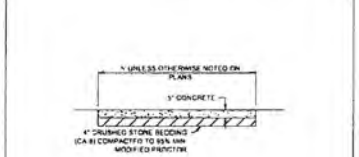
BUTT JOINT



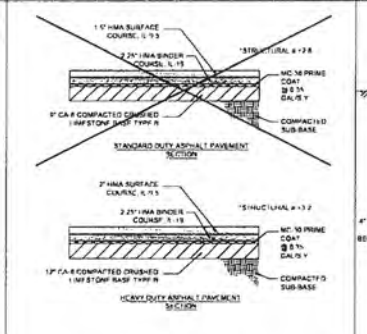
STANDARD DUTY CONCRETE PVMT



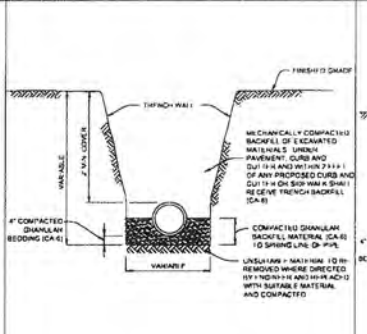
HEAVY DUTY CONCRETE PVMT



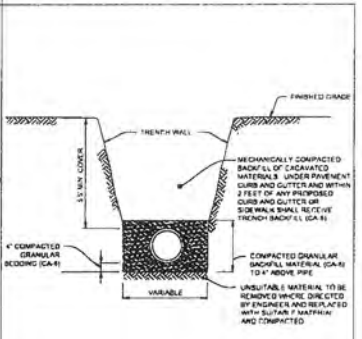
PCC SIDEWALK



ASPHALT PAVEMENT SECTIONS



STORM SEWER TRENCH DETAIL



WATER MAIN/SERVICE TRENCH DETAIL

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WHEATON, ILLINOIS 60189

PRELIMINARY ENGINEERING PLANS

STANDARD CONSTRUCTION DETAILS

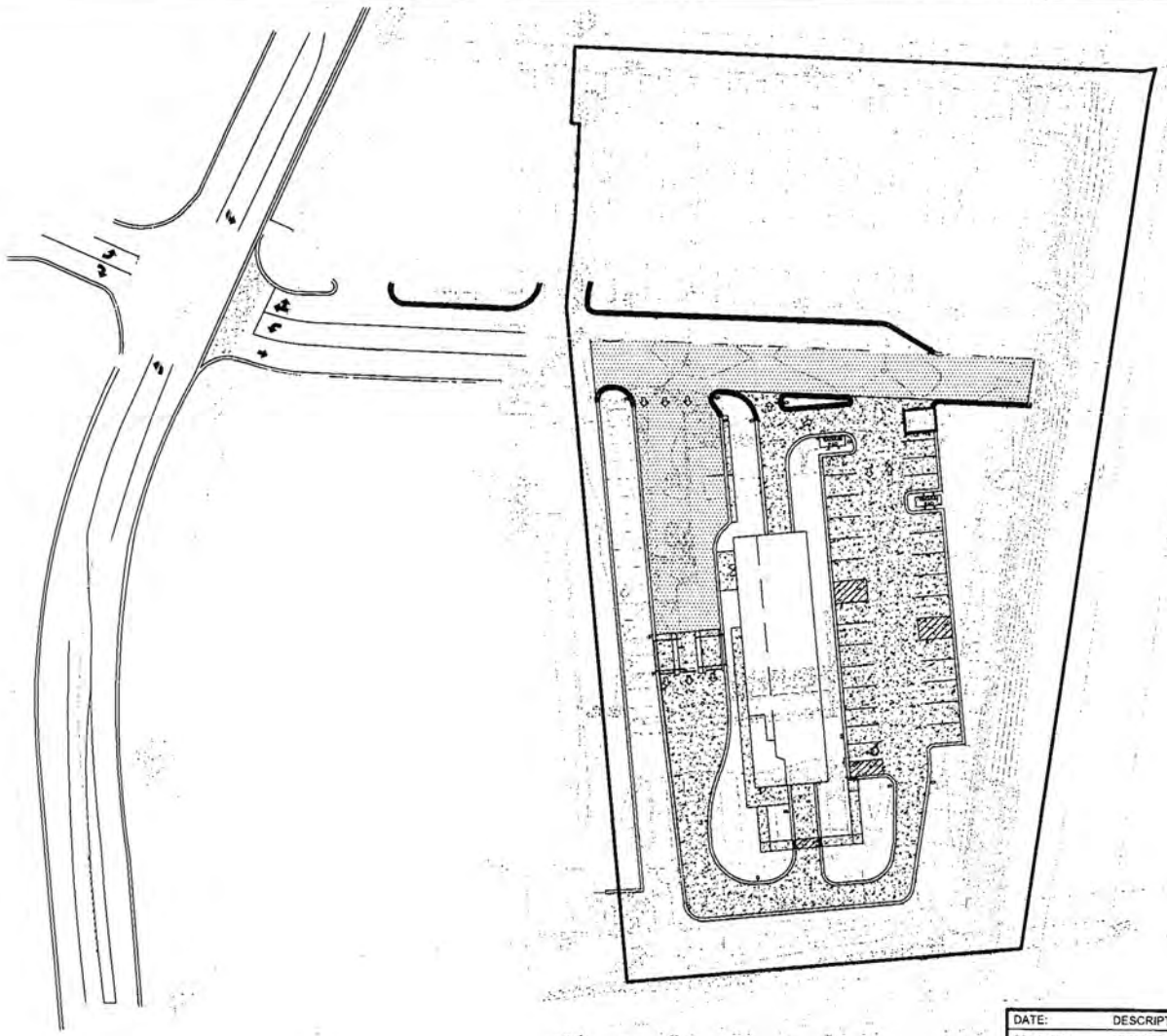
PROJECT NO. M21180

DRAWN BY: ZDS & JDS

CHECKED BY: CLS

SHEET NO. 11 / 11

SHEET No.: 1/1



NORTH

0 30 60

1" = 60'
GRAPHIC SCALE

DATE:	DESCRIPTION:
08-11-2022	ISSUED FOR REVIEW

WASH-U WHEATON
311 E. LOOP ROAD
WHEATON, ILLINOIS
BOLD CURB EXHIBIT

PROJECT No.: M21180

DRAWN BY: ZDS | CHECKED BY: CLS

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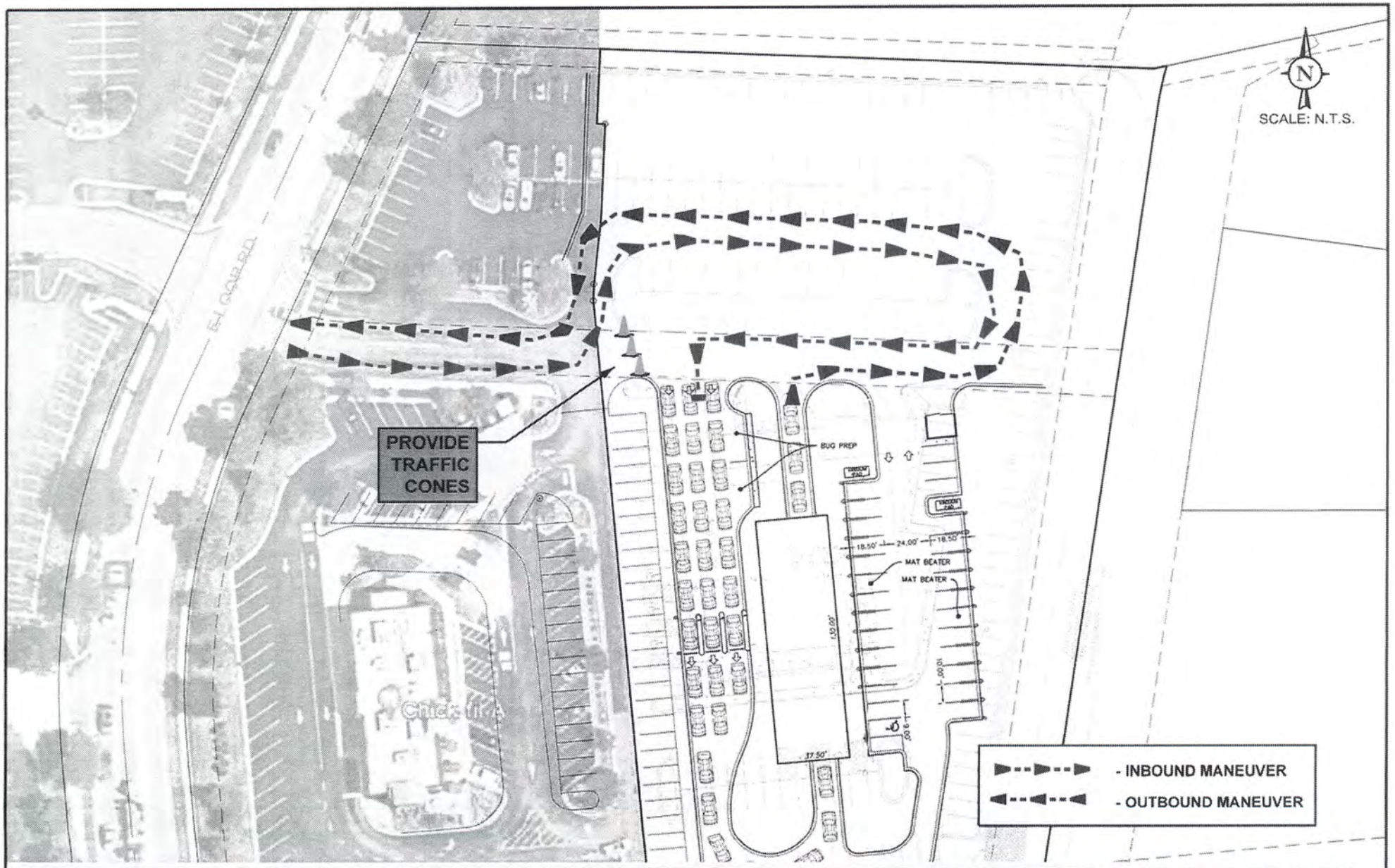
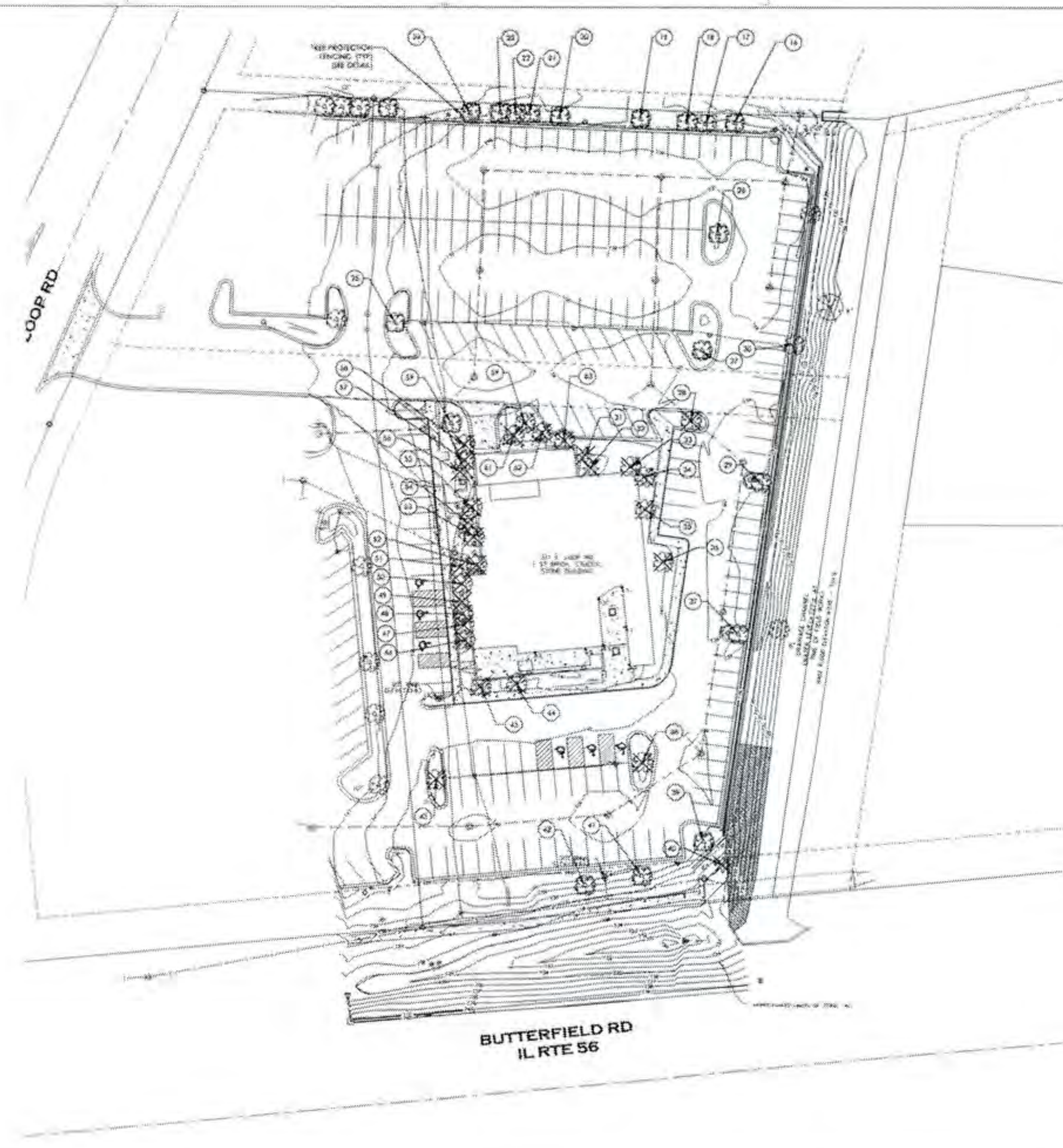


CARWASH
WHEATON, ILLINOIS

PEAK TIMES PROPOSED TRAFFIC FLOW PATTERNS

DRAWN: MD CHECKED: JM
DATE: 05-21-22 REV:
PROJECT # 22-163
EXHIBIT: A

KLOA
Kenig,Lindgren,O'Hara,Aboona,Inc.



EXISTING TREE CALCULATIONS:

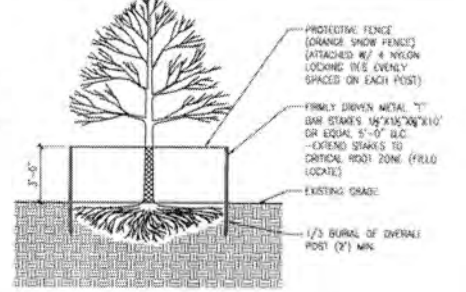
1. | | |
|---|---|
| EXISTING TREES ON-SITE TO REMAIN | 18 |
| EXISTING TREES ON-SITE TO BE REMOVED | 29 |
| PROPOSED ON-SITE TREES INSTALLED* | 18 |

2. TOTAL DBH TO BE REMOVED IS 214".
   TOTAL DBH TO BE REPLACED IS 45".
3.* SEE LANDSCAPE PLANS FOR THE REPLACEMENT TREES @ 2.5" CALIPER.

= TREE PROTECTION FENCING

X = TREE TO BE REMOVED

Tag Number	DBH	Action	Species	Condition
16	9"	Remain	Acer Spp. (Maple)	2 (Good)
17	12"	Remain	Malus Spp. (Crabapple)	2 (Good)
18	12"	Remain	Malus Spp. (Crabapple)	2 (Good)
19	6"	Remain	Acer Spp. (Maple)	2 (Good)
20	7"	Remain	Acer Spp. (Maple)	2 (Good)
21	8"	Remain	Malus Spp. (Crabapple)	2 (Good)
22	8"	Remain	Malus Spp. (Crabapple)	2 (Good)
23	8"	Remain	Malus Spp. (Crabapple)	2 (Good)
24	6"	Remain	Acer Spp. (Maple)	2 (Good)
25	8"	Remain	Gleditsia triacanthos Spp. (Honeylocust)	2 (Good)
26	12"	Remain	Gleditsia triacanthos Spp. (Honeylocust)	2 (Good)
27	10"	Remain	Gleditsia triacanthos Spp. (Honeylocust)	2 (Good)
28	10"	Remove	Gleditsia triacanthos Spp. (Honeylocust)	2 (Good)
29	8"	Remain	Malus Spp. (Crabapple)	3 (Fair)
30	6"	Remain	Juniperus Spp. (Eastern Red Cedar)	3 (Fair)
31	14"	Remove	Pinus Spp. (Pine)	3 (Fair)
32	12"	Remove	Pinus Spp. (Pine)	3 (Fair)
33	6" (Multi-Stem)	Remove	Crataegus Spp (Hawthorne)	3 (Fair)
34	4" (Multi-Stem)	Remove	Crataegus Spp (Hawthorne)	3 (Fair)
35	4" (Multi-Stem)	Remove	Crataegus Spp (Hawthorne)	3 (Fair)
36	14"	Remove	Gleditsia triacanthos Spp. (Honeylocust)	2 (Good)
37	10"	Remain	Malus Spp. (Crabapple)	2 (Good)
38	10"	Remove	Gleditsia triacanthos Spp. (Honeylocust)	2 (Good)
39	8"	Remain	Acer Spp. (Maple)	2 (Good)
40	18"	Remove	Picea Spp. (Spruce)	2 (Good)
41	9"	Remain	Malus Spp. (Crabapple)	2 (Good)
42	10"	Remain	Acer Spp. (Maple)	2 (Good)
43	10"	Remove	Gleditsia triacanthos Spp. (Honeylocust)	2 (Good)
44	8"	Remove	Crataegus Spp (Hawthorne)	3 (Fair)
45	8"	Remove	Crataegus Spp (Hawthorne)	3 (Fair)
46	4" (Multi-Stem)	Remove	Crataegus Spp (Hawthorne)	3 (Fair)
47	4" (Multi-Stem)	Remove	Crataegus Spp (Hawthorne)	3 (Fair)
48	8"	Remove	Pyrus calleryana Spp. (Pear)	2 (Good)
49	8"	Remove	Pinus Spp. (Pine)	3 (Fair)
50	4" (Multi-Stem)	Remove	Crataegus Spp (Hawthorne)	3 (Fair)
51	4" (Multi-Stem)	Remove	Crataegus Spp (Hawthorne)	3 (Fair)
52	4" (Multi-Stem)	Remove	Crataegus Spp (Hawthorne)	3 (Fair)
53	10"	Remove	Gleditsia triacanthos Spp. (Honeylocust)	2 (Good)
54	8"	Remove	Pinus Spp. (Pine)	3 (Fair)
55	4" (Multi-Stem)	Remove	Crataegus Spp (Hawthorne)	3 (Fair)
56	12"	Remove	Pinus Spp. (Pine)	3 (Fair)
57	4" (Multi-Stem)	Remove	Crataegus Spp (Hawthorne)	3 (Fair)
58	4" (Multi-Stem)	Remove	Crataegus Spp (Hawthorne)	3 (Fair)
59	10"	Remain	Gleditsia triacanthos Spp. (Honeylocust)	2 (Good)
60	8"	Remove	Pyrus calleryana Spp. (Pear)	2 (Good)
61	2" (Multi-Stem)	Remove	Crataegus Spp (Hawthorne)	3 (Fair)
62	2" (Multi-Stem)	Remove	Crataegus Spp (Hawthorne)	3 (Fair)
63	6"	Remove	Crataegus Spp (Hawthorne)	3 (Fair)



1 TREE PROTECTION FENCE
SCALE: NTS

SURVEY INFORMATION PROVIDED BY OTHERS

NORTH

30 0 30 60 90
SCALE: 1" = 30'

Wash U Car Wash
311 East Loop Road
Wheaton, IL 60189

DesignPerspectives Inc.
Grounded in Creativity
1167 Hobson Mill Drive
Naperville, Illinois 60540
Telephone: (630) 606-0776
www.design-perspectives.net

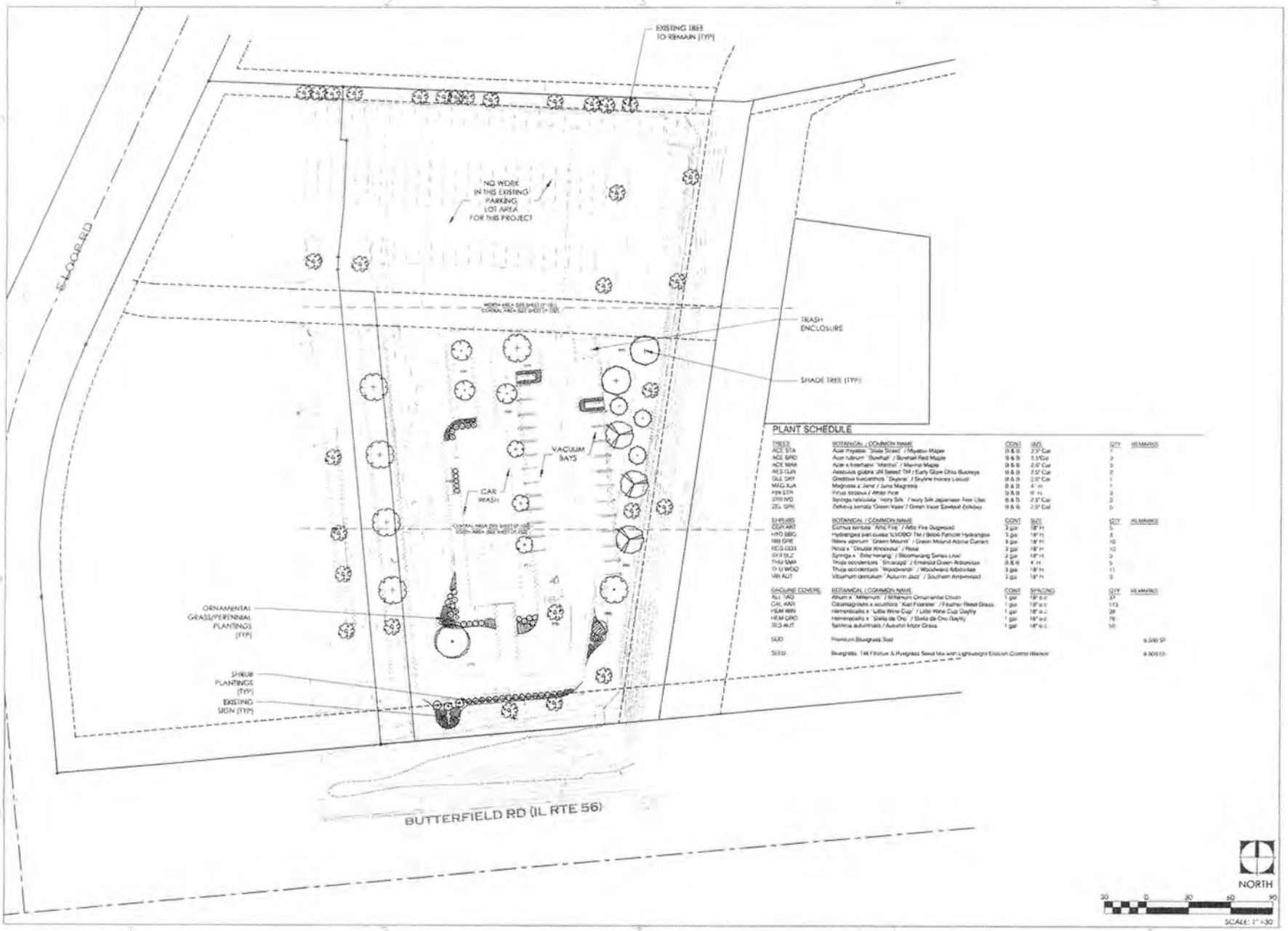
REV.	COMMENT	DATE

SEAL:

DATE: 7/1/2022
JOB NO.: 22-9386
DRAWN BY: TS
CHECKED BY: TS

DRAWING TITLE:
TREE REMOVAL & REPLACEMENT PLAN

SHEET NO.:
TP-100



PLANT SCHEDULE

TREES	BOTANICAL / COMMON NAME	CONT	SIZE	QTY	REMARKS
ACE SYA	Acer miyabei 'Shade Shield' / Miyabei Maple	B & B	2.5" Cal	7	
ACE BRD	Acer rubrum 'Bowhall' / Bowhall Red Maple	B & B	2.5"Cal	3	
ACE MAI	Acer x freemanii 'Marmo' / Marmo Maple	B & B	2.5" Cal	3	
AES GLH	Aesculus glabra UN Select TM / Early Glow Ohio Buckeye	B & B	2.5" Cal	2	
GLE SKY	Gleditsia triacanthos 'Skyline' / Skyline Honey Locust	B & B	2.5" Cal	1	
MAG JUN	Magnolia x 'Jane' / Jane Magnolia	B & B	4' Ht	1	
PIN STR	Pinus strobus / White Pine	B & B	10' Ht	3	
SYR IVO	Syringa reticulata 'Ivory Silk' / Ivory Silk Japanese Tree Lilac	B & B	2.5" Cal	3	
ZEL SPR	Zelkova serrata 'Green Vase' / Green Vase Sawleaf Zelkova	B & B	2.5" Cal	5	

SHRUBS	BOTANICAL / COMMON NAME	CONT	SIZE	QTY	REMARKS
COR ART	Cornus sericea 'Artic Fire' / Artic Fire Dogwood	3 gal	18" H	5	
HYD BBC	Hydrangea paniculata 'ILVOBO' TM / Bobo Panicle Hydrangea	3 gal	18" H	8	
RIB GRE	Ribes alpinum 'Green Mound' / Green Mound Alpine Currant	3 gal	18" H	10	
ROS DDS	Rosa x 'Double Knockout' / Rose	3 gal	18" H	10	
SYR BLZ	Syringa x 'Bloomerang' / Bloomerang Series Lilac	3 gal	18" H	5	
THU SMA	Thuja occidentalis 'Smaragd' / Emerald Green Arborvitae	B & B	6' H	5	
TH U WOO	Thuja occidentalis 'Woodwardii' / Woodward Arborvitae	3 gal	18" H	11	
VIB AUT	Viburnum carlcephalum 'Autumn Jazz' / Southern Arrowwood	3 gal	18" H	3	

GROUND COVERS	BOTANICAL / COMMON NAME	CONT	SPACING	QTY	REMARKS
ALL TAG	Allium x 'Millenium' / Millenium Ornamental Onion	1 gal	18" o.c.	37	
CAL KAR	Calamagrostis x acutiflora 'Karl Foerster' / Feather Reed Grass	1 gal	18" o.c.	173	
HEM WIN	Hemerocallis x 'Little Wine Cup' / Little Wine Cup Daylily	1 gal	18" o.c.	29	
HEM GRO	Hemerocallis x 'Stella de Oro' / Stella de Oro Daylily	1 gal	18" o.c.	78	
SES AUT	Sesleria autumnalis / Autumn Moor Grass	1 gal	18" o.c.	50	
SOD	Premium Bluegrass Sod				6,560 SF
SEED	Bluegrass, Tall Fescue & Ryegrass Seed Mix with Lightweight Erosion Control Blanket				4,900 SY

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www.design-perspectives.net

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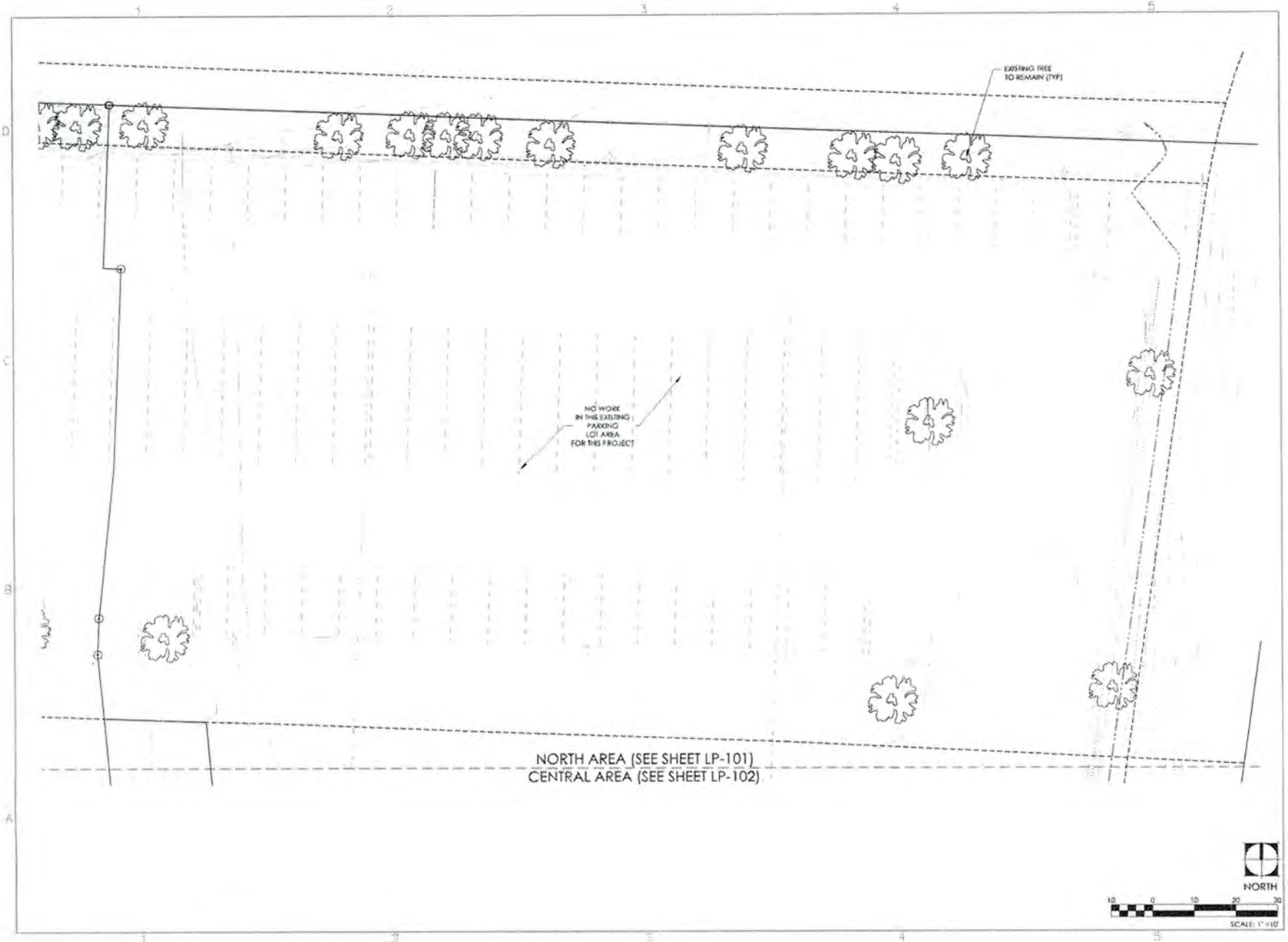
DRAWING TITLE:
OVERALL LANDSCAPE PLAN

SHEET NO.:
LP-100



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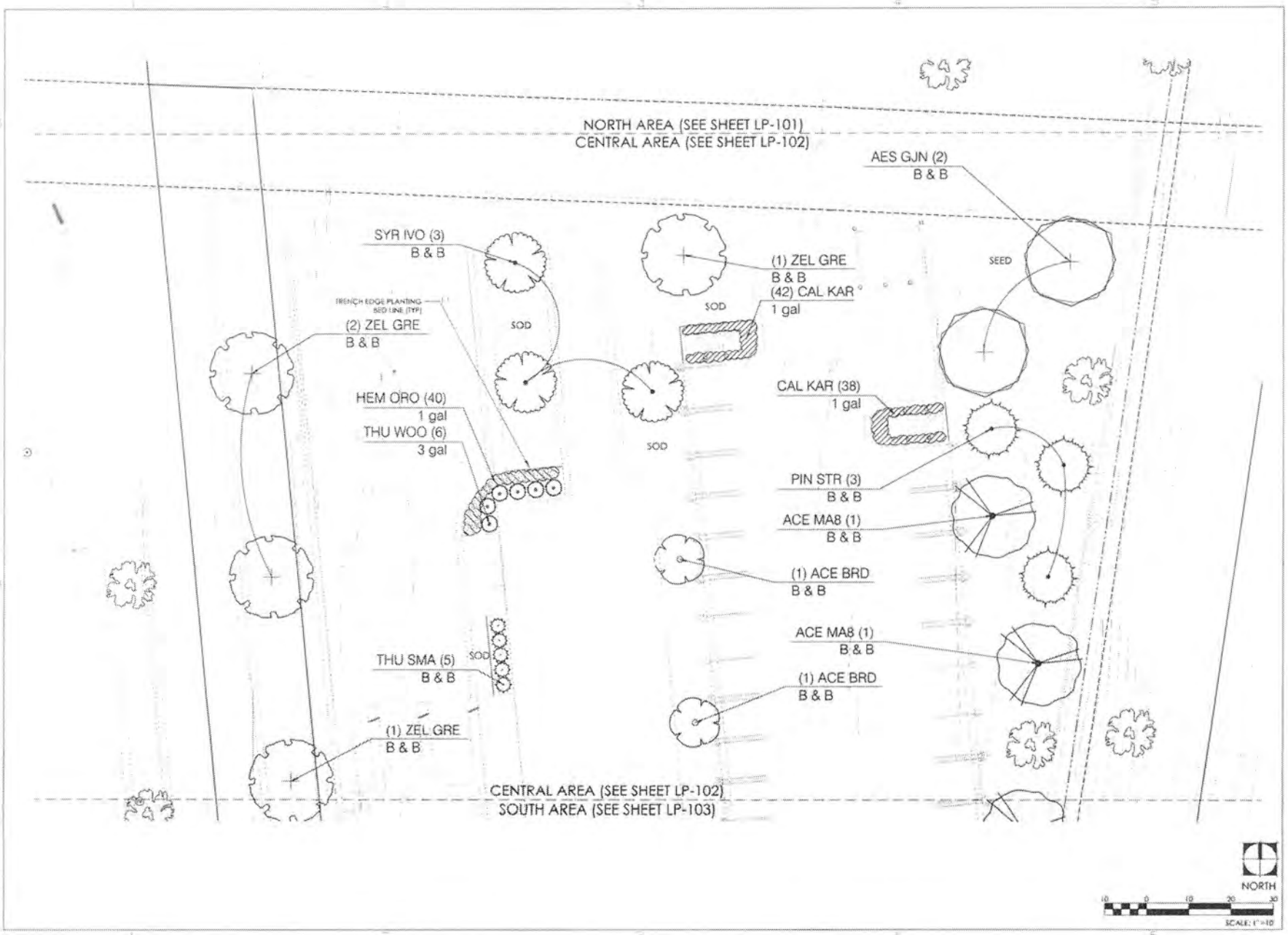
DRAWING TITLE:
LANDSCAPE PLAN-
NORTH

SHEET NO.:
LP-101



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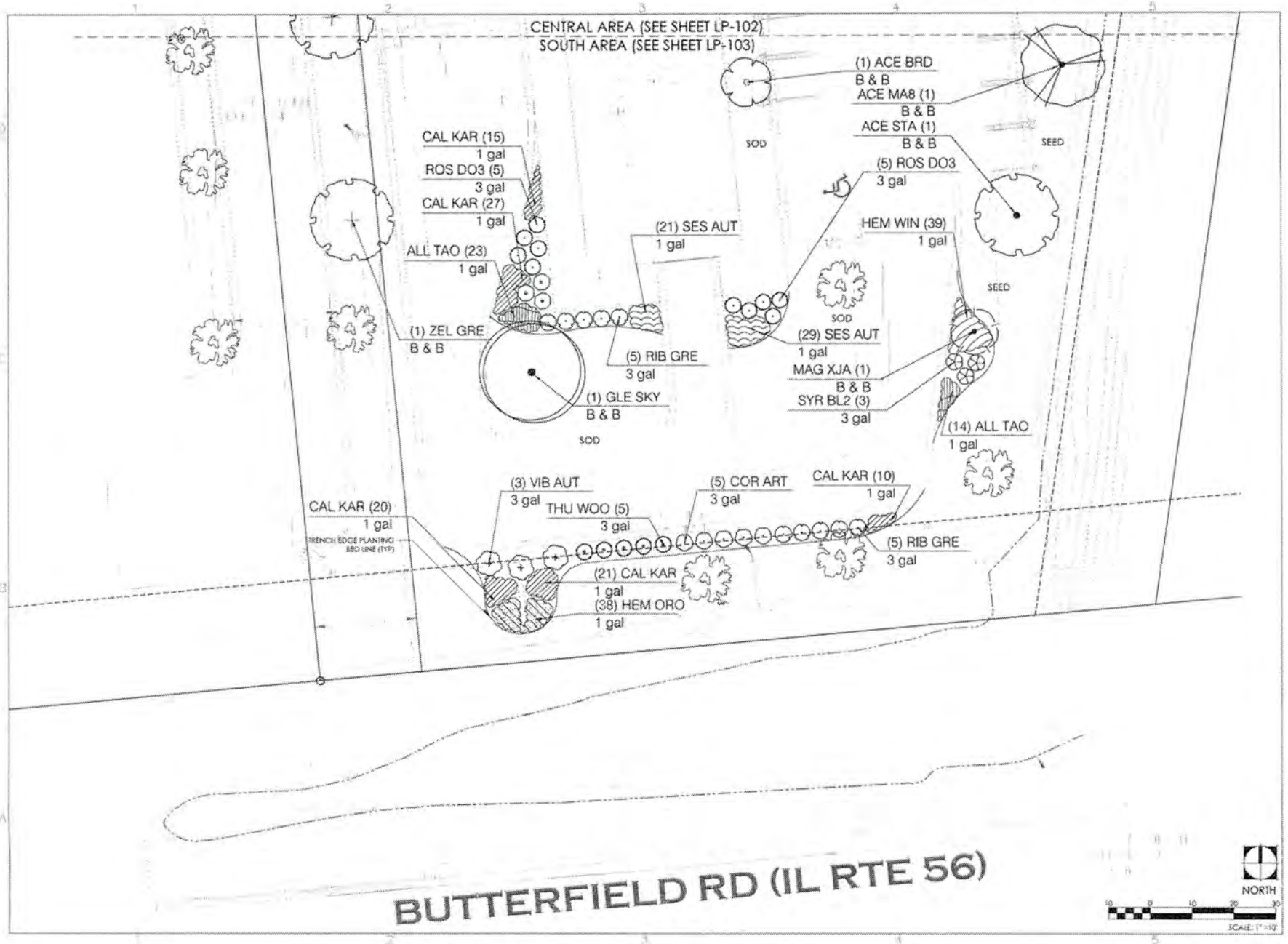
LANDSCAPE PLAN-
CENTRAL

SHEET NO.:
LP-102



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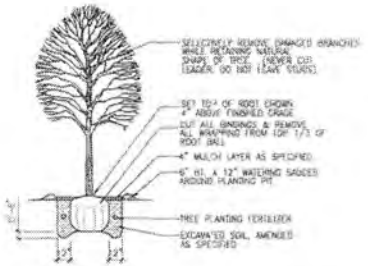
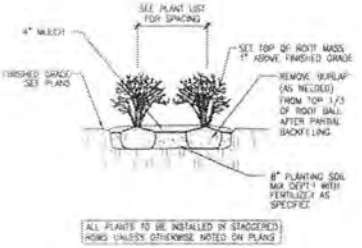
DRAWING TITLE:
LANDSCAPE PLAN-
SOUTH

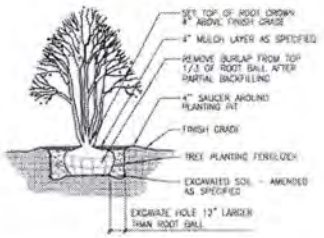
SHEET NO.:
LP-103



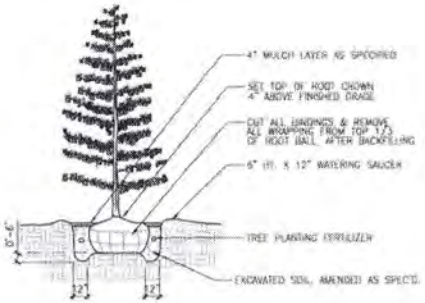
SHADE TREE PLANTING



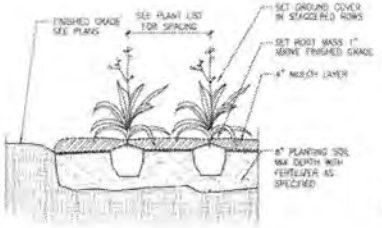
SHRUB PLANTING



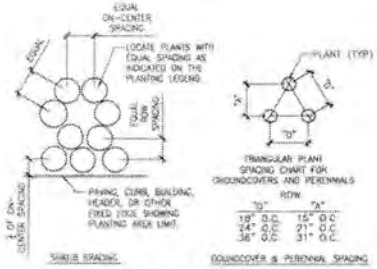
ORNAMENTAL TREE PLANTING



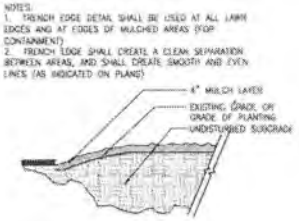
EVERGREEN TREE PLANTING



GROUNDCOVER PLANTING



PLANT SPACING DETAIL



TRENCH EDGE DETAIL

1. THE LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING HIMSELF FAMILIAR WITH ALL UNDERGROUND UTILITIES AND STRUCTURES. SEE CONSTRUCTION NOTES.

