City of Rogers
22350 South Diamond Lake Road • Rogers, MN 55374

FINAL

ALTERNATIVE URBAN AREAWIDE Review

Henry Study Area

WSB Project No. 2169-210

Comment Period Ends June 10, 2014

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Final
Alternative Urban Areawide Review
Henry Area

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EXECUTIVE SUMMARY

INTRODUCTION/BACKGROUND

The Henry Area is approximately 135 acres located in the west-central portion of the City of Rogers (see **Figure 5-1, 5-2, and 5-3**). The study area is bounded by I-94, the City of Dayton, Henry's Woods Park, and Vevea Lane. The existing land use is farmstead, agricultural, single family, and wetlands. There is a wooded area included within the study area. Henry's Woods park is located to the north of the study area. This area is a Maple-Basswood Forest and is held in a permanent conservation easement. The surrounding area outside of Henry's Woods is guided as Industrial and Commercial. To the west and south is I-94 and industrial development which is also guided as industrial. To the east is the City of Dayton and contains agricultural areas and Grass Lake. The guided land use in Dayton adjacent to the study area is low-medium density residential. One scenario, in conformance with the Comprehensive Plan, has been reviewed in this AUAR.

Scenario 1 – Comprehensive Plan (Figure 6-1)

The City's Comprehensive Plan indicates future land use in the study area to be commercial, limited industrial, and single-family residential. This scenario also reflects the anticipated development density that the City has experienced in the past and for which is allowed for each land use. The following table outlines the land uses for this scenario:

Table 6-1: Scenario 1

Land Use	Acres (Gross)	Housing (units)	Commercial (sqft)	Industrial (sqft)
Commercial	26		380,000	
Limited Industrial	76			1,100,000
Single-family	33	100		
TOTAL	**135**	**100**	**380,000**	**1,100,000**

* Calculations do not take into account existing or proposed wetlands, storm ponds, roads, right-of-way.

SUMMARY OF MAJOR ISSUES

Fish and Wildlife

The majority of the site is in agricultural production and therefore offers limited habitat for wildlife due to crop monocultures and frequent disturbance. However, there are a few wetlands and a 31 acre Maple-Basswood forest within the study area that provide connection to wetlands and wooded areas outside the study area. A portion of the wooded area is a Regionally Significant Ecological Resource Area and is ranked as high quality. Some wetland impact is anticipated and mitigation will be provided on-site or credit purchased from a wetland bank. Most of the wooded area is anticipated to be removed with this project for future development and road construction. In addition, as noted in the Kinghorn Industrial Development EAW (August 2013), the wooded area to the south is also anticipated to be removed. The City will consider maintaining a wooded buffer around the existing wetland in this area and also along the northern study area boundary with Henry's Woods Park.

Water Supply
The City's average day demand, which is based on a historical 5-year average, is 1.155 million gallons per day (MGD). The City's max day demand, which is also based on a historical 5-year average is 3.405 MGD. The City has a firm capacity for the entire City of 5.184 MGD. Full build out of the study area will result in an average day demand and max day demand of 106,440 gpd (73.9 gpm) and 266,100 gpd (184.8 gpm), respectively. Municipal water services will be extended to the study area by the City of Rogers. The Comprehensive Water System Plan indicates that the study area would include a 12-inch watermain along Brockton Lane, a 12-inch watermain crossing the study area east to west, and a 12-inch watermain along the western boundary of the study area. Both the water storage and well supply capacities for the entire City are sufficient for the entire City's water demands. The City's storage and supply system will be sufficient to provide service with this development scenario.

Wastewater/Sanitary Sewer
The City's Wastewater Treatment Plan (WWTP) can accommodate development in the study area. A regional lift station was constructed in 2013 that will serve all but the west 26 acres, which will be served from an existing gravity sanitary sewer system. Sewer services for the remainder of the study area will be extended from the lift station that is located east of Brockton Lane and north of 124th Ave.

Storm Water Management
Development will result in an increase in stormwater runoff. To mitigate for these impacts, a stormwater management plan that meets the requirements of the Elm Creek Watershed Management Commission and NPDES permit will be required within the site. Storm water will be treated within the study area and will ultimately discharge to Grass Lake.

Traffic Analysis
A Traffic Impact Study was completed for the AUAR. Traffic volumes were projected for the near term (2019) and a future year (2035) to determine the ability of proposed short-term improvements to accommodate long-term traffic volumes. 2035 operations were also analyzed with and without the proposed Fletcher Overpass, a long-range planned roadway over I-94 that is not specifically associated with development in the AUAR area. The results of the study include short-term and long-term improvements at the following intersections and roadway segments due to forecasted background growth and the trips produced by the proposed Henry Area development:

Intersections:

a. South Diamond Lake Road at Rogers Drive
b. CSAH 13 at CSAH 144
c. CSAH 13 at South Diamond Lake Road
d. CSAH 13 at David Koch Avenue
e. CSAH 13 at Rogers Drive

f. CSAH 13 at CSAH 81

Segments:

a. CSAH 13 (south of CSAH 81 to CSAH 144)
b. CSAH 81 (Maple Grove Parkway to Memorial Drive)

SUMMARY OF MITIGATION MEASURES

Pursuant to Minnesota Rules, mitigation measures have been developed as part of the AUAR. These measures would apply to any proposed development that may occur within the study area.

1. Any project proposer will be required to obtain all necessary permits and approvals for development.

2. Screening and a buffer between the industrial uses and Henry's Woods will be considered.

3. Development will need to meet the shoreland overlay district requirements for Grass Lake.

4. The western parcel will need to be rezoned to commercial in conformance with the Comprehensive Plan when development is proposed in this area.

5. The NPDES Phase II Construction Site permit requires a site specific Storm Water Pollution Prevention Plan (SWPPP) to be completed for the construction. The SWPPP is required to contain erosion and sediment control measures during construction.

6. Municipal sewer services will be extended to any development within the study area.

7. Design considerations for comprehensive storm water management should include regional ponding and consideration for infiltration where feasible.

8. If TMDL's are approved for French Lake and Diamond Lake, the storm water management for the study area that has not yet been implemented will be required to incorporate appropriate BMPs for the TMDL.

