Traffic Impact Letter

Blue Earth County Public Works Facility
Mankato Township, Blue Earth County, Minnesota

April 24, 2023

Project No. 20-24553

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Architecture
Engineering
Environmental
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REPORT FOR:
Blue Earth County
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FROM:
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SIGNATURE SHEET

I HEREBY CERTIFY THAT THESE CALCULATIONS WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

Corona Woychik, **PE, PTOE**
Project Engineer
License No. 59049, Expires June 30th, 2024

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Blue Earth County Public Works Facility
Mankato Township, Minnesota

Engineer's Project Number: 20-24553

Dated this 24th day of April, 2023

TABLE OF CONTENTS

APPENDICES

INTRODUCTION

This Traffic Impact Letter (TIL) has been requested by Mankato Township due to the nature of the proposed land use development and potential impact on the area roadway network. The subject project is a proposed public works facility on a vacant site in the Mankato Township, MN, located at the northeast quadrant of County State Aid Highway 90 (CSAH) and County State Aid Highway 16 (CSAH 16). The development will introduce one driveway access to CSAH 16. This TIL will:

- ✓ document access connection requests and reasoning
- ✓ analyze site and accesses to ensure minimal impact to adjacent streets
- ✓ recommend any needed improvements required to ensure safe and efficient roadway performance
- ✓ balance access needs with highway system protection

ANALYSIS OF EXISTING CONDITIONS

Location

The proposed project is the development of a site located in Mankato Township, MN. Mankato Township, population 1,867 (2020 US Census), is located in Blue Earth County. Development for the Blue Earth County Public Works Facility is proposed northeast of the intersection of CSAH 90 and CSAH 16. See **Appendix A** for a project location map. The existing site is currently vacant and used as farmland. Adjacent areas are used for farmland or low density residential. The preliminary site plan includes one driveway, to access County State Aid Highway 16.

Adjacent Street Network

County State Aid Highway 16 (CSAH 16) is also known as 195th Street. For the remainder of this report, this roadway will be referred to as CSAH 16. CSAH 16 is a north-south roadway functionally classified as a major collector that connects the City of Mankato to US Highway 169 to Minnesota Trunk Highway 22 (TH 22). Adjacent to the proposed development, CSAH 16 is a two-lane asphalt road. CSAH 16 has a statutory speed limit of 55 MPH, and it is assumed that the speed limit will remain 55 MPH into the future. CSAH 16 has an average annual daily traffic volume of 1,628 vehicles per day (2021 Minnesota DOT Traffic Mapping Application).

Adjacent to the proposed development, CSAH 16 has 7-foot shoulders. This roadway's paved shoulder width exceeds the minimum preferred bikeable shoulder width, 5 feet, for rural roadways (Minnesota Bicycle Facility Design Manual, Exhibit 3-4). Sidewalks are not provided on either side of the roadway. CSAH 16's intersections with most side roads are stop-controlled on the side road.

The proposed development's new access road is located about 670 feet north of the intersection of CSAH 16 and County State Aid Highway 90 (CSAH 90), also known as Hawthorn Road and 195th Street. For the remainder of this report, County State Aid Highway 90 will be referred to as CSAH 90. A conceptual site plan is provided in **Appendix B**.

PROPOSED DEVELOPMENT

Proposed Land Use and Operations

The proposed Blue Earth County Public Works Facility includes the construction of an approximately 90,800 square-foot County Public Works building and accessory building structures. The County Public Works building would house essential governmental services, including storage and repair of much of the Blue Earth County truck and road fleet which provides essential plowing and road maintenance services through the County. The County Public Works building would also house the County Engineering Department, County Park maintenance equipment, and other miscellaneous services. The accessory building structures include a cold storage building for off-season storage, a fuel island, and a salt shed building. Construction is planned for Spring 2024.

The proposed development is best described by the *ITE Trip Generation Manual, 11th Edition*, Land Use Code 730, Government Office Building. Because the proposed building is partially office space, but mostly storage and repair of Blue Earth County's truck and road fleet, much of the proposed building's square footage is inconsistent with the Government Office Building land use code. Because of this, calculating proposed trips is done by using employees as the independent variable. Blue Earth County anticipates that 35 full time employees would work at this location.

In the morning, County employees would typically arrive to the site in passenger vehicles and would park in the off-street parking lot. Employees would typically depart at the end of the workday. Visitors would arrive and depart throughout the day in passenger vehicles. Heavy vehicles would arrive and depart throughout the day and during the night as weather conditions dictate. All vehicles would use the single new access point to arrive and depart.

ANALYSIS OF FUTURE CONDITIONS

Trip Generation

Traffic generated by the proposed development is expected to be all new trips. Using the *ITE Trip Generation Manual, 11th Edition*, **Table 1** summarizes the generated traffic expected due to the proposed development. See **Appendix C** for additional trip generation details.