2. DO NOT WILLFULLY PROCEED WITH PLANTINGS AS DESIGNED WHEN IT IS OBVIOUS THAT OBSTRUCTIONS AND/OR GRADE DIFFERENCES EXIST THAT MAY NOT HAVE BEEN KNOWN DURING THE DESIGN PROCESS. SUCH CONDITIONS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE PROJECT MANAGER. THE LANDSCAPE CONTRACTOR WILL BE HELD RESPONSIBLE FOR ANY NECESSARY REVISIONS AND COSTS DUE TO FAILURE TO GIVE SUCH NOTIFICATION.

3. THE LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY COORDINATION WITH SUBCONTRACTORS AND/OR SUPPLIERS AS REQUIRED TO ACCOMPLISH PLANTING OPERATIONS.

4. THE LANDSCAPE CONTRACTOR IS TO ROUGH FINE SITE AT +/- 1/10TH OF AN INCH. THE LANDSCAPE CONTRACTOR SHALL OBTAIN A LETTER OF GRADE FROM THE GENERAL CONTRACTOR PRIOR TO BEGINNING WORK.

5. REFER TO SPECIFICATIONS FOR PLANTING REQUIREMENTS, MATERIALS, AND EXECUTION.

6. ALL TREES SHALL BE TAGGED BY THE PROJECT MANAGER AT A NURSERY SELECTED BY THE LANDSCAPE CONTRACTOR OR AT THE DISCRETION OF THE PROJECT MANAGER.

PLANTING NOTES

7. FINAL LOCATION OF ALL PLANT MATERIAL SHALL BE SUBJECT TO APPROVAL OF THE PROJECT MANAGER PRIOR TO DIGGING ANY HOLES. THE LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR PROVIDING PROJECT MANAGER ADEQUATE ADVANCE NOTICE FOR ON-SITE APPROVALS. THE LANDSCAPE CONTRACTOR IS TO THE FOLLOWING BEFORE BEGINNING INSTALLING PLANTINGS:

SHRUBS -- LAY OUT THE ACTUAL CONTAINERS ON-SITE BEFORE DIGGING HOLES.

TREES -- STAKE THE LOCATIONS BEYOND DIGGING HOLES. ANY TREE PLANTED WITHOUT ITS FINAL LOCATION APPROVED BY THE PROJECT MANAGER MAY BE REQUESTED TO BE RELOCATED AT THE SOLE EXPENSE OF THE LANDSCAPE CONTRACTOR.

8. THE LANDSCAPE CONTRACTOR SHALL NOTIFY THE PROJECT MANAGER AT LEAST 48 HOURS IN ADVANCE PRIOR TO COMMENCEMENT OF WORK TO COORDINATE PROJECT OBSERVATION SCHEDULES.

9. IF CONFLICTS ARISE BETWEEN THE ACTUAL SIZE OF AREAS ON THE SITE AND THE DRAWINGS, CONTACT THE PROJECT MANAGER FOR RESOLUTION.

10. IT IS THE LANDSCAPE CONTRACTOR'S RESPONSIBILITY TO FURNISH PLANTS FREE OF PESTS AND/OR DISEASES. PRE-SELECTED OR "PROJECT MANAGER TAGGED" PLANT MATERIAL MUST BE INSPECTED BY THE LANDSCAPE CONTRACTOR AND CERTIFIED PEST AND DISEASE FREE. IT IS THE LANDSCAPE CONTRACTOR'S OBLIGATION TO WARRANTY ALL PLANT MATERIAL PER THE SPECIFICATIONS.

11. GROUNDCOVERS AND SHRUBS ARE TO BE TRIANGULARLY SPACED UNLESS INDICATED ON THE PLANS.

12. ALL TREES WITHIN A SPECIES SHALL HAVE MATCHING FORM, UNLESS OTHERWISE NOTED.

13. ALL TREES, SHRUB AND GROUNDCOVER AREAS (EXCLUDING TURF AND SLOPE AREAS) ARE TO BE MULCHED PER DETAILS.

14. ALL MULCH TO BE SHREDDED HARDWOOD MULCH MINIMUM 4" THICK.

15. TREES SHALL BE SET BACK A MINIMUM OF TEN FEET (10') HORIZONTALLY FROM UTILITY STRUCTURES, INCLUDING, BUT NOT LIMITED TO, MANHOLES, VALVE VAULTS, VALVE BOXES, FIRE HYDRANTS, TRANSFORMERS AND SWITCH CANS. TREES SHALL BE SET BACK A MINIMUM OF FIVE (5') HORIZONTALLY FROM SANITARY SEWER AND WATER SERVICES. CONTRACTOR TO MAKE NECESSARY ADJUSTMENTS UNDER THE APPROVAL OF OWNER.

16. PLANTING RESTRICTIONS: PLANT DURING ONE OF THE FOLLOWING PERIODS. COORDINATE PLANTING PERIODS WITH MAINTENANCE PERIODS TO PROVIDE REQUIRED MAINTENANCE FROM DATE OF SUBSTANTIAL COMPLETION.

1. SPRING PLANTING: 5/1 -- 6/15
2. FALL PLANTING: 9/15 -- 12/1

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SEAL:

DATE: 7/1/2022
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DRAWN BY: TS
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DRAWING TITLE:
LANDSCAPE DETAILS

SHEET NO.:
LP-500

SECTION 02920 - LANDSCAPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Revise or delete this article in all Sections of Project Manual.

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Furnish all trees, shrubs, and other plant materials, labor equipment, and non-plant materials required to complete installation of planting indicated on the Landscape Drawings and Details.

Furnish all soil preparation, fertilizer, soil mulching, trees, shrubs, groundcovers, sodding, bed mulching, labor and equipment required to landscape all areas as indicated on the Landscape Drawings.

B. Seeding Includes:
1. Trees
2. Shrubs
3. Perennials
4. Annuals
5. Ornamental grasses
6. Mulch
7. Pruning
8. Guying and Staking
9. Landscape Edging
10. Tree Watering Devices
11. Seeding
12. Hydroseeding
13. Sodding
14. Plugging
15. Meadow grasses and wildflowers
16. Turf renovation
17. Erosion-control material(s)

C. Related Requirements (If Used):
1. Section 02231 "Tree Protection and Trimming" for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work.
2. Section 02810 "Design-Build Irrigation System".
3. Section 02100 "Earthwork".

1.3 ALLOWANCES

A. Perform planting work under quantity allowances and only as authorized. Authorized work includes work required by Drawings and the Specifications and work authorized in writing by the Project Manager.

B. Notify Project Manager weekly of extent of work performed that is attributable to quantity allowances.

C. Furnish trees as part of tree allowance.

1.4 UNIT PRICES

A. Work of this Section is affected by unit prices specified in Section 012100 "Unit Prices."

B. Unit prices apply to authorized work covered by quantity allowances.

C. Unit prices apply to additions to and deletions from the Work as authorized by Change Orders.

1.5 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Ball and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with a ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

C. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

D. Finish Grade: Elevation of finished surface of planting soil.

E. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

F. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), invasive plants (weeds), fungi, bacteria, and viruses.

G. Planting Area: Areas to be planted.

H. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. Plant, Plants, Plant Material: The terms refer to vegetation in general, including trees, shrubs, vines, groundcovers, ornamental grasses, bulbs, plugs, or herbaceous vegetation.

I. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

J. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

K. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.6 COORDINATION

A. Coordination with turf areas (lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.
1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.7 SUBMITTALS

A. Qualification Data: For landscape Installer.

B. Product Data: For each type of product.
1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
2. Plant Photographs: Include color photographs in digital format, of each species and size of plant materials as it will be furnished to the Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include scale rod or other measuring device in each photograph. For species where more than ten (10) plants are required, include a minimum of three (3) photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full botanical name of the plant, plant size, and name of the growing nursery.

C. Grower or Nursery Certifications:
1. All State, Federal, or other certificates shall be submitted to the Project Manager prior to acceptance of plant material along with other information showing the source or origin.
2. Current grower or nursery certifications indicating that all contractor supplied plant material is healthy, vigorous, and free from insects, pests, plant diseases, and injuries.

D. Certification of Topsoil Mixture: Submit topsoil mix test reports to Project Manager for review. If existing material is to be re-used, topsoil to be tested and reviewed by Project Manager.

E. Certification of each soil/seed mixture. Include identification of source and name and telephone number of supplier.

F. Product Certificates: For fertilizers, from manufacturer.

G. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

H. Samples: Submit physical samples of each of the following materials for approval. All samples shall be submitted in a one quart, clear, plastic bag (Ziploc type) or appropriate container. Submittals must be made prior to commencing any activities. All samples shall be clearly labeled with the following information:
- Project Name Site Improvements
- Material name as shown on plans and specifications
- Supplier or distributor's name
- Supplier or distributor's product name and/or order number

Required samples are as follows:
1. Mulch
2. Compost

I. Slow-Release, Tree-Watering Device: One (1) unit of each size required.

J. Edging Materials and Accessories:
1. Manufacturer's product information sheet.
2. 12" length of Manufacturer's standard size, to verify color selected.

1.8 CONSTRUCTION SCHEDULE

A. Prior to beginning installation of the landscape, the Contractor is to submit a project construction schedule to the Project Manager for approval. The schedule should include the areas and types of construction to be undertaken and the sequence which will be used to accomplish the completion of the project. Schedule must be submitted prior to commencing any activities.

B. At the completion of the work, furnish three (3) copies of written maintenance instructions to the Owner for maintenance and care of the landscaping. Instructions shall include directions for irrigation, weeding, pruning, fertilization, and spraying as required for maintenance of proper maintenance through a full growing season and dormant period.

C. Guarantee of Warranty: At completion of work, furnish written guarantee, and warranty, to the Owner based on the requirements of this section.

1.9 QUALITY ASSURANCE

A. Reference Standards:
1. U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act and equal in quality to standards for Certified Seed.
2. Requirements for measurements, grading, branching, quality, and the balling and burlapping of plants found in the plant list shall follow the current issue of American Standards for Nursery Stock issued by the American Association of Nurserymen, Inc. (ANSI-Z 60.1-1990).
3. Plants shall equal or exceed the measurements specified in the plant list, which are minimum acceptable sizes. Plants shall be measured before pruning with branches in normal position. Any necessary pruning shall be done at the time of planting.

B. Quality of Materials:
1. All materials shall be subject to inspection and approval. The Project Manager reserves the right to reject at any time any plant, prior to acceptance, the work and all materials which in the Project Manager's opinion fails to meet these specifications requirements.
2. Inspection is primarily for quality, however, other requirements are not waived even though visual inspection at the place of growth shall not preclude the right of rejection at the site. Inspection may be made periodically during installation of materials, at completion, and at the end of guarantee periods by the Project Manager. Plants shall have a habit of growth that is normal for the species. They shall be healthy, vigorous, and free from insect pests, plant diseases, and injuries. All plant material shall be inspected stock conforming to all State and Federal Regulations.
3. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread. Do not measure branches or roots tip to tip. Take caliper measurements 6 inches (150 mm) above the root flare for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above the root flare for larger sizes.
4. Other Plants: Measure with stems, peduncles, and foliage in their normal position.

C. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.
1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network in the American Nursery and Landscape Association.
2. Experience: Five years' experience in landscape installation in addition to requirements in Section 01800 "Quality Requirements."
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:
   a. Landscape Industry Certified Technician - Exterior.
   b. Landscape Industry Certified Horticultural Technician.
5. Pesticide Applicator: State licensed, commercial.

D. Plant Material Observation: Project Manager may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Project Manager may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material or any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
1. Notify Project Manager of sources of planting materials five days in advance of delivery to site.

E. Vandalism: The Contractor will not be responsible for malicious destruction of plantings after final acceptance of the project. He will, however, be responsible for replacement of vandalized materials stored but not yet installed, and vandalized material prior to final acceptance. All cases of vandalism shall be promptly reported to the Owner. The Contractor shall inform the Owner in writing if additional protection must be installed to protect the landscaping from damage after installation.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping:
1. Deliver fertilizer to site in original unopened containers bearing the manufacturer's guaranteed chemical analysis, name, trade name, trademark, and conformance to State law. Notify Project Manager of delivery schedule in advance so material may be inspected upon arrival at the job site.
2. Deliver packaged materials in original, unopened containers showing weight, analysis and name of manufacturer, and indication of compliance with state and Federal laws, if applicable. Provide copies of delivery receipts for materials to be incorporated into the construction to the Project Manager as deliveries are made. Materials to be accounted for include: fertilizers, soil amendments, peat moss, manure, grass seed, plant tabs, and mulch.
3. Plants shall be containerized with fibre bound, properly wrapped and prepared for shipping in accordance with recognized standard practice. The root system shall be kept moist and plants shall be protected from adverse conditions due to climate and transportation, between the time they are dug and actual planting.
4. Each plant shall be identified by means of a grower's label affixed to the plant. The grower's label shall give the data necessary to indicate conformance to specifications. Use durable waterproof labels with water resistant ink which will remain legible for at least 60 days. Notify the Project Manager prior to delivery of plant materials to the site so that a pre-planting inspection may be made or indicate delivery schedule in advance so plant material may be inspected upon arrival at job site, whichever is more appropriate. Grower's labels shall be removed prior to the walk through for initial acceptance.
5. Do not prune trees and shrubs before delivery.
6. Handle planting stock by root ball. Do not drop plants. Do not lift plants by the trunk, stems, or foliage. The ball of the plant shall be natural, and the plant shall be handled by the ball at all times. All plants shall be protected at all times from drying out or other injury. Minor broken and damaged roots shall be pruned before planting.

B. Acceptance at Site:
1. Remove unacceptable plant material immediately from job site.
2. Major damage shall be cause for rejection.
3. No balled or burlapped plant shall be accepted if the ball is broken or the trunk is loose in the ball.

C. Storage and Protection:
1. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, shade), protect from weather and mechanical damage, and keep roots moist.
   a. Heel-in bare-root stock. Soak roots that are in less than moist conditions in water for two hours. Reject plants with dry roots.
   b. Set balled stock on ground and cover ball with soil, peat moss, mulch, or other acceptable material.
   c. Do not remove container-grown stock from containers before time of planting.
   d. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.
2. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
3. Apply antidesiccants to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
   a. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again one weeks after planting.
4. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.
5. Protect all existing and newly planted trees, shrubs, and groundcovers within the areas of construction and related excavation as herein specified. Provide suitable barricades and/or fences as required.
6. Store bulbs in a dry place at 60 to 65 deg. F (16 to 18 deg. C) until planting.

B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections of TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and as soon the planting prepared. Protect sod from breakage and drying.

C. Bulk Materials:
1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

1.11 PROJECT CONDITIONS

A. The Contractor must examine the subgrade upon which work is to be performed, verify subgrade conditions, observe the conditions under which work is to be performed, verify suitability of the soil and notify the Project Manager in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Project Manager. Commencement of work shall mean acceptance of the site conditions.

B. Existing Conditions:
1. The site will be provided to the contractor within +/-0.2 foot finish grades.
2. Utilities - Determine location of underground utilities and perform work in a manner which will avoid possible damage. Do not permit heavy equipment, such as trucks, rollers, or bulldozers to damage utilities. Hand excavate when called for to minimize the possibility of damage to underground utilities. Maintain grade stakes set by others until removal is mutually agreed upon by all parties concerned. Any damage to utilities that may result in spite of protective measures must be completely corrected and repaired by the Contractor at no additional cost to the Owner.

1.12 SEQUENCING AND SCHEDULING

A. Planting Schedule:
Schedule each type of landscape work required during the normal season for such work in the area of the site. Establish dates for each type of work and establish a completion date. Complete work with specified maintenance periods to provide maintenance until accepted by the Owner. Do not depart from the accepted schedule, except with written authorization. Submit request to the Project Manager for changes in the planting schedule. When delays in the planting schedule are unavoidable, include documentation of the reason for delay.

B. Plant trees and shrubs during normal season for such work in the location of the project.

C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

D. Coordination with Lawns:
Plant trees and shrubs after final grades are established and prior to planting of lawns, unless otherwise acceptable to the Project Manager. If planting of trees and shrubs occurs after lawn work, protect lawn areas and promptly repair damage to lawns resulting from planting operations.

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REV	COMMENT	DATE

SEAL:

DATE: 7/1/2022
JOB NO.: 22-9386
DRAWN BY: TS
CHECKED BY: TS

DRAWING TITLE:
LANDSCAPE SPECIFICATIONS

SHEET NO.:
LP-501

1.11 WARRANTY AND GUARANTEE

A. Guarantee seed, shrubs, groundcovers and all plant material for a period of one year from the date of final acceptance against defects not resulting from neglect of Owner, or abuse and damage by others.

B. For a period of one year after acceptance of work, at no additional cost to the Owner, the Contractor is to replace any plants that are dead, or that are in unhealthy or unsightly condition, or have lost their natural shape due to dead branches or excessive pruning and replace planting materials/products due to faulty performance and/or deterioration beyond normal weathering. Inadequate maintenance by the Owner shall not be cause for replacement. All replacement planting is to be done no later than the succeeding season.

C. Replacement plants shall be of the same variety and size as larger as originally specified in the plant list. Plants shall be planted as originally specified. All areas damaged by planting or replacement operations shall be fully restored to their original condition as specified. Remove all dead or defective plant material from the site immediately.

D. A one year warranty shall also apply to the plants replaced at the first warranty walk-through.

E. Begin routine maintenance period immediately after planting of landscape materials, and after planting of lawn areas, and continue routine maintenance until landscape work is deemed substantially complete and accepted by the Owner or Landscape Architect.

F. The maintenance period, as specified on the bid form, will commence when all areas have received substantial completion. Large or phased projects may require adjustments to that date. That can be negotiated with the Owner and Landscape Architect after installation has begun.

G. Meet with the Owner prior to final acceptance, and prior to the termination of the maintenance period, to go over maintenance requirements of the project. Note that information conveyed to the Owner shall be consistent with the maintenance instructions provided by the contractor, as part of the contract close out submittals.

PART 2 - PRODUCTS

A. Mulches
1. Refer to plans for specified materials.

B. Stakes and Guys (Use only if specified):
1. Stakes - 5' and 2' long, heavy-duty t-bar steel posts.
2. Guys - 12 gauge galvanized steel wire.
3. Nylon straps - 1 1/2", with metal grommets ends.
4. 12" White, PVC pipe, 24" height.

C. Tree wrapping:
Chase's Tree Wrap, 4" wide, designed to prevent winter bark injury. Secure with flexible grafting ties.

D. Landscape Edging (Use only if specified)
1. Steel edging: Standard commercial-steel edging, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.
a. Manufacturer: Sure-loc Steel Edging, 800-787-3562, or equal.
2. Edging size: 10" x 5" x 16", unless specified otherwise on plans.
3. Stakes: Tapered steel, a minimum of 12 inches long.
4. Accessories: Standard tapered ends, corners, and splicers.
5. Finish: Black powder coat, unless specified otherwise on plans.

E. Tree Watering Devices
1. Slow-Release Watering Device: Standard product manufactured for drip irrigation of plants and targeting its water content over 5 to 9 hours, manufactured from UV-light stabilized polymer-modified polyethylene sheet, PVC, or HDPE plastic.
a. Manufacturer: Treegator by Spectrum Products, Inc., 866-873-3428, or equal

F. Turf Seed
1. Grass seed: Fresh clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.
2. Refer to plans for seed mixture.
3. Seed mixture is to be applied at a rate of 800 lbs/acre.

G. Turf Sod
1. Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects, complying with "Specifications for Turfgrass Sod Materials" in "Specifications and Guidelines for Turfgrass Sodding." Furnish viable, and of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.
2. Refer to plans for specified sod blend.

H. Native Prairie, Savannah, Decorative Area, and/or Wetland Seed
1. Fresh, clean, and dry new seed from a source specializing in native seed production. Seed shall be labeled no more than 350 miles from the Project site.
2. Refer to plans for seed mixture.
3. Refer to plans for seeding rate.
4. Install a mycorrhizal inoculant with seed mix at a rate of 40 lbs/acre.
5. Refer to plans for cover crop species and seeding rate. At no time shall annual or perennial Rye (Lolium multiflorum or perenne) be utilized as a cover crop.

I. Fertilizer
1. Commercial-grade complete fertilizer of neutral character, consisting of slow-release nitrogen. 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium to the following composition:
a. At the spring (April 1-15), fertilize trees, shrubs, ornamental grasses, and groundcovers with 16-7-10 formulation, slow release fertilizer at the rate of 6 oz/1,000 sq. ft. Use a broadcast method for application of fertilizer.
(a) For lawn areas (turf grass) April 1-15: Applications of 20-5-10-1% Fe 25% SCD at the rate of 5 lbs. per 1,000 sq. ft. for 1 lb. Actual Nitrogen per 1,000 sq. ft. Thoroughly sweep curb, gutter, and walks after application of fertilizer and prior to irrigation. Do not apply fertilizer during rainfall or when rainfall is imminent. Protect all concrete.
(b) Trace element form Zinc, Copper, Boron, and Manganese.
August 1-15: Repeat June application.
October 1-15: 24-6-12 no Fe 50%SCD

J. Pesticides
1. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and at required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
2. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
3. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

K. Erosion Control Materials
1. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or cocoanut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.
2. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-cast mesh, a minimum of 0.92 lb/sq. yd. (0.5 kg/sq. m), with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.
3. Erosion-Control Mats: Cellular, multibiodegradable cups-and-laminate mats designed to retain and contain small areas of soil over steeply sloped surface, min. thickness as specified on the Drawings. Include manufacturer's recommended anchorage system for slope conditions.

C. Water
1. Free of substances harmful to plant growth. Be responsible for furnishing water from underground sprinkler system, quick couplers, or other source.

M. Trees, Shrubs, Ornamental Grasses, and Perennials
1. Provide nursery grown trees, shrubs, ornamental grasses, and perennials except as otherwise indicated, grown in a recognized nursery in accordance with good horticultural practices, with healthy root systems developed by transplanting or root pruning. Provide only healthy vigorous stock, free of diseases, insects, eggs, larvae, and defects such as knots, sunscald, injuries, abrasions, or disfigurement. Plants grown in Hardiness Zones 2, 3, 4, 5, and 6 only, will be accepted. Hardiness Zones are defined in U.S. Department of Agriculture publications. Grower's certificates may be required when doubt exists as to the origin of the plant material.
2. Provide trees, shrubs, ornamental grasses, and perennials true to name and variety established by the American Joint Committee on Horticultural Nomenclature "Standardized Plant Names", Second Edition, 1942.
3. Provide trees, shrubs, ornamental grasses, and perennials of the size shown or specified in the plant list and in accordance with the denominated relationship requirements of ANSI Z60.1 for the kind and type of plant material required. Plant material of larger than specified size may be used, in which case the sizes of the root balls will be increased proportionately.
a. Label each tree and shrub with a securely attached waterproof tag stating legible designation of botanical and common name and size during shipping. Labels shall be removed prior to initial acceptance (substantial completion).
b. Where formal arrangements or consecutive order of plants are shown, select stock for uniform height and spread, and temporarily label with numbers (if necessary) to assure symmetry in planting. Labels shall be removed prior to initial acceptance (substantial completion).
c. Provide plant material complying with the recommendations and requirements of ANSI Z60.1 "Standard for Nursery Stock" and as further specified.

N. Deciduous Trees
1. Provide trees of the height and caliper listed or shown.
2. Where shade trees are required, provide single stem trees with straight trunk and intact leader, free of branches to a point.
3. Where small trees of upright or spreading type are required, provide trees with single stem, branched or pruned naturally according to species and type, and with the relationship of caliper and branching recommended by ANSI Z60.1, unless otherwise shown.
4. Where shown as "bush form" provide trees with 3 or more stems starting close to the ground in the manner of a shrub.
5. Where shown as a "clump form" provide trees with 3 or more stems starting from the ground.
6. Provide balled and burlapped deciduous trees unless noted as container plants. Balled and burlapped plants shall be dug with firm, natural balls of earth of the diameter specified or larger, to encompass the fibrous and feeding root system necessary for full recovery of the plant. No balled or burlapped plant shall be accepted if the ball is broken, or the trunk is loose in the ball.
7. All labels and tags shall be removed prior to initial acceptance (substantial completion).

O. Deciduous Shrubs and Groundcovers
1. Provide deciduous shrubs with not less than the minimum number of canes required by ANSI Z60.1 for the type and height of shrub specified.
2. Plants furnished in containers shall have been grown in pots, cans, or baskets long enough to have sufficient roots to hold earth together intact after removal from containers, without being root bound.
3. All labels and tags shall be removed prior to initial acceptance (substantial completion).

P. Coniferous and Broadleaf Evergreens
1. Provide evergreens of the size shown. Dimensions indicate minimum spread for spreading and semi-spreading type evergreens and height for all other types such as globe, dwarf, pine, pyramidal, broad-upright, and columnar.
2. Provide evergreens with well-balanced form complying with requirements for other size relationships in the nursery dimension shown.
3. Trees shall exhibit consistent growth periods, and shall not exhibit signs of accelerated growth.
4. Provide balled and burlapped evergreen trees unless noted as container or collected stock.
5. Foliage shall have a good intense color.
6. Trees shall possess a central dominant leader with evenly spaced branches. Plants containing multiple central leaders will be rejected, unless the Project Manager has made special exception in rugged plant material at the nursery.
7. All labels and tags shall be removed prior to initial acceptance (substantial completion).

Q. Requirements for Balled and Burlapped Stock
1. Where shown or specified to be balled and burlapped, provide trees and shrubs dug with a firm, natural ball of earth in which they were grown.
2. Provide ball size not less than the diameter and depth recommended by ANSI Z60.1 for the type and size of tree or shrub required. Increase ball size as necessary or as directed to encompass the fibrous and feeding root system necessary for full recovery of trees or shrubs subject to unusual or unusual conditions of growth, soil conditions, or horticultural practice.
3. Wrap and tie earth ball as recommended by ANSI Z60.1 for the size of balls required. Dewater balls with a diameter of ninety inches (90") or greater.
4. All labels and tags shall be removed prior to initial acceptance (substantial completion).

R. Requirements for Container Grown Stock
1. Where specified as acceptable, provide healthy, vigorous well rooted shrubs or ornamental grasses established in the container in which they are sold.
2. No bare rooted or recently containerized stock will be accepted.
3. Established container stock is defined as a tree or shrub transplanted into a container and grown in the container for a length of time sufficient to develop new fine root system so that the root mass will retain its shape and hold together when removed from the container.
4. Use rigid containers which will hold ball shape and protect root mass during shipment.
5. Provide trees and shrubs established in containers of not less than the minimum sizes recommended by ANSI Z60.1 for the kind, type, and size of trees and shrubs required.
6. All labels and tags shall be removed prior to initial acceptance (substantial completion).

S. Plugs
1. Provide plugs as 2-1/8" square x 3-3/4" deep open-bottomed pots from a source specializing in native species. Plugs shall be sourced no more than 350 miles from the Project site.
2. Plugs shall be thoroughly rooted throughout the container.
3. See plans for species and spacing.
4. All plug installations shall be accompanied by goose exclosure, per the Drawing details, for up to 12 months after installation. Contractor to remove goose exclosure after 12 months.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.
1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or sand has been deposited in soil within a planting area.
2. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.
3. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable or which is dusty.
B. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Project Manager and replace with new planting soil.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray of seed.
2. Protect grade stakes set by others until directed to remove them.
B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 INSTALLATION
A. General: Prepare planting area for soil placement and mix planting soil or substrate as the drawings.
B. Before planting, obtain Project Manager's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.
C. Proceed with and complete the landscape work as rapidly as portions of the site become available, working within the seasonal limitations for each kind of landscape work required.
D. Cooperate with any other Contractors and trades which may be working in and adjacent to the landscape work areas. Examine drawings which show the development of the entire site and become familiar with the scope of all work required.

3.4 FINAL PLANT LOCATIONS
A. Stake locations of individual trees, for approval by Project Manager, prior to planting or excavating.
B. If a new tree or shrub relocation is necessary due to interference with underground piping or wiring, the Contractor shall notify the Project Manager and receive approval of a new location.
C. The Project Manager must approve the precise location of all plants prior to pit excavation and installation.
D. Make minor adjustments as requested by the Project Manager, or as necessary to avoid conflicts with utility locations.

3.5 EXCAVATION FOR PLANTING
A. Where rubble fill is encountered, notify Project Manager and prepare planting pits properly by removal of rubble or other acceptable methods.
B. If rock, underground construction work, or other obstructions are encountered in excavation for planting of trees or shrubs, notify the Project Manager. If necessary, new locations may be selected by the Project Manager.
C. If subsoil conditions indicate the retention of water in planting areas, as shown by seepage or other evidence indicates the presence of underground water, notify the Project Manager before backfilling.
D. Planting Pits and Trenches: Excavate circular planting pits.
1. Excavate planting pits with sides sloping at a 45-degree angle. Excavations with vertical sides are unacceptable. Treat perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
2. Excavate at least 2-times the diameter of the root ball in width.
3. Do not excavate deeper than depth of root ball, measured from the root flare to the bottom of the root ball.
4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
5. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
6. Maintain supervision of excavations during working hours.
7. Keep excavations covered or otherwise protected when unattended by installer's personnel.
8. If drain tile is indicated on Drawings, or required under planting areas, excavate to top of porous backfill over tile.
E. At the Project Manager's option, plant pits will be filled with water and must drain completely within twenty-four hours to be acceptable. Pits that do not drain shall be provided with twelve inch (12") diameter X thirty six inch (36") deep auger holes (one per pit) to be filled with 1 1/2" gravel. A change order will be issued if the Project Manager determines drain holes shall be installed.
F. Backfill Soil: Subsoil and topsoil removed from excavations may be used as backfill soil unless otherwise indicated.

3.6 TREE, SHRUB, ORNAMENTAL GRASS, AND PERENNIAL PLANTING
A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the uppermost root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.
B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
C. Set container grown stock, excavate as specified for balled and burlapped stock except excavate width and depth shall govern. Pit shall be at least twice as wide as the container.
D. Set tree ball, plumb and in the center of pit or trench with top of ball 2", maximum, above adjacent landscape grades. Remove burlap from sides and tops of balls, but do not remove from under balls. Remove platforms, if any, before setting. Do not use stock if ball is cracked, or broken before or during planting operations. When setting place additional backfill around base and sides of ball, and work each layer to settle backfill and eliminate voids and air pockets. When excavation is approximately 2/3 full, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing final layer of backfill. No burlap shall be pulled out from under balls.
E. A minimum of three-quarters of the wire baskets and surplus nylon or binding shall be completely removed, taking care not to damage the root ball. Any rocks which are bruised or broken shall be pruned at the time of planting.
F. Set container grown stock as specified for balled and burlapped stock, except cut cans on 2 sides with a metal cutter, and remove bottoms of wooden boxes before setting. Carefully remove cans and sides of wooden boxes after partial backfilling so as not to damage root balls.
G. Set out ornamental grasses, perennials, and groundcovers at spacing noted on the Plans in even rows with triangular spacing. Dig holes large enough to spreading of roots. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
H. For plantings in non-turf areas, provide berm around the edge of excavation to form shallow basin to collect water and to hold mulch.
I. After planting, the Contractor shall water each plant regularly until final acceptance.
J. All labels and tags shall be removed.

3.7 EDGING INSTALLATION
A. Steel Edging: Install steel edging where indicated on the Drawings according to manufacturer's written instructions. Anchor with steel stakes spaced approximately 30 inches apart, driven below top elevation of edging.
B. Shovel-Cut (Spade) Edging: Separate mulched areas from turf areas with a 45-degree, 4 - 6 inch deep shovel-cut edge at boldness shown on the Drawings.

Wash U Car Wash
311 East Loop Road
Wheaton, IL 60189

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1107 Ridson Mill Drive
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REV.	COMMENT	DATE

SEAL:

DATE: 7/1/2022
JOB NO.: 22-9386
DRAWN BY: TS
CHECKED BY: TS

DRAWING TITLE:
LANDSCAPE SPECIFICATIONS

SHEET NO.:
LP-502

C. Mow-Strip/Maintenance Edge Installation:
1. Excavate for mow strip or maintenance edge as indicated on Drawings.
2. Compact subgrade uniformly beneath mow strip or maintenance edge.
3. For mow strips, apply nonselective, pre-emergent herbicide that inhibits growth of grass and weeds. For maintenance edges, install 6-oz min woven geotextile fabric as shown on the Drawing Details.
4. Install steel edging, delineating the edge of the mow strip or maintenance edge.
5. Place interlocked thickness of mulch or stone.
6. Rake mulch to a uniform surface level with adjacent finish grades.

D. Finished Edges: Trim with maker or paint for acceptance by Project Manager, before installing irrigation.

E. Spade cut edges shall be to all locations identified on the Drawings. Mark line turning of these lines may be removed after the placement of sod.

3.8 MULCHING

A. Fine grade all planting beds to be mulched allowing for full depth of specified mulch.

B. Place specified mulch evenly over all areas at depth indicated on plans.

C. Rake and feather finish grade of mulch level and ½" below adjacent edges' surfaces (if edger is specified).

D. Make sure mulch is at full depth at adjacent walks and paved surfaces and that mulch doesn't protrude above these surfaces.