9. The stormwater management plan(s) for the future developments will provide analysis of existing and proposed drainage patterns and pollutant loads. The plan(s) will demonstrate compliance with city, Elm Creek Watershed Management Commission and state requirements.

10. It will be required that post-development discharge rates will be no greater than pre-development discharge rates to reduce erosion impacts downstream of the site.

11. Storm water will be required to be pretreated prior to discharge to wetlands.

12. Storm Water Pollution Prevention Plan (SWPPP) in conformance with the NPDES regulations will be needed for any development in the study area. Review of the SWPPP for each development will be required by the City.

13. If temporary construction dewatering is needed, the project proposer will be required to obtain a permit from the DNR.

14. If necessary upon development, private wells will be abandoned in conformance with state standards.

15. The City will extend their water services to the study area which will include a 12-inch watermain along Brockton Lane, a 12-inch watermain crossing the study area east to west, and a 12-inch watermain along the western boundary of the study area. This is in conformance with the Comprehensive Water System Plan.

16. As future wells are constructed, a DWSMA will be established and the City's existing WHPP will be updated.

17. Wetland delineation and mitigation is required in conformance with state and federal requirements. Wetland mitigation is required to meet the WCA and Section 404 requirements and could be on-site or purchased from a bank.

18. If contamination is encountered during project grading or development, grading activities will be suspended until material can be characterized and then disposed on in conformance with state requirements.

19. The municipal waste hauler company will make residential and commercial recycling programs available to the area. General municipal waste will be removed by these waste hauler companies.

20. Hazardous waste spills will be reported immediately to emergency response agencies via emergency dispatch service and addressed in conformance with state requirements.

21. Wetlands will need to be delineated in conformance with the Wetland Conservation Act as part of the development process. The City will review and verify the wetland delineation.

22. Wetland impact is anticipated to be minimized to the maximum extent possible throughout the review area. Wetland impact and mitigation will need to meet the requirements of the Wetland Conservation Act (WCA).

23. Storm water management features should incorporate native plantings of grasses, trees, and shrubs.

24. The City will encourage development to retain portions of the wooded areas for habitat and buffer.

25. The Blanding's turtle fact sheet will be provided to developers and contractors when development occurs in the study area.

26. If during any earth moving or construction activities, any archeological or historic resources are found that indicate the site is likely to yield information important to pre-history or history, the site shall be reported to the City. The City reserves the right to stop work authorized in its approval until the site is appropriately investigated and work is re-authorized.

27. Through the plan review process, the City shall require appropriate screening and buffers of development in the study area to screen for visual impacts between adjacent land uses.

28. Development activities will be required to adhere to the City's construction work hours and noise guidelines.

29. See **Appendix C** for transportation related mitigation items.

Henry Area AUAR

1. PROJECT TITLE:

Henry Area AUAR

2. PROPOSER

There is no specific project proposer for development within the study area.

3. RGU

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4. REASON FOR EAW PREPARATION

EQB guidance indicates no response is necessary

5. PROJECT LOCATION

County: Hennepin
City/Township: Rogers
Section S1/2 Section 24 , T120N, R23W

Figures 5-1 through 5-3 in **Appendix A** show the location of the Henry AUAR study area.

6. PROJECT DESCRIPTION

a) Provide the brief project summary to be published in the EQB Monitor, (approximately 50 words).

The City of Rogers is evaluating the environmental impacts of development of a 135 acre area in the west-central portion of the city north of I-94 and south of David Koch Avenue. The proposed land use in this study area is commercial, limited industrial, and single-family residential and anticipates future short-term and long-term roadway improvements.

b) Give a complete description of the proposed project and related new construction, including infrastructure needs. If the project is an expansion include a description of the existing facility. Emphasize: 1) construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes, 2) modifications to existing equipment or industrial processes, 3) significant demolition, removal or remodeling of existing structures, and 4) timing and duration of construction activities.

The Henry Area is approximately 135 acres located in the west-central portion of the City of Rogers (see **Figure 5-1, 5-2, and 5-3**). The study area is bound by I-94, the City of Dayton, Henry's Woods, and Vevea Lane. The existing land use is farmstead, agricultural, single family, and wetlands. There is a wooded area included within the study area.

Description of Development Scenarios

The existing conditions of the 135 acre study area include undeveloped agricultural areas, wetlands, and wooded areas. The wooded area is a Maple-Basswood forest identified as a Regionally Significant Area.

Minnesota Rules Chapter 4410.3610, Subpart 3 requires that "the Responsible Governmental Unit (RGU) may specify more than one scenario of anticipated development provided that at least one scenario is consistent with the adopted comprehensive plan. At least one scenario must be consistent with any known development plans of property owners within the area." The Henry Area AUAR includes the review of one development scenario that is in conformance with the Comprehensive Plan.

Scenario 1 – Comprehensive Plan (Figure 6-1)

The City's Comprehensive Plan indicates future land use in the study area to be commercial, limited industrial, and single-family residential. This scenario also reflects the anticipated development density that the City has experienced in the past and for which is allowed for each land use. The following table outlines the land uses for this scenario:

Table 6-1: Scenario 1

Land Use	Acres (Gross)	Housing (units)	Commercial (sqft)	Industrial (sqft)
Commercial	26		380,000	
Limited Industrial	76			1,100,000
Single-family	33	100		
TOTAL	**135**	**100**	**380,000**	**1,100,000**

* Calculations do not take into account existing or proposed wetlands, storm ponds, roads, right-of-way.

Development Assumptions
The development assumptions used to create the scenario are intended to satisfy guidance from the Environmental Quality Board (EQB), which indicates that the AUAR document should cover the possible impacts through a 'worst case scenario' analysis or else prevent the impacts through provisions of the mitigation plan. This means that the residential density assumption used to analyze the development scenarios may be higher than the actual built density and the assumed intensity of commercial and industrial development may be more intense than that of future development. Slightly overestimating the amount of potential development in the AUAR will help to ensure validity of the AUAR for development projects in the future. If the RGU determines in the future that the project is not consistent with the AUAR assumptions and mitigation measures, then the AUAR will need to be amended or a separate environmental analysis (e.g. EAW, AUAR, or EIS) would need to be completed in accordance with Minnesota Rules Chapter 4410.