Table 1: Trip Generation Summary

	Total New Trips	Entering	Exiting
Weekday AM (AM Peak Hour of Adj Street Traffic)	45	34	11
Weekday AM (AM Peak Hour of Generator)	51	28	23
Weekday PM (PM Peak Hour of Adj Street Traffic)	26	5	21
Weekday PM (PM Peak Hour of Generator)	34	15	19
Weekday	312	156	156

Blue Earth County anticipates that the proposed development will generate 120 passenger vehicle trips and 60 heavy vehicle trips, for a total of 180 trips per day. Truck trips would include tandem trucks, motor graders, and other equipment. Blue Earth County's estimates are lower than the expected trip generation per the *ITE Trip Generation Manual, 11th Edition*. To be conservative, the data provided by the *ITE Trip Generation Manual, 11th Edition*, is used in this report.

Per the current site plan, a right-turn lane would be provided on CSAH 16 at the intersection of the new Blue Earth County Public Works Facility driveway and CSAH 16. It is expected that vehicular users making a right-turn from CSAH 16 to the new access driveway, would enter the right-turn lane at the posted speed limit and decelerate to turning speed (15 MPH). Vehicular users making a left-turn from CSAH 16 onto the new access driveway would slow down to turning speed (15 MPH) and make the turning

maneuver if there is no oncoming traffic, or they would stop in CSAH 16's southbound travel lane to wait for a gap in traffic to make a left-turn. This would require following southbound traffic, if any, to slow down and potentially stop. Vehicular users waiting to turn onto CSAH 16 from the new access driveway would wait in an unmarked outbound lane for a gap in traffic on CSAH 16 and would accelerate up to the statutory speed limit within the travel lanes on CSAH 16.

Trip Distribution

Because of the proposed site's proximity to the City of Mankato, it is expected that about 80% of the traffic generated by the development would come from the City of Mankato and surrounding area during the AM and PM peak hours and would approach the site via CSAH 16 from the north. The remaining 20% of traffic would come from throughout Blue Earth County during the AM and PM peak hours and would approach the site via CSAH 16 from the south. A trip distribution map is provided as **Appendix D**. Using this trip distribution, the entering and exiting traffic data provided in the **Trip Generation** section, and existing traffic data, turning movement diagrams have been prepared and are provided below.

A k-factor of 0.12 was used to convert CSAH 16's average annual daily traffic numbers estimated by MnDOT to existing peak hour volumes.