E. Mulch a 36" diameter ring around all trees in turf areas with specified deep 6 oz wood mulch, after irrigation areas have been watered in.

F. All trees and shrubs in native areas are to have a mulch ring equal to the diameter of the planting pit. Mulch shall be a uniform three inches in depth. Do not remove saucer (or berm) around plants in native areas when mulching.

3.9 PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Do not cut tree leaders, and remove only injured or dead branches from flowering trees, if any.

C. Prune shrubs to retain their natural character and shape, and to accomplish their use in the landscape design.

D. Do not apply pruning paint to wounds.

E. Restored shrub sizes are the size after pruning.

F. Remove and replace excessively pruned or deformed stock resulting from improper pruning.

3.10 GUYING AND STAKING

A. Standard guying system:
1. Pound stakes into undisturbed soil beyond the planting pit so that stake is secure (2' deep minimum). Secure wire through metal grommets on nylon strap and wrap above first branch or at mid-point of tree. Secure guy wire to stake so that it is tight but allows some movement and so that no sharp protection of wire are extending from post. Adjust tension on wire if needed. Flag guy wire with 5/8" PVC pipe for visibility.

B. Alternate (conifer) guying system:
1. Pound stakes into undisturbed soil beyond the planting pit so that stake is secure (2' deep min.), angling away from planting pit and so that top is flush with finish grade. Secure wire through metal grommets on canvas strap and wrap at mid-point of tree. Secure guy wire so stake or that it is not too tight and so that no sharp protection of wire are extending from post. Adjust tension on wire if needed. Flag guy wire with 5/8" PVC for visibility.

3.11 INSTALLING SLOW-RELEASE WATERING DEVICE

A. Provide one device for each tree.

B. Place device on top of the mulch at base of tree trunk and fill with water according to manufacturer's written instructions.

3.12 MECHANIZED TREE-SPADE PLANTING (FOR ON-SITE TRANSPLANTS, IF INDICATED ON PLANS)

A. Trees may be planted with an approved mechanized tree spade at the designated locations. Do not use tree spade to move trees larger than the maximum size allowed for a similar field-grown, balled-and-burlapped root ball diameter according to ANSI Z60.1, or larger than manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.

B. Use the same tree spade to excavate the planting hole as will be used to extract and transport the tree.

C. When excavating the tree, center the trunk within the tree spade and move tree with a solid ball of earth.

D. Cut exposed roots cleanly during transplanting operations.

E. Plant trees following procedures in "Tree, Shrub, Ornamental Grass, and Perennial Planting" Article.

F. Where possible, orient the face in the same direction as in the original location (north with north).

3.13 PLACING SOIL IN PLANTERS

A. Place a layer of drainage gravel at least 4 inches thick at bottom of planter. Cover bottom with filter fabric and wrap filter fabric 4 inches up on all sides. Duct tape along the entire top edge of filter fabric to secure the filter fabric against the sides during the soil-filling process.

B. Fill planter with planting soil. Place soil in lightly compacted layers to an elevation of 1-1/2 inches below top of planter, allowing natural settlement.

3.14 TURF AREA PREPARATION

A. General: Prepare planting area for sod placement and mix planting soil as indicated on the Drawings.

B. Planting Planting Soil: Place planting soil as indicated on the Drawings.
1. Restore elevation of planting soil to allow for soil thickness of sod.

C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

D. Before planting, obtain Project Manager's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.15 PREPARATION FOR EROSION-CONTROL MATERIALS

A. Prepare area as specified in "Turf Area Preparation" Article.

B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.

C. Fill cells of erosion-control mat with planting soil and compact before planting.

D. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.16 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h).
1. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
2. Do not use wet seed or seed that is moldy or otherwise damaged.
3. Do not seed against existing trees. Limit extent of seed to outside edge of planting pocket.

B. Sow seed at a total rate according to the written recommendations of the seed supplier.

C. Roller seed lightly into top 1/4 inch (3 mm) of soil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding 3:1 with erosion-control blanket installed and stapled according to manufacturer's written instructions.

E. Protect seeded areas with erosion-control mats where indicated on Drawings, install and anchor according to manufacturer's written instructions.

F. Protect seeded areas with slopes not exceeding 1:4 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches (38 mm) in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.
1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.
2. Bond straw mulch by spraying with asphalt emulsion at a rate of 10 to 13 gal./9000 sq. ft. (38 to 49 L/92.9 sq. m). Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or planted areas.

G. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch (4.8 mm) and roll surface smooth.

3.17 HYDROSEEDING

A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
1. Mix slurry with fiber-mulch manufacturer's recommended tackifier.
2. Spray-apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500 lb/acre (15 bales/92.9 sq. m) dry weight, and seed component is deposited at not less than the specified seed-sowing rate.
3. Spray-apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry coat at a rate so that mulch component is deposited at not less than 500 lb/acre (5 bales/92.9 sq. m) dry weight, and seed component is deposited at not less than the specified seed-sowing rate. Apply slurry cover coat of fiber mulch (hydromulching) at a rate of 1000 lb/acre (10.4 kg/92.9 sq. m).

3.18 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch to overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to sod or sod during installation. Tamp and roll lightly to ensure contact with soil, eliminate air pockets, and form a smooth surface. Work dirtfine soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
1. Lay sod across slopes exceeding 1:3.
2. Anchor sod on slopes exceeding 1:6 with biodegradable stakes spaced as recommended by sod manufacturer but not less than two stakes per sod strip to prevent slippage.

C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below sod.

3.19 PLUGGING

A. Plant plugs in holes or furrows, at spacings indicated on the Drawings or triangular pattern. On slopes, contour furrows to rear level.

3.20 TURF RENOVATION

A. Renovate existing turf where indicated.

B. Renovate turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.
1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
2. Install new planting soil as necessary.

C. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury as sod.

D. Remove topsoil containing foreign materials, such as soil sterilants, fuel spills, stones, gravel, and other construction rubble resulting from Contractor's operations, and replace with new planting soil.

E. Mark, outline, cut, aerate, and take existing turf.

F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

G. Remove waste and foreign materials, including weeds, soil stone, grass, vegetation, and turf, and legally dispose of them off Owner's property.

H. Till to depth, here, and compacted areas thoroughly to a soil depth of 6 inches (150 mm).

I. Apply soil amendments as required based on site-specific soil conditions and initial fertilizer required for establishing new turf and mix thoroughly into top 4 inches (100 mm) of existing soil. Install new planting soil to fill low spots and meet finish grades.
1. Initial Fertilizer: Slow-release fertilizer applied according to manufacturer's recommendations.

J. Apply seed and protect with straw mulch or sod (see Drawings as required for new turf.

K. Water newly planted areas and keep moist until new turf is established.

3.21 TURF MAINTENANCE

A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and reinstall to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged in turf in areas of subsidence.
2. In areas where mulch or blanket has been disturbed by wind or maintenance operations, add new mulch/blanket and anchor as required to prevent displacement.
3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering:
1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid washing over muddy or newly planted areas.
2. When turf was sod, move at a minimum rate of 1 inch (25 mm) per week unless rainfall precipitation is adequate.

C. Mow turf as soon as tall growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain proper grass height.

D. Turf Post-fertilization: Apply as noted in Materials Article, L Fertilizer, based on season.

3.22 SATISFACTORY TURF

A. Turf installation shall meet the following criteria as determined by Project Manager:
1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (9.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm).
2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

3.23 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and groundcover areas according to manufacturer's written recommendations. Do not apply to seeded areas.

C. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.24 FIELD QUALITY CONTROL

A. When all the landscape work is completed, the Project Manager shall, upon seven (7) calendar days advance notice, make an inspection of the landscape work to determine if the work is complete. The Project Manager shall prepare a punch list of items improperly installed, inadequately sized or otherwise deficient based on the findings of his inspection. The punch list shall be completed not more than seven (7) working days after the field inspection. When the Contractor has completed all deficiencies and completed all items on the punch list, the Contractor shall request another inspection by the Project Manager to determine whether the deficiencies have been adequately corrected. Once the punch list items have been corrected and re-inspected, the Project Manager shall issue a written certificate to the Owner who will also respond to the Contractor in writing, formally accepting the work and beginning the warranty and guarantee period.

B. Additional landscape inspections shall be conducted upon request by the Project Manager, to determine the condition of the work at the completion of the guarantee period.

C. The required maintenance instructions shall be forwarded to the Owner's representative prior to the final acceptance to inform the Owner of any maintenance responsibilities that would be required for the project.

3.25 CLEANING AND PROTECTION

A. During landscape work, store materials and equipment where directed.

B. Keep pavements clean and work areas in an orderly condition.

C. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas. At the time of the final inspection of the work and before the issuance of Final Acceptance, all paved areas shall be thoroughly cleaned by the Contractor by sweeping, and washing. All construction equipment and excess materials shall have been removed and any debris or rubbish shall have been removed from the site.

D. Protect landscape work from loss, damage, and deterioration during storage, installation, and maintenance periods.

E. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

F. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

G. Protect from unauthorized persons (trespassers), as well as from operations by other Contractors and tradesmen and landscape operations.

H. Remove non-degradable erosion-control measures after grass establishment period.

END OF SECTION 02920

Wash U Car Wash
311 East Loop Road
Wheaton, IL 60189

DesignPerspectives, Inc.
Grounded in Diversity
1167 Hobson Mill Drive
Naperville, Illinois 60540
Telephone: (630) 606-0776
www.design-perspectives.net

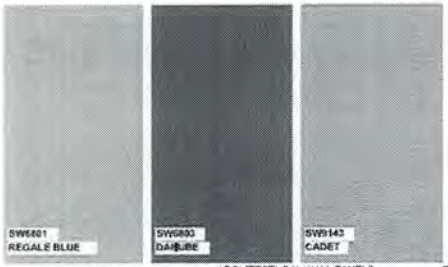
REV	COMMENT	DATE

SEAL:

DATE: 7/1/2022
JOB NO.: 22-9384
DRAWN BY: TS
CHECKED BY: TS

DRAWING TITLE:
LANDSCAPE SPECIFICATIONS

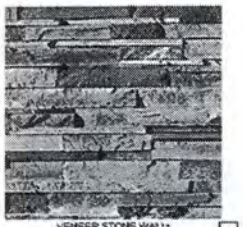
SHEET NO.:
LP-503



ARCHITECTURAL WALL PANELS-
METAL PANEL SYSTEM, COLOR BY SHERWIN-WILLIAMS 1

SW7006
EXTRA WHITE

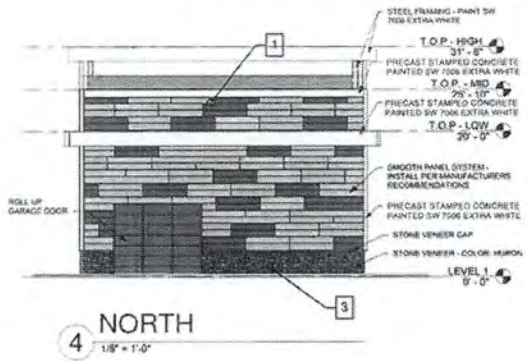
PRECAST STAMPED CONCRETE WITH PAINTED FINISH
COLOR BY SHERWIN-WILLIAMS 2



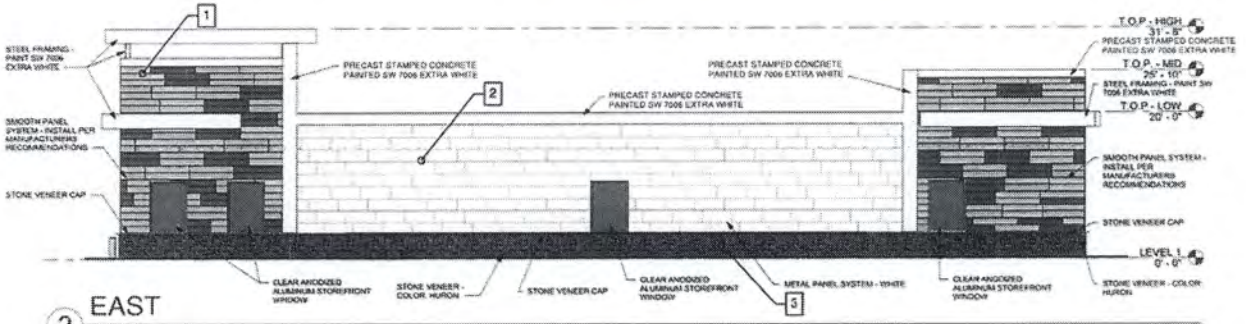
VENEER STONE WALLS
CORONADO STONE- PRO LEDGE HURON 3

EXTERIOR MATERIALS LEGEND

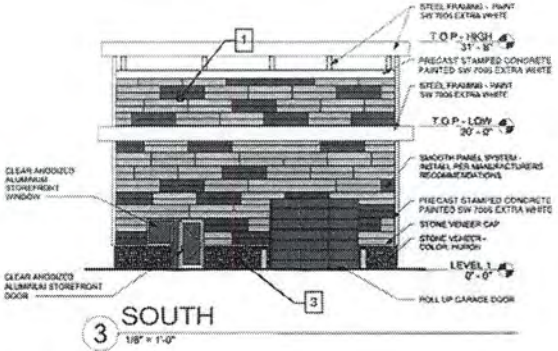
- SMOOTH METAL PANEL SYSTEM - 24 GAUGE
  COLOR: BURKSHIRE BLUE
  CITYSCAPE
  ZINC
- PRECAST STAMPED CONCRETE WITH PAINTED FINISH
  COLOR: SW 7006
- PRECAST STAMPED CONCRETE WITH PAINTED FINISH
  COLOR: SW 7006
- STONE VENEER
  COLOR: HURON



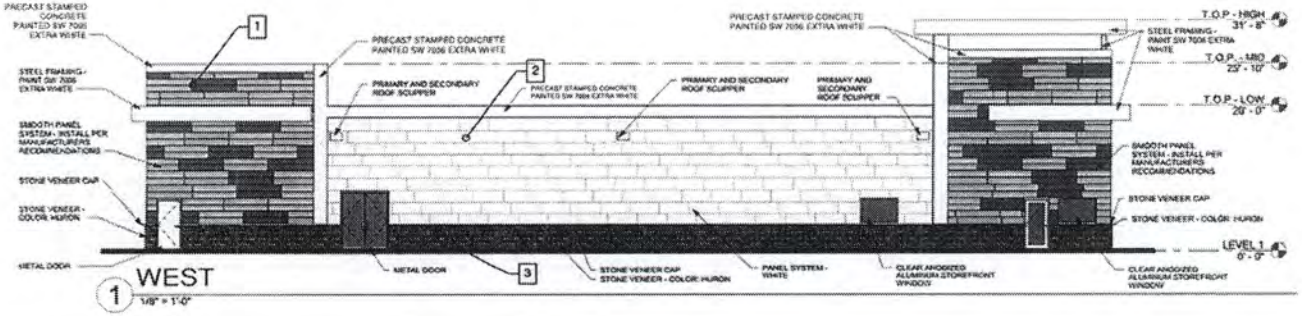
4 NORTH
1/8" = 1'-0"



2 EAST
1/8" = 1'-0"



3 SOUTH
1/8" = 1'-0"



1 WEST
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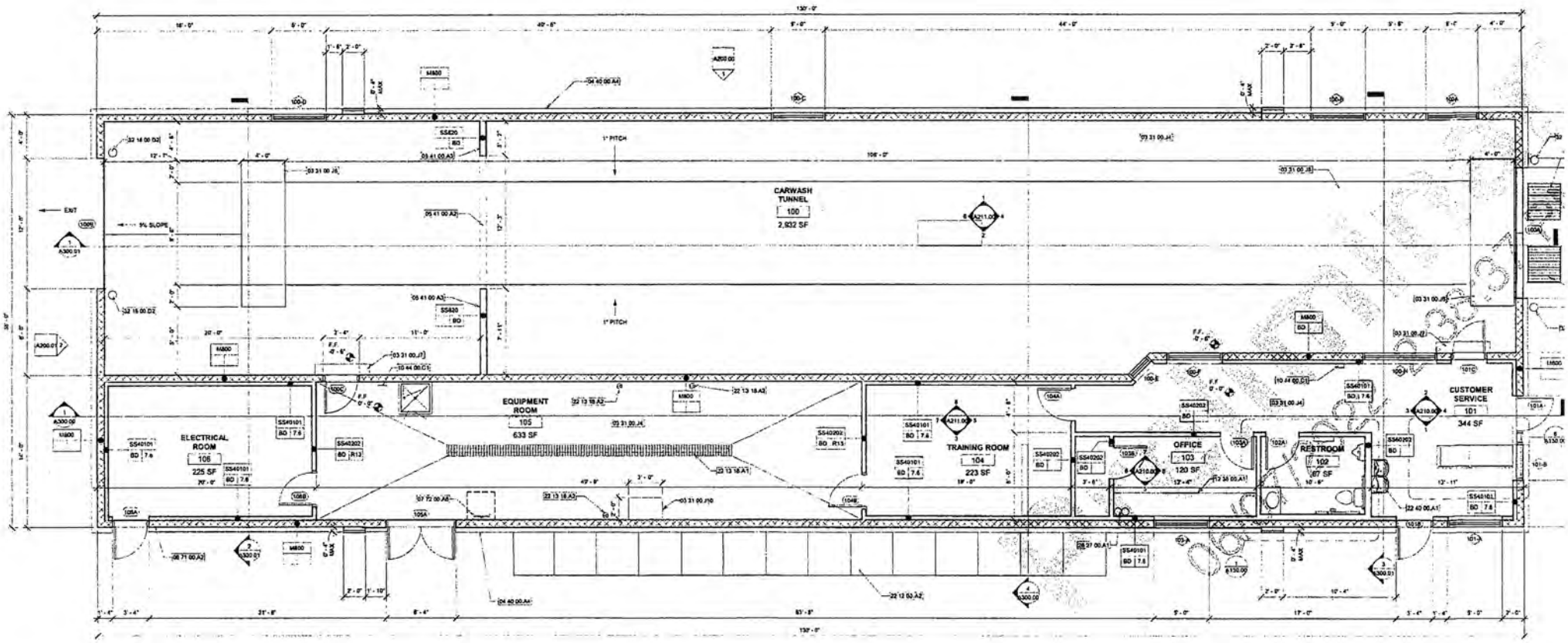
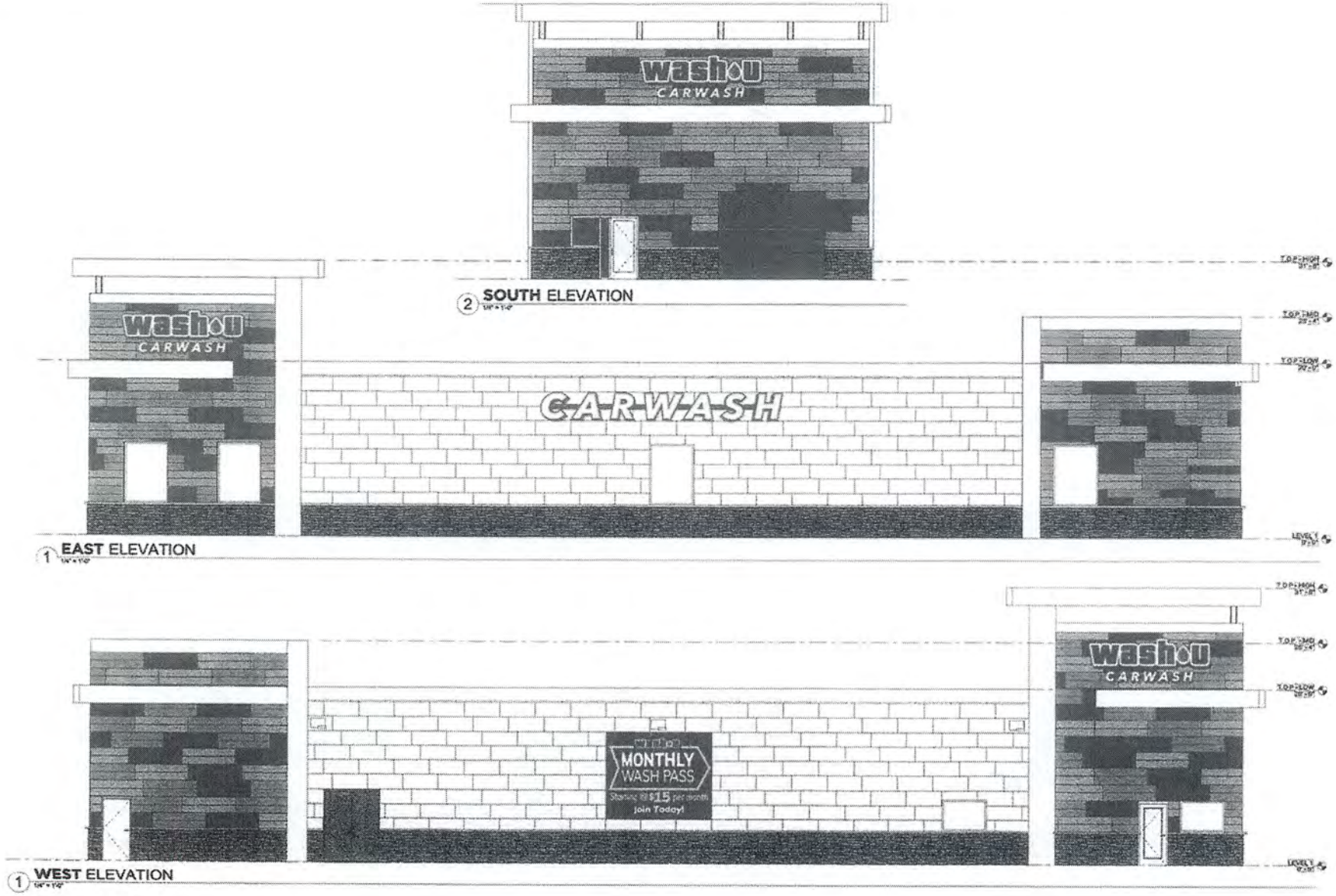


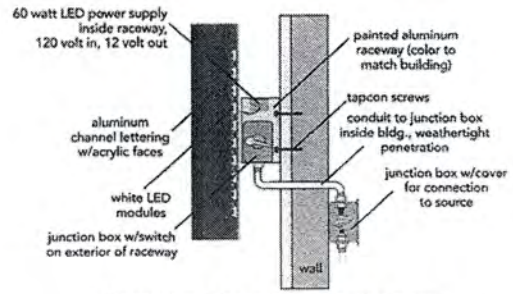
1 PROPOSED FLOOR PLAN
1/4" = 1'-0"

Wash U



NATURE:	DATE:	DRAWING: wheaton exterior	MANAGER: B. Avink	DATE:	
MIDWEST SIGN COMPANY	1124 Electric Ave. Wayland, MI 49348 midwestsignco.com	PROJECT: Wash U/Wheaton IL	DESIGN: R. Sobota	5/16/2022	2.0

68.75 SF, QTY (3)



electrical: internally illuminated with LEDs, 60 watt power supply housed inside raceway, conduit to feed power through wall, weathertight penetration, 120V, UL listed
FINAL CONNECTION TO BE MADE BY OTHERS

91.4 SF

NATURE:	DATE:	DRAWING: wheaton exterior	MANAGER: B. Avink	DATE:	
MIDWEST SIGN COMPANY	1124 Electric Ave. Wayland, MI 49348 midwestsignco.com	PROJECT: Wash U/Wheaton IL	DESIGN: R. Sobota	5/16/2022	2.0

Wash U

1-sided 3 piece sign panel, 120 SF

SIGNATURE:	DATE:	DRAWING: wheaton exterior	MANAGER: B. Avink	DATE:	
MIDWEST SIGN COMPANY	1124 Electric Ave. Wayland, MI 49348 midwestsignco.com	PROJECT: Wash U/Wheaton IL	DESIGN: R. Sobota	5/16/2022	2.0

Wash U

criteria: 48 SF maximum, 7 FT height maximum, 50% EMC maximum
as drawn: 46.3 SF double-sided custom fabricated sign structure with internally illuminated channel lettering, 41" x 75" full color Watchfire LED message center (21.35 SF, 46.1%)

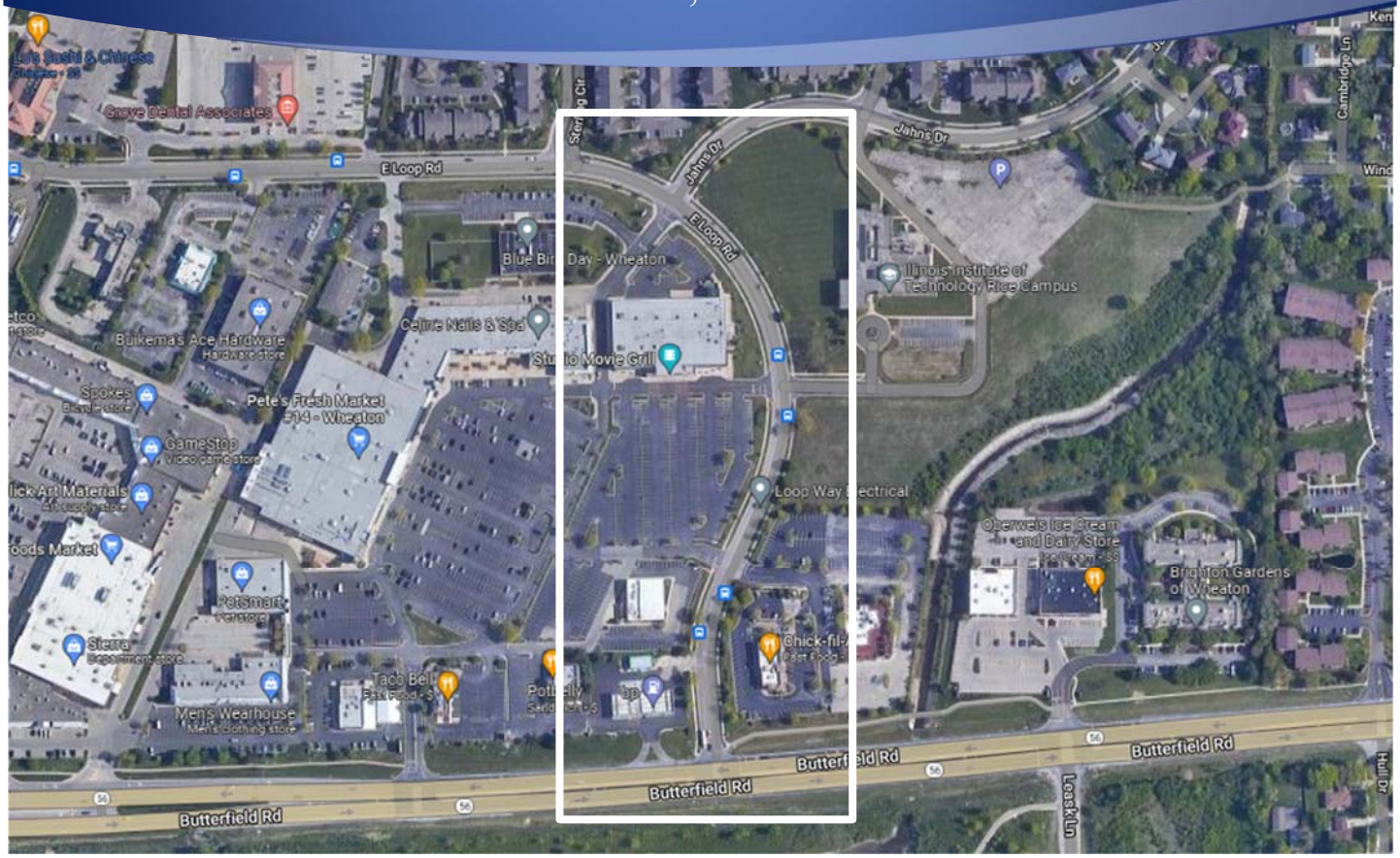
SIGNATURE:	DATE:	DRAWING: wheaton main id revB	MANAGER: B. Avink	DATE:
		PROJECT: Wash U/Wheaton, IL	DESIGN: R. Sobota	7/12/2022 4.0

MIDWEST SIGN COMPANY
1124 Electric Ave.
Wayland, MI 49348
midwestsignco.com
616-583-1743

EXHIBIT B

Comprehensive Traffic Study
North Section of East Loop Road

Wheaton, Illinois



Prepared For:

CITY OF WHEATON ILLINOIS

KLOA
Kenig, Lindgren, O'Hara, Aboona, Inc.

February 23, 2023

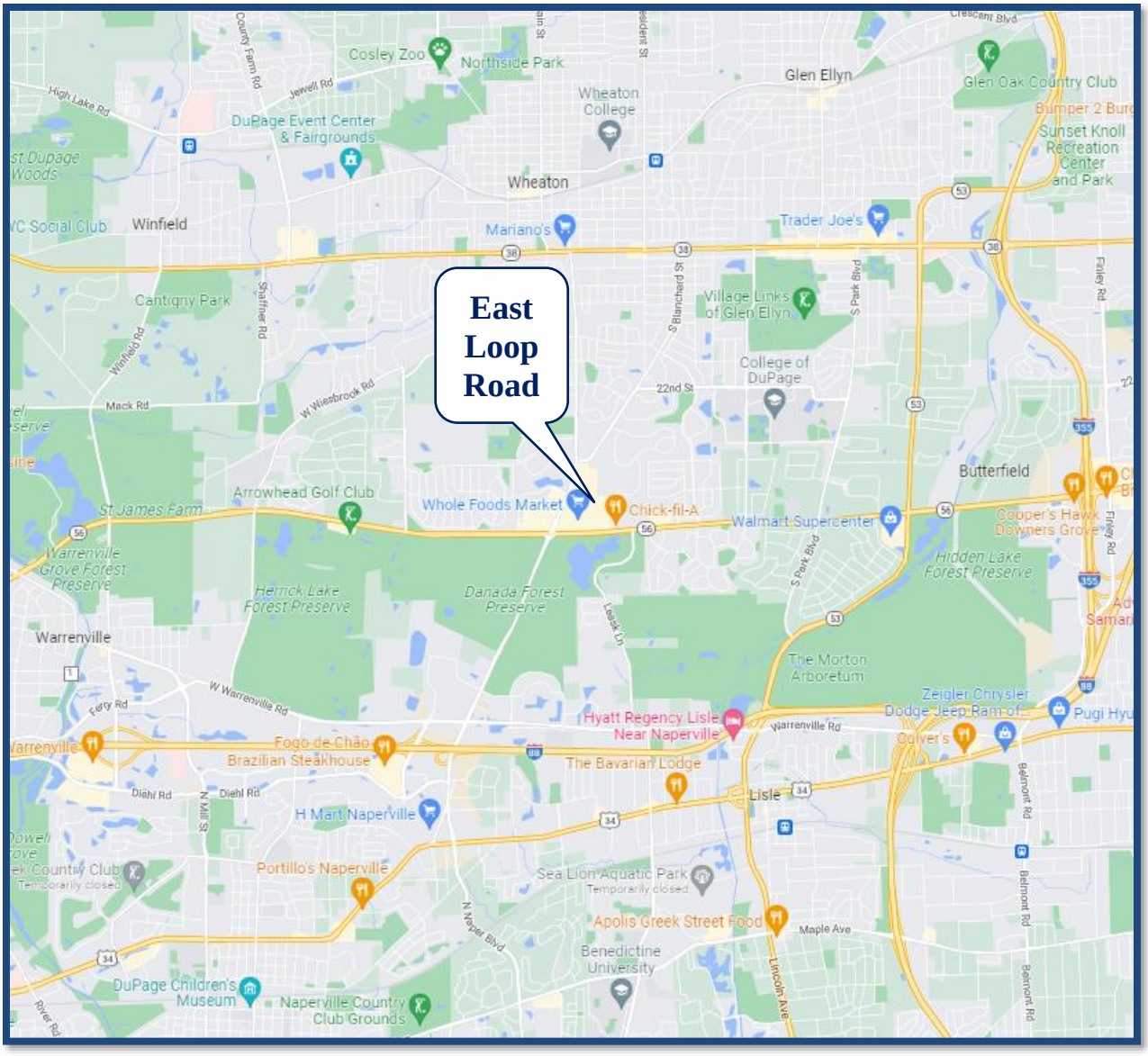
1. Introduction

This report presents the methodologies, findings, and recommendations of a comprehensive traffic study conducted by Kenig, Lindgren, O'Hara, Aboona, Inc. (KLOA, Inc.) for the north-south section of East Loop Road located in Wheaton, Illinois. East Loop Road is an approximate 0.6-mile road that extends in a quarter circle between IL 56 and Naperville Road. The road has a three-lane cross-section and is under traffic signal control at its intersections with IL 56 and Naperville Road. **Figure 1** shows the location of East Loop Road in relation to the area roadway system. **Figure 2** shows an aerial view of the East Loop Road corridor.

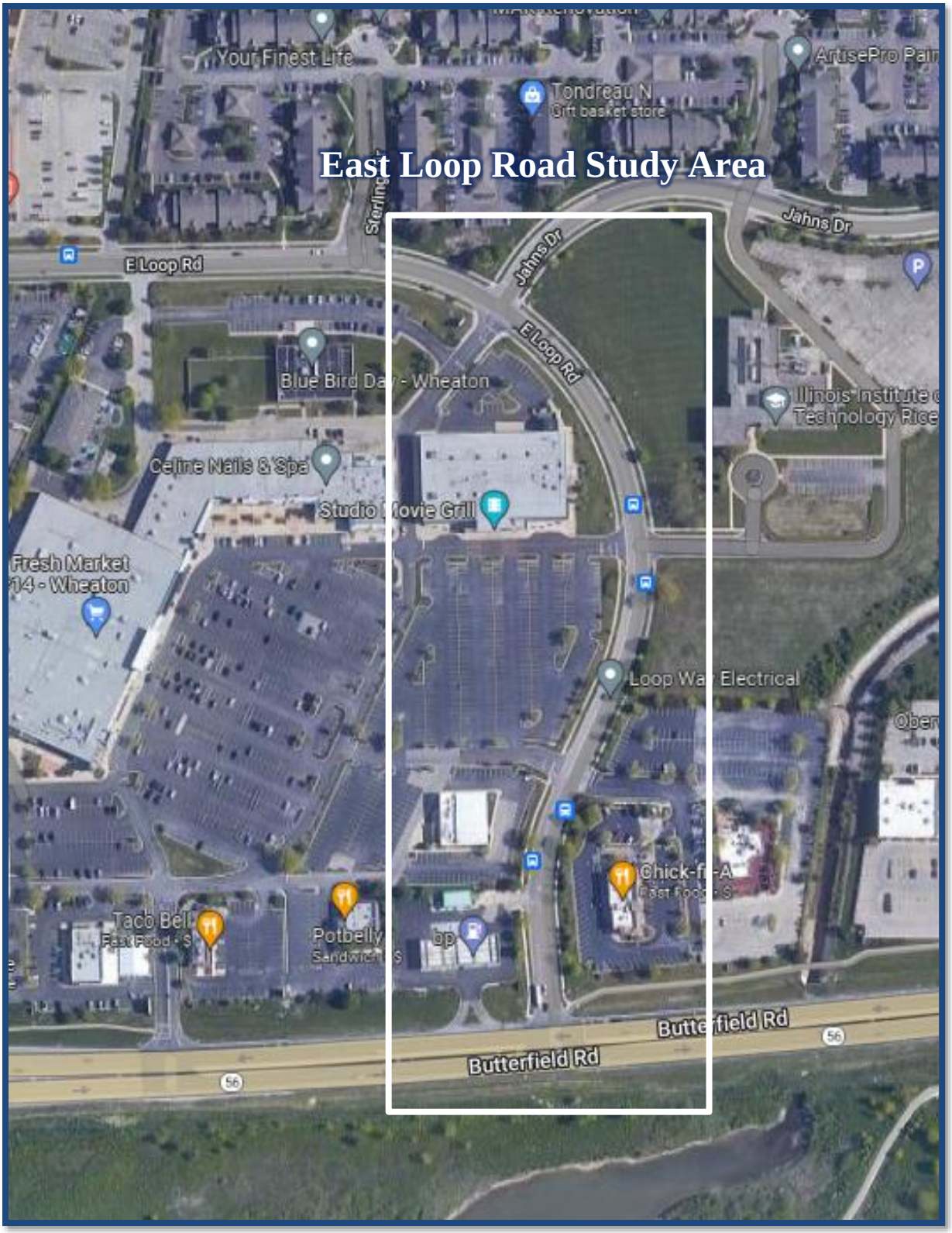
East Loop Road provides access to the Danada Square subdivision and serves several commercial, office, institutional, and multi-family uses located north of IL 56 and east of Naperville Road. In addition, the road serves as a by-pass route around the major intersection of IL 56 with Naperville Road. The volume of traffic along East Loop Road, particularly the southern section, is projected to increase with the approval of the Wash U car wash and the full occupancy of the Rice Lake Square shopping center. As a result, several transportation issues and concerns have been raised regarding the existing and projected operations of East Loop Road and the roads and access drives intersecting the road. As such, the City of Wheaton has requested that a comprehensive traffic study be performed of the north-south section of East Loop Road.