- **Single Family Residential**
  Single family residential uses include detached single-family houses only and would be served by municipal sewer and water services. The density range for this residential category is two (2) to five (5) dwelling units per net acre to attain an average of three (3) dwelling units per net acre and allow opportunities for some diversity in housing types within the community's single family residential neighborhoods. The AUAR assumes the average 3 units per acre (33 acres) for a total of 100 units.

- **Commercial**
  Commercial uses include community and regional scale retail and service. Commercial land uses are located in places with good accessibility to the regional highway system as well as to alternative roadway access points that provide convenient access for the local community. Commercial nodes should be sized to accommodate a critical mass of uses that create a strong and vibrant commercial center. In this location, the commercial use is anticipated to be specialty retail that complements the existing retail to the north, which includes camping and outdoor stores.

- **Limited Industrial**
  Industrial uses include manufacturing, assembly, processing, warehousing and distribution uses. Industrial districts should be located to take advantage of good access to the regional roadway system with limited traffic circulation through residential and pedestrian-oriented areas. This use would include light manufacturing, assembly storage, transportation or freight terminals, or warehouses.

Description of Surrounding Areas
The study area is located in west-central Rogers. Henry's Woods park is located to the north of the study area. This area is a Maple-Basswood Forest and is held in a permanent conservation easement. The surrounding area outside of Henry's Woods

is guided as Industrial and Commercial. To the west and south is I-94 and industrial development which is also guided as industrial. To the east is the City of Dayton and contains agricultural areas and Grass Lake. The guided land use in Dayton adjacent to the study area is low-medium density residential.

Anticipated Infrastructure

To accommodate any development of the study area, municipal sewer and water will need to be extended to the site. Additionally, transportation infrastructure and storm water management facilities will be needed. These improvements are summarized below.

Wastewater

The City of Rogers Wastewater Treatment Plan (WWTP) has capacity to accommodate development in the study area. Sanitary sewer is anticipated to be extended to the study area with the Kinghorn sewer district as outlined in the City's Comprehensive Sewer Plan. As part of the Kinghorn lift station construction in 2013 (at Brockton Lane and 124th Ave N), a 6-inch forcemain was constructed along Brockton Lane connecting the Kinghorn lift station to the existing sanitary sewer system. An existing 12-inch sewer is located at the northwest corner of the study area.

Water Supply

The City's average day demand, which is based on a historical 5-year average, is 1.155 million gallons per day (MGD). The City's max day demand, which is also based on a historical 5-year average is 3.405 MGD. The City has a firm capacity for the entire City of 5.184 MGD. Full build out of the study area will result in an average day demand and max day demand of 106,440 gpd (73.9 gpm) and 266,100 gpd (184.8 gpm), respectively. Municipal water services will be extended to the study area by the City of Rogers. The Comprehensive Water System Plan indicates that the study area would include a 12-inch watermain along Brockton Lane, a 12-inch watermain crossing the study area east to west, and a 12-inch watermain along the western boundary of the study area. Both the water storage and well supply capacities for the entire City are sufficient for the entire City's water demands. The City's storage and supply system will be sufficient to provide service with this development scenario.

Storm Water Management

Development will be required to develop a site-specific storm water management plan that provides rate control, volume control, and treatment of storm water in conformance with City, Elm Creek Watershed Management Commission (ECWMC) and NPDES requirements.

Transportation

Some roadway improvements will be included as development occurs in the area. These include construction of roadways to accommodate future traffic growth, as well as those to accommodate traffic from the proposed development. A Traffic Impact Study has been included in **Appendix C.**

In addition, the Rogers Drive Extension would be constructed in 2014 and 2015. This is anticipated in two phases as shown in **Figure 6-2** with a Phase 1 extension of Rogers Drive planned in 2014 and Phase 2 of Rogers drive in 2015. Also, planning for the future Fletcher Overpass has also been included in the development planning for the study area. The Fletcher Overpass is anticipated to be constructed in 2035 or beyond and would provide an overpass over I-94 and connect to Rogers Drive within the study area. No specific construction plans have been developed for the Fletcher Overpass. They are included within this AUAR for potential environmental impacts associated with their potential impact within the study area. However, if additional environmental review is required for Fletcher Overpass, it would need to be completed as a separate document.

Phasing

Development is anticipated to occur over the next 1-20 years, depending on housing, commercial, and industrial development demand. The timing of development will be largely dependent on economic conditions for the type of development proposed. Development is anticipated to be phased generally from the center of the study area, west of Brockton Lane expected in the next 1-10 years and then the eastern and western portions of the project anticipated in the next 15-20 years.

c) Project magnitude:

Total Project Acreage	135
Linear project length	NA
Number and type of residential units	100 – single family
Commercial building area (in square feet)	380,000
Industrial building area (in square feet)	1,100,000
Institutional building area (in square feet)	NA
Other uses – specify (in square feet)	232,174 sf (Rogers Dr Extension)
Structure height(s)	Two stories or less

7. COVER TYPES.

A Minnesota Land Cover Classification System (MLCCS) inventory is shown in **Figure 7-1.** Based on this information and field review of the study area, the following land cover types are found in the study area:

- **Planted or Cultivated:** Approximately 93 acres of the site is currently cropland planted with corn.

- **Wetland:** There are a few wetland complexes in the study area. There are about 6 acres of wetland in the study area. The main wetland within the site is a Type 3 cattail marsh within the wooded area. The other wetland areas are Type 3 on the northwestern corner and Type 1 along the eastern edge. Grass Lake is adjacent to the study area on the east and is a Type 2 cattail marsh in this area.

- **Wooded/Forested:** The central portion of the site contains a Maple Basswood Forest. This woods is connected to the Henry's Woods to the north, which is in a conservation easement, and the wooded area to the south within the Kinghorn Industrial Park site. Information from the DNR (**Appendix B**) indicates a portion of this wooded area has been identified as a Site of High Biodiversity Significance as well as a Regionally Significant Ecological Area (**Figure 11-1**). The DNR recommends allowing this area to remain as open space and to avoid impact.