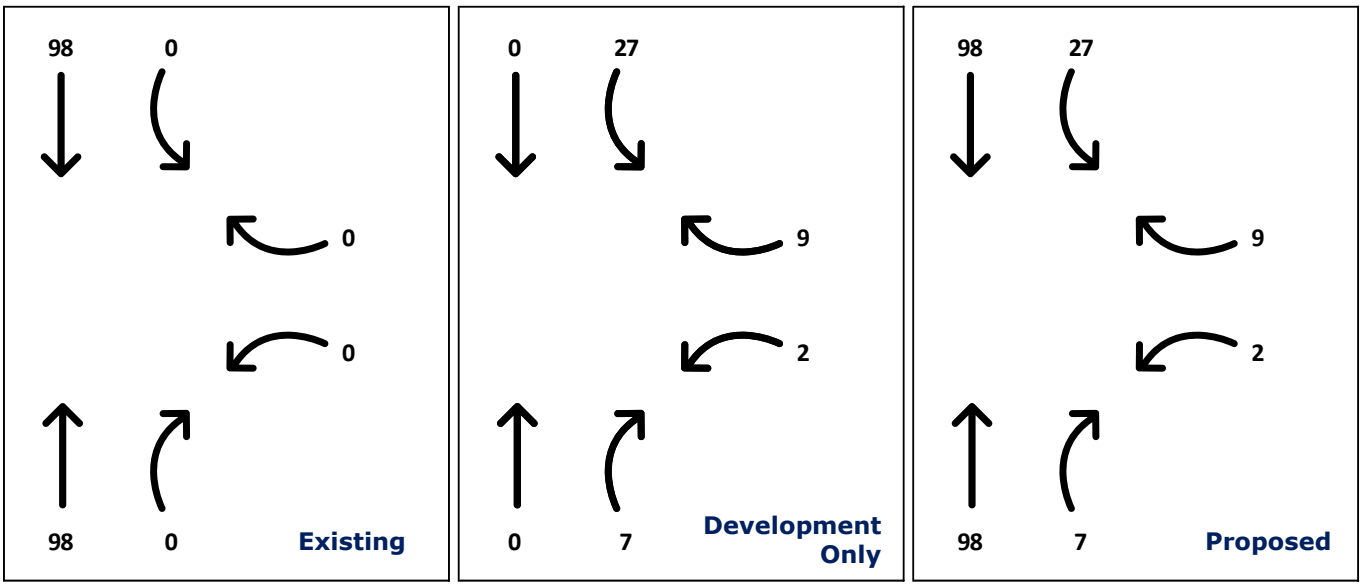


Figure 1: AM Peak Hour Turning Movements

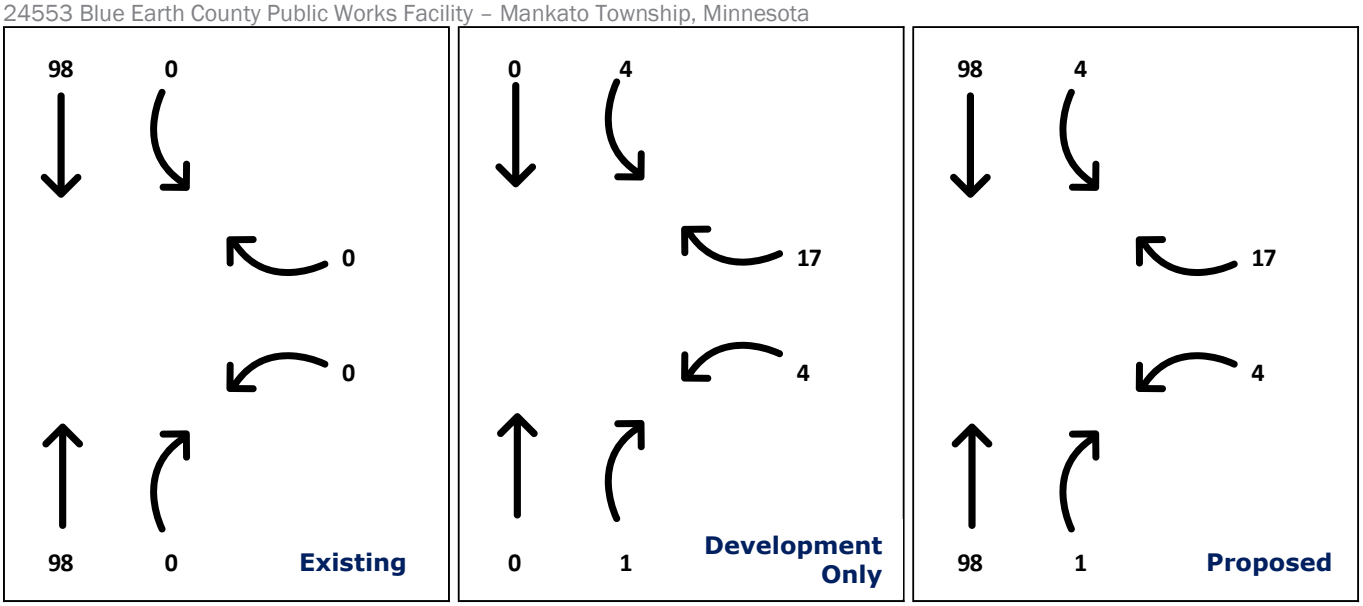


Figure 2: PM Peak Hour Turning Movements

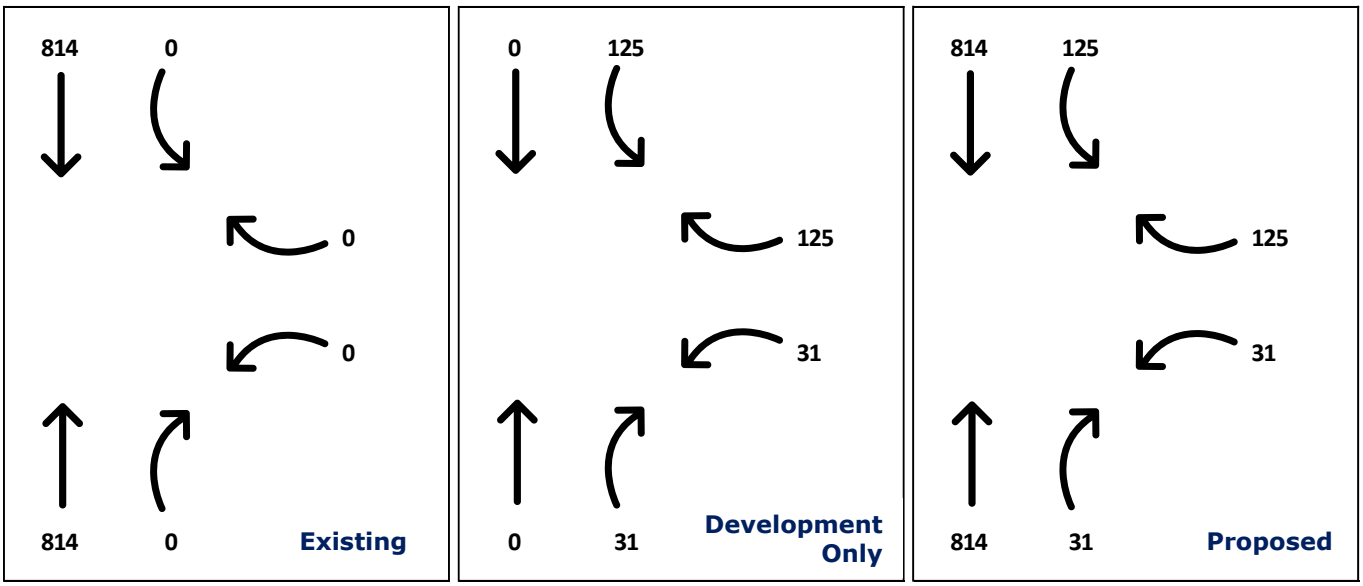


Figure 3: Weekday Turning Movements

Turn Lane Analysis

RIGHT-TURN LANE

Per Blue Earth County's Code of Ordinances, "A developer shall install right-turn lanes on the county road or county state aid highway at their expense at all subdivisions and public roads, or any entrance serving commercial or industrial property that is estimated to generate over 100 right turns per day." The development will be a public institutional property, and the development is expected to generate up to 7 vehicles that would turn right onto the new access driveway. Because of this, a right-turn lane is not required per Blue Earth County Code.

MnDOT's Road Design Manual states that right-turn lanes should be considered on 2-lane rural highways when the projected average daily traffic is over 1,500 vehicles per day, the design speed is 45 MPH or higher and the following:

- at all public road access points,
- if industrial, commercial, or substantial trip generating land use is to be served, or
- if the access serves more than 10 residential units.

The projected daily traffic on CSAH 16 will be about 1,880 vehicles per day. Per MnDOT's Road Design Manual, a right-turn lane is warranted per MnDOT standards.

LEFT-TURN LANE

MnDOT's Road Design Manual states that "left-turn lanes should be provided when the access is to a public road, an industrial tract, or a commercial center." Blue Earth County's Code of Ordinances states that "Turn lanes and/or bypass lanes may be required if other similar access along the same segment of the roadway already have turn lanes and/or bypass lanes." The proposed access is not for a public road, industrial tract, or a commercial center, and in this area, left-turn lanes are not typically provided. Per MnDOT's Road Design Manual and Blue Earth County Code, a left-turn lane is not required.

NCHRP Report 457 also provides guidance on when left-turn treatments are warranted. Per this guidance for two-lane roadways with a design speed of 60 MPH, a left-turn treatment is not warranted.