Through this study, KLOA, Inc. will thoroughly document the existing roadway conditions, estimated the projected traffic volumes based on the projected growth in the area, evaluate the existing and projected operations, examine alternative improvements and/or modifications, and, if necessary, develop recommendations to enhance the operations of the corridor. Per the direction of the City of Wheaton, the traffic study focused on the north-south section of East Loop Road, which extends between IL 56 and Jahns Drive, and includes the following four intersections:

- East Loop Road with IL 56
- East Loop Road with Jahns Drive and the Rice Lake Square northern access drive
- East Loop Road with the Rice Lake Square southern access drive and the Chick-fil-A access drive
- East Loop Road with the Rice Lake Square middle access drive and the Illinois Institute of Technology access drive



Corridor Location **Figure 1**



Aerial View of Corridor **Figure 2**

2. Existing Conditions

Existing transportation conditions along East Loop Road and the crossroads and access drives were documented based on field visits conducted by KLOA, Inc. in order to obtain a database for projecting future conditions. The following provides a description of the geographical location of the corridor, physical characteristics of the area roadway system including lane usage and traffic control devices, and existing peak hour traffic volumes.

Existing Land Uses

As previously noted, East Loop Road provides access to the Danada Square subdivision and serves several commercial, office, institutional, and multi-family uses located north of IL 56 and east of Naperville Road. Multi-family developments are located north of Jahns Drive and the east-west section of East Loop Road. The following summarizes the specific existing land uses located along the north-south section of East Loop Road:

- A Chick-fil-A restaurant and the Wash U car wash site are located in the northeast quadrant of the East Loop Road/IL 56 intersection.
- The Illinois Institute of Technology campus (IIT) is located in the southeast quadrant of the East Loop Road/Jahns Drive intersection.
- A BP fuel center is located in the northwest quadrant of the East Loop Road/IL 56 intersection.
- The Rice Lake Square shopping center is located on the west side of East Loop Road bounded by IL 56 on the south and the east-west section of East Loop Road on the north.

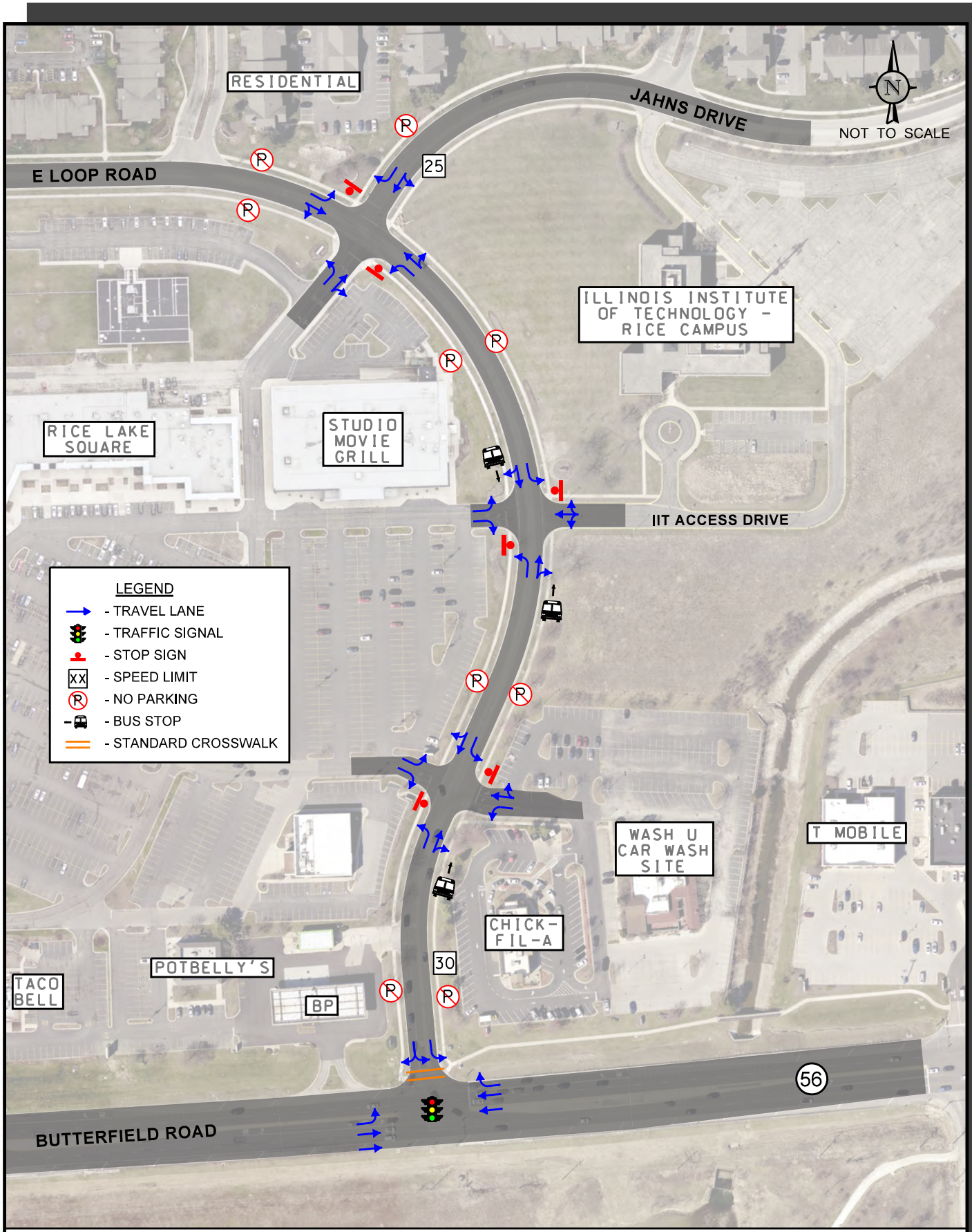
Existing Roadway System Characteristics

The characteristics of East Loop Road and the adjacent roadways and access drives within the study area are described below and illustrated in **Figure 3**.

East Loop Road is an approximate 0.6-mile major collector road that extends in a quarter circle between its signalized intersection with IL 56 and its signalized intersection with Naperville Road. The road has one lane in each direction with a center median that accommodates separate left-turn lanes serving the various crossroads and access drives along the road. East Loop Road is under the jurisdiction of the City of Wheaton and has a posted speed limit of 30 miles per hour. The following summarizes the lane geometrics provided along East Loop Road at the various intersections:

- At its signalized intersection with IL 56, East Loop Road has a separate left-turn lane and a shared left-turn/right-turn lane on the southbound approach.

- At its unsignalized intersections with (1) Jahns Drive and the Rice Lake Square northern access drive, (2) the Rice Lake Square southern access drive and the Chick-fil-A access drive, and (3) the Rice Lake Square middle access drive and the Illinois Institute of Technology access drive, East Loop Road has a separate left-turn lane and a shared through/right-turn lane on both approaches.



East Loop Road Study
Wheaton, Illinois

Existing Roadway Characteristics

KLOA
Kenig,Lindgren,O'Hara,Aboona,Inc.

Job No: 22-405 Figure: 3

IL 56 (Butterfield Road) is an east-west, principal arterial roadway that has two travel lanes in each direction. The road is under the jurisdiction of the Illinois Department of Transportation (IDOT), is classified as a Strategic Regional Arterial (SRA) route, carries an Annual Average Daily Traffic (AADT) volume of 24,700 vehicles (IDOT 2021), and has a posted speed limit of 45 miles per hour. At its signalized intersection with East Loop Road, IL 56 has a separate left-turn lane and two through lanes on the eastbound approach and two through lanes and a separate right-turn lane on the westbound approach.

Jahns Drive is a local road that extends north and east from East Loop Road to Hawkins Circle. It has one lane in each direction and is aligned opposite the Rice Lake Square northern access drive at its intersection with East Loop Road. At its unsignalized intersection with East Loop Road, Jahns Drive has a shared left-turn/through lane and a separate right-turn lane that are under stop sign control.

Access Drives. The following summarizes the characteristics of the access drives that intersect East Loop Road within the study area:

- The Chick-fil-A access drive has one inbound lane and two outbound lanes striped for a separate left-turn lane and a shared through/right-turn lane with the outbound lanes under stop sign control.

- The Illinois Institute of Technology access drive has one inbound lane and one outbound lane with the outbound lane under stop sign control.

- The Rice Lake Square southern and middle access drives both have one inbound lane and two outbound lanes striped for a separate left-turn lane and a separate right-turn lane with the outbound lanes under stop sign control.

- The Rice Lake Square northern access drive has one inbound lane and two outbound lanes striped for a separate left-turn lane and a shared through/right-turn lane with the outbound lanes under stop sign control.

East Loop Road Alternative Modes of Transportation

The following summarizes the alternative modes of transportation that extend along East Loop Road and the other roads in the study area:

- Sidewalks are located along both sides of East Loop Road and Jahns Drive.
- Both East Loop Road and Jahns Drive are designated bike routes.
- Pace Bus Route 714 runs along East Loop Drive.

Existing Traffic Volumes

To determine current traffic conditions in the vicinity of the site, KLOA, Inc. conducted peak period vehicle, pedestrian, bicycle counts using Miovision Scout Collection Units at the following intersections:

- East Loop Road with IL 56 (Tuesday and Saturday, December 6 and 10, 2022)
- East Loop Road with Jahns Drive and the Rice Lake Square northern access drive (Thursday and Saturday, June 2 and 4, 2022)
- East Loop Road with the Rice Lake Square southern access drive and the Chick-fil-A access drive (Tuesday and Saturday, December 6 and 10, 2022)
- East Loop Road with the Rice Lake Square middle access drive and the Illinois Institute of Technology access drive (Tuesday and Saturday, December 6 and 10, 2022)

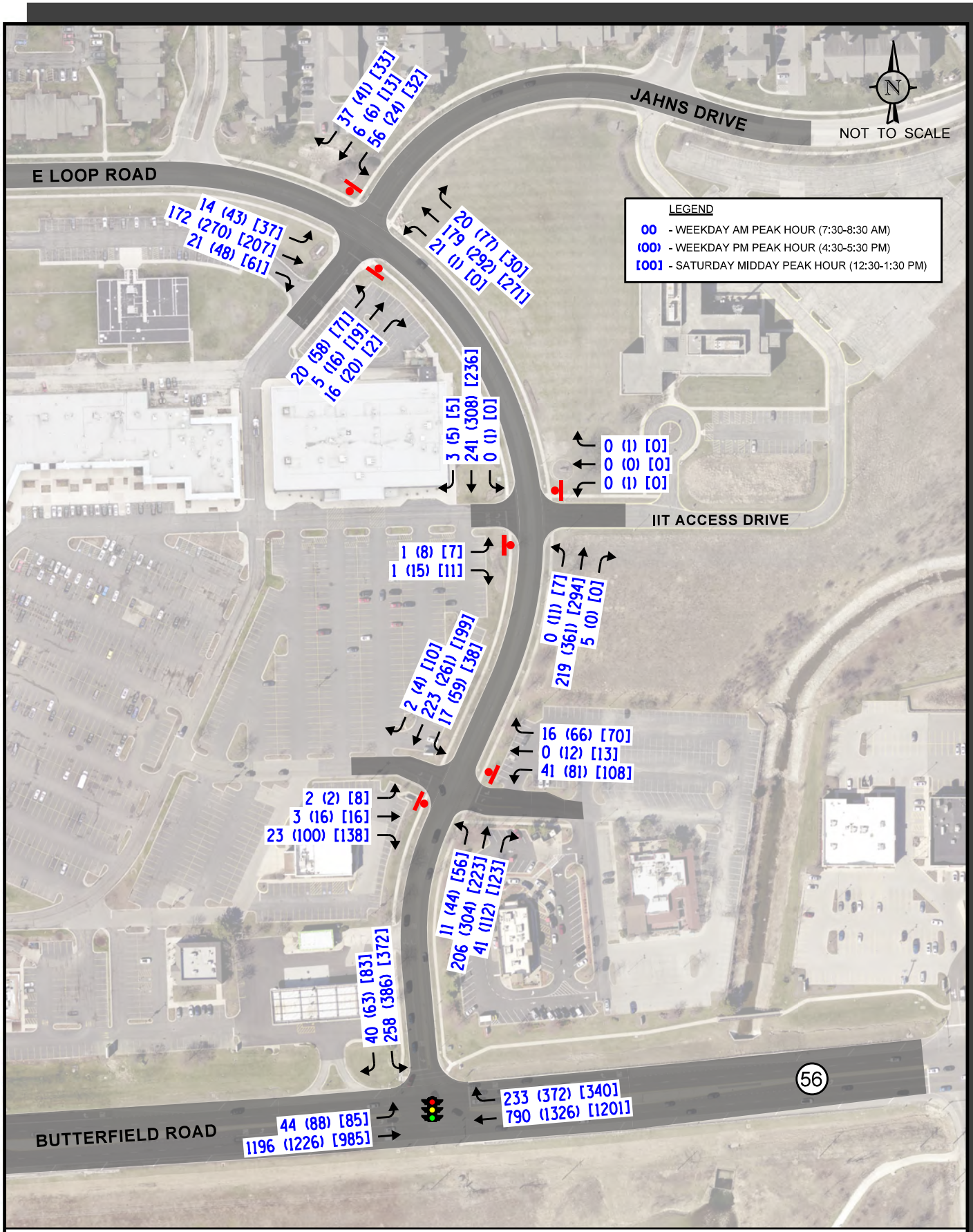
The traffic counts were performed during the weekday morning (7:00 A.M. to 9:00 A.M.), weekday evening (4:00 P.M. to 6:00 P.M.), and Saturday midday (11:30 A.M. to 1:30 P.M.) peak periods. It should be noted that the traffic counts were performed during the peak holiday season for the adjacent commercial developments. The results of the traffic counts showed that the weekday morning peak hour of traffic occurs from 7:30 A.M. to 8:30 A.M., the weekday evening peak hour of traffic occurs from 4:30 P.M. to 5:30 P.M., and the Saturday midday peak hour of traffic occurs from 12:30 P.M. to 1:30 P.M. **Figure 4** illustrates the existing peak hour traffic volumes. Copies of the traffic count summary sheets are included in the Appendix.

Field Observations

As part of the study, KLOA, Inc. performed field observations and reviewed the videos taken as part of the traffic counts conducted at the intersections in the study area. Both the videos collected as part of the December 2022 traffic counts and the traffic counts performed in June 2022 as part of the Wash U traffic study were reviewed. The results of the field observations and the review of the videos revealed the following:

- Overall, the East Loop Road corridor generally operates well with limited congestion. Some delay and queueing can occur along the corridor. However, any queueing generally dissipates quickly and is typical of collector roads serving commercial areas.

- The southbound approach of East Loop Road at its intersection with IL 56 generally operates well and all vehicles typically clear the intersection during each green phase. Further, a review of the videos as well as field observations revealed that the southbound queues along East Loop Road at its intersection with IL 56 rarely extend past the Rice Lake Square southern access drive and the Chick-fil-A access drive. The few times that the queue was observed extending past the access drives, the queue quickly dissipated.



East Loop Road Study
Wheaton, Illinois

Year 2022 Traffic Volumes

KLOA
Kenig,Lindgren,O'Hara,Aboona,Inc.

Job No: 22-405 Figure: 4

- Jahns Drive and all the access drives in the study area generally operate well. A review of the videos as well as the field observations showed that the Chick-fil-A access drive has an average queue of one to two vehicles with a typical peak queue of three to four vehicles. The queue exceeded four vehicles on several occasions. However, it is important to note that the queues generally dissipated quickly.

Crash Data Summary

KLOA, Inc. obtained crash data[1] for the most recent available past five years (2017 to 2021) for the four intersections in the study area. The crash data for the intersection of IL 56 with East Loop Road is summarized in **Table 1** and the following summarizes the crash data at the other three intersections:

- At the East Loop Road/Jahns Drive/Rice Lake Square northern access drive intersection, two crashes were reported in 2017 and 2019, one crash was reported in 2018, and zero crashes were reported in 2020 and 2021.

- At the East Loop Road/Rice Lake Square southern access drive/Chick-fil-A access drive intersection, one crash was reported in 2020.

- At the East Loop Road/Rice Lake Square northern access drive/Illinois Institute of Technology intersection, no crashes were reported over the five-year period.

Table 1
IL 56 WITH EAST LOOP ROAD – CRASH SUMMARY

Year	Type of Crash Frequency							
	Angle	Head On	Object	Rear End	Sideswipe	Turning	Other	Total
2017	0	0	1	2	0	2	0	5
2018	0	0	0	1	0	3	0	4
2019	0	0	0	1	0	3	0	4
2020	0	0	0	1	1	1	0	3
2021	0	0	0	2	0	3	0	5
Total	**0**	**0**	**1**	**7**	**1**	**12**	**0**	**21**
Average	**0**	**0**	**< 1**	**1.4**	**< 1**	**2.4**	**0**	**4.2**

[1] IDOT DISCLAIMER: The motor vehicle crash data referenced herein was provided by the Illinois Department of Transportation. Any conclusions drawn from analysis of the aforementioned data are the sole responsibility of the data recipient(s). Additionally, for coding years 2015 to present, the Bureau of Data Collection uses the exact latitude/longitude supplied by the investigating law enforcement agency to locate crashes. Therefore, location data may vary in previous years since data prior to 2015 was physically located by bureau personnel.

3. Year 2028 Projected Traffic Volumes

In order to determine how the East Loop Road corridor will operate in the future, Year 2028 traffic projections were developed that included the traffic to be generated by (1) regional (ambient) traffic growth and (2) any specific developments along the corridor.

Regional (Ambient) Traffic Growth

The existing traffic volumes (Figure 4) were increased by a regional growth factor to account for the increase in existing traffic related to regional growth in the area (i.e., not attributable to any particular planned development). Based on ADT projections provided by the Chicago Metropolitan Agency for Planning (CMAP) in a letter dated January 5, 2023, the existing traffic volumes were increased by an annually compounded growth rate of 0.5 percent per year for six years (one-year buildout plus five years) for a total of approximately three percent to represent Year 2028 background conditions. A copy of the CMAP projections letter is included in the Appendix.

Corridor Developments

Per the direction of the City of Wheaton, the study also included the traffic to be generated by the following existing developments or proposed developments:

- The occupancy of the vacant space in the Rice Lake Square shopping center
- The reestablishment of a technical institute/school at the IIT facility
- The approved Wash U car wash to be located in the northeast quadrant of the IL 56/East Loop Road intersection
- The potential redevelopment of the parking lot located directly north of the Chick-fil-A restaurant and approved Wash U car wash with a 7,000 square-foot sit-down restaurant.

Rice Lake Square Shopping Center

According to the City, the Rice Lake Square shopping center has approximately 68,800 square feet of vacant commercial space. The traffic to be generated by the occupancy of the vacant space was estimated based on the existing traffic generated by the shopping center and assigned to the existing access drives and roadway system based on the existing traffic conditions. It is important to note that access to the Rice Lake Square shopping center is provided via three access drives on East Loop Road, one access drive on IL 56, and cross-access to the developments located east of the shopping center. As such, not all the traffic to be generated by the vacant space will be using East Loop Road.

IIT Facility

The currently closed IIT facility is located in the southeast quadrant of East Loop Road with Jahns Drive. Access to the facility is provided via one access drive on East Loop Road and one access drive on Jahns Drive. The traffic to be generated by the reestablishment of a technical institute/school at the facility was based on the number of parking spaces serving the facility and the arrival/departure of students/staff and was assigned to the existing access drives and roadway system based on the existing traffic conditions. It should be noted that if the IIT facility is redeveloped as multi-family homes, similar to the homes located directly north of the IIT site, the multi-family homes will generate significantly lower weekday morning and evening peak hour traffic volumes compared to the projected traffic to be generated by the reestablishment of the IIT facility as a technical institute/school.

Wash U Car Wash

Development Plan

The Wash U car wash is to replace the approximate 12,000 square-foot vacant restaurant located on the north side of IL 56 directly east of the Chick-fil-A restaurant. As approved, the car wash is to contain an automatic car wash tunnel with six employee parking spaces and 22 vacuum parking spaces. As was the case with the existing restaurant, access to the car wash will be provided via the existing East Loop Road access drive that serves both the Chick-fil-A restaurant and the restaurant site.

Trip Generation Estimates

The number of peak hour trips estimated to be generated by the car wash was based on "Automated Car Wash" (Land-Use Code 948) vehicle trip generation rates contained in *Trip Generation Manual*, 11th Edition, published by ITE. It should be noted that the *Trip Generation Manual* does not provide data for the morning peak hour for an automated car wash. Therefore, the weekday morning peak hour traffic to be generated by the car wash was assumed to be approximately one-third of the weekday evening peak hour trip generation.

It is important to note that surveys conducted by ITE have shown that a significant number of trips made to car washes are diverted from the existing traffic on the roadway system. This is particularly true during the weekday morning and evening peak hours when traffic is diverted from the home-to-work and work-to-home trips. Such diverted trips are referred to as pass-by traffic. However, in order to present a worst-case scenario, no reduction in the development trip generation estimates was considered. Additionally, the trip generation estimates were not reduced to account for the potential interaction between the car wash and the Chick-fil-A restaurant as well as the proximity to the Rice Lake Square shopping center.

Table 2 summarizes the estimated peak hour trips to be generated by the car wash on a typical or normal day. The estimated traffic volumes were assigned to the roadway system based on the operation of the existing roadway system as determined by the existing traffic volumes. The directional distribution for the car wash is illustrated in **Figure A**, located in the Appendix.

Table 2
CAR WASH ESTIMATED PEAK HOUR TRAFFIC VOLUMES

ITE Land-Use Code	Type	Weekday Morning Peak Hour			Weekday Evening Peak Hour			Saturday Midday Peak Hour		
		In	Out	Total	In	Out	Total	In	Out	Total
948	Car Wash (1 tunnel)	13	13	26	39	39	78	19	22	41

Lastly, the trip generation shown in Table 2 represents the traffic to be generated by the car wash on a typical or normal day. It should be noted that peak operations (design day) of a car wash generally occur after a weather event such as a snowfall or a rain event. Based on historical data from other car washes, the peak days at a car wash normally occur 12 to 15 times per year. Since the peak days at the car wash only occur approximately five percent of the days per year, the peak day volumes were not evaluated as part of this study.

Potential 7,000 Square-Foot Sit-Down Restaurant

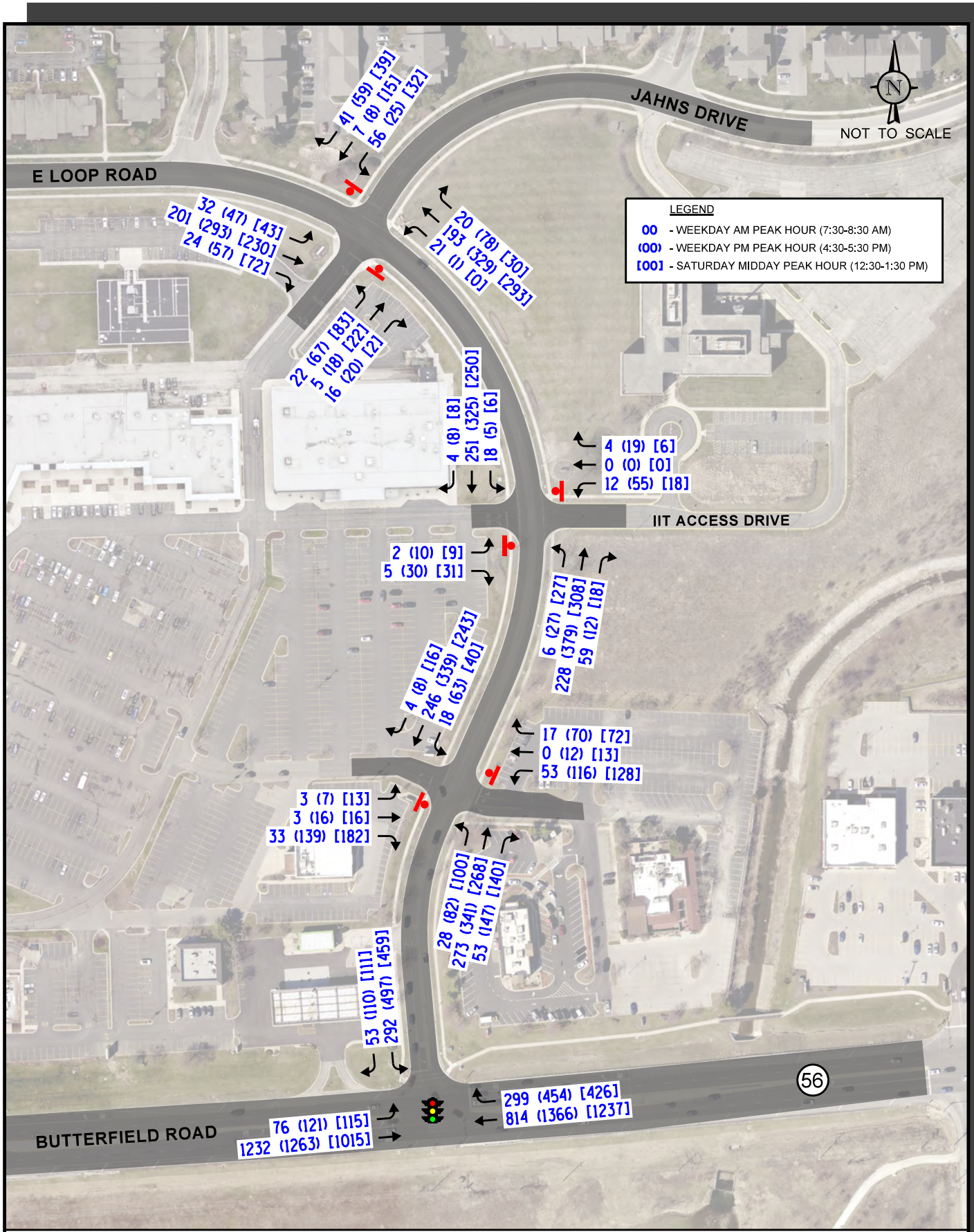
In addition to the occupancy/reestablishment of the existing vacant stores/buildings along the corridor, the City of Wheaton also requested that the study examine the potential redevelopment of the existing parking lot located directly north of the Chick-fil-A restaurant and the Wash U car wash. It should be noted that any redevelopment of the parcel will require a zoning change. Per the direction of the City of Wheaton, the parking lot was assumed to be redeveloped with a 7,000 square-foot sit-down restaurant. The volume of traffic to be generated by the restaurant was based on the trip rates provided in the ITE *Trip Generation Manual*, 5th Edition and assigned to the existing access drive and roadway system based on the existing traffic conditions.

Year 2028 Projected Traffic Volumes

The following two Year 2028 traffic assignments were developed and evaluated:

- The *Year 2008 Traffic Volumes without the Potential Sit-Down Restaurant* which include the existing traffic volumes, the traffic to be generated by the Wash U car wash, the full occupancy of the Rice Lake Square shopping center, and the occupancy of the IIT facility as well as the regional (ambient) growth are illustrated in **Figure 5**.

- The *Year 2008 Traffic Volumes with the Potential Sit-Down Restaurant* which include the existing traffic volumes, the traffic to be generated by the Wash U car wash, the full occupancy of the Rice Lake Square shopping center, the occupancy of the IIT facility, and the traffic to be generated by the potential 7,000 square-foot sit-down restaurant as well as the regional (ambient) growth are illustrated in **Figure 6**.

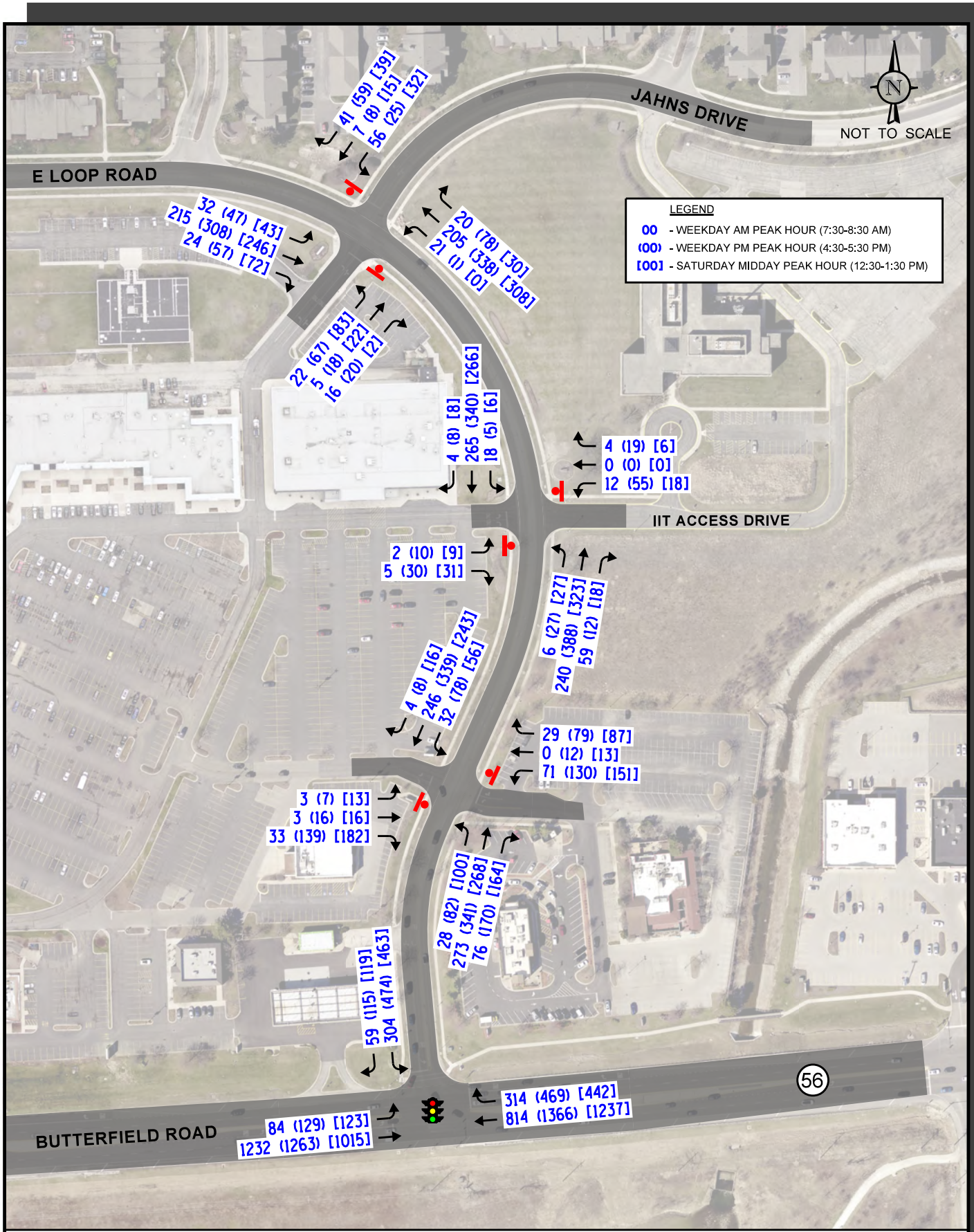


East Loop Road Study
Wheaton, Illinois

Year 2028 Total Traffic Volumes
Without 7,000 Square-Foot Restaurant

KLOA
Kenig,Lindgren,O'Hara,Aboona,Inc.

Job No: 22-405 Figure: 5



East Loop Road Study
Wheaton, Illinois

Year 2028 Total Traffic Volumes
With 7,000 Square-Foot Restaurant

KLOA
Kenig,Lindgren,O'Hara,Aboona,Inc.

Job No: 22-405 Figure: 6

4. Traffic Analysis and Recommendations

The following provides an evaluation conducted for the weekday morning, weekday evening, and Saturday midday peak hours. The analysis includes conducting capacity analyses to determine how well the roadway system and access drives currently operate and are projected to operate and whether any roadway improvements or modifications are required.

Traffic Analyses

Roadway and adjacent or nearby intersection analyses were performed for the weekday morning, weekday evening, and Saturday midday peak hours peak hours for the Year 2022 existing and Year 2028 total conditions.

The traffic analyses were performed using the methodologies outlined in the Transportation Research Board's *Highway Capacity Manual* (HCM), 6th Edition and analyzed using Synchro/SimTraffic 11 software. The analysis for the traffic-signal controlled intersections were accomplished using actual and field measured lengths and phasings to determine the average overall vehicle delay and levels of service.

The analyses for the unsignalized intersections determine the average control delay to vehicles at an intersection. Control delay is the elapsed time from a vehicle joining the queue at a stop sign (includes the time required to decelerate to a stop) until its departure from the stop sign and resumption of free flow speed. The methodology analyzes each intersection approach controlled by a stop sign and considers traffic volumes on all approaches and lane characteristics.

The ability of an intersection to accommodate traffic flow is expressed in terms of level of service, which is assigned a letter from A to F based on the average control delay experienced by vehicles passing through the intersection. The *Highway Capacity Manual* definitions for levels of service and the corresponding control delay for signalized intersections and unsignalized intersections are included in the Appendix of this report.

Summaries of the traffic analysis results showing the level of service and overall intersection delay (measured in seconds) for the Year 2022 existing and Year 2028 conditions are presented in **Tables 4** through **7**. A discussion of each intersection follows. Summary sheets for the capacity analyses are included in the Appendix.

Table 4
CAPACITY ANALYSIS RESULTS – SIGNALIZED
IL 56 WITH EAST LOOP ROAD

	Condition	Eastbound		Westbound		Southbound	Overall
		L	T	T	R	L/R	
Weekday Morning Peak Hour	**Year 2022 Existing Conditions**	A 4.7	A 7.3	A 9.6	A 9.2	E 56.9	B 13.9
		A – 7.2		A – 9.5			
	Year 2028 Total Conditions[1]	A (A) 5.9 (6.3)	A (A) 8.5 (8.9)	B (B) 11.8 (12.3)	B (B) 11.3 (12.6)	E (E) 55.9 (55.6)	B (B) 15.7 (16.3)
		A – 8.4 (A – 8.7)		B – 11.8 (B – 12.4)			
Weekday Evening Peak Hour	**Year 2022 Existing Conditions**	A 8.8	A 9.1	B 15.6	B 13.8	D 54.4	B 17.9
		A – 9.0		B – 15.2			
	Year 2028 Total Conditions[1]	B (B) 14.8 (15.9)	B (B) 12.0 (11.8)	C (C) 20.3 (20.1)	B (B) 19.1 (19.4)	D (D) 52.9 (52.8)	C (C) 22.4 (22.2)
		B – 12.2 (B – 12.2)		C – 20.0 (B – 19.9)			
Saturday Midday Peak Hour	**Year 2022 Existing Conditions**	A 8.1	A 8.4	B 15.5	B 14.0	D 49.3	B 17.9
		A – 8.4		B – 15.2			
	Year 2028 Total Conditions[1]	B (B) 12.2 (12.9)	B (B) 10.5 (10.7)	B (B) 19.4 (19.7)	B (B) 18.8 (19.5)	D (D) 47.3 (47.4)	C (C) 21.1 (21.5)
		B – 10.7 (B – 10.9)		B – 19.2 (B – 19.7)			

Letter denotes Level of Service; Delay is measured in seconds.
L – Left Turn; T – Through; R – Right Turn
1. The operation of the intersection assuming the Year 2028 traffic volumes **without** the potential 7,000 square-foot restaurant is shown without parentheses.
The operation of the intersection assuming the Year 2028 traffic volumes **with** the potential 7,000 square-foot restaurant is shown in parentheses.

Table 5
CAPACITY ANALYSIS RESULTS – TWO-WAY STOP SIGN CONTROL
EAST LOOP ROAD WITH JAHNS DRIVE AND RICE LAKE SQUARE NORTHERN ACCESS DRIVE

Intersection	Weekday Morning Peak Hour		Weekday Evening Peak Hour		Saturday Midday Peak Hour	
	LOS	Delay	LOS	Delay	LOS	Delay
Year 2022 Existing Peak Hour Conditions						
• Northbound Left Turn	B	12.3	C	17.2	B	14.3
• Northbound Through/Right Turn	B	10.1	B	12.7	B	12.9
• Southbound Left Turn/Through	B	12.8	C	15.6	B	13.4
• Southbound Right Turn	A	9.6	B	10.9	B	10.0
• Westbound Left Turn	A	7.7	A	8.0	A	0.0
• Eastbound Left Turn	A	7.7	A	8.3	A	7.9
Year 2028 Total Peak Hour Conditions[1]						
• Northbound Left Turn	B (B)	13.3 (13.5)	C (C)	20.1 (20.7)	C (C)	15.7 (16.1)
• Northbound Through/Right Turn	B (B)	10.4 (10.5)	B (B)	13.5 (13.7)	B (B)	13.5 (13.7)
• Southbound Left Turn/Through	B (B)	13.8(14.1)	C (C)	16.8 (17.1)	B (B)	14.2 (14.5)
• Southbound Right Turn	A (A)	9.7(9.8)	B (B)	11.5 (11.6)	B (B)	10.2 (10.3)
• Westbound Left Turn	A (A)	7.8 (7.8)	A (A)	8.1 (8.1)	A (A)	0.0 (0.0)
• Eastbound Left Turn	A (A)	7.8 (7.8)	A (A)	8.4 (8.5)	A (A)	8.0 (8.0)

LOS = Level of Service
Delay is measured in seconds.
1. The operation of the intersection assuming the Year 2028 traffic volumes **without** the potential 7,000 square-foot restaurant is shown without parentheses. The operation of the intersection assuming the Year 2028 traffic volumes **with** the potential 7,000 square-foot restaurant is shown in parentheses.