- **Right-of-way/ Developed:** This cover type is associated the existing road right-of-way of Brockton Lane and also a few homes located within the western portion of the study area.

The anticipated proposed cover types have been approximated as shown in **Table 7-1 and Figure 7-2.** This change is cover type will have an impact for stormwater management and habitat in the area. These changes will result in increases stormwater runoff. Stormwater management and habitat impacts are addressed elsewhere in the AUAR.

Table 7-1: Existing and Proposed Cover Types*

Cover Type	**Existing Conditions (acres)**	**Scenario 1* (acres)**
Wetlands	6	3
Wooded/forest	31	5
Grassland	0	3
Cropland	93	0
Developed/Artificial Surfaces (includes lawn and storm water management)	5	124
TOTAL:	**135 ac**	**135 ac**

*These acreages are based on estimates and not actual development plans. Further, these acreages do not take into account and wetland or wildlife mitigation measures for purposes of reviewing potential environmental impact.

8. PERMITS AND APPROVALS.

Federal	***Permit/Approval***
US Army Corps of Engineers	Section 404 Permit
State	***Permit/Approval***
Pollution Control Agency	NPDES Storm Water Permit
Pollution Control Agency	Sanitary Sewer Permit
Pollution Control Agency	Section 401 Water Quality Certification Permit, if Section 404 Individual Permit is needed
Department of Natural Resources	Temporary dewatering for construction
Department of Health	Water main
Department of Transportation	Work in ROW permit
Regional/ County/ Local	***Permit/Approval***
City	WCA Approval
City	Preliminary plat approvals
City	Final plat approvals
City	Building permits
Elm Creek Watershed Management Commission	Storm water and erosion control permit

Development within the study area would be financed by private developers. To address public infrastructure, these items could also be financed by the developer through development fees. Roadway improvements could be financed at the local, state, or federal level.

Mitigation Plan

- Any project proposer will be required to obtain necessary permits and approvals for development.

9. LAND USE.

a. Describe:

i. Existing land use of the site as well as areas adjacent to and near the site, including parks, trails, prime or unique farmlands.

ii. **Plans. Describe planned land use as identified in comprehensive plan (if available) and any other applicable plan for land use, water, or resources management by a local, regional, state, or federal agency.**

iii. **Zoning, including special districts or overlays such as shoreland, floodplain, wild and scenic rivers, critical area, agricultural preserves, etc.**

Existing and Surrounding Land Use

The Henry Area is approximately 135 acres located in the west-central portion of the City of Rogers (see **Figure 5-1, 5-2, and 5-3**). The study area is bound by I-94, the City of Dayton, Henry's Woods Park, and Vevea Lane. The existing land use is farmstead, agricultural, single family, and wetlands. There is a wooded area within the study area also.

The existing land use is agricultural, single-family detached, and farmstead. There are no existing trails within the study area.

To the north is Henry's Woods site, which is park and open space in a conservation easement. This is a 52 acre park that has a parking and picnic area along with trails and natural area.

There is also commercial land use to the north with industrial beyond those uses further north. To the west is I-94, a major freeway. To the west of that is commercial, agricultural, and industrial land uses. South of the study area is Kinghorn Industrial Park with planned industrial uses. To the east is the City of Dayton with existing land use of agricultural.

The planned land use in the study area will be commercial, industrial and single-family residential. This is in conformance with the City's Comprehensive Plan and will be subject to the City's development policies. Development will also be required to conform to the regulations of the Elm Creek Watershed Management Commission.

There are no floodplain or agricultural preserve overlay districts. Grass Lake is adjacent to the site and as such, a shoreland overlay district applies to the study area. Grass Lake is a Natural Environment lake and there is a 1,000 foot shoreland overlay area from the OHW of Grass Lake. This is shown approximately on **Figure 7-2.**

b. **Discuss the project's compatibility with nearby land uses, zoning, and plans listed in Item 9a above, concentrating on implications for environmental effects.**

The adjacent land uses and zoning are primarily industrial, commercial, and the freeway. The study area's proposed uses are compatible with these adjacent uses. The eastern portion of the site is planned to be single family residential. The area within Dayton east of the study area is guided as low-medium density residential. These uses will be compatible. The area to the north is permanent park with Henry's Woods. Henry's Woods provides permanent open space within this area. These adjacent uses are not in conflict with each other and are included in the City's Comprehensive Plan and development in the study area will consider providing buffer between the industrial development and the park to the north.

Mitigation Plan

- Screening and a buffer between the industrial uses and Henry's Woods will be considered.
- Development will need to meet the shoreland overlay district requirements for Grass Lake.
- The western parcel will need to be rezoned to commercial in conformance with the Comprehensive Plan when development is proposed in this area.

10. GEOLOGY, SOILS, AND TOPOGRAPHY

a. **Geology - Describe the geology underlying the project area and identify and map any susceptible geologic features such as sinkholes, shallow limestone formations, unconfined/shallow aquifers, or karst conditions. Discuss any limitations of these features for the project and any effects the project could have on these features. Identify any project designs or mitigation measures to address effects to geologic features.**

Information from the MPCA indicates that the study area is not within a karst landform region. Existing geological hazards are minimal to none in the study area. Shale, which is dominant bedrock in the study area, is buried under 140 feet or more of clay rich till and outwash/terrace sand.

b. **Soils and topography - Describe the soils on the site, giving NRCS (SCS) classifications and descriptions, including limitations of soils. Describe topography, any special site conditions relating to erosion potential, soil stability or other soils limitations, such as steep slopes, highly permeable soils. Provide estimated volume and acreage of soil excavation and/or grading. Discuss impacts from project activities (distinguish between construction and operational activities) related to soils and topography. Identify measures during and after project construction to address soil limitations including stabilization, soil corrections or other measures. Erosion/sedimentation control related to stormwater runoff should be**

addressed in response to Item 11.b.ii.

AUAR guidance indicated that the estimated volume and acres to be graded does not need to be included in the AUAR.