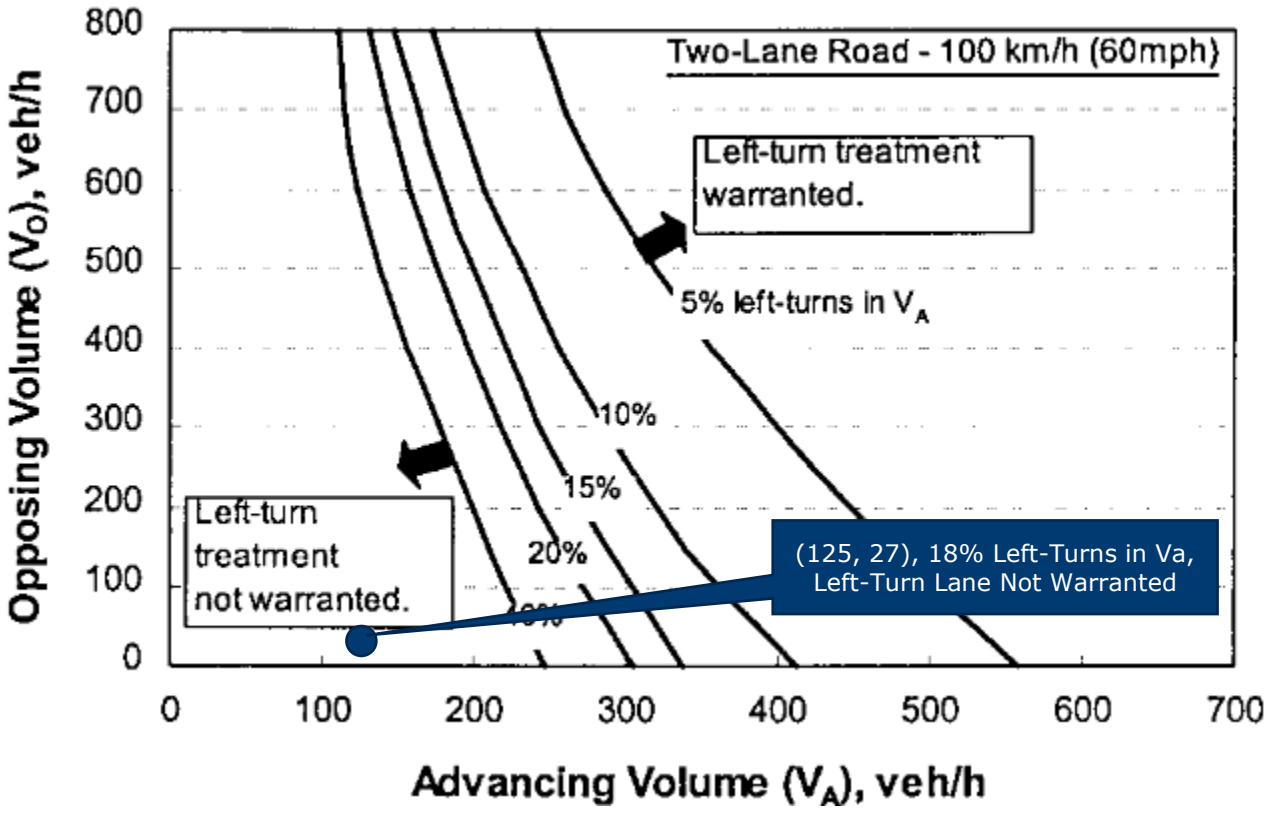


Figure 4: Left-Turn Lane Warrant

LEFT-TURN BYPASS LANE

Per Blue Earth County's Code of Ordinances, "A left-turn bypass lane may be required if warranted in MnDOT's Road Design Manual." The Minnesota Department of Transportation's (MnDOT's) Road Design Manual states, "If a left-turn lane is not warranted, or if the construction of a left-turn lane is not practical (due to R/W, terrain, etc.), leaving no left-turn treatment as the only other alternative, designers should consider left-turn bypass lanes." Because a left-turn bypass lane would conflict with the

existing southbound right-turn lane at the intersection of CSAH 90 and CSAH 16, a left-turn bypass lane is not recommended for the access at its current location. To construct a bypass lane per the geometry shown in MnDOT Road Design Manual Figure 5-4.01A, the access driveway should be at least 790 feet from the intersection of CSAH 90 and CSAH 16 in order to avoid conflicts with the southbound right-turn lane at the intersection of CSAH 90 and CSAH 16.

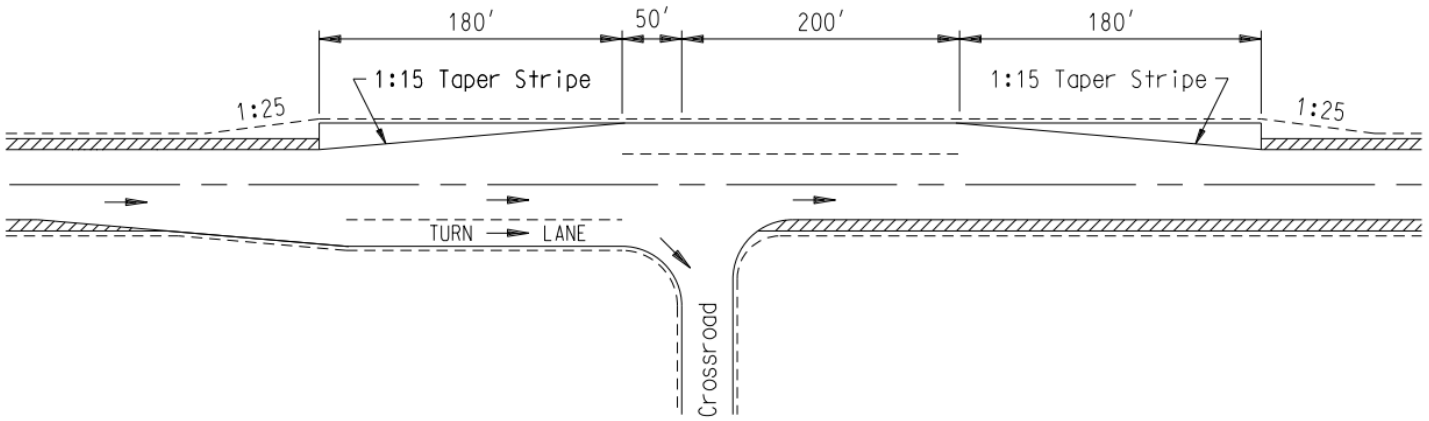


Figure 5: Left-Turn Bypass Lane (MnDOT Road Design Manual Figure 5-4.01A)