Table 6
CAPACITY ANALYSIS RESULTS – TWO-WAY STOP SIGN CONTRIOL
EAST LOOP ROAD WITH CHICK-FIL-A ACCESS DRIVE AND RICE LAKE SQUARE SOUTHERN ACCESS DRIVE

Intersection	Weekday Morning Peak Hour		Weekday Evening Peak Hour		Saturday Midday Peak Hour	
	LOS	Delay	LOS	Delay	LOS	Delay
Year 2022 Existing Peak Hour Conditions						
• Eastbound Left Turn	B	12.1	C	16.7	C	15.7
• Eastbound Right Turn	B	10.1	B	11.8	B	11.4
• Westbound Left Turn	B	13.0	C	21.5	C	23.2
• Westbound Through/Right Turn	A	9.7	B	12.0	B	11.5
• Northbound Left Turn	A	7.7	A	7.9	A	7.8
• Southbound Left Turn	A	7.9	A	8.4	A	8.1
Year 2028 Total Peak Hour Conditions[1]						
• Eastbound Left Turn	B (B)	13.4 (14.1)	C (C)	21.5 (22.3)	C (C)	19.7 (21.7)
• Eastbound Right Turn	B (B)	10.4 (10.4)	B (B)	13.6 (13.8)	B (B)	12.7 (12.9)
• Westbound Left Turn	C (C)	15.0(16.3)	E (F)	48.8 (65.7)	E (F)	49.2 (77.2)
• Westbound Through/Right Turn	B (B)	10.3 (10.5)	B (B)	13.2 (13.5)	B (B)	12.4 (12.7)
• Northbound Left Turn	A (A)	7.8 (7.8)	A (A)	8.2 (8.2)	A (A)	8.1 (8.1)
• Southbound Left Turn	A (A)	8.1 (8.2)	A (A)	8.6 (8.8)	A (A)	8.3 (8.5)

LOS = Level of Service
Delay is measured in seconds.
1. The operation of the intersection assuming the Year 2028 traffic volumes **without** the potential 7,000 square-foot restaurant is shown without parentheses. The operation of the intersection assuming the Year 2028 traffic volumes **with** the potential 7,000 square-foot restaurant is shown in parentheses.

Table 7
CAPACITY ANALYSIS RESULTS – TWO-WAY STOP SIGN CONTRIOL
EAST LOOP ROAD WITH ILLINOIS INSTITUTE OF TECHNOLOGY ACCESS DRIVE AND
RICE LAKE SQUARE MIDDLE ACCESS DRIVE

Intersection	Weekday Morning Peak Hour		Weekday Evening Peak Hour		Saturday Midday Peak Hour	
	LOS	Delay	LOS	Delay	LOS	Delay
Year 2022 Existing Peak Hour Conditions						
• Eastbound Left Turn	B	11.8	B	13.0	B	12.1
• Eastbound Right Turn	A	9.8	B	10.1	A	9.7
• Westbound Approach	A	0.0	B	11.7	A	0.0
• Northbound Left Turn	A	0.0	A	7.9	A	7.8
• Southbound Left Turn	A	0.0	A	8.0	A	0.0
Year 2028 Total Peak Hour Conditions[1]						
• Eastbound Left Turn	B (B)	12.8 (13.0)	B (B)	14.2 (14.4)	B (B)	13.2 (13.4)
• Eastbound Right Turn	A (B)	9.9 (10.0)	B (B)	10.3 (10.4)	A (B)	9.9 (10.0)
• Westbound Approach	B (B)	12.3 (12.5)	B (C)	14.8 (15.0)	B (B)	12.9 (13.2)
• Northbound Left Turn	A (A)	7.9 (7.9)	A (A)	8.0 (8.0)	A (A)	7.8 (7.9)
• Southbound Left Turn	A (A)	8.0 (8.0)	A (A)	8.1 (8.1)	A (A)	8.0 (8.0)

LOS = Level of Service
Delay is measured in seconds.
1. The operation of the intersection assuming the Year 2028 traffic volumes **without** the potential 7,000 square-foot restaurant is shown without parentheses. The operation of the intersection assuming the Year 2028 traffic volumes **with** the potential 7,000 square-foot restaurant is shown in parentheses.

Discussion and Recommendations

The following summarizes how the intersections are projected to operate and identifies any roadway and traffic control improvements necessary to accommodate the development-generated traffic.

East Loop Road with IL 56

The following summarizes the results of the capacity analyses at this intersection:

- The intersection currently operates overall at Level of Service (LOS) B during the weekday morning, weekday evening, and Saturday midday peak hours. Assuming the Year 2028 total conditions with and without the potential 7,000 square-foot restaurant, this intersection is projected to continue to operate at LOS B during the weekday morning peak hour and at LOS C during the weekday evening and Saturday midday peak hours.

- All the IL 56 movements currently operate at LOS A or B during the weekday morning, weekday evening, and Saturday midday peak hours. Assuming the Year 2028 total conditions with and without the potential 7,000 square-foot restaurant, all the IL 56 movements are projected to operate on the threshold of LOS B/C or better during all three peak hours.

- The southbound approach of East Loop Road currently operates at LOS D during the weekday evening and Saturday midday peak hours and on the threshold between LOS D/E during the weekday morning peak hour. The lower level of service along the East Loop Road approach is due to the longer traffic signal cycle at this intersection and the fact that IL 56 is the primary road at this intersection and receives most of the green time. Assuming the Year 2028 total conditions with and without the potential 7,000 square-foot restaurant, the East Loop Road approach is projected to continue to operate at the same levels of service during all three peak hours. Further, the 95th percentile queues along the southbound approach of East Loop Road are not projected to extend to or past the Chick-fil-A access drive/Rice Lake Square southern access drive assuming the Year 2028 traffic conditions with and without the potential 7,000 square-foot restaurant during the weekday morning and Saturday afternoon peak hours. It should be noted that the 95th percentile queue during the weekday evening peak hour is projected to extend to approximately the Chick-fil-A access drive/Rice Lake Square southern access drive and, as is the case under existing conditions, may extend past the Chick-fil-A access drive/Rice Lake Square southern access drive on occasion during the weekday evening peak period.

As such, this intersection has sufficient reserve capacity to accommodate the Year 2028 total traffic volumes with and without the potential 7,000 square-foot restaurant and no roadway improvements or traffic control modifications are required. The operation of this intersection is enhanced due in part to the fact that (1) it is a T-intersection, which operates more efficiently than a four-way intersection, and (2) dual left-turn lanes are provided along the southbound approach of East Loop Road.

East Loop Road with Chick-fil-A Access Drive and the Rice Lake Square Southern Access Drive

The results of the capacity analysis indicate that all critical movements at this intersection currently operate at LOS C or better during the weekday morning, weekday evening, and Saturday midday peak hours.

Assuming the Year 2028 total conditions with and without the potential 7,000 square-foot restaurant, all the critical movements are projected to continue operating at LOS C or better during all the peak hours except for the westbound left-turn movement from the Chick-fil-A access drive. The westbound left-turn movement is projected to operate at LOS B during the weekday morning peak hour and LOS E during the weekday evening and Saturday midday peak hours assuming the Year 2028 total conditions without the potential 7,000 square-foot restaurant. Assuming the potential 7,000 square-foot restaurant, the westbound left-turn movement is projected to operate at LOS F during the weekday evening and Saturday midday peak hours. 95th percentile queues along the Chick-fil-A access drive are projected to be three to four vehicles during the weekday evening and Saturday midday peak hours without the 7,000 square-foot restaurant, which is consistent with the observations of the existing operations. With the 7,000 square-foot restaurant, the 95th percentile queues along the Chick-fil-A access drive are projected to increase to five to six vehicles during the weekday evening and Saturday midday peak hours. As can be expected and discussed above, the delays and the queues along the access drive are projected to increase with the addition of the potential 7,000 square-foot restaurant. It is important to note that any additional delay experienced along the Chick-fil-A access drive will only impact traffic exiting the access drive and will not impact the through traffic along East Loop Road. As such, this intersection generally has sufficient reserve capacity to accommodate the Year 2028 total traffic volumes and no roadway improvements or traffic control modifications are required.

East Loop Road with IIT Access Drive and the Rice Lake Square Middle Access Drive

The results of the capacity analysis indicate that all critical movements/approaches at this intersection currently operate at LOS B or better during the weekday morning, weekday evening, and Saturday midday peak hours. Assuming Year 2028 total conditions with and without the potential 7,000 square-foot restaurant, all critical movements are projected to operate on the threshold between LOS B/C or better during the peak hours. As such, this intersection has sufficient reserve capacity to accommodate the Year 2028 total traffic volumes and no roadway improvements or traffic control modifications are required.

East Loop Road with Jahns Drive and the Rice Lake Square Northern Access Drive

The results of the capacity analysis indicate that all critical movements at this intersection currently operate at LOS C or better during the weekday morning, weekday evening, and Saturday midday peak hours. Assuming Year 2028 total conditions with and without the potential 7,000 square-foot restaurant, all the critical movements are projected to continue operating at LOS C or better during all three peak hours. As such, this intersection has sufficient reserve capacity to accommodate the Year 2028 total traffic volumes and no roadway improvements or traffic control modifications are required.

Gap Study

Gap studies are conducted to determine whether a roadway traffic stream has sufficient available gaps to enable traffic to enter or exit a particular road or access drive. This is accomplished by surveying the number and lengths of available gaps in the traffic stream of a roadway. Gaps are defined as the headways (spacing) of the traffic flow (vehicles) on the roadway with the right-of-way at unsignalized intersections. The distribution of available gaps in a traffic stream is dependent on the traffic volume, the directional distribution of the traffic, the number of lanes on the roadway, and the degree and type of platooning in the traffic flow. (It should be noted that vehicles typically do not travel at constant [equal] headways. Vehicles tend to travel in platoons or groups, with varying headways [gaps] between successive vehicles.) The demand for gaps in the traffic flow is a function of the number of vehicles entering and exiting a road or access drive.

As part of the traffic study, a gap study was performed at the intersection of East Loop Road with the Chick-fil-A access drive and the Rice Lake Square southern access drive to determine if sufficient gaps are available to accommodate the additional traffic projected to be using the two access drives. The gap study was conducted in December 2022 during the weekday morning, weekday evening, and Saturday midday peak hours. **Table 8** shows the number of available gaps in the East Loop Road traffic stream and the additional traffic estimated to be generated to and from the access drives without the potential 7,000 square-foot restaurant. It is important to note the following concerning the gap study:

- If a vehicle was observed turning to or from either of the access drives, those gaps were not assumed to be available for the additional traffic projected to use the two access drives.

- The gap study did not include follow-up gaps, which consist of the shorter gaps required for any additional vehicles stacked behind the first vehicle waiting at the access drive.

As such, the gap study provides a conservative (worst-case) analysis. Based on the results of the gap study, adequate gaps are available in the East Loop Road traffic stream to accommodate the additional traffic projected to use the two access drives.

Table 8
RESULTS OF EAST LOOP ROAD GAP STUDY AT
CHICK-FIL-A ACCESS DRIVE/RICE LAKE SQUARE SOUTHERN ACCESS DRIVE

	Total Gaps	Demand For Gaps
Northbound Gaps (Southbound Left-Turn and Westbound Right-Turn Movements)		
• Weekday Morning Peak Hour	114	2
• Weekday Evening Peak Hour	183	8
• Saturday Midday Peak Hour	120	4
Southbound Gaps (Northbound Left-Turn and Eastbound Right-Turn Movements)		
• Weekday Morning Peak Hour	77	15
• Weekday Evening Peak Hour	144	24
• Saturday Midday Peak Hour	106	53
Combined Gaps (Eastbound Left-Turn and Westbound Left-Turn Movements)		
• Weekday Morning Peak Hour	318	13
• Weekday Evening Peak Hour	167	37
• Saturday Midday Peak Hour	210	22

Notes:
- Gap study only surveyed the available gaps at the intersection and did not include gaps currently used by existing traffic or follow-up gaps.
- Demand for gaps represents the additional traffic estimated to be generated to and from the access drives.

Potential Modifications and/or Improvements

The traffic study has shown that the East Loop Road corridor is currently and projected to continue generally operating well and functioning typical of a commercial collector road. Nevertheless, per the request of the City of Wheaton, the traffic study also examined the following additional modifications and/or improvements that could potentially enhance the operation of the corridor.

Relocation of the Chick-fil-A Access Drive

Access spacing and access management is an important concept of roadway design as it (1) minimizes turning conflicts between access drives and (2) allows for sufficient distance between access drives in order to provide appropriate-sized turn lanes along the road serving the access drives. Relocating the Chick-fil-A access drive further north will compromise the excellent access spacing and management that is currently designed along East Loop Road, particularly the north-south section, due to the following:

- The relocation of the access drive will result in three access drives within approximately 400 feet of each other. As a result, the relocated Chick-fil-A access drive will be located only approximately 200 feet from both the Rice Lake Square middle access drive/IIT access drive and the Rice Lake Square southern access drive, creating off-set intersections with both access drives. Generally, four-legged intersections are preferred to off-set T-intersections.

- If the relocated access drive is located approximately halfway between the two Rice Lake Square access drives, only approximately 160 to 170 feet will be available to accommodate back-to-back left-turn lanes on East Loop Road serving the relocated Chick-fil-A access drive and the Rice Lake Square middle access drive which may require a center, left-turn lane instead of back-to-back turn lanes. As such, the back-to-back separate left-turn lanes or the center, two-way left-turn lane will substantially reduce the left-turn stacking and taper, which will likely impact the flow of traffic along East Loop Road.

Further, the majority of the Chick-fil-A access drive traffic is traveling to and from the south on East Loop Road. As such, the relocation of the access drive will result in additional travel for the majority of the traffic traveling to and from this access drive.

Additional Access Drive Serving the Chick-fil-A and Car Wash Sites

Given the discussion above concerning access spacing and management, an additional access drive serving the Chick-fil-A and car wash sites would likely be restricted to right-turn in and right-turn out movements only. Based on the following, an additional right-turn in/right-turn out access drive will likely provide limited mitigation to the operation of the existing Chick-fil-A access drive:

- The amount of traffic that will use the access drive will be limited as it will likely be restricted to right-turn movements only, particularly inbound right-turn movements.

- The through/right-turn lane at the existing Chick-fil-A access drive is currently and projected to continue operating at a good level of service with limited delay.

- The additional access drive would provide limited mitigation to the left-turn movement from the Chick-fil-A access drive to southbound East Loop Road, which is the critical movement along this access drive.

Installation of a Traffic Signal

In order to determine if a traffic signal is warranted at intersection of East Loop Road with the Chick-fil-A access drive and the Rice Lake Square southern access drive, the warrants that control the installation of traffic signals were compared to the Year 2028 total traffic volumes. The results of the review showed that the Year 2028 traffic volumes do not meet Warrant 3 (Peak Hour Volumes). It should be noted that the weekday evening and Saturday midday peak hour volumes either meet or are close to meeting Warrant 1 (Eight Hour Volumes) and Warrant 2 (Four Hour Volumes) for one hour of the day. However, the minimum volumes must be met for eight hours in a day to meet Warrant 1 or four hours in a day to meet Warrant 2. While the traffic counts for this study were only performed for a limited number of hours, it does not appear that the projected traffic volumes would meet Warrant 1 or Warrant 2. More importantly, a traffic signal is not appropriate at this intersection given its proximity (approximately 580 feet) to the signalized intersection of IL 56 with East Loop Road. Further, a traffic signal is not needed at this intersection as the traffic study has shown that (1) the critical movements at this intersection currently and are projected to continue to generally operate at good levels of service with limited delay and queuing and (2) the East Loop Road traffic stream has sufficient gaps to accommodate the traffic entering and exiting the two access drives.

In addition, a review of the warrants that control the installation of traffic signals and the Year 2028 total traffic volumes shows that a traffic signal is not warranted at the intersection of East Loop Road with Jahns Drive and the Rice Lake Square northern access drive.

Widening of East Loop Road at its Intersection with IL 56

The capacity and operation of the southbound approach of East Loop Road can be enhanced by adding a third southbound lane along East Loop Road in order to provide dual left-turn lanes and a separate right-turn lane. A review of alternative capacity analyses performed at this intersection shows that the addition of the third lane would reduce the delay along the southbound approach of East Loop Road by two to three seconds and reduce the queuing along the southbound approach of East Loop Road by approximately 20 percent (20 to 55 feet). However, as the traffic study has shown, the southbound approach of East Loop Road at its intersection with IL 56 is currently and projected to continue operating at Level of Service D or on the threshold of LOS D/E. All vehicles generally clear the intersection on each green phase and are projected to continue to do so assuming the Year 2028 total traffic volumes. It should be noted that the additional lane will reduce the queuing along the southbound approach of East Loop Road. As discussed previously, assuming the Year 2028 traffic volumes and the existing lane geometrics, the 95th percentile queues are projected to extend to approximately the Chick-fil-A access drive/Rice Lake Square southern access drive during the evening peak period and, as is the case under existing conditions, may extend past the Chick-fil-A access drive/Rice Lake Square southern access drive on occasion during the weekday evening peak period.

Prohibiting Right Turns on Red from Westbound IL 56 to Northbound East Loop Road

Currently, the IL 56 westbound separate right-turn lane at its signalized intersection with East Loop Road does not have an overlap (green arrow) phase with the southbound East Loop Road phase. As such, the westbound right-turn movement has a stop condition (red ball) during the (1) southbound East Loop Road phase and (2) IL 56 eastbound left-turn phase. However, right turns on red are permitted from the IL 56 westbound right-turn lane. While many right-turn movements occur when they have the stopped condition, the results of the gap study and capacity analyses show that the East Loop Road traffic stream has sufficient gaps to accommodate the traffic to and from the access drives along East Loop Road.

It should be noted that prohibiting right turns on red will limit when traffic is able to flow along northbound East Loop Road and provide additional gaps along East Loop Road. However, restricting right turn on red movements will also result in additional delay for the IL 56 westbound right-turn movements and longer queues along the right-turn lane. In addition, IDOT will need to approve the restriction of right turns on red at this location.

6. Conclusion

Based on the preceding analyses and recommendations, the following conclusions have been made:

- Field observations and the results of the capacity analyses reveal the following concerning the existing operation of the East Loop Road corridor:
    - Overall, the corridor generally operates well with limited congestion. Some delay and queueing occur along the corridor. However, any queueing generally dissipates quickly and is typical of collector roads serving commercial areas.
    - The East Loop Road southbound approach at its intersection with IL 56 operates well and all vehicles typically clear the intersection during each green phase. Further, the southbound queues rarely extend past the Rice Lake Square southern access drive and the Chick-fil-A access drive. The few occasions that the queue extended past the two access drives, the queue quickly dissipated.
    - Jahns Road and all the access drives in the study area typically operate well. The Chick-fil-A access drive and Rice Lake Square southern access drive have an average queue of one to two vehicles with a typical peak queue of three to four vehicles. However, it is important to note that the queues generally dissipated quickly.
- A review of the crash data over the past five years shows that the East Loop Road corridor is experiencing a low incidence of crashes.
- The traffic volumes in the study area were projected to Year 2028 which include (1) a three percent increase in the existing traffic volumes to account for ambient growth, (2) the traffic to be generated by the Wash U car wash, and (3) the traffic to be generated by the vacant space at the Rice Lake Square shopping center.
- Assuming the Year 2028 traffic conditions with and without the potential 7,000 square-foot restaurant, the IL 56/East Loop Road intersection and all the critical movements at the stop sign controlled intersections are projected to operate at LOS D or better. It should be noted that the left-turn movement from the Chick-fil-A access drive is projected to operate at LOS E or F and the East Loop Road southbound approach at IL 56 is projected to operate on the threshold between LOS D/E during certain peak periods.

- The results of the gap study conducted along East Loop Road showed that sufficient gaps are available in the East Loop Road traffic stream to accommodate the traffic turning to and from the Chick-fil-A access drive and the Rice Lake Square southern access drive.

- In general, the existing roadway system has sufficient reserve capacity to accommodate the Year 2028 projected traffic volumes with and without the potential 7,000 square-foot restaurant.

  The traffic study also examined the following additional modifications and/or improvements that could potentially enhance the operation of the corridor:

  - Relocating the Chick-fil-A access drive further north will compromise the excellent access spacing and management that is currently designed along East Loop Road, particularly the north-south section, as it would result in (1) three access drives within approximately 400 feet and (2) would significantly reduce the left-turn lanes/stacking along East Loop Road.

  - In order to maintain appropriate access spacing and management, an additional access drive serving the Chick-fil-A and car wash sites would likely be restricted to right-turn in and right-turn out movements only which will provide limited mitigation to the operation of the existing Chick-fil-A access drive.

  - A traffic signal is not required at the East Loop Road/Chick-fil-A access drive/Rice Lake Square southern access drive intersection and is a not appropriate at this intersection given its proximity (approximately 580 feet) to the signalized intersection of IL 56 with East Loop Road.

  - Widening the southbound approach of East Loop Road to provide a separate right-turn lane at its intersection with IL 56 will increase the capacity of this approach. However, the capacity analyses have shown that the additional lane will provide only minimal reductions in the average delay experienced at this intersection. However, it will reduce the queueing and the potential for the queue to block the Chick-fil-A access drive/Rice Lake Square southern access drive.

  - Prohibiting right turns on red from westbound IL 56 to northbound East Loop Road will limit when traffic is able to flow along northbound East Loop Road and provide additional gaps along East Loop Road. However, restricting right turn on red movements will also result in additional delay for the IL 56 westbound right-turn movements and longer queues along the right-turn lane. In addition, IDOT will need to approve the restriction of right turns on red at this location.

Appendix

Traffic Count Summary Sheets
CMAP 2050 Projections Letter
Figure A
Level of Service Criteria
Capacity Analysis Summary Sheets

Traffic Count Summary Sheets

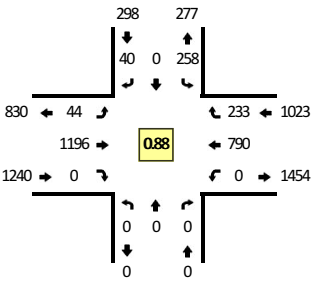
Type of peak hour being reported: User-Defined

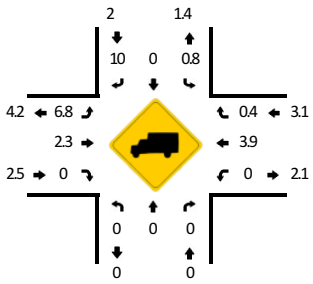
Method for determining peak hour: Total Entering Volume

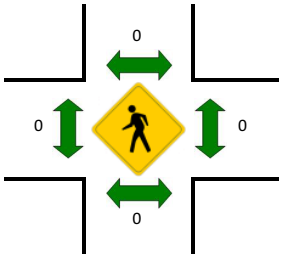
LOCATION: E Loop Rd -- IL 56
CITY/STATE: Wheaton, IL

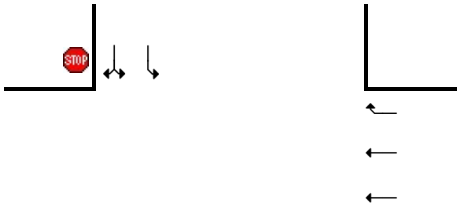
QC JOB #: 16029801
DATE: Tue, Dec 6 2022

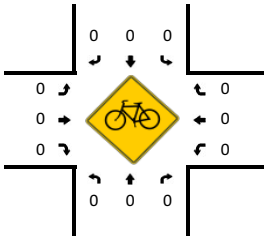
Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

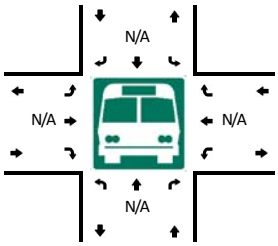


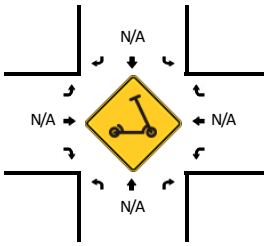












15-Min Count Period Beginning At	E Loop Rd (Northbound)				E Loop Rd (Southbound)				IL 56 (Eastbound)				IL 56 (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	0	0	47	0	7	0	6	200	0	0	0	151	23	1	435	
7:15 AM	0	0	0	0	65	0	3	0	5	262	0	0	0	176	38	0	549	
7:30 AM	0	0	0	0	84	0	6	0	11	321	0	0	0	204	63	0	689	
7:45 AM	0	0	0	0	69	0	11	0	6	366	0	0	0	217	62	0	731	2404
8:00 AM	0	0	0	0	57	0	6	0	15	269	0	0	0	181	61	0	589	2558
8:15 AM	0	0	0	0	48	0	17	0	12	240	0	0	0	188	47	0	552	2561
8:30 AM	0	0	0	0	53	0	4	0	9	297	0	0	0	204	48	0	615	2487
8:45 AM	0	0	0	0	43	0	7	0	7	261	0	0	0	207	55	0	580	2336

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	276	0	44	0	24	1464	0	0	0	868	248	0	2924
Heavy Trucks	0	0	0		0	0	8		4	20	0		0	20	0		52
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 12/15/2022 11:09 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

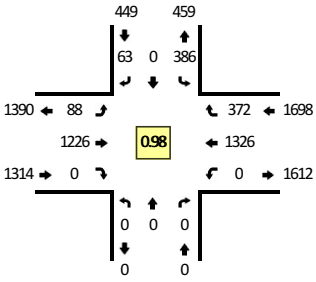
Type of peak hour being reported: User-Defined

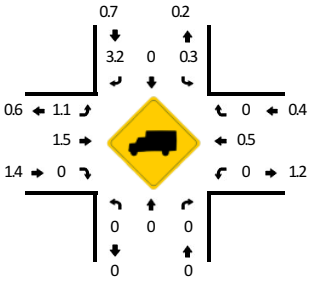
Method for determining peak hour: Total Entering Volume

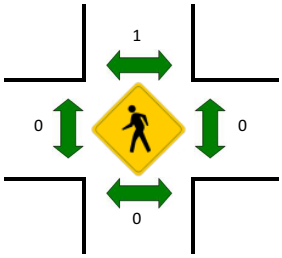
LOCATION: E Loop Rd -- IL 56
CITY/STATE: Wheaton, IL

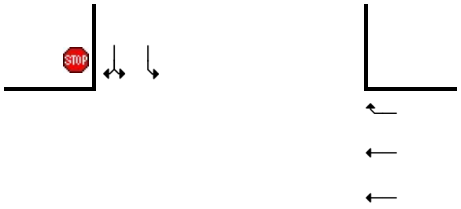
QC JOB #: 16029802
DATE: Tue, Dec 6 2022

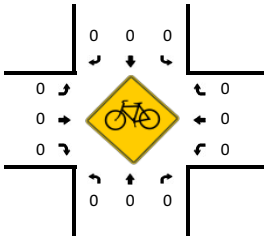
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:30 PM -- 4:45 PM

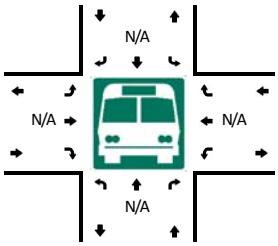


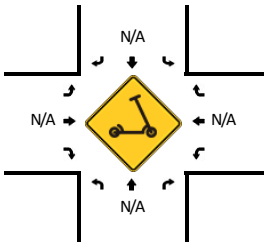












15-Min Count Period Beginning At	E Loop Rd (Northbound)				E Loop Rd (Southbound)				IL 56 (Eastbound)				IL 56 (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	97	0	10	0	18	261	0	0	0	368	78	0	832	
4:15 PM	0	0	0	0	70	0	10	0	24	291	0	0	0	353	92	0	840	
4:30 PM	0	0	0	0	93	0	19	0	20	308	0	1	0	349	89	0	879	
4:45 PM	0	0	0	0	94	0	16	0	14	303	0	0	0	328	99	0	854	3405
5:00 PM	0	0	0	0	97	0	17	0	23	317	0	0	0	323	82	0	859	3432
5:15 PM	0	0	0	0	102	0	11	0	30	298	0	0	0	326	102	0	869	3461
5:30 PM	0	0	0	0	108	0	17	0	18	284	0	0	0	312	106	0	845	3427
5:45 PM	0	0	0	0	80	0	25	0	31	236	0	0	0	311	104	0	787	3360

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	372	0	76	0	80	1232	0	4	0	1396	356	0	3516
Heavy Trucks	0	0	0		4	0	4		0	16	0		0	4	0		28
Buses																	
Pedestrians		0				4				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 12/15/2022 11:10 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

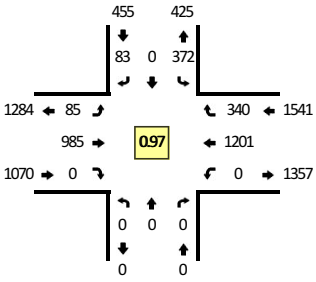
Type of peak hour being reported: User-Defined

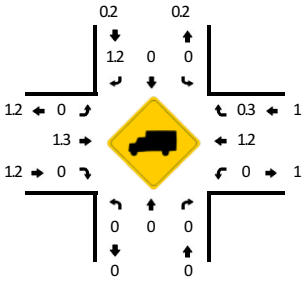
Method for determining peak hour: Total Entering Volume

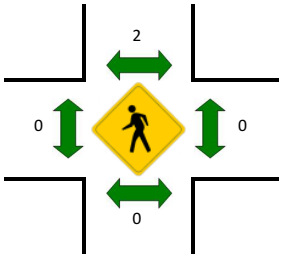
LOCATION: E Loop Rd -- IL 56
CITY/STATE: Wheaton, IL

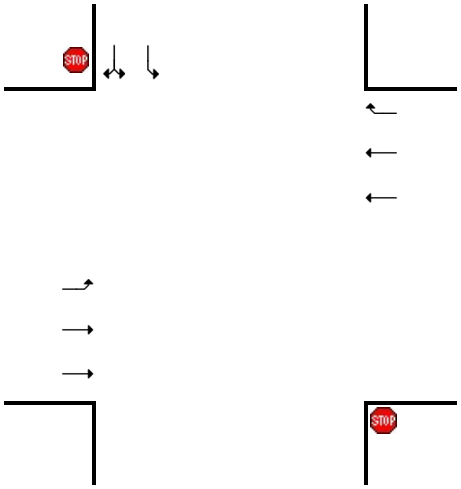
QC JOB #: 16029803
DATE: Sat, Dec 10 2022

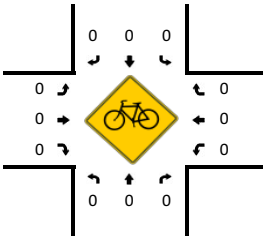
Peak-Hour: 12:30 PM -- 1:30 PM
Peak 15-Min: 1:15 PM -- 1:30 PM

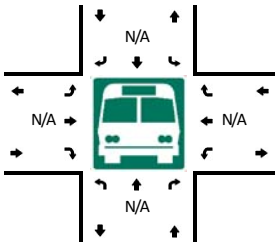


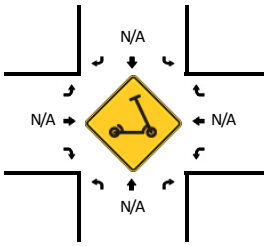












15-Min Count Period Beginning At	E Loop Rd (Northbound)				E Loop Rd (Southbound)				IL 56 (Eastbound)				IL 56 (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
11:30 AM	0	0	0	0	72	0	10	0	17	226	0	0	0	285	73	0	683	
11:45 AM	0	0	0	0	83	0	18	0	15	204	0	0	0	298	92	0	710	
12:00 PM	0	0	0	0	97	0	19	0	19	274	0	0	0	251	90	0	750	
12:15 PM	0	0	0	0	105	0	17	0	19	248	0	0	0	290	88	0	767	2910
12:30 PM	0	0	0	0	79	0	23	0	26	235	0	0	0	311	84	0	758	2985
12:45 PM	0	0	0	0	93	0	23	0	11	270	0	0	0	294	95	0	786	3061
1:00 PM	0	0	0	0	90	0	14	0	26	248	0	0	0	276	79	0	733	3044
1:15 PM	0	0	0	0	110	0	23	0	22	232	0	0	0	320	82	0	789	3066

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	0	0	440	0	92	0	88	928	0	0	0	1280	328	0	3156
Heavy Trucks	0	0	0		0	0	0		0	16	0		0	28	4		48
Buses																	
Pedestrians		0				4				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

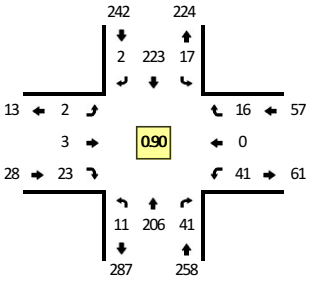
Report generated on 12/15/2022 11:10 AM

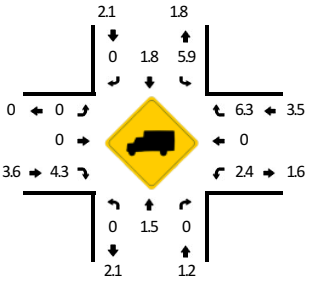
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

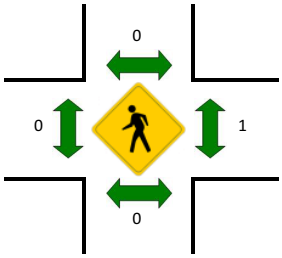
Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

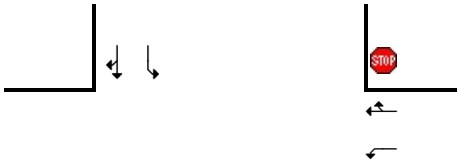
LOCATION: E Loop Rd -- Rice Lake Square Southern Dwy/Chick-Fil-A Access Dwy | **QC JOB #:** 16029804
CITY/STATE: Wheaton, IL | **DATE:** Tue, Dec 6 2022

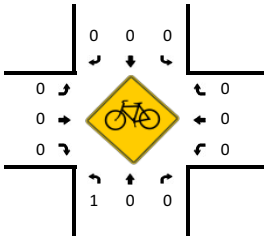
Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:30 AM -- 7:45 AM

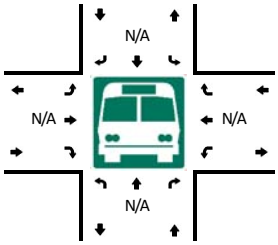


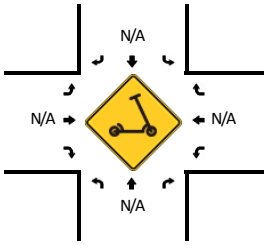












15-Min Count Period Beginning At	E Loop Rd (Northbound)				E Loop Rd (Southbound)				Rice Lake Square Southern Dwy/Chick-Fil-A Access Dwy (Eastbound)				Rice Lake Square Southern Dwy/Chick-Fil-A Access Dwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	16	3	0	1	46	0	0	0	0	5	0	1	0	1	0	73	
7:15 AM	1	37	7	0	3	59	0	0	0	0	2	0	4	0	0	0	113	
7:30 AM	1	56	6	0	7	72	1	0	0	2	7	0	7	0	4	0	163	
7:45 AM	1	53	14	0	5	64	0	0	2	0	8	0	7	0	6	0	160	509
8:00 AM	2	50	9	0	3	44	1	0	0	1	4	0	12	0	4	0	130	566
8:15 AM	7	47	12	0	2	43	0	0	0	0	4	0	15	0	2	0	132	585
8:30 AM	0	45	6	0	5	46	1	0	0	1	6	0	6	0	5	0	121	543
8:45 AM	3	46	10	0	8	33	0	0	1	0	9	0	6	2	7	0	125	508

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	224	24	0	28	288	4	0	0	8	28	0	28	0	16	0	652
Heavy Trucks	0	4	0		4	4	0		0	0	0		0	0	0		12
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	4	0	0		0	0	0		0	0	0		0	0	0		4
Scooters																	

Comments:

Report generated on 12/15/2022 11:09 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