The topography of the site is generally flat between the 950 and 952 contour. There are no steep slopes. The NRCS Hennepin County Soil Survey indicates that the following soils are present in the study area (**Figure 10-1**):

Map Symbol	Map Unit Name	Hydric	Erodibility	Permeability
L23A	Cordova loam, 0 to 2 percent slopes	No	NHEL	Poorly Drained
L24A	Glencoe loam, depressional, 0 to 1 percent slopes	Yes	NHEL	Very poorly drained
L50A	Houghton and Muskego soils, depressional, 0 to 1 percent slopes	Yes	NHEL	Very Poorly drained
L44A	Nessel loam, 1 to 3 percent slopes	No	NHEL	Moderately well drained
L45A	Dundas-Cordova complex, 0 to 3 percent slopes	Yes	NHEL	Somewhat poorly drained
L37B	Angus loam, morainic, 2 to 5 percent slopes	No	NHEL	Well drained
L36A	Hamel, overwash-Hamel complex, 1 to 4 percent slopes	No	NHEL	Somewhat poorly drained
L22C2	Lester loam, morainic, 6 to 12 percent slopes, eroded	No	PHEL	Well drained

* NHEL = Not Highly Erodible Land
PHEL = Potentially Highly Erodible Land

Based on information from the Elm Creek Watershed Management Plan and the Hennepin County Geologic Atlas, the sensitivity to the ground water in the study area to contamination is low. It is not anticipated that the nature of the development project will cause any increased risk to contamination to the ground water in the study area.

Geology, Soils, and Topography Mitigation Plan

- The NPDES Phase II Construction Site permit requires a site specific Storm Water Pollution Prevention Plan (SWPPP) to be completed for the construction. The SWPPP is required to contain erosion and sediment control measures during construction.

11. WATER RESOURCES

a. **Describe surface water and groundwater features on or near the site in a.i. and a.ii. below.**

   i. **Surface water - lakes, streams, wetlands, intermittent channels, and county/judicial ditches. Include any special designations such as public waters, trout stream/lake, wildlife lakes, migratory waterfowl feeding/resting lake, and outstanding resource value water. Include water quality impairments or special designations listed on the current MPCA 303d Impaired Waters List that are within 1 mile of the project. Include DNR Public Waters Inventory number(s), if any.**

   ii. **Groundwater – aquifers, springs, seeps. Include: 1) depth to groundwater; 2) if project is within a MDH wellhead protection area; 3) identification of any onsite and/or nearby wells, including unique numbers and well logs if available. If there are no wells known on site or nearby, explain the methodology used to determine this.**

Within the study area, there are six acres of existing water bodies which include Type 1, 2 and 3 wetlands. There are no DNR Public Waters/Wetlands within the study area. To the south on the adjacent property is a large Type 2/3 wetland. To the east is Grass Lake, Diamond Lake, and French Lake. Diamond Lake and French Lake are impaired for nutrients.

There are no known springs or seeps within the study area. Based on the County Geologic Atlas, the depth to groundwater is 50-100 feet below the surface. Wetlands in the area would indicate there is a high surface water table in the area. A portion of the study area is within a wellhead protection area or a drinking water supply management area (**Figure 11-1**). Based on the County Well Index, there are two wells within the study area that appear to be associated with the few existing homes within the study area (**Figure 11-2**).

b. **Describe effects from project activities on water resources and measures to minimize or mitigate the effects in Item b.i. through Item b.iv. below.**

   i. **Wastewater - For each of the following, describe the sources, quantities and composition of all sanitary, municipal/domestic and industrial wastewater produced or treated at the site.**

1) **If the wastewater discharge is to a publicly owned treatment facility, identify any pretreatment measures and the ability of the facility to handle the added water and waste loadings, including any effects on, or required expansion of, municipal wastewater infrastructure.**
2) **If the wastewater discharge is to a subsurface sewage treatment systems (SSTS), describe the system used, the design flow, and suitability of site conditions for such a system.**
3) **If the wastewater discharge is to surface water, identify the wastewater treatment methods and identify discharge points and proposed effluent limitations to mitigate impacts. Discuss any effects to surface or groundwater from wastewater discharges.**

The City of Rogers wastewater influent records at the Wastewater Treatment Facility (WWTF) indicate wastewater flow generated within the study area can be accommodated by the City of Rogers WWTF.

The wastewater generated from the city is diverted to the sanitary sewer collection system and directed to the city's WWTF located in central Rogers. Treated wastewater from the city's WWTF is discharged to an unnamed ditch which ultimately discharges to the Crow River. The existing treatment capacity is adequate for the existing wastewater flows in the city with the existing flows currently consuming approximately 70% of the WWTF capacity. Met Council has proposed constructing a regional WWTF in the future that will meet all of the City of Roger's wastewater development needs.

The WWTF has a current annual average wastewater flow capacity of 1.282 MGD. Million Gallons per Day (MGD). Based on data for the years from 2010 through 2013, the WWTF currently receives an annual average daily wastewater flow of approximately 840,200 GPD. The highest annual average daily flow was in 2011 and was 0.873 MGD.

Roger's wastewater collection system includes many miles of sewer lines that range in size from 8-inch diameter to 18-inch diameter. The collection system includes 12 lift stations.

The 135 acre study area is within the Kinghorn sewer district. There are no existing municipal services within the study area. There is an existing lift station (the Kinghorn station) located at Brockton and 124th Ave N that was constructed in the fall of 2013 to serve the study area.

Sanitary sewer is anticipated to be extended to the Kinghorn sewer district within the City's Comprehensive Sewer Plan. As part of the Kinghorn lift station construction, a 6-inch forcemain was constructed along Brockton Lane connecting the Kinghorn lift station to the existing sanitary sewer system. An existing 12-inch sewer is located at the northwest corner of the study area that will provide service to the westerly 26 acres (**Figure 11-3**).

Scenario 1

This scenario is consistent with the Comprehensive Plan. Sanitary sewer would be extended to serve the single-family area and the industrial area. These areas would connect to the Kinghorn lift station which would direct sewage to the north along Brockton Lane to the existing sanitary sewer system located at David Koch Avenue. The commercial area on the west would be served by the 12-inch sewer in the northwest corner of the study area. Normal municipal sewer discharge is anticipated from the project area.