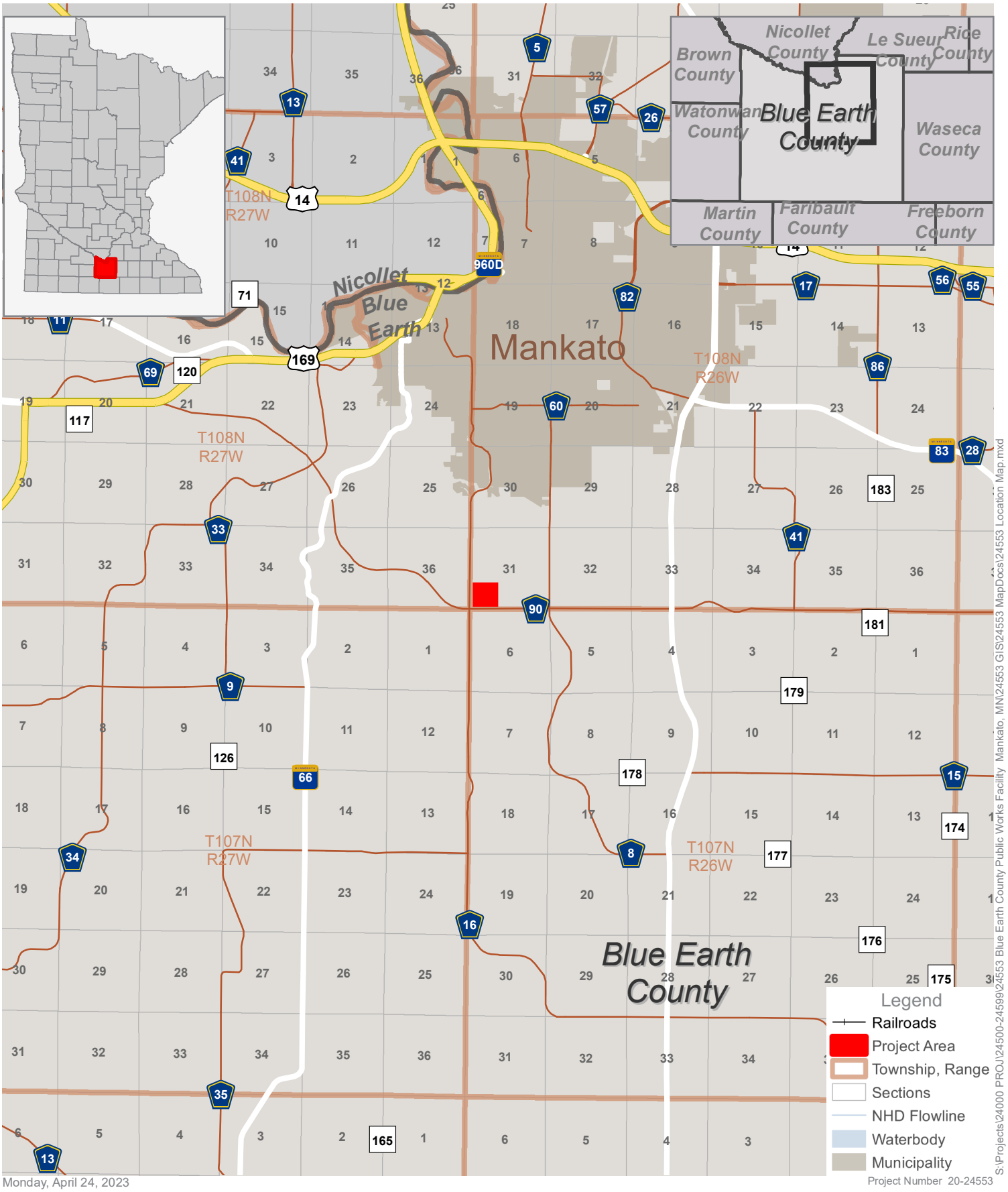
CONCLUSIONS & RECOMMENDATIONS

The proposed Blue Earth County Public Works Facility in Mankato Township, Blue Earth County, MN, is expected to generate up to 312 trips on an average weekday. The proposed site is expected to generate up to 45 trips during the AM peak hour of CSAH 16 traffic and about 26 trips during the PM peak hour of CSAH 16 traffic. The proposed development is expected to add trips to the adjacent road network, but the proposed development's impacts to the primary highway being accessed can be managed through the construction of a warranted right-turn lane.

From this review, the following is recommended as a part of improvements for the proposed development:

- Construct a right-turn lane at the proposed access to CSAH 16 to Blue Earth County standards.
- Consider moving the access road about 120 feet further north from its current location shown on the conceptual site plan to allow for the construction of a left-turn bypass lane.
    - After moving the proposed access road north to avoid impacts to the southbound right-turn lane at the intersection of CSAH 90 and CSAH 16, a left-turn bypass lane would allow other southbound traffic on CSAH 16 to safely bypass stopped traffic, improving operational efficiency and reducing the potential for rear-end collisions; however, a left-turn treatment is not warranted and the benefits of constructing a left-turn bypass lane may not justify the cost of construction and maintenance and the potential impacts to adjacent property. Because of this, a left-turn bypass lane is optional.