LOCATION: E Loop Rd -- Rice Lake Square Southern Dwy/Chick-Fil-A Access Dwy

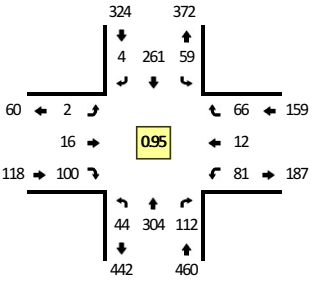
QC JOB #: 16029805

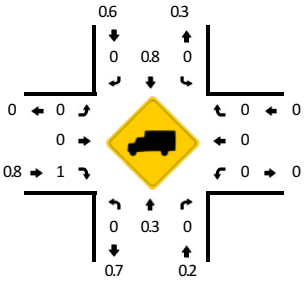
CITY/STATE: Wheaton, IL

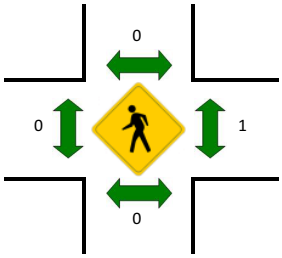
DATE: Tue, Dec 6 2022

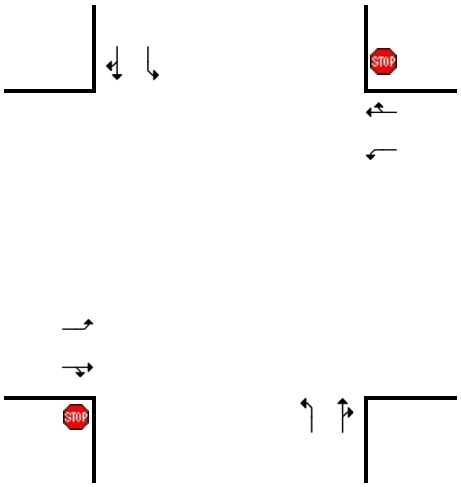
Peak-Hour: 4:30 PM -- 5:30 PM

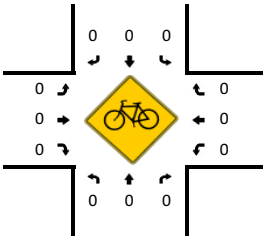
Peak 15-Min: 5:15 PM -- 5:30 PM

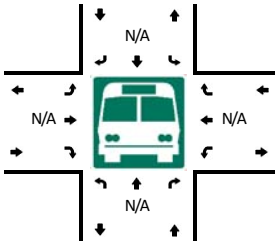


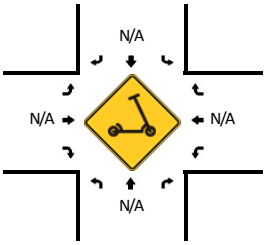












15-Min Count Period Beginning At	E Loop Rd (Northbound)				E Loop Rd (Southbound)				Rice Lake Square Southern Dwy/Chick-Fil-A Access Dwy (Eastbound)				Rice Lake Square Southern Dwy/Chick-Fil-A Access Dwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	12	67	16	0	6	65	5	1	1	2	27	0	15	2	2	0	221	
4:15 PM	14	68	32	0	18	51	2	0	2	2	16	0	17	2	7	0	231	
4:30 PM	8	75	23	0	23	69	0	0	1	4	29	0	16	6	10	0	264	
4:45 PM	16	79	22	0	15	50	1	0	1	3	32	0	21	1	22	0	263	979
5:00 PM	7	72	23	0	12	70	2	0	0	6	21	0	19	1	21	0	254	1012
5:15 PM	13	78	44	0	9	72	1	0	0	3	18	0	25	4	13	0	280	1061
5:30 PM	9	76	31	0	16	73	4	0	1	1	28	0	28	1	24	0	292	1089
5:45 PM	18	82	35	0	13	42	1	0	0	2	23	0	32	3	14	0	265	1091

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	52	312	176	0	36	288	4	0	0	12	72	0	100	16	52	0	1120
Heavy Trucks	0	4	0		0	4	0		0	0	0		0	0	0		8
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

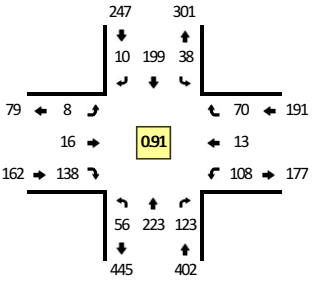
Report generated on 12/15/2022 11:10 AM

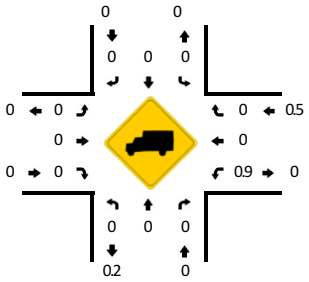
SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined | Method for determining peak hour: Total Entering Volume

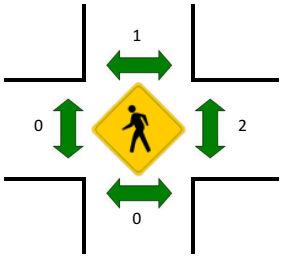
LOCATION: E Loop Rd -- Rice Lake Square Southern Dwy/Chick-Fil-A Access Dwy | **QC JOB #:** 16029806
CITY/STATE: Wheaton, IL | **DATE:** Sat, Dec 10 2022

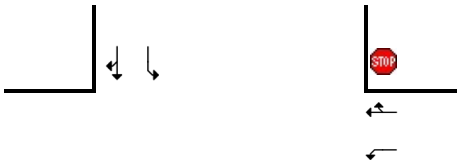
Peak-Hour: 12:30 PM -- 1:30 PM
Peak 15-Min: 12:45 PM -- 1:00 PM

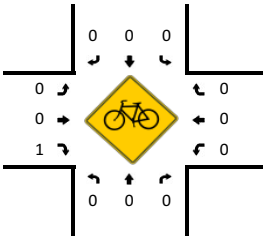


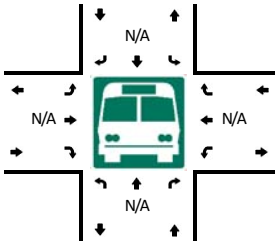


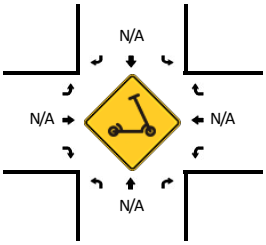
Quality Counts
DATA THAT DRIVES COMMUNITIES











15-Min Count Period Beginning At	E Loop Rd (Northbound)				E Loop Rd (Southbound)				Rice Lake Square Southern Dwy/Chick-Fil-A Access Dwy (Eastbound)				Rice Lake Square Southern Dwy/Chick-Fil-A Access Dwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
11:30 AM	14	47	24	0	11	36	2	0	0	6	33	0	21	0	14	0	208	
11:45 AM	21	65	22	0	17	51	0	0	1	6	30	0	18	3	15	0	249	
12:00 PM	21	61	20	0	20	60	2	0	1	6	37	0	23	0	17	0	268	
12:15 PM	14	58	34	0	20	48	2	0	2	4	43	0	28	3	14	0	270	995
12:30 PM	12	51	32	0	8	53	4	0	2	8	28	0	23	4	21	0	246	1033
12:45 PM	14	73	26	0	10	45	1	0	3	2	40	0	34	5	23	0	276	1060
1:00 PM	11	56	31	0	9	47	2	0	1	2	34	0	26	2	14	0	235	1027
1:15 PM	19	43	34	0	11	54	3	0	2	4	36	0	25	2	12	0	245	1002

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	56	292	104	0	40	180	4	0	12	8	160	0	136	20	92	0	1104
Heavy Trucks	0	0	0		0	0	0		0	0	0		4	0	0		4
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 12/15/2022 11:10 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

LOCATION: E Loop Rd -- Rice Lake Square Middle Dwy/IIT Rice Campus Dwy

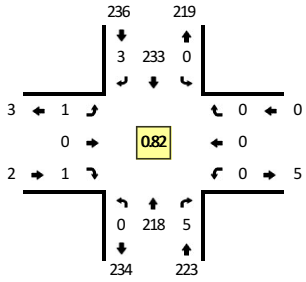
CITY/STATE: Wheaton, IL

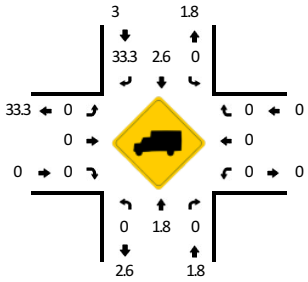
QC JOB #: 16029807

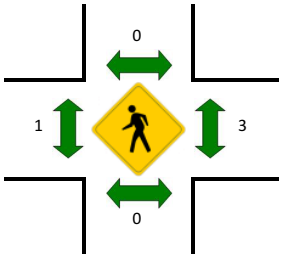
DATE: Tue, Dec 6 2022

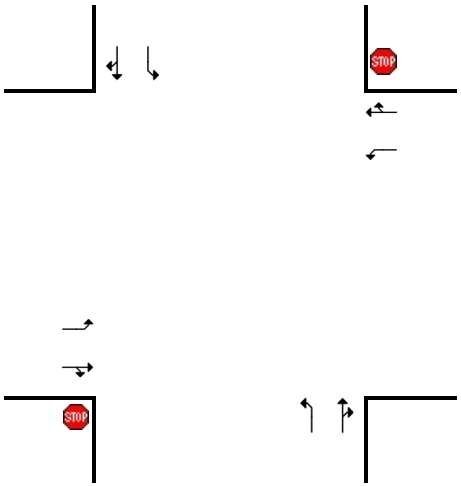
Peak-Hour: 7:30 AM -- 8:30 AM

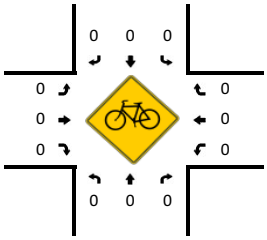
Peak 15-Min: 7:30 AM -- 7:45 AM

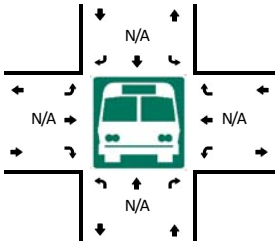


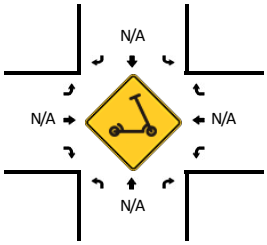












15-Min Count Period Beginning At	E Loop Rd (Northbound)				E Loop Rd (Southbound)				Rice Lake Square Middle Dwy/IIT Rice Campus Dwy (Eastbound)				Rice Lake Square Middle Dwy/IIT Rice Campus Dwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	20	0	0	0	49	0	0	0	0	1	0	0	0	0	0	70	
7:15 AM	1	38	0	0	0	72	0	0	0	0	1	0	1	0	0	0	113	
7:30 AM	0	60	2	0	0	76	1	0	0	0	1	0	0	0	0	0	140	
7:45 AM	0	58	1	0	0	67	1	0	0	0	0	0	0	0	0	0	127	450
8:00 AM	0	56	1	0	0	48	1	0	0	0	0	0	0	0	0	0	106	486
8:15 AM	0	44	1	0	0	42	0	0	1	0	0	0	0	0	0	0	88	461
8:30 AM	0	50	0	0	1	54	1	0	0	0	1	0	0	0	0	0	107	428
8:45 AM	1	52	0	0	0	39	0	0	0	0	0	0	0	0	0	0	92	393

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	240	8	0	0	304	4	0	0	0	4	0	0	0	0	0	560
Heavy Trucks	0	4	0		0	12	0		0	0	0		0	0	0		16
Buses																	
Pedestrians		0				0				4				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 12/15/2022 11:09 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

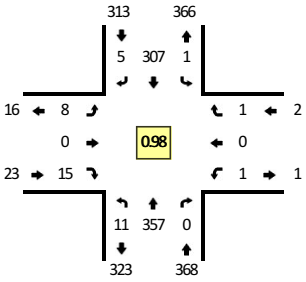
Type of peak hour being reported: User-Defined

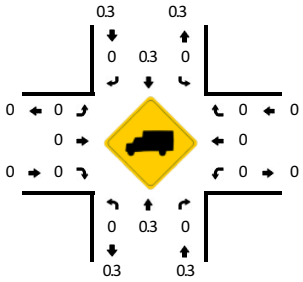
Method for determining peak hour: Total Entering Volume

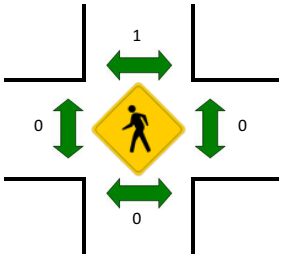
LOCATION: E Loop Rd -- Rice Lake Square Middle Dwy/IIT Rice Campus Dwy
CITY/STATE: Wheaton, IL

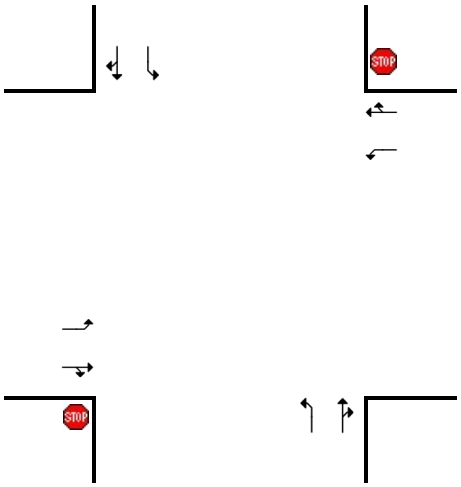
QC JOB #: 16029808
DATE: Tue, Dec 6 2022

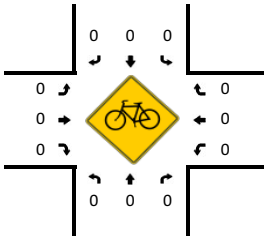
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:45 PM -- 5:00 PM

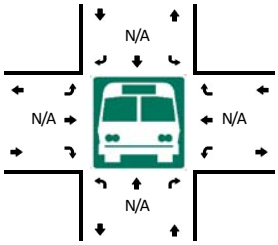


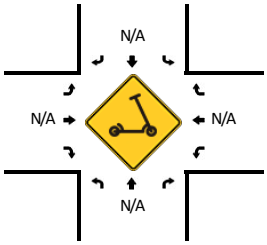












15-Min Count Period Beginning At	E Loop Rd (Northbound)				E Loop Rd (Southbound)				Rice Lake Square Middle Dwy/IIT Rice Campus Dwy (Eastbound)				Rice Lake Square Middle Dwy/IIT Rice Campus Dwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	4	64	0	0	0	72	1	0	0	0	5	0	0	0	0	0	146	
4:15 PM	3	76	1	0	0	75	2	0	3	0	1	0	1	0	0	0	162	
4:30 PM	4	81	0	0	0	78	1	0	2	0	9	0	0	0	0	0	175	
4:45 PM	1	102	0	0	0	73	1	0	3	0	0	0	0	0	0	0	180	663
5:00 PM	3	89	0	0	0	75	2	0	2	0	2	0	1	0	0	0	174	691
5:15 PM	3	85	0	0	1	81	1	0	1	0	4	0	0	0	1	0	177	706
5:30 PM	0	105	0	0	0	85	4	0	0	0	4	0	0	0	0	0	198	729
5:45 PM	4	89	0	0	0	59	0	0	1	0	1	0	0	0	0	0	154	703

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	4	408	0	0	0	292	4	0	12	0	0	0	0	0	0	0	720
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 12/15/2022 11:10 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: User-Defined

Method for determining peak hour: Total Entering Volume

LOCATION: E Loop Rd -- Rice Lake Square Middle Dwy/IIT Rice Campus Dwy

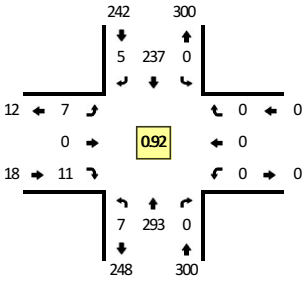
QC JOB #: 16029809

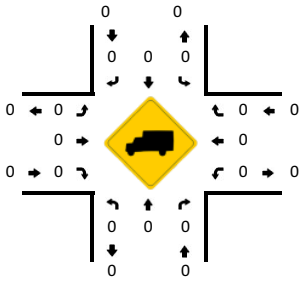
CITY/STATE: Wheaton, IL

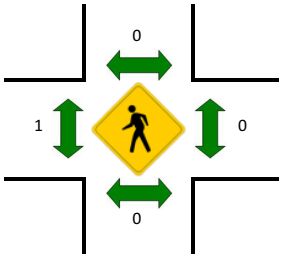
DATE: Sat, Dec 10 2022

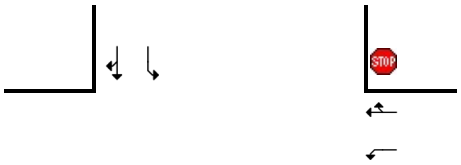
Peak-Hour: 12:30 PM -- 1:30 PM

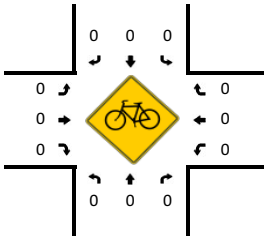
Peak 15-Min: 12:45 PM -- 1:00 PM

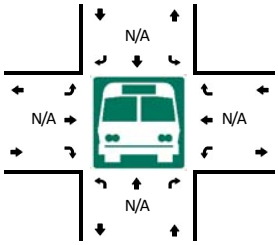


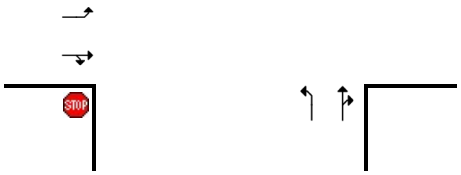


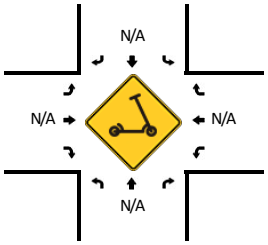












15-Min Count Period Beginning At	E Loop Rd (Northbound)				E Loop Rd (Southbound)				Rice Lake Square Middle Dwy/IIT Rice Campus Dwy (Eastbound)				Rice Lake Square Middle Dwy/IIT Rice Campus Dwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
11:30 AM	1	58	0	0	0	44	0	0	0	0	5	0	0	0	0	0	108	
11:45 AM	4	77	0	0	1	64	3	0	1	0	3	0	1	0	0	0	154	
12:00 PM	2	76	0	0	0	79	3	0	0	1	2	0	0	1	0	0	164	
12:15 PM	0	72	0	0	0	71	5	0	0	0	1	0	0	0	0	0	149	575
12:30 PM	1	76	0	0	0	61	1	0	2	0	4	0	0	0	0	0	145	612
12:45 PM	4	90	0	0	0	52	2	0	1	0	4	0	0	0	0	0	153	611
1:00 PM	1	72	0	0	0	58	1	0	3	0	0	0	0	0	0	0	135	582
1:15 PM	1	55	0	0	0	66	1	0	1	0	3	0	0	0	0	0	127	560

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	16	360	0	0	0	208	8	0	4	0	16	0	0	0	0	0	612
Heavy Trucks	0	0	0		0	0	0		0	0	0		0	0	0		0
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 12/15/2022 11:10 AM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Kenig Lindgren O'Hara Aboona, Inc.
9575 W. Higgins Rd., Suite 400

Rosemont, Illinois, United States 60018
(847)518-9990 kpachowicz@kloainc.com

Count Name: Loop Rd with Jahns Dr TMC
Site Code:
Start Date: 06/02/2022

Turning Movement Data

Start Time	Loop Rd Eastbound						Loop Rd Westbound						Jahns Dr Northbound						Jahns Dr Southbound						Int. Total
	U-Turn	Left	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Right	Peds	App. Total	
7:00 AM	0	5	15	4	0	24	0	1	32	3	0	36	0	4	1	0	0	5	0	13	1	12	0	26	91
7:15 AM	0	5	43	5	0	53	0	3	40	1	0	44	0	1	0	0	1	1	0	12	1	10	0	23	121
7:30 AM	0	0	39	2	0	41	0	4	43	6	0	53	0	4	1	0	0	5	0	16	1	11	0	28	127
7:45 AM	0	6	36	8	0	50	0	9	42	8	0	59	0	4	2	7	0	13	0	16	2	12	0	30	152
Hourly Total	0	16	133	19	0	168	0	17	157	18	0	192	0	13	4	7	1	24	0	57	5	45	0	107	491
8:00 AM	0	3	39	7	0	49	0	6	38	1	0	45	0	9	2	7	0	18	0	12	2	5	0	19	131
8:15 AM	0	5	37	4	1	46	0	2	49	5	0	56	0	3	0	2	0	5	0	12	1	9	3	22	129
8:30 AM	0	7	36	3	0	46	0	1	44	5	0	50	0	5	2	4	0	11	0	12	1	6	0	19	126
8:45 AM	0	3	34	10	0	47	0	2	60	2	1	64	0	4	0	2	1	6	0	9	7	15	0	31	148
Hourly Total	0	18	146	24	1	188	0	11	191	13	1	215	0	21	4	15	1	40	0	45	11	35	3	91	534
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	0	13	53	14	5	80	0	0	69	10	0	79	0	13	0	3	0	16	0	11	2	8	0	21	196
4:15 PM	0	7	51	9	2	67	0	0	67	14	0	81	0	10	1	2	0	13	0	5	2	5	0	12	173
4:30 PM	0	10	57	5	0	72	0	0	68	11	0	79	0	13	3	5	0	21	0	8	1	5	0	14	186
4:45 PM	0	13	59	11	1	83	0	1	77	17	1	95	0	13	4	2	0	19	0	5	1	9	0	15	212
Hourly Total	0	43	220	39	8	302	0	1	281	52	1	334	0	49	8	12	0	69	0	29	6	27	0	62	767
5:00 PM	0	11	74	13	1	98	0	0	68	21	1	89	0	20	6	10	0	36	0	6	3	11	0	20	243
5:15 PM	0	9	79	19	0	107	0	0	87	28	0	115	0	12	3	3	0	18	0	5	1	16	0	22	262
5:30 PM	0	10	71	20	1	101	0	1	80	17	0	98	0	12	2	4	0	18	0	12	0	8	0	20	237
5:45 PM	0	17	51	14	0	82	0	0	71	16	1	87	0	12	1	2	0	15	0	8	1	10	0	19	203
Hourly Total	0	47	275	66	2	388	0	1	306	82	2	389	0	56	12	19	0	87	0	31	5	45	0	81	945
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM	0	10	54	12	2	76	0	1	47	8	2	56	0	15	4	0	0	19	0	9	1	11	0	21	172
11:15 AM	0	14	54	10	0	78	0	1	55	12	0	68	0	17	1	1	2	19	0	5	0	9	1	14	179
11:30 AM	0	10	63	14	1	87	0	0	67	11	0	78	0	5	1	0	0	6	0	8	4	16	0	28	199
11:45 AM	0	14	72	18	0	104	0	0	64	14	0	78	0	19	3	0	0	22	0	11	2	11	0	24	228
Hourly Total	0	48	243	54	3	345	0	2	233	45	2	280	0	56	9	1	2	66	0	33	7	47	1	87	778
12:00 PM	0	15	50	18	1	83	0	0	64	4	0	68	0	16	4	1	0	21	0	5	2	12	0	19	191
12:15 PM	0	8	52	18	0	78	0	2	77	20	0	99	0	15	5	2	0	22	0	19	2	13	0	34	233
12:30 PM	0	6	56	16	0	78	0	0	78	5	0	83	0	14	5	1	0	20	0	11	2	12	0	25	206
12:45 PM	0	8	72	15	0	95	0	0	59	8	0	67	0	18	5	0	0	23	0	6	4	5	0	15	200
Hourly Total	0	37	230	67	1	334	0	2	278	37	0	317	0	63	19	4	0	86	0	41	10	42	0	93	830
1:00 PM	0	15	55	14	0	84	0	0	66	10	0	76	0	25	4	0	0	29	0	6	3	8	0	17	206
1:15 PM	0	8	66	16	0	90	0	0	62	7	0	69	0	14	5	1	0	20	0	9	4	8	0	21	200
1:30 PM	0	8	55	8	0	71	0	1	77	13	1	91	0	12	3	1	0	16	0	5	1	12	0	18	196

1:45 PM	0	7	49	9	0	65	0	0	65	19	0	84	0	13	2	0	0	15	0	4	3	12	0	19	183
Hourly Total	0	38	225	47	0	310	0	1	270	49	1	320	0	64	14	2	0	80	0	24	11	40	0	75	785
Grand Total	0	247	1472	316	15	2035	0	35	1716	296	7	2047	0	322	70	60	4	452	0	260	55	281	4	596	5130
Approach %	0.0	12.1	72.3	15.5	-	-	0.0	1.7	83.8	14.5	-	-	0.0	71.2	15.5	13.3	-	-	0.0	43.6	9.2	47.1	-	-	-
Total %	0.0	4.8	28.7	6.2	-	39.7	0.0	0.7	33.5	5.8	-	39.9	0.0	6.3	1.4	1.2	-	8.8	0.0	5.1	1.1	5.5	-	11.6	-
Lights	0	246	1451	313	-	2010	0	33	1695	292	-	2020	0	321	67	59	-	447	0	255	51	274	-	580	5057
% Lights	-	99.6	98.6	99.1	-	98.8	-	94.3	98.8	98.6	-	98.7	-	99.7	95.7	98.3	-	98.9	-	98.1	92.7	97.5	-	97.3	98.6
Buses	0	0	10	0	-	10	0	0	9	1	-	10	0	0	0	0	-	0	0	1	0	4	-	5	25
% Buses	-	0.0	0.7	0.0	-	0.5	-	0.0	0.5	0.3	-	0.5	-	0.0	0.0	0.0	-	0.0	-	0.4	0.0	1.4	-	0.8	0.5
Single-Unit Trucks	0	0	8	2	-	10	0	2	9	1	-	12	0	0	1	1	-	2	0	1	0	0	-	1	25
% Single-Unit Trucks	-	0.0	0.5	0.6	-	0.5	-	5.7	0.5	0.3	-	0.6	-	0.0	1.4	1.7	-	0.4	-	0.4	0.0	0.0	-	0.2	0.5
Articulated Trucks	0	0	0	1	-	1	0	0	1	1	-	2	0	0	0	0	-	0	0	0	0	1	-	1	4
% Articulated Trucks	-	0.0	0.0	0.3	-	0.0	-	0.0	0.1	0.3	-	0.1	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.4	-	0.2	0.1
Bicycles on Road	0	1	3	0	-	4	0	0	2	1	-	3	0	1	2	0	-	3	0	3	4	2	-	9	19
% Bicycles on Road	-	0.4	0.2	0.0	-	0.2	-	0.0	0.1	0.3	-	0.1	-	0.3	2.9	0.0	-	0.7	-	1.2	7.3	0.7	-	1.5	0.4
Pedestrians	-	-	-	-	15	-	-	-	-	-	7	-	-	-	-	-	4	-	-	-	-	-	4	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Kenig Lindgren O'Hara Aboona, Inc.
9575 W. Higgins Rd., Suite 400

Rosemont, Illinois, United States 60018
(847)518-9990 kpachowicz@kloainc.com

Count Name: Loop Rd with Jahns Dr TMC
Site Code:
Start Date: 06/02/2022

Turning Movement Peak Hour Data (7:30 AM)

Start Time	Loop Rd Eastbound						Loop Rd Westbound						Jahns Dr Northbound						Jahns Dr Southbound						Int. Total
	U-Turn	Left	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Right	Peds	App. Total	
7:30 AM	0	0	39	2	0	41	0	4	43	6	0	53	0	4	1	0	0	5	0	16	1	11	0	28	127
7:45 AM	0	6	36	8	0	50	0	9	42	8	0	59	0	4	2	7	0	13	0	16	2	12	0	30	152
8:00 AM	0	3	39	7	0	49	0	6	38	1	0	45	0	9	2	7	0	18	0	12	2	5	0	19	131
8:15 AM	0	5	37	4	1	46	0	2	49	5	0	56	0	3	0	2	0	5	0	12	1	9	3	22	129
Total	0	14	151	21	1	186	0	21	172	20	0	213	0	20	5	16	0	41	0	56	6	37	3	99	539
Approach %	0.0	7.5	81.2	11.3	-	-	0.0	9.9	80.8	9.4	-	-	0.0	48.8	12.2	39.0	-	-	0.0	56.6	6.1	37.4	-	-	-
Total %	0.0	2.6	28.0	3.9	-	34.5	0.0	3.9	31.9	3.7	-	39.5	0.0	3.7	0.9	3.0	-	7.6	0.0	10.4	1.1	6.9	-	18.4	-
PHF	0.000	0.583	0.968	0.656	-	0.930	0.000	0.583	0.878	0.625	-	0.903	0.000	0.556	0.625	0.571	-	0.569	0.000	0.875	0.750	0.771	-	0.825	0.887
Lights	0	13	145	19	-	177	0	21	170	20	-	211	0	20	5	16	-	41	0	56	5	35	-	96	525
% Lights	-	92.9	96.0	90.5	-	95.2	-	100.0	98.8	100.0	-	99.1	-	100.0	100.0	100.0	-	100.0	-	100.0	83.3	94.6	-	97.0	97.4
Buses	0	0	4	0	-	4	0	0	2	0	-	2	0	0	0	0	-	0	0	0	0	1	-	1	7
% Buses	-	0.0	2.6	0.0	-	2.2	-	0.0	1.2	0.0	-	0.9	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	2.7	-	1.0	1.3
Single-Unit Trucks	0	0	2	1	-	3	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	3
% Single-Unit Trucks	-	0.0	1.3	4.8	-	1.6	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	0.6
Articulated Trucks	0	0	0	1	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	1
% Articulated Trucks	-	0.0	0.0	4.8	-	0.5	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	0.2
Bicycles on Road	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	0	1	1	-	2	3
% Bicycles on Road	-	7.1	0.0	0.0	-	0.5	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	-	0.0	16.7	2.7	-	2.0	0.6
Pedestrians	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	3	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-

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(847)518-9990 kpachowicz@kloainc.com

Count Name: Loop Rd with Jahns Dr TMC
Site Code:
Start Date: 06/02/2022

Turning Movement Peak Hour Data (4:30 PM)

Start Time	Loop Rd Eastbound						Loop Rd Westbound						Jahns Dr Northbound						Jahns Dr Southbound						
	U-Turn	Left	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Right	Peds	App. Total	Int. Total
4:30 PM	0	10	57	5	0	72	0	0	68	11	0	79	0	13	3	5	0	21	0	8	1	5	0	14	186
4:45 PM	0	13	59	11	1	83	0	1	77	17	1	95	0	13	4	2	0	19	0	5	1	9	0	15	212
5:00 PM	0	11	74	13	1	98	0	0	68	21	1	89	0	20	6	10	0	36	0	6	3	11	0	20	243
5:15 PM	0	9	79	19	0	107	0	0	87	28	0	115	0	12	3	3	0	18	0	5	1	16	0	22	262
Total	0	43	269	48	2	360	0	1	300	77	2	378	0	58	16	20	0	94	0	24	6	41	0	71	903
Approach %	0.0	11.9	74.7	13.3	-	-	0.0	0.3	79.4	20.4	-	-	0.0	61.7	17.0	21.3	-	-	0.0	33.8	8.5	57.7	-	-	-
Total %	0.0	4.8	29.8	5.3	-	39.9	0.0	0.1	33.2	8.5	-	41.9	0.0	6.4	1.8	2.2	-	10.4	0.0	2.7	0.7	4.5	-	7.9	-
PHF	0.000	0.827	0.851	0.632	-	0.841	0.000	0.250	0.862	0.688	-	0.822	0.000	0.725	0.667	0.500	-	0.653	0.000	0.750	0.500	0.641	-	0.807	0.862
Lights	0	43	264	48	-	355	0	1	296	76	-	373	0	57	15	20	-	92	0	24	6	39	-	69	889
% Lights	-	100.0	98.1	100.0	-	98.6	-	100.0	98.7	98.7	-	98.7	-	98.3	93.8	100.0	-	97.9	-	100.0	100.0	95.1	-	97.2	98.4
Buses	0	0	2	0	-	2	0	0	2	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	4
% Buses	-	0.0	0.7	0.0	-	0.6	-	0.0	0.7	0.0	-	0.5	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	0.4
Single-Unit Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Single-Unit Trucks	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	1	-	1	1
% Articulated Trucks	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	2.4	-	1.4	0.1
Bicycles on Road	0	0	3	0	-	3	0	0	2	1	-	3	0	1	1	0	-	2	0	0	0	1	-	1	9
% Bicycles on Road	-	0.0	1.1	0.0	-	0.8	-	0.0	0.7	1.3	-	0.8	-	1.7	6.3	0.0	-	2.1	-	0.0	0.0	2.4	-	1.4	1.0
Pedestrians	-	-	-	-	2	-	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Count Name: Loop Rd with Jahns Dr TMC
Site Code:
Start Date: 06/02/2022

Turning Movement Peak Hour Data (12:30 PM)

Start Time	Loop Rd Eastbound						Loop Rd Westbound						Jahns Dr Northbound						Jahns Dr Southbound						Int. Total
	U-Turn	Left	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Right	Peds	App. Total	U-Turn	Left	Thru	Right	Peds	App. Total	
12:30 PM	0	6	56	16	0	78	0	0	78	5	0	83	0	14	5	1	0	20	0	11	2	12	0	25	206
12:45 PM	0	8	72	15	0	95	0	0	59	8	0	67	0	18	5	0	0	23	0	6	4	5	0	15	200
1:00 PM	0	15	55	14	0	84	0	0	66	10	0	76	0	25	4	0	0	29	0	6	3	8	0	17	206
1:15 PM	0	8	66	16	0	90	0	0	62	7	0	69	0	14	5	1	0	20	0	9	4	8	0	21	200
Total	0	37	249	61	0	347	0	0	265	30	0	295	0	71	19	2	0	92	0	32	13	33	0	78	812
Approach %	0.0	10.7	71.8	17.6	-	-	0.0	0.0	89.8	10.2	-	-	0.0	77.2	20.7	2.2	-	-	0.0	41.0	16.7	42.3	-	-	-
Total %	0.0	4.6	30.7	7.5	-	42.7	0.0	0.0	32.6	3.7	-	36.3	0.0	8.7	2.3	0.2	-	11.3	0.0	3.9	1.6	4.1	-	9.6	-
PHF	0.000	0.617	0.865	0.953	-	0.913	0.000	0.000	0.849	0.750	-	0.889	0.000	0.710	0.950	0.500	-	0.793	0.000	0.727	0.813	0.688	-	0.780	0.985
Lights	0	37	246	61	-	344	0	0	263	30	-	293	0	71	18	2	-	91	0	29	12	33	-	74	802
% Lights	-	100.0	98.8	100.0	-	99.1	-	-	99.2	100.0	-	99.3	-	100.0	94.7	100.0	-	98.9	-	90.6	92.3	100.0	-	94.9	98.8
Buses	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Buses	-	0.0	0.0	0.0	-	0.0	-	-	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	0.0
Single-Unit Trucks	0	0	3	0	-	3	0	0	1	0	-	1	0	0	1	0	-	1	0	1	0	0	-	1	6
% Single-Unit Trucks	-	0.0	1.2	0.0	-	0.9	-	-	0.4	0.0	-	0.3	-	0.0	5.3	0.0	-	1.1	-	3.1	0.0	0.0	-	1.3	0.7
Articulated Trucks	0	0	0	0	-	0	0	0	1	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1
% Articulated Trucks	-	0.0	0.0	0.0	-	0.0	-	-	0.4	0.0	-	0.3	-	0.0	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	0.1
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	2	1	0	-	3	3
% Bicycles on Road	-	0.0	0.0	0.0	-	0.0	-	-	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	-	6.3	7.7	0.0	-	3.8	0.4
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CMAP 2050 Projections Letter

Chicago Metropolitan Agency for Planning

433 West Van Buren Street
Suite 450
Chicago, IL 60607

312-454-0400
cmap.illinois.gov

January 6, 2023

Kelly Pachowicz
Consultant
Kenig, Lindgren, O'Hara, Aboona, Inc.
9575 West Higgins Road
Suite 400
Rosemont, IL 60018

Subject: ***Butterfield Road @ East Loop Drive***
IDOT

Dear Ms. Pachowicz:

In response to a request made on your behalf and dated January 5, 2023, we have developed year 2050 average daily traffic (ADT) projections for the subject location.

ROAD SEGMENT	Current ADT (2019)	Year 2050 ADT
Butterfield Rd @ East Loop Dr	27,100	32,300

Traffic projections are developed using existing ADT data provided in the request letter and the results from the October 2022 CMAP Travel Demand Analysis. The regional travel model uses CMAP 2050 socioeconomic projections and assumes the implementation of the ON TO 2050 Comprehensive Regional Plan for the Northeastern Illinois area. The provision of this data in support of your request does not constitute a CMAP endorsement of the proposed development or any subsequent developments.

If you have any questions, please call me at (312) 386-8806.

Sincerely,

Jose Rodriguez, PTP, AICP
Senior Planner, Research & Analysis

cc: Rios (IDOT)
S:\AdminGroups\ResearchAnalysis\2023_TrafficForecasts\Wheaton\du-01-23\du-01-23.docx

Figure A

East Loop Road Study
Wheaton, Illinois

Directional Distribution

KLOA
Kenig,Lindgren,O'Hara,Aboona,Inc.

Job No: 22-405 Figure: A

Level of Service Criteria

LEVEL OF SERVICE CRITERIA

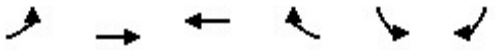
Signalized Intersections		
Level of Service	Interpretation	Average Control Delay (seconds per vehicle)
A	Favorable progression. Most vehicles arrive during the green indication and travel through the intersection without stopping.	≤10
B	Good progression, with more vehicles stopping than for Level of Service A.	>10 - 20
C	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. Number of vehicles stopping is significant, although many vehicles still pass through the intersection without stopping.	>20 - 35
D	The volume-to-capacity ratio is high and either progression is ineffective or the cycle length is too long. Many vehicles stop and individual cycle failures are noticeable.	>35 - 55
E	Progression is unfavorable. The volume-to-capacity ratio is high and the cycle length is long. Individual cycle failures are frequent.	>55 - 80
F	The volume-to-capacity ratio is very high, progression is very poor, and the cycle length is long. Most cycles fail to clear the queue.	>80.0

Unsignalized Intersections	
Level of Service	Average Total Delay (SEC/VEH)
A	0 - 10
B	> 10 - 15
C	> 15 - 25
D	> 25 - 35
E	> 35 - 50
F	> 50

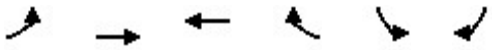
Source: *Highway Capacity Manual*, 2010.