To estimate the anticipated flow from the study area, a unit wastewater flow of 1,000 gpd/net acre was used for Commercial, 500 gpd/net acre was used for Light Industrial, and 480 gpd/net acre was used for single family. A peaking factor of 3.2 will be used to determine the peak hour flow from the overall AUAR area. There are 26 acres (380,000 sf) of commercial, 76 acres (1,100,000 sf) of industrial, and 100 homes on 33 acres being studied with this AUAR. Therefore, the estimate average day wastewater flow is 20,800 gpd and the peak day wastewater flow is 66,560 gpd to the northwest, and 43,070 gpd average and 137,830 gpd peak wastewater flow to the Kinghorn lift station. The existing wastewater collection and the existing WWTF have capacity to provide wastewater service for the proposed development area under this scenario.

Future wastewater flow for the study area under Scenario 1 is shown below in **Table 11-1**.

Table 11-1. Estimated Average Day and Peak Hour Wastewater Flow from Scenario 1

Type	Acres (Gross)	Net Acres (20% Gross Acres)	Unit Wastewater Flow (gpd/net acre)	Average Daily Wastewater Flow (gpd)	Peak Day Wastewater Flow (gpd)
Single Family Residential	33	26.4	480	12,672	40,550
Commercial	26	20.8	1,000	20,800	66,560
Light Industrial	76	60.8	500	30,400	97,280
Total	**135**	**108**		**63,872**	**204,390**

Table 11-2 summarizes the estimated wastewater characteristics and loading for the wastewater that will be generated from the study area under Scenario 1. The light industrial and commercial wastewater characteristics for the study area are expected to be consistent with normal domestic wastewater characteristics.

Table 11-2 Estimated Wastewater Characteristics and Total Average Daily Wastewater Loading from Scenario 1

Parameter	Estimated Wastewater Characteristics and Average Daily Loading	
	mg/l	lbs/day
Biochemical Oxygen Demand	220	117
Total Suspended Solids	220	117
Ammonia –Nitrogen	25	13
Total Phosphorous	8	4

The wastewater generator from the study area will be conveyed via municipal services that will be extended to the development area and be either served by the Kinghorn Lift Station on the east or the existing sewer in the northwestern corner of the study area. Wastewater will be conveyed north through the existing sewer system to the WWTP. See **Figure 11-3.**

Wastewater Mitigation Plan

The mitigation plan for wastewater collection and conveyance associated with development of the AUAR Study area are shown in **Figure 11-3**:

- Municipal sewer services will be extended to any development within the study area.

ii. **Stormwater - Describe the quantity and quality of stormwater runoff at the site prior to and post construction. Include the routes and receiving water bodies for runoff from the site (major downstream water bodies as well as the immediate receiving waters). Discuss any environmental effects from stormwater discharges. Describe stormwater pollution prevention plans including temporary and permanent runoff controls and potential BMP site locations to manage or treat stormwater runoff. Identify specific erosion control, sedimentation control or stabilization measures to address soil limitations during and after project construction.**

Existing Conditions

The study area currently consists of the cover types summarized in **Item 7.** Runoff from the existing conditions generally flows to the north, east, and south into existing wetlands. Ultimately, water from the study area enters Grass Lake via roadside ditches and culverts that flow under Brockton Lane.

The soils are generally Type C soils that are unsuitable for infiltration, however the agricultural land is drain tiled therefore these areas currently drain as more of a

Type B soil. Upon development, the drain tile will be removed and the soils will operate more as Type C soils in the agricultural area will not be suitable for infiltration.

Proposed Conditions

Due to the conceptual nature of the development scenarios, the amount of impervious surfaces in each land use was assumed based on typical past development in the City. Scenario 1 represents the 135 acre study area becoming 87.4 acres of impervious based on standard impervious percentages for industrial, commercial, and single family land uses. The cover types are anticipated to change as indicated in **Item 7** and thus result in an increase in stormwater rate and volume. Stormwater management for development can be provided through a combination of wet detention ponds. Utilizing infiltration to achieve volume reduction and water quality goals is not possible in this case due to the nature of the soils. Treated storm water will ultimately be discharged to Grass Lake.

Stormwater management within the future development of the study area must be in conformance with local requirements. This will include conformance with the NPDES permit, as well as Elm Creek Watershed Management District.

- **National Pollution Discharge Elimination System (NPDES) Standards**
  The French Lake and Diamond Lake are listed as impaired for nutrients, are located within one mile of the study area, and do not have an approved TMDL. As a result, the post-construction water quality standards of the NPDES permit will require future development to provide retention for the water quality volume of 1-inch of runoff from the new impervious surfaces.

- **Elm Creek Watershed Management Commission**
  The Elm Creek WMC requires that storm water treatment be constructed to mitigate the effects of the increase runoff and reduce the 2-, 10-, and 100-year storms runoff rates to existing conditions as well as providing runoff volume control in conformance with the ECWMC's rules. ECWCM also requires that water quality treatment be provided to provide phosphorus removal to pre-development conditions and treat stormwater to NURP guidelines.

A water quantity and quality analysis was completed for the existing conditions within the study area. Since the development is conceptual at this time, the existing conditions have been modeled and the results provided to document the water quantity/quality rates that the development will be required to meet. This analysis uses the assumptions and methods based on standard impervious percentages for commercial, industrial and single family land use.

Tables 11-3 and 11-4 summarizes the total pollutant and volume loads for the development scenario compared to the baseline condition.

Table 11-3 Water Quantity Prior to Mitigation

Existing Conditions				Proposed		
	2-yr	10-yr	100-yr	2-yr	10-yr	100-yr
Flow Rate (cfs)	54.5	133.94	246.87	224.8	369.9	553.8
Volume (ac-ft)	9.2	20.2	35.6	21.6	35.6	53.4

Table 11-4: Annual Estimated Pollutant Loads Prior to Mitigation

Development Scenario	Annual Runoff Volume (ac-ft)	Annual TP Load (lbs)	Annual TSS Load (lbs)
Baseline Condition	5.33	3.31	434
Development	28.66	16.9	3868

To achieve compliance with NPDES and ECWMC requirements, future development must provide annual volume and pollutant load reductions in the amounts presented in **Table 11-5**.