Appendix A: Project Location Map



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Monday, April 24, 2023

Project Number 20-24553

0 0.75 1.5 Miles

1 in = 2 miles

N

Project Location Map

Public Works Facility

Blue Earth County, Minnesota

Source(s):

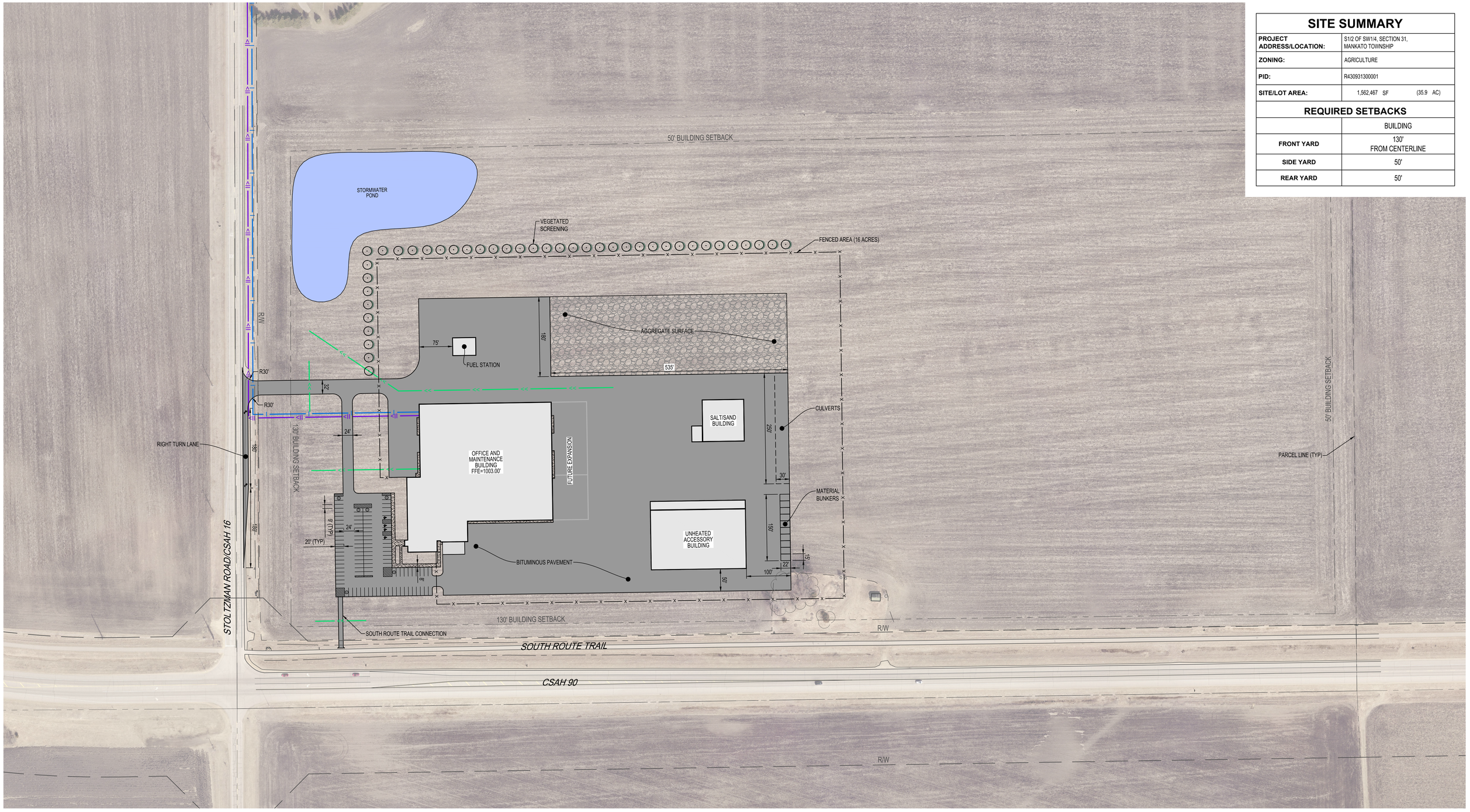
Municipalities (MN DOT, 6/24/2016)
Lakes (MN DNR, July, 2008)
Counties (MN DNR, July 2013)
PLSS (MnGeo/USGS)

ISG

Appendix B: Conceptual Site Plan

SITE SUMMARY	
PROJECT ADDRESS/LOCATION:	S1/2 OF SW1/4, SECTION 31, MANKATO TOWNSHIP
ZONING:	AGRICULTURE
PID:	R430931300001
SITE/LOT AREA:	1,562,467 SF (35.9 AC)

REQUIRED SETBACKS	
	BUILDING
FRONT YARD	130' FROM CENTERLINE
SIDE YARD	50'
REAR YARD	50'



CONCEPTUAL SITE PLAN

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CAD FILE NAME 24553 CONCEPT

BLUE EARTH COUNTY PUBLIC WORKS FACILITY
MANKATO TOWNSHIP, MINNESOTA - 04/20/2023
ISG PROJECT NO. 21-24553

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Appendix C: Trip Generation Details