Capacity Analysis Summary Sheets

Existing Weekday Morning Peak Hour



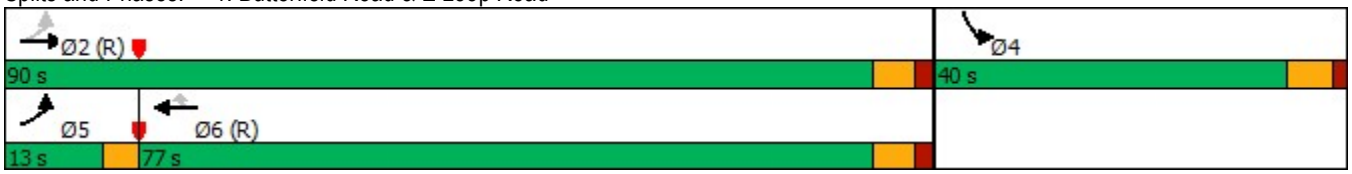
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	44	1196	790	233	258	40
Future Volume (vph)	44	1196	790	233	258	40
Ideal Flow (vphpl)	1900	2000	2000	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	230			220	225	150
Storage Lanes	1			1	1	0
Taper Length (ft)	250				55	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.95
Ped Bike Factor						
Frt				0.850	0.980	
Flt Protected	0.950				0.958	
Satd. Flow (prot)	1687	3725	3654	1615	3386	0
Flt Permitted	0.275				0.958	
Satd. Flow (perm)	488	3725	3654	1615	3386	0
Right Turn on Red				No		No
Satd. Flow (RTOR)						
Link Speed (mph)		45	45		30	
Link Distance (ft)		1427	1045		481	
Travel Time (s)		21.6	15.8		10.9	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	7%	2%	4%	0%	1%	10%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	50	1359	898	265	338	0
Turn Type	pm+pt	NA	NA	Perm	Prot	
Protected Phases	5	2	6		4	
Permitted Phases	2			6		
Detector Phase	5	2	6	6	4	
Switch Phase						
Minimum Initial (s)	3.0	15.0	15.0	15.0	8.0	
Minimum Split (s)	12.5	24.5	24.5	24.5	24.0	
Total Split (s)	13.0	90.0	77.0	77.0	40.0	
Total Split (%)	10.0%	69.2%	59.2%	59.2%	30.8%	
Yellow Time (s)	3.5	4.0	4.0	4.0	4.5	
All-Red Time (s)	0.0	2.0	2.0	2.0	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	3.5	6.0	6.0	6.0	6.0	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Min	C-Min	C-Min	None	
Act Effct Green (s)	100.2	97.7	89.6	89.6	20.3	
Actuated g/C Ratio	0.77	0.75	0.69	0.69	0.16	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.11	0.49	0.36	0.24	0.64	
Control Delay	4.7	7.3	9.6	9.2	56.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	4.7	7.3	9.6	9.2	56.9	
LOS	A	A	A	A	E	
Approach Delay		7.2	9.5		56.9	
Approach LOS		A	A		E	
Queue Length 50th (ft)	9	204	156	79	139	
Queue Length 95th (ft)	21	283	220	136	176	
Internal Link Dist (ft)		1347	965		401	
Turn Bay Length (ft)	230			220	225	
Base Capacity (vph)	463	2800	2517	1112	885	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.11	0.49	0.36	0.24	0.38	

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 130			
Offset: 35 (27%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.64			
Intersection Signal Delay: 13.9		Intersection LOS: B	
Intersection Capacity Utilization 50.0%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Butterfield Road & E Loop Road



Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	3	23	41	0	16	11	206	41	17	223	2
Future Vol, veh/h	2	3	23	41	0	16	11	206	41	17	223	2
Conflicting Peds, #/hr	0	0	0	0	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	0	-	-	0	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	4	2	0	6	0	2	0	6	2	0
Mvmt Flow	2	3	26	46	0	18	12	229	46	19	248	2

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	572	586	249	578	564	252	250	0	0	275	0	0
Stage 1	287	287	-	276	276	-	-	-	-	-	-	-
Stage 2	285	299	-	302	288	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.24	7.12	6.5	6.26	4.1	-	-	4.16	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.12	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.12	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.336	3.518	4	3.354	2.2	-	-	2.254	-	-
Pot Cap-1 Maneuver	434	425	785	427	438	777	1327	-	-	1265	-	-
Stage 1	725	678	-	730	685	-	-	-	-	-	-	-
Stage 2	727	670	-	707	677	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	416	415	785	404	427	777	1327	-	-	1265	-	-
Mov Cap-2 Maneuver	510	489	-	498	499	-	-	-	-	-	-	-
Stage 1	718	668	-	723	679	-	-	-	-	-	-	-
Stage 2	704	664	-	670	667	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.2	12.1	0.3	0.6
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1327	-	-	510	734	498	777	1265	-	-
HCM Lane V/C Ratio	0.009	-	-	0.004	0.039	0.091	0.023	0.015	-	-
HCM Control Delay (s)	7.7	-	-	12.1	10.1	13	9.7	7.9	-	-
HCM Lane LOS	A	-	-	B	B	B	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0.1	0.3	0.1	0	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	0	1	0	0	0	0	219	5	0	241	3
Future Vol, veh/h	1	0	1	0	0	0	0	219	5	0	241	3
Conflicting Peds, #/hr	0	0	0	0	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	0	-	0	-	-	-	150	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	0	0	0	0	0	0	0	2	0	0	3	33
Mvmt Flow	1	0	1	0	0	0	0	267	6	0	294	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	566	-	296	567	568	270	298	0	0	273	0	0
Stage 1	296	-	-	270	270	-	-	-	-	-	-	-
Stage 2	270	-	-	297	298	-	-	-	-	-	-	-
Critical Hdwy	7.1	-	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	-	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	438	0	748	437	435	774	1275	-	-	1302	-	-
Stage 1	717	0	-	740	690	-	-	-	-	-	-	-
Stage 2	740	0	-	716	671	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	438	-	748	436	435	774	1275	-	-	1302	-	-
Mov Cap-2 Maneuver	532	-	-	531	509	-	-	-	-	-	-	-
Stage 1	717	-	-	740	690	-	-	-	-	-	-	-
Stage 2	740	-	-	715	671	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.8	0	0	0
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1275	-	-	532	748	-	1302	-	-
HCM Lane V/C Ratio	-	-	-	0.002	0.002	-	-	-	-
HCM Control Delay (s)	0	-	-	11.8	9.8	0	0	-	-
HCM Lane LOS	A	-	-	B	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0	-	0	-	-

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	14	172	21	21	179	20	20	5	16	56	6	37
Future Vol, veh/h	14	172	21	21	179	20	20	5	16	56	6	37
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	0	-	-	-	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	0	3	10	0	1	0	0	0	0	0	0	3
Mvmt Flow	16	193	24	24	201	22	22	6	18	63	7	42

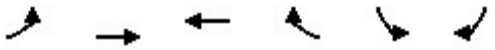
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	223	0	0	217	0	0	522	508	205	509	509	212
Stage 1	-	-	-	-	-	-	237	237	-	260	260	-
Stage 2	-	-	-	-	-	-	285	271	-	249	249	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.327
Pot Cap-1 Maneuver	1358	-	-	1365	-	-	468	471	841	478	470	826
Stage 1	-	-	-	-	-	-	771	713	-	749	697	-
Stage 2	-	-	-	-	-	-	727	689	-	759	704	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1358	-	-	1365	-	-	430	457	841	454	456	826
Mov Cap-2 Maneuver	-	-	-	-	-	-	515	519	-	536	517	-
Stage 1	-	-	-	-	-	-	762	704	-	740	684	-
Stage 2	-	-	-	-	-	-	672	677	-	728	696	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	0.5	0.7	11.2	11.6
HCM LOS			B	B

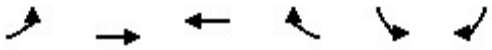
Minor Lane/Major Mvmt	NELn1	NELn2	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1	SWLn2
Capacity (veh/h)	515	733	1358	-	-	1365	-	-	534	826
HCM Lane V/C Ratio	0.044	0.032	0.012	-	-	0.017	-	-	0.13	0.05
HCM Control Delay (s)	12.3	10.1	7.7	-	-	7.7	-	-	12.8	9.6
HCM Lane LOS	B	B	A	-	-	A	-	-	B	A
HCM 95th %tile Q(veh)	0.1	0.1	0	-	-	0.1	-	-	0.4	0.2

Capacity Analysis Summary Sheets

Existing Weekday Evening Peak Hour



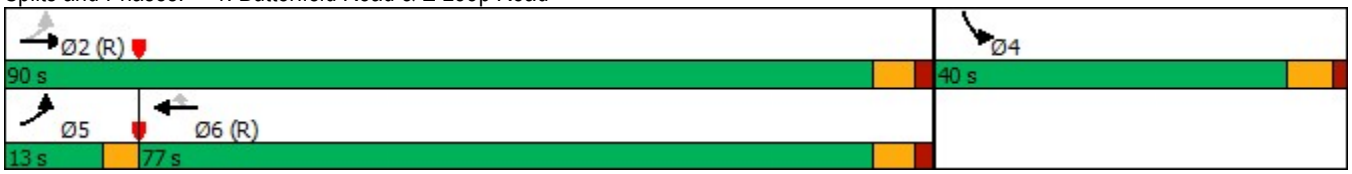
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	88	1226	1326	372	386	63
Future Volume (vph)	88	1226	1326	372	386	63
Ideal Flow (vphpl)	1900	2000	2000	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	230			220	225	150
Storage Lanes	1			1	1	0
Taper Length (ft)	250				55	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.95
Ped Bike Factor						
Frt				0.850	0.979	
Flt Protected	0.950				0.959	
Satd. Flow (prot)	1787	3725	3800	1615	3446	0
Flt Permitted	0.134				0.959	
Satd. Flow (perm)	252	3725	3800	1615	3446	0
Right Turn on Red				No		No
Satd. Flow (RTOR)						
Link Speed (mph)		45	45		30	
Link Distance (ft)		1427	1045		481	
Travel Time (s)		21.6	15.8		10.9	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	2%	0%	0%	0%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	90	1251	1353	380	458	0
Turn Type	pm+pt	NA	NA	Perm	Prot	
Protected Phases	5	2	6		4	
Permitted Phases	2			6		
Detector Phase	5	2	6	6	4	
Switch Phase						
Minimum Initial (s)	3.0	15.0	15.0	15.0	8.0	
Minimum Split (s)	12.5	24.5	24.5	24.5	24.0	
Total Split (s)	13.0	90.0	77.0	77.0	40.0	
Total Split (%)	10.0%	69.2%	59.2%	59.2%	30.8%	
Yellow Time (s)	3.5	4.0	4.0	4.0	4.5	
All-Red Time (s)	0.0	2.0	2.0	2.0	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	3.5	6.0	6.0	6.0	6.0	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Min	C-Min	C-Min	None	
Act Effct Green (s)	95.6	93.1	82.1	82.1	24.9	
Actuated g/C Ratio	0.74	0.72	0.63	0.63	0.19	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.33	0.47	0.56	0.37	0.69	
Control Delay	8.8	9.1	15.6	13.8	54.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	8.8	9.1	15.6	13.8	54.4	
LOS	A	A	B	B	D	
Approach Delay		9.0	15.2		54.4	
Approach LOS		A	B		D	
Queue Length 50th (ft)	19	215	322	145	186	
Queue Length 95th (ft)	41	304	454	247	231	
Internal Link Dist (ft)		1347	965		401	
Turn Bay Length (ft)	230			220	225	
Base Capacity (vph)	297	2666	2401	1020	901	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.30	0.47	0.56	0.37	0.51	

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 130			
Offset: 23 (18%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.69			
Intersection Signal Delay: 17.9		Intersection LOS: B	
Intersection Capacity Utilization 66.0%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Butterfield Road & E Loop Road



Intersection	
Int Delay, s/veh	4.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	16	100	81	12	66	44	304	112	59	261	4
Future Vol, veh/h	2	16	100	81	12	66	44	304	112	59	261	4
Conflicting Peds, #/hr	0	0	0	0	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	0	-	-	0	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	1	0	0	0	0	0	0	0	1	0
Mvmt Flow	2	17	105	85	13	69	46	320	118	62	275	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	913	931	277	933	874	379	279	0	0	438	0	0
Stage 1	401	401	-	471	471	-	-	-	-	-	-	-
Stage 2	512	530	-	462	403	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.21	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.309	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	256	269	764	248	290	672	1295	-	-	1133	-	-
Stage 1	630	604	-	577	563	-	-	-	-	-	-	-
Stage 2	548	530	-	584	603	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	208	245	764	192	264	672	1295	-	-	1133	-	-
Mov Cap-2 Maneuver	309	338	-	302	364	-	-	-	-	-	-	-
Stage 1	607	571	-	556	543	-	-	-	-	-	-	-
Stage 2	463	511	-	462	570	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.9	16.8	0.8	1.5
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1295	-	-	309	651	302	595	1133	-	-
HCM Lane V/C Ratio	0.036	-	-	0.007	0.188	0.282	0.138	0.055	-	-
HCM Control Delay (s)	7.9	-	-	16.7	11.8	21.5	12	8.4	-	-
HCM Lane LOS	A	-	-	C	B	C	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0	0.7	1.1	0.5	0.2	-	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	0	15	1	0	1	11	361	0	1	308	5
Future Vol, veh/h	8	0	15	1	0	1	11	361	0	1	308	5
Conflicting Peds, #/hr	0	0	0	0	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	0	-	0	-	-	-	150	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	8	0	15	1	0	1	11	368	0	1	314	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	710	-	317	716	711	368	319	0	0	368	0	0
Stage 1	319	-	-	390	390	-	-	-	-	-	-	-
Stage 2	391	-	-	326	321	-	-	-	-	-	-	-
Critical Hdwy	7.1	-	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	-	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	351	0	728	348	361	682	1252	-	-	1202	-	-
Stage 1	697	0	-	638	611	-	-	-	-	-	-	-
Stage 2	637	0	-	691	655	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	348	-	728	338	357	682	1252	-	-	1202	-	-
Mov Cap-2 Maneuver	459	-	-	450	447	-	-	-	-	-	-	-
Stage 1	691	-	-	632	606	-	-	-	-	-	-	-
Stage 2	630	-	-	676	654	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.1	11.7	0.2	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1252	-	-	459	728	542	1202	-	-
HCM Lane V/C Ratio	0.009	-	-	0.018	0.021	0.004	0.001	-	-
HCM Control Delay (s)	7.9	-	-	13	10.1	11.7	8	-	-
HCM Lane LOS	A	-	-	B	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0	0	-	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	43	270	48	1	292	77	58	16	20	24	6	41
Future Vol, veh/h	43	270	48	1	292	77	58	16	20	24	6	41
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	0	-	-	-	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	2
Mvmt Flow	50	314	56	1	340	90	67	19	23	28	7	48

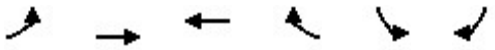
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	430	0	0	370	0	0	857	874	342	850	857	385
Stage 1	-	-	-	-	-	-	442	442	-	387	387	-
Stage 2	-	-	-	-	-	-	415	432	-	463	470	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.318
Pot Cap-1 Maneuver	1140	-	-	1200	-	-	280	290	705	283	297	663
Stage 1	-	-	-	-	-	-	598	580	-	641	613	-
Stage 2	-	-	-	-	-	-	619	586	-	583	563	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1140	-	-	1200	-	-	248	277	705	254	284	663
Mov Cap-2 Maneuver	-	-	-	-	-	-	361	375	-	371	390	-
Stage 1	-	-	-	-	-	-	572	554	-	613	612	-
Stage 2	-	-	-	-	-	-	567	585	-	521	538	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	1	0	15.5	12.9
HCM LOS			C	B

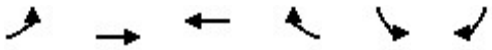
Minor Lane/Major Mvmt	NELn1	NELn2	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1	SWLn2
Capacity (veh/h)	361	507	1140	-	-	1200	-	-	375	663
HCM Lane V/C Ratio	0.187	0.083	0.044	-	-	0.001	-	-	0.093	0.072
HCM Control Delay (s)	17.2	12.7	8.3	-	-	8	-	-	15.6	10.9
HCM Lane LOS	C	B	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0.7	0.3	0.1	-	-	0	-	-	0.3	0.2

Capacity Analysis Summary Sheets

Existing Saturday Midday Peak Hour



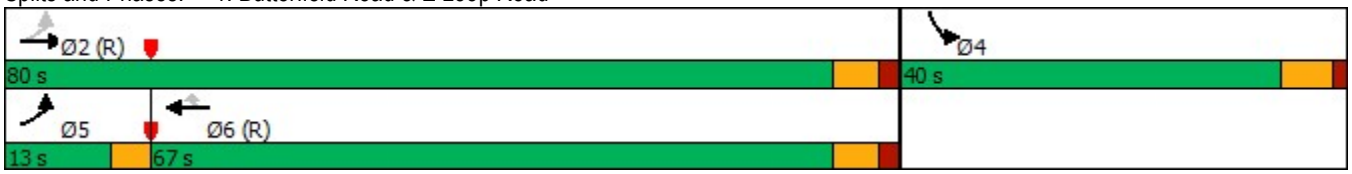
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	85	985	1201	340	372	83
Future Volume (vph)	85	985	1201	340	372	83
Ideal Flow (vphpl)	1900	2000	2000	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	230			220	225	150
Storage Lanes	1			1	1	0
Taper Length (ft)	250				55	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.95
Ped Bike Factor						
Frt				0.850	0.973	
Flt Protected	0.950				0.961	
Satd. Flow (prot)	1805	3762	3762	1615	3440	0
Flt Permitted	0.155				0.961	
Satd. Flow (perm)	294	3762	3762	1615	3440	0
Right Turn on Red				No		No
Satd. Flow (RTOR)						
Link Speed (mph)		45	45		30	
Link Distance (ft)		1427	1045		481	
Travel Time (s)		21.6	15.8		10.9	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	1%	1%	0%	0%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	88	1015	1238	351	470	0
Turn Type	pm+pt	NA	NA	Perm	Prot	
Protected Phases	5	2	6		4	
Permitted Phases	2			6		
Detector Phase	5	2	6	6	4	
Switch Phase						
Minimum Initial (s)	3.0	15.0	15.0	15.0	8.0	
Minimum Split (s)	12.5	24.5	24.5	24.5	24.0	
Total Split (s)	13.0	80.0	67.0	67.0	40.0	
Total Split (%)	10.8%	66.7%	55.8%	55.8%	33.3%	
Yellow Time (s)	3.5	4.0	4.0	4.0	4.5	
All-Red Time (s)	0.0	2.0	2.0	2.0	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	3.5	6.0	6.0	6.0	6.0	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Min	C-Min	C-Min	None	
Act Effct Green (s)	86.4	83.9	73.1	73.1	24.1	
Actuated g/C Ratio	0.72	0.70	0.61	0.61	0.20	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.29	0.39	0.54	0.36	0.68	
Control Delay	8.1	8.4	15.5	14.0	49.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	8.1	8.4	15.5	14.0	49.3	
LOS	A	A	B	B	D	
Approach Delay		8.4	15.2		49.3	
Approach LOS		A	B		D	
Queue Length 50th (ft)	18	154	276	128	174	
Queue Length 95th (ft)	40	224	397	223	218	
Internal Link Dist (ft)		1347	965		401	
Turn Bay Length (ft)	230			220	225	
Base Capacity (vph)	331	2631	2292	984	974	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.27	0.39	0.54	0.36	0.48	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 29 (24%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.68			
Intersection Signal Delay: 17.9		Intersection LOS: B	
Intersection Capacity Utilization 62.8%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 1: Butterfield Road & E Loop Road



Intersection	
Int Delay, s/veh	6.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	16	138	108	13	70	56	223	123	38	199	10
Future Vol, veh/h	8	16	138	108	13	70	56	223	123	38	199	10
Conflicting Peds, #/hr	0	0	0	0	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	0	-	-	0	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	0	0	0	1	0	0	0	0	0	0	0	0
Mvmt Flow	9	18	152	119	14	77	62	245	135	42	219	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	791	813	225	831	751	313	230	0	0	380	0	0
Stage 1	309	309	-	437	437	-	-	-	-	-	-	-
Stage 2	482	504	-	394	314	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.11	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.11	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.11	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.509	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	310	315	819	290	342	732	1350	-	-	1190	-	-
Stage 1	705	663	-	600	583	-	-	-	-	-	-	-
Stage 2	569	544	-	633	660	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	254	290	819	214	315	732	1350	-	-	1190	-	-
Mov Cap-2 Maneuver	345	376	-	315	402	-	-	-	-	-	-	-
Stage 1	673	640	-	572	556	-	-	-	-	-	-	-
Stage 2	473	519	-	484	637	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.6	18.1	1.1	1.3
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1350	-	-	345	730	315	649	1190	-	-
HCM Lane V/C Ratio	0.046	-	-	0.025	0.232	0.377	0.141	0.035	-	-
HCM Control Delay (s)	7.8	-	-	15.7	11.4	23.2	11.5	8.1	-	-
HCM Lane LOS	A	-	-	C	B	C	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0.9	1.7	0.5	0.1	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	0	11	0	0	0	7	294	0	0	236	5
Future Vol, veh/h	7	0	11	0	0	0	7	294	0	0	236	5
Conflicting Peds, #/hr	0	0	0	0	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	0	-	0	-	-	-	150	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	8	0	12	0	0	0	8	320	0	0	257	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	596	-	260	602	598	320	262	0	0	320	0	0
Stage 1	260	-	-	336	336	-	-	-	-	-	-	-
Stage 2	336	-	-	266	262	-	-	-	-	-	-	-
Critical Hdwy	7.1	-	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	-	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	418	0	784	414	418	725	1314	-	-	1251	-	-
Stage 1	749	0	-	682	645	-	-	-	-	-	-	-
Stage 2	682	0	-	744	695	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	416	-	784	406	415	725	1314	-	-	1251	-	-
Mov Cap-2 Maneuver	513	-	-	505	491	-	-	-	-	-	-	-
Stage 1	745	-	-	678	641	-	-	-	-	-	-	-
Stage 2	678	-	-	733	695	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.6	0	0.2	0
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1314	-	-	513	784	-	1251	-	-
HCM Lane V/C Ratio	0.006	-	-	0.015	0.015	-	-	-	-
HCM Control Delay (s)	7.8	-	-	12.1	9.7	0	0	-	-
HCM Lane LOS	A	-	-	B	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0	-	0	-	-

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	37	207	61	0	271	30	71	19	2	32	13	33
Future Vol, veh/h	37	207	61	0	271	30	71	19	2	32	13	33
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	0	-	-	-	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	0	1	0	0	1	0	0	5	0	3	0	0
Mvmt Flow	38	211	62	0	277	31	72	19	2	33	13	34

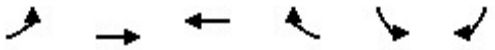
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	308	0	0	273	0	0	634	626	242	622	642	293
Stage 1	-	-	-	-	-	-	318	318	-	293	293	-
Stage 2	-	-	-	-	-	-	316	308	-	329	349	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.55	6.2	7.13	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.55	-	6.13	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.55	-	6.13	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4.045	3.3	3.527	4	3.3
Pot Cap-1 Maneuver	1264	-	-	1302	-	-	395	397	802	398	395	751
Stage 1	-	-	-	-	-	-	698	648	-	713	674	-
Stage 2	-	-	-	-	-	-	699	655	-	682	637	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1264	-	-	1302	-	-	361	385	802	375	383	751
Mov Cap-2 Maneuver	-	-	-	-	-	-	459	460	-	474	468	-
Stage 1	-	-	-	-	-	-	677	629	-	692	674	-
Stage 2	-	-	-	-	-	-	655	655	-	639	618	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	1	0	14	12
HCM LOS			B	B

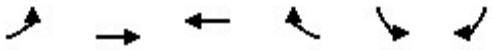
Minor Lane/Major Mvmt	NELn1	NELn2	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1	SWLn2
Capacity (veh/h)	459	479	1264	-	-	1302	-	-	472	751
HCM Lane V/C Ratio	0.158	0.045	0.03	-	-	-	-	-	0.097	0.045
HCM Control Delay (s)	14.3	12.9	7.9	-	-	0	-	-	13.4	10
HCM Lane LOS	B	B	A	-	-	A	-	-	B	B
HCM 95th %tile Q(veh)	0.6	0.1	0.1	-	-	0	-	-	0.3	0.1

Capacity Analysis Summary Sheets

Year 2028 Total Projected Weekday Morning Peak Hour
With Restaurant



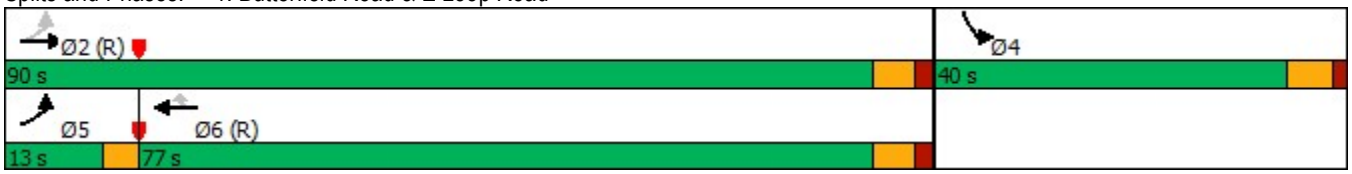
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	84	1232	814	314	304	59
Future Volume (vph)	84	1232	814	314	304	59
Ideal Flow (vphpl)	1900	2000	2000	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	230			220	225	150
Storage Lanes	1			1	1	0
Taper Length (ft)	250				55	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.95
Ped Bike Factor						
Frt				0.850	0.976	
Flt Protected	0.950				0.960	
Satd. Flow (prot)	1687	3725	3654	1615	3371	0
Flt Permitted	0.257				0.960	
Satd. Flow (perm)	456	3725	3654	1615	3371	0
Right Turn on Red				No		No
Satd. Flow (RTOR)						
Link Speed (mph)		45	45		30	
Link Distance (ft)		1427	1045		481	
Travel Time (s)		21.6	15.8		10.9	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	7%	2%	4%	0%	1%	10%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	95	1400	925	357	412	0
Turn Type	pm+pt	NA	NA	Perm	Prot	
Protected Phases	5	2	6		4	
Permitted Phases	2			6		
Detector Phase	5	2	6	6	4	
Switch Phase						
Minimum Initial (s)	3.0	15.0	15.0	15.0	8.0	
Minimum Split (s)	12.5	24.5	24.5	24.5	24.0	
Total Split (s)	13.0	90.0	77.0	77.0	40.0	
Total Split (%)	10.0%	69.2%	59.2%	59.2%	30.8%	
Yellow Time (s)	3.5	4.0	4.0	4.0	4.5	
All-Red Time (s)	0.0	2.0	2.0	2.0	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	3.5	6.0	6.0	6.0	6.0	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Min	C-Min	C-Min	None	
Act Effct Green (s)	97.2	94.7	83.7	83.7	23.3	
Actuated g/C Ratio	0.75	0.73	0.64	0.64	0.18	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.23	0.52	0.39	0.34	0.68	
Control Delay	6.3	8.9	12.3	12.6	55.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	6.3	8.9	12.3	12.6	55.6	
LOS	A	A	B	B	E	
Approach Delay		8.7	12.4		55.6	
Approach LOS		A	B		E	
Queue Length 50th (ft)	19	237	180	127	170	
Queue Length 95th (ft)	39	326	256	213	207	
Internal Link Dist (ft)		1347	965		401	
Turn Bay Length (ft)	230			220	225	
Base Capacity (vph)	431	2714	2352	1039	881	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.22	0.52	0.39	0.34	0.47	

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 130			
Offset: 35 (27%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.68			
Intersection Signal Delay: 16.3		Intersection LOS: B	
Intersection Capacity Utilization 52.9%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Butterfield Road & E Loop Road



Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	3	33	71	0	29	28	273	76	32	246	4
Future Vol, veh/h	3	3	33	71	0	29	28	273	76	32	246	4
Conflicting Peds, #/hr	0	0	0	0	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	0	-	-	0	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	4	2	0	6	0	2	0	6	2	0
Mvmt Flow	3	3	37	79	0	32	31	303	84	36	273	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	770	796	275	774	756	345	277	0	0	387	0	0
Stage 1	347	347	-	407	407	-	-	-	-	-	-	-
Stage 2	423	449	-	367	349	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.24	7.12	6.5	6.26	4.1	-	-	4.16	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.12	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.12	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.336	3.518	4	3.354	2.2	-	-	2.254	-	-
Pot Cap-1 Maneuver	320	322	759	316	340	689	1298	-	-	1150	-	-
Stage 1	673	638	-	621	601	-	-	-	-	-	-	-
Stage 2	613	576	-	653	637	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	292	305	759	286	322	689	1298	-	-	1150	-	-
Mov Cap-2 Maneuver	399	397	-	398	415	-	-	-	-	-	-	-
Stage 1	657	618	-	606	587	-	-	-	-	-	-	-
Stage 2	570	562	-	599	617	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.7	14.6	0.6	0.9
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1298	-	-	399	705	398	689	1150	-	-
HCM Lane V/C Ratio	0.024	-	-	0.008	0.057	0.198	0.047	0.031	-	-
HCM Control Delay (s)	7.8	-	-	14.1	10.4	16.3	10.5	8.2	-	-
HCM Lane LOS	A	-	-	B	B	C	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0	0.2	0.7	0.1	0.1	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	0	5	12	0	4	6	240	59	18	265	4
Future Vol, veh/h	2	0	5	12	0	4	6	240	59	18	265	4
Conflicting Peds, #/hr	0	0	0	0	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	0	-	0	-	-	-	150	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	0	0	0	0	0	0	0	2	0	0	3	33
Mvmt Flow	2	0	6	15	0	5	7	293	72	22	323	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	716	-	326	716	715	329	328	0	0	365	0	0
Stage 1	370	-	-	343	343	-	-	-	-	-	-	-
Stage 2	346	-	-	373	372	-	-	-	-	-	-	-
Critical Hdwy	7.1	-	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	-	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	348	0	720	348	359	717	1243	-	-	1205	-	-
Stage 1	654	0	-	676	641	-	-	-	-	-	-	-
Stage 2	674	0	-	652	622	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	339	-	720	339	350	717	1243	-	-	1205	-	-
Mov Cap-2 Maneuver	450	-	-	451	442	-	-	-	-	-	-	-
Stage 1	650	-	-	672	637	-	-	-	-	-	-	-
Stage 2	666	-	-	635	611	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.9	12.5	0.2	0.5
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1243	-	-	450	720	497	1205	-	-
HCM Lane V/C Ratio	0.006	-	-	0.005	0.008	0.039	0.018	-	-
HCM Control Delay (s)	7.9	-	-	13	10	12.5	8	-	-
HCM Lane LOS	A	-	-	B	B	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0	0.1	0.1	-	-

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	32	215	24	21	205	20	22	5	16	56	7	41
Future Vol, veh/h	32	215	24	21	205	20	22	5	16	56	7	41
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	0	-	-	-	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	0	3	10	0	1	0	0	0	0	0	0	3
Mvmt Flow	36	242	27	24	230	22	25	6	18	63	8	46

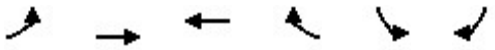
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	252	0	0	269	0	0	644	628	256	629	630	241
Stage 1	-	-	-	-	-	-	328	328	-	289	289	-
Stage 2	-	-	-	-	-	-	316	300	-	340	341	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.327
Pot Cap-1 Maneuver	1325	-	-	1306	-	-	389	402	788	398	401	795
Stage 1	-	-	-	-	-	-	689	651	-	723	677	-
Stage 2	-	-	-	-	-	-	699	669	-	679	642	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1325	-	-	1306	-	-	349	384	788	372	383	795
Mov Cap-2 Maneuver	-	-	-	-	-	-	448	461	-	468	462	-
Stage 1	-	-	-	-	-	-	670	633	-	703	665	-
Stage 2	-	-	-	-	-	-	639	657	-	640	625	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	0.9	0.7	12	12.4
HCM LOS			B	B

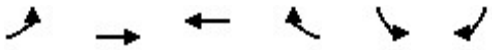
Minor Lane/Major Mvmt	NELn1	NELn2	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1	SWLn2
Capacity (veh/h)	448	674	1325	-	-	1306	-	-	467	795
HCM Lane V/C Ratio	0.055	0.035	0.027	-	-	0.018	-	-	0.152	0.058
HCM Control Delay (s)	13.5	10.5	7.8	-	-	7.8	-	-	14.1	9.8
HCM Lane LOS	B	B	A	-	-	A	-	-	B	A
HCM 95th %tile Q(veh)	0.2	0.1	0.1	-	-	0.1	-	-	0.5	0.2

Capacity Analysis Summary Sheets

Year 2028 Total Projected Weekday Morning Peak Hour
Without Restaurant



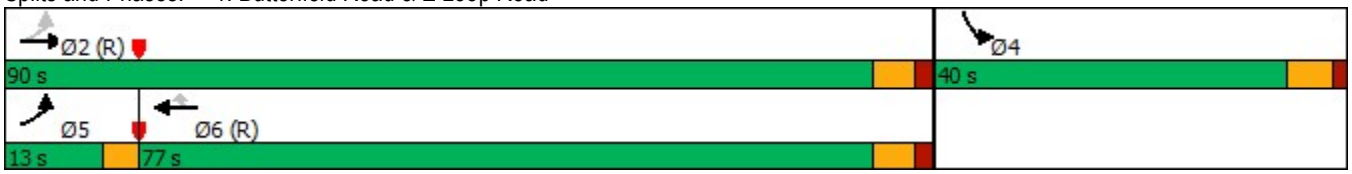
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	76	1232	814	299	292	53
Future Volume (vph)	76	1232	814	299	292	53
Ideal Flow (vphpl)	1900	2000	2000	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	230			220	225	150
Storage Lanes	1			1	1	0
Taper Length (ft)	250				55	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.95
Ped Bike Factor						
Frt				0.850	0.977	
Flt Protected	0.950				0.959	
Satd. Flow (prot)	1687	3725	3654	1615	3373	0
Flt Permitted	0.259				0.959	
Satd. Flow (perm)	460	3725	3654	1615	3373	0
Right Turn on Red				No		No
Satd. Flow (RTOR)						
Link Speed (mph)		45	45		30	
Link Distance (ft)		1427	1045		481	
Travel Time (s)		21.6	15.8		10.9	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	7%	2%	4%	0%	1%	10%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	86	1400	925	340	392	0
Turn Type	pm+pt	NA	NA	Perm	Prot	
Protected Phases	5	2	6		4	
Permitted Phases	2			6		
Detector Phase	5	2	6	6	4	
Switch Phase						
Minimum Initial (s)	3.0	15.0	15.0	15.0	8.0	
Minimum Split (s)	12.5	24.5	24.5	24.5	24.0	
Total Split (s)	13.0	90.0	77.0	77.0	40.0	
Total Split (%)	10.0%	69.2%	59.2%	59.2%	30.8%	
Yellow Time (s)	3.5	4.0	4.0	4.0	4.5	
All-Red Time (s)	0.0	2.0	2.0	2.0	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	3.5	6.0	6.0	6.0	6.0	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Min	C-Min	C-Min	None	
Act Effct Green (s)	98.0	95.5	84.7	84.7	22.5	
Actuated g/C Ratio	0.75	0.73	0.65	0.65	0.17	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.21	0.51	0.39	0.32	0.67	
Control Delay	5.9	8.5	11.8	11.8	55.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	5.9	8.5	11.8	11.8	55.9	
LOS	A	A	B	B	E	
Approach Delay		8.4	11.8		55.9	
Approach LOS		A	B		E	
Queue Length 50th (ft)	16	231	176	116	161	
Queue Length 95th (ft)	35	317	249	196	199	
Internal Link Dist (ft)		1347	965		401	
Turn Bay Length (ft)	230			220	225	
Base Capacity (vph)	436	2736	2380	1052	882	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.20	0.51	0.39	0.32	0.44	

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 130			
Offset: 35 (27%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 15.7		Intersection LOS: B	
Intersection Capacity Utilization 52.3%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 1: Butterfield Road & E Loop Road



Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	3	33	53	0	17	28	273	53	18	246	4
Future Vol, veh/h	3	3	33	53	0	17	28	273	53	18	246	4
Conflicting Peds, #/hr	0	0	0	0	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	0	-	-	0	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	4	2	0	6	0	2	0	6	2	0
Mvmt Flow	3	3	37	59	0	19	31	303	59	20	273	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	719	739	275	730	712	333	277	0	0	362	0	0
Stage 1	315	315	-	395	395	-	-	-	-	-	-	-
Stage 2	404	424	-	335	317	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.24	7.12	6.5	6.26	4.1	-	-	4.16	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.12	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.12	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.336	3.518	4	3.354	2.2	-	-	2.254	-	-
Pot Cap-1 Maneuver	346	347	759	338	360	700	1298	-	-	1175	-	-
Stage 1	700	659	-	630	608	-	-	-	-	-	-	-
Stage 2	627	590	-	679	658	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	326	333	759	310	345	700	1298	-	-	1175	-	-
Mov Cap-2 Maneuver	432	423	-	419	433	-	-	-	-	-	-	-
Stage 1	683	648	-	615	593	-	-	-	-	-	-	-
Stage 2	596	576	-	632	647	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.6	13.9	0.6	0.5
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1298	-	-	432	712	419	700	1175	-	-
HCM Lane V/C Ratio	0.024	-	-	0.008	0.056	0.141	0.027	0.017	-	-
HCM Control Delay (s)	7.8	-	-	13.4	10.4	15	10.3	8.1	-	-
HCM Lane LOS	A	-	-	B	B	C	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0	0.2	0.5	0.1	0.1	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	0	5	12	0	4	6	228	59	18	251	4
Future Vol, veh/h	2	0	5	12	0	4	6	228	59	18	251	4
Conflicting Peds, #/hr	0	0	0	0	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	0	-	0	-	-	-	150	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	82	82	82	82	82	82	82	82	82	82	82	82
Heavy Vehicles, %	0	0	0	0	0	0	0	2	0	0	3	33
Mvmt Flow	2	0	6	15	0	5	7	278	72	22	306	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	684	-	309	684	683	314	311	0	0	350	0	0
Stage 1	353	-	-	328	328	-	-	-	-	-	-	-
Stage 2	331	-	-	356	355	-	-	-	-	-	-	-
Critical Hdwy	7.1	-	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	-	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	365	0	736	365	374	731	1261	-	-	1220	-	-
Stage 1	668	0	-	689	651	-	-	-	-	-	-	-
Stage 2	687	0	-	666	633	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	356	-	736	356	365	731	1261	-	-	1220	-	-
Mov Cap-2 Maneuver	464	-	-	465	454	-	-	-	-	-	-	-
Stage 1	664	-	-	685	647	-	-	-	-	-	-	-
Stage 2	679	-	-	649	622	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.7	12.3	0.2	0.5
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1261	-	-	464	736	512	1220	-	-
HCM Lane V/C Ratio	0.006	-	-	0.005	0.008	0.038	0.018	-	-
HCM Control Delay (s)	7.9	-	-	12.8	9.9	12.3	8	-	-
HCM Lane LOS	A	-	-	B	A	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0	0.1	0.1	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	32	201	24	21	193	20	22	5	16	56	7	41
Future Vol, veh/h	32	201	24	21	193	20	22	5	16	56	7	41
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	0	-	-	-	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	0	3	10	0	1	0	0	0	0	0	0	3
Mvmt Flow	36	226	27	24	217	22	25	6	18	63	8	46

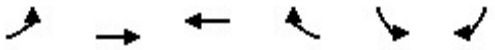
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	239	0	0	253	0	0	615	599	240	600	601	228
Stage 1	-	-	-	-	-	-	312	312	-	276	276	-
Stage 2	-	-	-	-	-	-	303	287	-	324	325	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.327
Pot Cap-1 Maneuver	1340	-	-	1324	-	-	406	418	804	416	417	809
Stage 1	-	-	-	-	-	-	703	661	-	735	685	-
Stage 2	-	-	-	-	-	-	711	678	-	692	653	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1340	-	-	1324	-	-	365	399	804	389	398	809
Mov Cap-2 Maneuver	-	-	-	-	-	-	461	473	-	481	473	-
Stage 1	-	-	-	-	-	-	684	643	-	715	673	-
Stage 2	-	-	-	-	-	-	651	666	-	653	635	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	1	0.7	11.9	12.2
HCM LOS			B	B

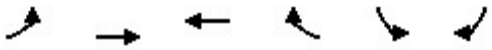
Minor Lane/Major Mvmt	NELn1	NELn2	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1	SWLn2
Capacity (veh/h)	461	689	1340	-	-	1324	-	-	480	809
HCM Lane V/C Ratio	0.054	0.034	0.027	-	-	0.018	-	-	0.147	0.057
HCM Control Delay (s)	13.3	10.4	7.8	-	-	7.8	-	-	13.8	9.7
HCM Lane LOS	B	B	A	-	-	A	-	-	B	A
HCM 95th %tile Q(veh)	0.2	0.1	0.1	-	-	0.1	-	-	0.5	0.2

Capacity Analysis Summary Sheets

Year 2028 Total Projected Weekday Evening Peak Hour
With Restaurant



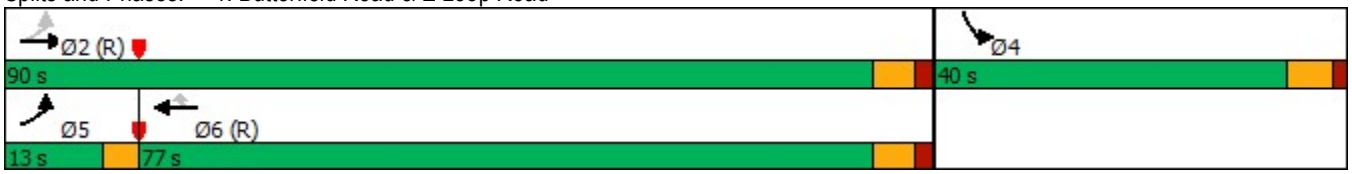
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	129	1263	1366	469	474	115
Future Volume (vph)	129	1263	1366	469	474	115
Ideal Flow (vphpl)	1900	2000	2000	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	230			220	225	150
Storage Lanes	1			1	1	0
Taper Length (ft)	250				55	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.95
Ped Bike Factor						
Frt				0.850	0.971	
Flt Protected	0.950				0.961	
Satd. Flow (prot)	1787	3725	3800	1615	3420	0
Flt Permitted	0.109				0.961	
Satd. Flow (perm)	205	3725	3800	1615	3420	0
Right Turn on Red				No		No
Satd. Flow (RTOR)						
Link Speed (mph)		45	45		30	
Link Distance (ft)		1427	1045		481	
Travel Time (s)		21.6	15.8		10.9	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	2%	0%	0%	0%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	132	1289	1394	479	601	0
Turn Type	pm+pt	NA	NA	Perm	Prot	
Protected Phases	5	2	6		4	
Permitted Phases	2			6		
Detector Phase	5	2	6	6	4	
Switch Phase						
Minimum Initial (s)	3.0	15.0	15.0	15.0	8.0	
Minimum Split (s)	12.5	24.5	24.5	24.5	24.0	
Total Split (s)	13.0	90.0	77.0	77.0	40.0	
Total Split (%)	10.0%	69.2%	59.2%	59.2%	30.8%	
Yellow Time (s)	3.5	4.0	4.0	4.0	4.5	
All-Red Time (s)	0.0	2.0	2.0	2.0	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	3.5	6.0	6.0	6.0	6.0	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Min	C-Min	C-Min	None	
Act Effct Green (s)	90.3	87.8	75.8	75.8	30.2	
Actuated g/C Ratio	0.69	0.68	0.58	0.58	0.23	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.54	0.51	0.63	0.51	0.76	
Control Delay	15.9	11.8	20.1	19.4	52.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	15.9	11.8	20.1	19.4	52.8	
LOS	B	B	C	B	D	
Approach Delay		12.2	19.9		52.8	
Approach LOS		B	B		D	
Queue Length 50th (ft)	34	268	397	234	242	
Queue Length 95th (ft)	63	343	504	353	300	
Internal Link Dist (ft)		1347	965		401	
Turn Bay Length (ft)	230			220	225	
Base Capacity (vph)	258	2514	2216	941	894	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.51	0.51	0.63	0.51	0.67	

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 130			
Offset: 23 (18%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.76			
Intersection Signal Delay: 22.2		Intersection LOS: C	
Intersection Capacity Utilization 73.5%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Butterfield Road & E Loop Road



Intersection	
Int Delay, s/veh	9.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	16	139	130	12	79	82	341	170	78	339	8
Future Vol, veh/h	7	16	139	130	12	79	82	341	170	78	339	8
Conflicting Peds, #/hr	0	0	0	0	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	0	-	-	0	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	0	0	1	0	0	0	0	0	0	0	1	0
Mvmt Flow	7	17	148	138	13	84	87	363	181	83	361	9

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1208	1250	366	1242	1164	454	370	0	0	544	0	0
Stage 1	532	532	-	628	628	-	-	-	-	-	-	-
Stage 2	676	718	-	614	536	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.21	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.309	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	161	174	681	153	196	610	1200	-	-	1035	-	-
Stage 1	535	529	-	474	479	-	-	-	-	-	-	-
Stage 2	446	436	-	483	527	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	119	149	681	~ 101	167	610	1200	-	-	1035	-	-
Mov Cap-2 Maneuver	204	240	-	186	268	-	-	-	-	-	-	-
Stage 1	496	487	-	440	445	-	-	-	-	-	-	-
Stage 2	346	405	-	336	485	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.2	44.2	1.1	1.6
HCM LOS	B	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1200	-	-	204	572	186	522	1035	-	-
HCM Lane V/C Ratio	0.073	-	-	0.037	0.288	0.744	0.185	0.08	-	-
HCM Control Delay (s)	8.2	-	-	23.3	13.8	65.7	13.5	8.8	-	-
HCM Lane LOS	A	-	-	C	B	F	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.1	1.2	4.8	0.7	0.3	-	-

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

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	0	30	55	0	19	27	388	12	5	340	8
Future Vol, veh/h	10	0	30	55	0	19	27	388	12	5	340	8
Conflicting Peds, #/hr	0	0	0	0	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	0	-	0	-	-	-	150	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	10	0	31	56	0	19	28	396	12	5	347	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	829	-	351	835	823	402	355	0	0	408	0	0
Stage 1	361	-	-	458	458	-	-	-	-	-	-	-
Stage 2	468	-	-	377	365	-	-	-	-	-	-	-
Critical Hdwy	7.1	-	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	-	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	292	0	697	289	311	653	1215	-	-	1162	-	-
Stage 1	662	0	-	587	570	-	-	-	-	-	-	-
Stage 2	579	0	-	649	627	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	277	-	697	271	303	653	1215	-	-	1162	-	-
Mov Cap-2 Maneuver	394	-	-	389	401	-	-	-	-	-	-	-
Stage 1	647	-	-	573	557	-	-	-	-	-	-	-
Stage 2	549	-	-	618	624	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.4	15	0.5	0.1
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1215	-	-	394	697	434	1162	-	-
HCM Lane V/C Ratio	0.023	-	-	0.026	0.044	0.174	0.004	-	-
HCM Control Delay (s)	8	-	-	14.4	10.4	15	8.1	-	-
HCM Lane LOS	A	-	-	B	B	C	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0.1	0.6	0	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	47	308	57	1	338	78	67	18	20	25	8	59
Future Vol, veh/h	47	308	57	1	338	78	67	18	20	25	8	59
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	0	-	-	-	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	2
Mvmt Flow	55	358	66	1	393	91	78	21	23	29	9	69

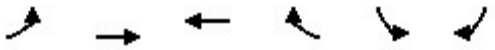
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	484	0	0	424	0	0	981	987	391	964	975	439
Stage 1	-	-	-	-	-	-	501	501	-	441	441	-
Stage 2	-	-	-	-	-	-	480	486	-	523	534	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.318
Pot Cap-1 Maneuver	1089	-	-	1146	-	-	231	249	662	237	253	618
Stage 1	-	-	-	-	-	-	556	546	-	599	580	-
Stage 2	-	-	-	-	-	-	571	554	-	541	528	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1089	-	-	1146	-	-	193	236	662	210	240	618
Mov Cap-2 Maneuver	-	-	-	-	-	-	307	339	-	331	353	-
Stage 1	-	-	-	-	-	-	528	518	-	568	579	-
Stage 2	-	-	-	-	-	-	499	553	-	476	501	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	1	0	18.2	13.6
HCM LOS			C	B

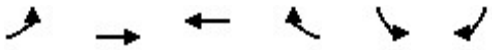
Minor Lane/Major Mvmt	NELn1	NELn2	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1	SWLn2
Capacity (veh/h)	307	456	1089	-	-	1146	-	-	336	618
HCM Lane V/C Ratio	0.254	0.097	0.05	-	-	0.001	-	-	0.114	0.111
HCM Control Delay (s)	20.7	13.7	8.5	-	-	8.1	-	-	17.1	11.6
HCM Lane LOS	C	B	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	1	0.3	0.2	-	-	0	-	-	0.4	0.4

Capacity Analysis Summary Sheets

Year 2028 Total Projected Weekday Evening Peak Hour
Without Restaurant



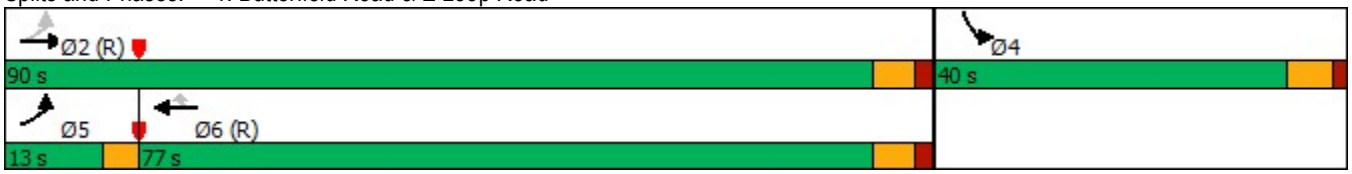
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	121	1263	1366	454	497	110
Future Volume (vph)	121	1263	1366	454	497	110
Ideal Flow (vphpl)	1900	2000	2000	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	230			220	225	150
Storage Lanes	1			1	1	0
Taper Length (ft)	250				55	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.95
Ped Bike Factor						
Frt				0.850	0.973	
Flt Protected	0.950				0.961	
Satd. Flow (prot)	1787	3725	3800	1615	3428	0
Flt Permitted	0.108				0.961	
Satd. Flow (perm)	203	3725	3800	1615	3428	0
Right Turn on Red				No		No
Satd. Flow (RTOR)						
Link Speed (mph)		45	45		30	
Link Distance (ft)		1427	1045		481	
Travel Time (s)		21.6	15.8		10.9	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	2%	0%	0%	0%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	123	1289	1394	463	619	0
Turn Type	pm+pt	NA	NA	Perm	Prot	
Protected Phases	5	2	6		4	
Permitted Phases	2			6		
Detector Phase	5	2	6	6	4	
Switch Phase						
Minimum Initial (s)	3.0	15.0	15.0	15.0	8.0	
Minimum Split (s)	12.5	24.5	24.5	24.5	24.0	
Total Split (s)	13.0	90.0	77.0	77.0	40.0	
Total Split (%)	10.0%	69.2%	59.2%	59.2%	30.8%	
Yellow Time (s)	3.5	4.0	4.0	4.0	4.5	
All-Red Time (s)	0.0	2.0	2.0	2.0	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	3.5	6.0	6.0	6.0	6.0	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Min	C-Min	C-Min	None	
Act Effct Green (s)	89.8	87.3	75.5	75.5	30.7	
Actuated g/C Ratio	0.69	0.67	0.58	0.58	0.24	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.51	0.52	0.63	0.49	0.77	
Control Delay	14.8	12.0	20.3	19.1	52.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	14.8	12.0	20.3	19.1	52.9	
LOS	B	B	C	B	D	
Approach Delay		12.2	20.0		52.9	
Approach LOS		B	C		D	
Queue Length 50th (ft)	32	272	401	225	249	
Queue Length 95th (ft)	58	343	504	337	309	
Internal Link Dist (ft)		1347	965		401	
Turn Bay Length (ft)	230			220	225	
Base Capacity (vph)	255	2501	2208	938	896	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.48	0.52	0.63	0.49	0.69	

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 130			
Offset: 23 (18%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay: 22.4		Intersection LOS: C	
Intersection Capacity Utilization 73.5%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Butterfield Road & E Loop Road



Intersection	
Int Delay, s/veh	7.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	16	139	116	12	70	82	341	147	63	339	8
Future Vol, veh/h	7	16	139	116	12	70	82	341	147	63	339	8
Conflicting Peds, #/hr	0	0	0	0	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	0	-	-	0	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	0	0	1	0	0	0	0	0	0	0	1	0
Mvmt Flow	7	17	148	123	13	74	87	363	156	67	361	9

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1159	1193	366	1197	1119	441	370	0	0	519	0	0
Stage 1	500	500	-	615	615	-	-	-	-	-	-	-
Stage 2	659	693	-	582	504	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.21	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.309	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	174	188	681	164	209	621	1200	-	-	1057	-	-
Stage 1	557	546	-	482	485	-	-	-	-	-	-	-
Stage 2	456	448	-	502	544	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	133	164	681	~ 110	182	621	1200	-	-	1057	-	-
Mov Cap-2 Maneuver	225	260	-	199	282	-	-	-	-	-	-	-
Stage 1	517	512	-	447	450	-	-	-	-	-	-	-
Stage 2	362	416	-	356	510	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.9	34.1	1.2	1.3
HCM LOS	B	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1200	-	-	225	583	199	528	1057	-	-
HCM Lane V/C Ratio	0.073	-	-	0.033	0.283	0.62	0.165	0.063	-	-
HCM Control Delay (s)	8.2	-	-	21.5	13.6	48.8	13.2	8.6	-	-
HCM Lane LOS	A	-	-	C	B	E	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	0.1	1.2	3.6	0.6	0.2	-	-

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

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	10	0	30	55	0	19	27	379	12	5	325	8
Future Vol, veh/h	10	0	30	55	0	19	27	379	12	5	325	8
Conflicting Peds, #/hr	0	0	0	0	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	0	-	0	-	-	-	150	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	10	0	31	56	0	19	28	387	12	5	332	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	805	-	336	811	799	393	340	0	0	399	0	0
Stage 1	346	-	-	449	449	-	-	-	-	-	-	-
Stage 2	459	-	-	362	350	-	-	-	-	-	-	-
Critical Hdwy	7.1	-	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	-	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	303	0	711	300	321	660	1230	-	-	1171	-	-
Stage 1	674	0	-	593	576	-	-	-	-	-	-	-
Stage 2	586	0	-	661	636	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	288	-	711	281	312	660	1230	-	-	1171	-	-
Mov Cap-2 Maneuver	403	-	-	398	408	-	-	-	-	-	-	-
Stage 1	658	-	-	579	563	-	-	-	-	-	-	-
Stage 2	556	-	-	630	633	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.3	14.8	0.5	0.1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1230	-	-	403	711	443	1171	-	-
HCM Lane V/C Ratio	0.022	-	-	0.025	0.043	0.17	0.004	-	-
HCM Control Delay (s)	8	-	-	14.2	10.3	14.8	8.1	-	-
HCM Lane LOS	A	-	-	B	B	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0.1	0.6	0	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	47	293	57	1	329	78	67	18	20	25	8	59
Future Vol, veh/h	47	293	57	1	329	78	67	18	20	25	8	59
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	0	-	-	-	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	2
Mvmt Flow	55	341	66	1	383	91	78	21	23	29	9	69

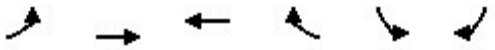
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	474	0	0	407	0	0	954	960	374	937	948	429
Stage 1	-	-	-	-	-	-	484	484	-	431	431	-
Stage 2	-	-	-	-	-	-	470	476	-	506	517	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.318
Pot Cap-1 Maneuver	1099	-	-	1163	-	-	240	259	677	247	263	626
Stage 1	-	-	-	-	-	-	568	555	-	607	586	-
Stage 2	-	-	-	-	-	-	578	560	-	552	537	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1099	-	-	1163	-	-	201	246	677	219	250	626
Mov Cap-2 Maneuver	-	-	-	-	-	-	315	347	-	339	362	-
Stage 1	-	-	-	-	-	-	540	527	-	577	585	-
Stage 2	-	-	-	-	-	-	506	559	-	486	510	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	1	0	17.7	13.4
HCM LOS			C	B

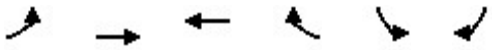
Minor Lane/Major Mvmt	NELn1	NELn2	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1	SWLn2
Capacity (veh/h)	315	467	1099	-	-	1163	-	-	344	626
HCM Lane V/C Ratio	0.247	0.095	0.05	-	-	0.001	-	-	0.112	0.11
HCM Control Delay (s)	20.1	13.5	8.4	-	-	8.1	-	-	16.8	11.5
HCM Lane LOS	C	B	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	1	0.3	0.2	-	-	0	-	-	0.4	0.4

Capacity Analysis Summary Sheets

Year 2028 Total Projected Saturday Midday Peak Hour
With Restaurant



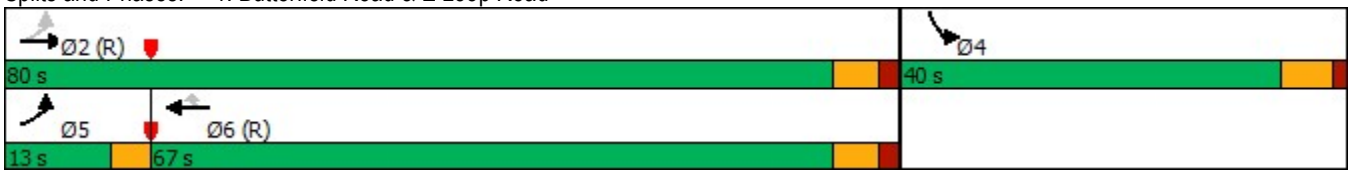
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	123	1015	1237	442	463	119
Future Volume (vph)	123	1015	1237	442	463	119
Ideal Flow (vphpl)	1900	2000	2000	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	230			220	225	150
Storage Lanes	1			1	1	0
Taper Length (ft)	250				55	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.95
Ped Bike Factor						
Frt				0.850	0.969	
Flt Protected	0.950				0.962	
Satd. Flow (prot)	1805	3762	3762	1615	3429	0
Flt Permitted	0.130				0.962	
Satd. Flow (perm)	247	3762	3762	1615	3429	0
Right Turn on Red				No		No
Satd. Flow (RTOR)						
Link Speed (mph)		45	45		30	
Link Distance (ft)		1427	1045		481	
Travel Time (s)		21.6	15.8		10.9	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	1%	1%	0%	0%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	127	1046	1275	456	600	0
Turn Type	pm+pt	NA	NA	Perm	Prot	
Protected Phases	5	2	6		4	
Permitted Phases	2			6		
Detector Phase	5	2	6	6	4	
Switch Phase						
Minimum Initial (s)	3.0	15.0	15.0	15.0	8.0	
Minimum Split (s)	12.5	24.5	24.5	24.5	24.0	
Total Split (s)	13.0	80.0	67.0	67.0	40.0	
Total Split (%)	10.8%	66.7%	55.8%	55.8%	33.3%	
Yellow Time (s)	3.5	4.0	4.0	4.0	4.5	
All-Red Time (s)	0.0	2.0	2.0	2.0	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	3.5	6.0	6.0	6.0	6.0	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Min	C-Min	C-Min	None	
Act Effct Green (s)	81.8	79.3	67.6	67.6	28.7	
Actuated g/C Ratio	0.68	0.66	0.56	0.56	0.24	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.46	0.42	0.60	0.50	0.73	
Control Delay	12.9	10.7	19.7	19.5	47.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	12.9	10.7	19.7	19.5	47.4	
LOS	B	B	B	B	D	
Approach Delay		10.9	19.7		47.4	
Approach LOS		B	B		D	
Queue Length 50th (ft)	31	187	334	209	220	
Queue Length 95th (ft)	61	258	450	336	270	
Internal Link Dist (ft)		1347	965		401	
Turn Bay Length (ft)	230			220	225	
Base Capacity (vph)	291	2485	2118	909	971	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.44	0.42	0.60	0.50	0.62	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 29 (24%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 21.5		Intersection LOS: C	
Intersection Capacity Utilization 69.6%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Butterfield Road & E Loop Road



Intersection	
Int Delay, s/veh	13

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	16	182	151	13	87	100	268	164	56	243	16
Future Vol, veh/h	13	16	182	151	13	87	100	268	164	56	243	16
Conflicting Peds, #/hr	0	0	0	0	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	0	-	-	0	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	0	0	0	1	0	0	0	0	0	0	0	0
Mvmt Flow	14	18	200	166	14	96	110	295	180	62	267	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1060	1095	276	1114	1014	385	285	0	0	475	0	0
Stage 1	400	400	-	605	605	-	-	-	-	-	-	-
Stage 2	660	695	-	509	409	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.11	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.11	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.11	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.509	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	204	215	768	186	240	667	1289	-	-	1098	-	-
Stage 1	630	605	-	486	491	-	-	-	-	-	-	-
Stage 2	455	447	-	549	600	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	151	186	768	~ 117	207	667	1289	-	-	1098	-	-
Mov Cap-2 Maneuver	230	273	-	198	301	-	-	-	-	-	-	-
Stage 1	576	571	-	445	449	-	-	-	-	-	-	-
Stage 2	345	409	-	371	566	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.4	51.5	1.5	1.5
HCM LOS	B	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1289	-	-	230	670	198	576	1098	-	-
HCM Lane V/C Ratio	0.085	-	-	0.062	0.325	0.838	0.191	0.056	-	-
HCM Control Delay (s)	8.1	-	-	21.7	12.9	77.2	12.7	8.5	-	-
HCM Lane LOS	A	-	-	C	B	F	B	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	0.2	1.4	6.1	0.7	0.2	-	-

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

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	0	31	18	0	6	27	323	18	6	266	8
Future Vol, veh/h	9	0	31	18	0	6	27	323	18	6	266	8
Conflicting Peds, #/hr	0	0	0	0	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	0	-	0	-	-	-	150	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	10	0	34	20	0	7	29	351	20	7	289	9

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	731	-	294	744	731	361	298	0	0	371	0	0
Stage 1	308	-	-	419	419	-	-	-	-	-	-	-
Stage 2	423	-	-	325	312	-	-	-	-	-	-	-
Critical Hdwy	7.1	-	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	-	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	340	0	750	333	351	688	1275	-	-	1199	-	-
Stage 1	706	0	-	616	593	-	-	-	-	-	-	-
Stage 2	613	0	-	692	661	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	329	-	750	311	341	688	1275	-	-	1199	-	-
Mov Cap-2 Maneuver	437	-	-	422	430	-	-	-	-	-	-	-
Stage 1	690	-	-	602	579	-	-	-	-	-	-	-
Stage 2	593	-	-	657	657	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.8	13.2	0.6	0.2
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1275	-	-	437	750	467	1199	-	-
HCM Lane V/C Ratio	0.023	-	-	0.022	0.045	0.056	0.005	-	-
HCM Control Delay (s)	7.9	-	-	13.4	10	13.2	8	-	-
HCM Lane LOS	A	-	-	B	B	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0.1	0.2	0	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	43	246	72	0	308	30	83	22	2	32	15	39
Future Vol, veh/h	43	246	72	0	308	30	83	22	2	32	15	39
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	0	-	-	-	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	0	1	0	0	1	0	0	5	0	3	0	0
Mvmt Flow	44	251	73	0	314	31	85	22	2	33	15	40

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	345	0	0	324	0	0	733	721	288	718	742	330
Stage 1	-	-	-	-	-	-	376	376	-	330	330	-
Stage 2	-	-	-	-	-	-	357	345	-	388	412	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.55	6.2	7.13	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.55	-	6.13	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.55	-	6.13	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4.045	3.3	3.527	4	3.3
Pot Cap-1 Maneuver	1225	-	-	1247	-	-	339	350	756	343	346	716
Stage 1	-	-	-	-	-	-	649	611	-	681	649	-
Stage 2	-	-	-	-	-	-	665	631	-	634	598	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1225	-	-	1247	-	-	303	337	756	319	334	716
Mov Cap-2 Maneuver	-	-	-	-	-	-	410	422	-	427	430	-
Stage 1	-	-	-	-	-	-	626	589	-	656	649	-
Stage 2	-	-	-	-	-	-	613	631	-	586	576	-

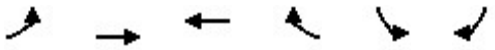
Approach	EB	WB	NE	SW
HCM Control Delay, s	1	0	15.6	12.6
HCM LOS			C	B

Minor Lane/Major Mvmt	NELn1	NELn2	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1	SWLn2
Capacity (veh/h)	410	438	1225	-	-	1247	-	-	428	716
HCM Lane V/C Ratio	0.207	0.056	0.036	-	-	-	-	-	0.112	0.056
HCM Control Delay (s)	16.1	13.7	8	-	-	0	-	-	14.5	10.3
HCM Lane LOS	C	B	A	-	-	A	-	-	B	B
HCM 95th %tile Q(veh)	0.8	0.2	0.1	-	-	0	-	-	0.4	0.2

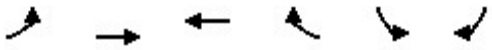
Capacity Analysis Summary Sheets

Year 2028 Total Projected Saturday Midday Peak Hour

Without Restaurant



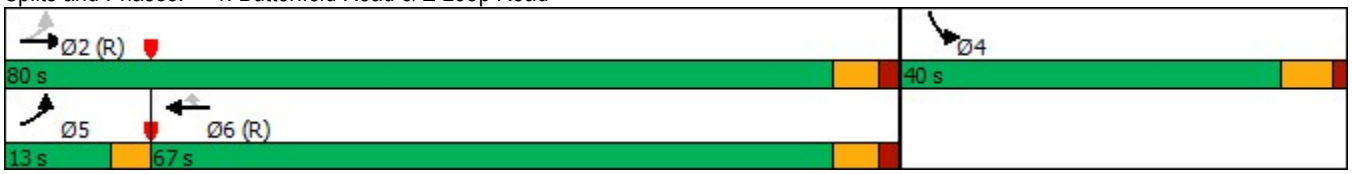
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	115	1015	1237	426	459	111
Future Volume (vph)	115	1015	1237	426	459	111
Ideal Flow (vphpl)	1900	2000	2000	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	230			220	225	150
Storage Lanes	1			1	1	0
Taper Length (ft)	250				55	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.95
Ped Bike Factor						
Frt				0.850	0.971	
Flt Protected	0.950				0.961	
Satd. Flow (prot)	1805	3762	3762	1615	3433	0
Flt Permitted	0.131				0.961	
Satd. Flow (perm)	249	3762	3762	1615	3433	0
Right Turn on Red				No		No
Satd. Flow (RTOR)						
Link Speed (mph)		45	45		30	
Link Distance (ft)		1427	1045		481	
Travel Time (s)		21.6	15.8		10.9	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	1%	1%	0%	0%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	119	1046	1275	439	587	0
Turn Type	pm+pt	NA	NA	Perm	Prot	
Protected Phases	5	2	6		4	
Permitted Phases	2			6		
Detector Phase	5	2	6	6	4	
Switch Phase						
Minimum Initial (s)	3.0	15.0	15.0	15.0	8.0	
Minimum Split (s)	12.5	24.5	24.5	24.5	24.0	
Total Split (s)	13.0	80.0	67.0	67.0	40.0	
Total Split (%)	10.8%	66.7%	55.8%	55.8%	33.3%	
Yellow Time (s)	3.5	4.0	4.0	4.0	4.5	
All-Red Time (s)	0.0	2.0	2.0	2.0	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	3.5	6.0	6.0	6.0	6.0	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	C-Min	C-Min	C-Min	None	
Act Effct Green (s)	82.1	79.6	68.1	68.1	28.4	
Actuated g/C Ratio	0.68	0.66	0.57	0.57	0.24	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
v/c Ratio	0.43	0.42	0.60	0.48	0.72	
Control Delay	12.2	10.5	19.4	18.8	47.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	12.2	10.5	19.4	18.8	47.3	
LOS	B	B	B	B	D	
Approach Delay		10.7	19.2		47.3	
Approach LOS		B	B		D	
Queue Length 50th (ft)	29	185	329	196	215	
Queue Length 95th (ft)	57	258	450	320	263	
Internal Link Dist (ft)		1347	965		401	
Turn Bay Length (ft)	230			220	225	
Base Capacity (vph)	293	2496	2134	916	972	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.41	0.42	0.60	0.48	0.60	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 29 (24%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 21.1		Intersection LOS: C	
Intersection Capacity Utilization 68.8%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Butterfield Road & E Loop Road



Intersection	
Int Delay, s/veh	9.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	13	16	182	128	13	72	100	268	140	40	243	16
Future Vol, veh/h	13	16	182	128	13	72	100	268	140	40	243	16
Conflicting Peds, #/hr	0	0	0	0	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	0	-	-	0	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	0	0	0	1	0	0	0	0	0	0	0	0
Mvmt Flow	14	18	200	141	14	79	110	295	154	44	267	18

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1003	1033	276	1065	965	372	285	0	0	449	0	0
Stage 1	364	364	-	592	592	-	-	-	-	-	-	-
Stage 2	639	669	-	473	373	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.11	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.11	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.11	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.509	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	223	234	768	201	257	678	1289	-	-	1122	-	-
Stage 1	659	627	-	494	497	-	-	-	-	-	-	-
Stage 2	468	459	-	574	622	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	173	206	768	~ 129	226	678	1289	-	-	1122	-	-
Mov Cap-2 Maneuver	259	297	-	214	318	-	-	-	-	-	-	-
Stage 1	603	603	-	452	455	-	-	-	-	-	-	-
Stage 2	366	420	-	396	598	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.1	34.5	1.6	1.1
HCM LOS	B	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1289	-	-	259	681	214	578	1122	-	-
HCM Lane V/C Ratio	0.085	-	-	0.055	0.32	0.657	0.162	0.039	-	-
HCM Control Delay (s)	8.1	-	-	19.7	12.7	49.2	12.4	8.3	-	-
HCM Lane LOS	A	-	-	C	B	E	B	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	0.2	1.4	4	0.6	0.1	-	-

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

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	0	31	18	0	6	27	308	18	6	250	8
Future Vol, veh/h	9	0	31	18	0	6	27	308	18	6	250	8
Conflicting Peds, #/hr	0	0	0	0	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	0	-	0	-	-	-	150	-	-	100	-	-
Veh in Median Storage, #	-	1	-	-	1	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	10	0	34	20	0	7	29	335	20	7	272	9

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	698	-	277	711	698	345	281	0	0	355	0	0
Stage 1	291	-	-	403	403	-	-	-	-	-	-	-
Stage 2	407	-	-	308	295	-	-	-	-	-	-	-
Critical Hdwy	7.1	-	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	-	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	358	0	767	351	367	702	1293	-	-	1215	-	-
Stage 1	721	0	-	628	603	-	-	-	-	-	-	-
Stage 2	625	0	-	706	673	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	347	-	767	329	357	702	1293	-	-	1215	-	-
Mov Cap-2 Maneuver	451	-	-	436	443	-	-	-	-	-	-	-
Stage 1	705	-	-	614	590	-	-	-	-	-	-	-
Stage 2	605	-	-	671	669	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.6	12.9	0.6	0.2
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1293	-	-	451	767	482	1215	-	-
HCM Lane V/C Ratio	0.023	-	-	0.022	0.044	0.054	0.005	-	-
HCM Control Delay (s)	7.8	-	-	13.2	9.9	12.9	8	-	-
HCM Lane LOS	A	-	-	B	A	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0.1	0.2	0	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	43	230	72	0	293	30	83	22	2	32	15	39
Future Vol, veh/h	43	230	72	0	293	30	83	22	2	32	15	39
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	0	-	-	-	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	0	1	0	0	1	0	0	5	0	3	0	0
Mvmt Flow	44	235	73	0	299	31	85	22	2	33	15	40

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	330	0	0	308	0	0	702	690	272	687	711	315
Stage 1	-	-	-	-	-	-	360	360	-	315	315	-
Stage 2	-	-	-	-	-	-	342	330	-	372	396	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.55	6.2	7.13	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.55	-	6.13	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.55	-	6.13	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4.045	3.3	3.527	4	3.3
Pot Cap-1 Maneuver	1241	-	-	1264	-	-	355	364	772	360	361	730
Stage 1	-	-	-	-	-	-	662	621	-	694	659	-
Stage 2	-	-	-	-	-	-	677	640	-	646	607	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1241	-	-	1264	-	-	318	351	772	336	348	730
Mov Cap-2 Maneuver	-	-	-	-	-	-	422	433	-	441	441	-
Stage 1	-	-	-	-	-	-	639	599	-	670	659	-
Stage 2	-	-	-	-	-	-	625	640	-	598	586	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	1	0	15.2	12.4
HCM LOS			C	B

Minor Lane/Major Mvmt	NELn1	NELn2	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1	SWLn2
Capacity (veh/h)	422	449	1241	-	-	1264	-	-	441	730
HCM Lane V/C Ratio	0.201	0.055	0.035	-	-	-	-	-	0.109	0.055
HCM Control Delay (s)	15.7	13.5	8	-	-	0	-	-	14.2	10.2
HCM Lane LOS	C	B	A	-	-	A	-	-	B	B
HCM 95th %tile Q(veh)	0.7	0.2	0.1	-	-	0	-	-	0.4	0.2