Table 11-5: Required Annual Pollutant Load Reductions to Achieve Baseline Condition (1988)

Development Scenario	Annual Runoff Volume (ac-ft)	Annual TP Load (lbs)	Annual TSS Load (lbs)
Scenario 1	81%	80%	88%

Storm Water Mitigation Plan

- Design considerations for comprehensive storm water management should include regional ponding. Using infiltration in this location may not be feasible.

- A TMDL is currently underway for Elm Creek Watershed District. If the TMDL is approved, the storm water management for the study area that has not yet been implemented will be required to incorporate appropriate BMPs for the TMDL.

- The stormwater management plan(s) for the future developments will need to provide analysis of existing and proposed drainage patterns and pollutant loads. The plan(s) will demonstrate compliance with city, Elm Creek Watershed Management Commission and state requirements.

- Elm Creek Watershed Management Commission is currently in the process of updating their stormwater rules. The Third Generation Plan should be completed and adopted late summer 2014. Depending on the timing of development, the project will need to meet the requirements of the rules that are in-place with ECWMC at the time of permitting.

- It will be required that post-development discharge rates will be no greater than pre-development discharge rates to reduce erosion impacts downstream of the site.

- Storm water will be required to be pretreated prior to discharge to wetlands.

- Storm Water Pollution Prevention Plan (SWPPP) in conformance with the NPDES regulations will be needed for any development in the study area. Review of the SWPPP for each development will be required by the City.

iii. **Water appropriation - Describe if the project proposes to appropriate surface or groundwater (including dewatering). Describe the source, quantity, duration, use and purpose of the water use and if a DNR water appropriation permit is required. Describe any well abandonment. If connecting to an existing municipal water supply, identify the wells to be used as a water source and any effects on, or required expansion of, municipal water infrastructure. Discuss environmental effects from water appropriation, including an assessment of the water resources available for appropriation. Identify any measures to avoid, minimize, or mitigate environmental effects from the water appropriation.**

Dewatering

No permanent dewatering is anticipated with development within the study area. Temporary dewatering during construction to install utilities may be needed, but is unknown. If temporary construction dewatering is needed, the project proposer will be required to obtain a permit from the DNR.

Water supply

Based on the City's Comprehensive Water Supply Plan, the City's existing system consists of six confined aquifer wells, two elevated water towers and one ground storage reservoir. The City wells have a combined capacity of 6.624 MGD. The firm wells capacity is 5.184 MGD. The water storage volume includes a 400,000 gallon East Tower, a 750,000 gallon West Tower and a 2,000,000 gallon ground storage reservoir. The City draws its water from the Franconia-Ironton-Galesville (FIG) aquifer.

The City has designated Drinking Water Supply Management Areas (DWSMA) as shown in **Figure 11-1.** The DWSMA is within a portion of the study area and was established as a part of the City's current Wellhead Protection Program. Residential development is appropriate within a DWSMA. However, Industrial development is subject to review during the permit process.

To estimate the water demand within the study area, the following assumptions were used.

Table 11-3. Residential and Non-Residential Water Demand Assumptions

Land Use	Average Daily Wastewater Flow per Acre (gpd/net acre) [1]	Historical Average Wastewater Flow to Water Demand Factor [1]	Max Day Factor [2]	Max Hour Factor [3]
Residential	480	1.67	2.5	1.5
Commercial	1000	1.67	2.5	1.5
Industrial	500	1.67	2.5	1.5

[1] the City's average day water demand is based on average day wastewater flow development and a historical average wastewater flow to water demand multiplying factor
[2] the City's Max Day factor is based on the historical 5-year average day to peak day factor information provided by the DNR.
[3] the Max Hour Factor is based on our experience with other projects in Cities of a similar size.

The existing and future demands for the entire City were reviewed. The City's average day demand, which is based on a historical 5-year average, is 1.155 million gallons per day (MGD). The City's max day demand, which is also based on a historical 5-year average is 3.405 MGD.

According to 10-State Standards, a City should be able to provide a water supply in the amount of their max day demands with their largest well out of service (firm capacity). The City has a firm capacity for the entire City of 5.184 MGD.

Full build out of the study area will result in an average day demand and max day demand of 106,440 gpd (73.9 gpm) and 266,100 gpd (184.8 gpm), respectively. Municipal water services will be extended to the study area by the City of Rogers. The Comprehensive Water System Plan indicates that the study area would include a 12-inch watermain along Brockton Lane, a 12-inch watermain crossing the study area east to west, and a 12-inch watermain along the western boundary of the study area.

According to AWWA, it is typical to recommend that the City have an approximate storage capacity equal to the average day demand plus a fire flow equalization amount. For purposes of this study, a fire flow of 3,500 gallons per minute for three hours (630,000 gallons) was added to the average day demand to determine the required storage capacity for the entire City. Therefore, 1.891 million gallons is required for the City's water storage. Currently, the City has approximately 3.150 million gallons in storage capacity.

Both the water storage and well supply capacities for the entire City are sufficient for the entire City's water demands. The City's storage and supply system will be sufficient to provide service with this development scenario.

Water Use Mitigation Plan

- If temporary construction dewatering is needed, the project proposer will be required to obtain a permit from the DNR.

- If necessary upon development, private wells will be abandoned in conformance with state standards.

- The City will extend water services to the study area which will include a 12-inch watermain along Brockton Lane, a 12-inch watermain crossing the study area east to west, and a 12-inch watermain along the western boundary of the study area. This is in conformance with the Comprehensive Water System Plan.

- As future wells are constructed, a DWSMA will be established and the City's existing WHPP will be updated.

iv. **Surface Waters**

a) Wetlands - Describe any anticipated physical effects or alterations to wetland features such as draining, filling, permanent inundation, dredging and vegetative removal. Discuss direct and indirect environmental effects from physical modification of wetlands, including the anticipated effects that any proposed wetland alterations may have to the host watershed. Identify measures to avoid (e.g., available alternatives that were considered), minimize, or mitigate environmental effects to wetlands. Discuss whether any required compensatory wetland mitigation for unavoidable wetland impacts will occur in the same minor or major watershed, and identify those probable locations.