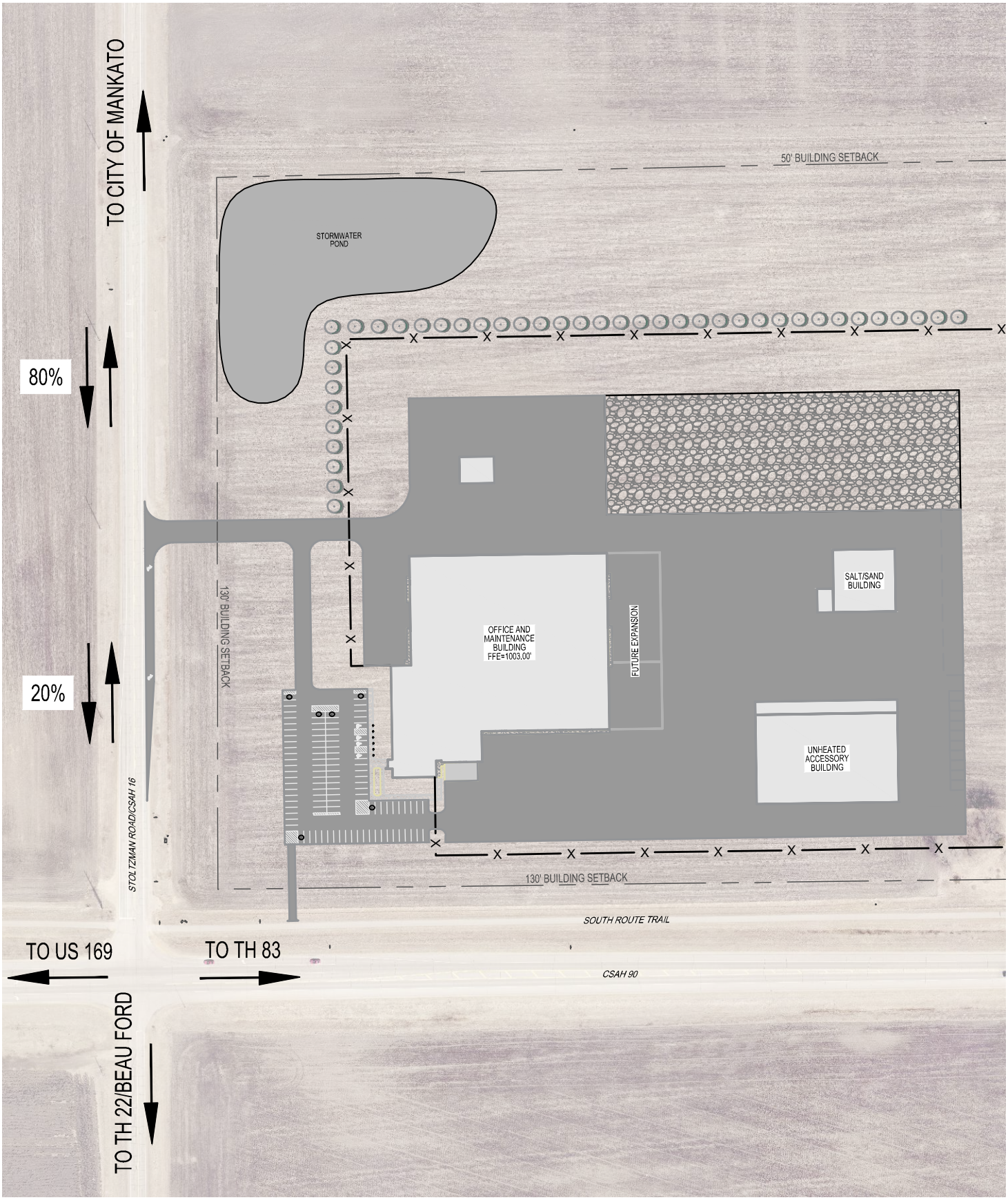
PROPOSED DEVELOPMENT

Proposed Site

ITE Code	730	Government Office Building			35	Employees		
	Average Rate / Fitted Curve Equation	# of Generated Trips	% Entering	% Exiting	# of New Trips Entering	# of New Trips Exiting	R^2 / Standard Deviation	# of Studies
Weekday AM (AM Peak Hour of Adj Street Traffic)	Ln(T)=0.56Ln(X)+1.81	45	75%	25%	34	11	0.94	7
Weekday AM (AM Peak Hour of Generator)	Ln(T)=0.59Ln(X)+1.83	51	55%	45%	28	23	0.96	7
Weekday PM (PM Peak Hour of Adj Street Traffic)	Ln(T)=0.87Ln(X)+0.18	26	20%	80%	5	21	0.84	6
Weekday PM (PM Peak Hour of Generator)	T=0.39(X)+20.44	34	43%	57%	15	19	0.75	6
Weekday	Ln(T)=0.83Ln(X)+2.79	311	50%	50%	156	156	0.88	7

Note: Sums may not add as expected due to rounding. Utilized Trip Generation Manual, 10th Edition.

Appendix D: Trip Distribution Map



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