Wetland Impact: Both state and federal wetland regulations require avoidance and minimization of wetland impact. While no specific development plans have been developed, with anticipated infrastructure needed to serve the study area such as roads and utilities, it is anticipated some wetland impact would occur.

Approximately 1-3 acres of wetland impact could be anticipated as part of development in the study area and of future roadway improvements planned. Wetland impact would be subject to State regulations through the Wetland Conservation Act (WCA). The City is the Local Government Unit (LGU) for the WCA. Impacts could also be regulated by the US Corps of Engineers through Section 404 of the Clean Water Act. Wetland impact would need to be avoided and minimized to the greatest extend practical. Wetland mitigation is required to meet the WCA and Section 404 requirements and could be on-site or purchased from a bank.

b) **Other surface waters- Describe any anticipated physical effects or alterations to surface water features (lakes, streams, ponds, intermittent channels, county/judicial ditches) such as draining, filling, permanent inundation, dredging, diking, stream diversion, impoundment, aquatic plant removal and riparian alteration. Discuss direct and indirect environmental effects from physical modification of water features. Identify measures to avoid, minimize, or mitigate environmental effects to surface water features, including in-water Best Management Practices that are proposed to avoid or minimize turbidity/sedimentation while physically altering the water features. Discuss how the project will change the number or type of watercraft on any water body, including current and projected watercraft usage.**

There are no other surface waters within the study area. Grass Lake, DNR Public Water 135P, is adjacent to the study area. No impacts to Grass Lake are anticipated.

Mitigation Plan – Surface Waters

- Wetland delineation and mitigation is required in conformance with state and federal requirements. Wetland mitigation is required to meet the WCA and Section 404 requirements and could be on-site or purchased from a bank.

12. CONTAMINATION/HAZARDOUS MATERIALS/WASTE

a) **Pre-project site conditions - Describe existing contamination or potential environmental hazards on or in close proximity to the project site such as soil or ground water contamination, abandoned dumps, closed landfills, existing or abandoned storage tanks, and hazardous liquid or gas pipelines. Discuss any potential environmental effects from pre-project site conditions that would be caused or exacerbated by project construction and operation. Identify measures to avoid, minimize or mitigate adverse effects from existing contamination or potential environmental hazards. Include development of a Contingency Plan or Response Action Plan.**

MPCA's database information was reviewed to identify verified or potential hazardous substances and petroleum release sites associated with the study area or surrounding area. The following databases were reviewed as part of this investigation:

- MPCA "What's in My Neighborhood?" website search
- MPCA Storage Tank Leak site website search

Based on this review, the existing known conditions for the study area and surrounding area are as follows:

Project Area: No database listings were identified within the project area. A few structures (residential) are located within the project. Aerial photo review indicates there may be some automobiles were observed on the existing residential property located in the western portion of the project area.

Surrounding Properties: Two database listings were identified for adjoining properties. The adjoining property listings were located west of the study area (across Interstate Highway 94). The following is a summary of the adjoining property database listings:

- Marine Max (20300 County Road 81, Rogers MN 55374) – This site is located approximately 500 feet west of the project area. The site was identified on the tanks and water quality stormwater permit databases. Two active above ground storage tanks (ASTs) were reportedly present at the property containing gasoline and diesel. No releases or an indication of a release was identified for the tanks. Inclusion on the water quality stormwater permit database indicates that the property has a plan in place to limit surface/groundwater contamination.

- Metro Mold & Design LLC (20600 County Road 81, Rogers MN 55374) – This site is located approximately 600 feet west of the project area. The site was identified on the air quality, hazardous waste small quantity generator, and tanks databases. One active above ground storage tank (AST) is reportedly present at the property containing waste oil. No releases or indication of a release was identified for the tank. Inclusion on the air quality database indicates that the facility generates air pollutants' requiring permitting and inclusion on the small quantity hazardous waste generator means that the facility generates, handles, or stores 0 – 1,000 kilograms of hazardous waste per calendar month. No release of violations associated with the hazardous waste was reported.

Based on the information provided, database listing types, regulatory status, and the distance from the project area; thee adjoining listings do not appear to represent a contamination risk to the project area at this time.

Surrounding Area: Ten sites were identified within a 1,000 feet of the project area. Some of these sites are listed on more than one database and the majority of the listings are located west of Interstate Highway 94. Based on the information provided, database listing types, regulatory status, and the distance from the project area, these listings do not appear to represent a contamination risk to the project area at this time.

b) Project related generation/storage of solid wastes - Describe solid wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from solid waste handling, storage and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of solid waste including source reduction and recycling.

Development with the study area is anticipated to generate typical municipal waste. Disposal of waste will be provided through the municipal garbage hauler and recycling will be encouraged. The estimated amount of municipal solid waste from the study area is summarized below.

Table 12-1. Estimated quantities of municipal solid waste generated annually.*

	Scenario 1
Solid Waste Generated	2,360,820 lbs

* Estimated municipal solid waste numbers generated with the following assumptions:

- 4.9 lbs/person/day of solid municipal waste is generated. This number is an aggregate number that takes into account commercial and business use and is based on information from the Environmental Protection Agency (1999).
- For the purposes of generating solid waste numbers only, it was assumed that 3 persons were present per household for the residential use and 10 people per acre were present per industrial and commercial use.

c) Project related use/storage of hazardous materials - Describe chemicals/hazardous materials used/stored during construction and/or operation of the project including method of storage. Indicate the number, location and size of any above or below ground tanks to store petroleum or other materials. Discuss potential environmental effects from accidental spill or release of hazardous materials. Identify measures to avoid, minimize or mitigate adverse effects from the use/storage of chemicals/hazardous materials including source reduction and recycling. Include development of a spill prevention plan.

The proposed industrial or commercial areas have the potential to contain some hazardous waste or include a small generator of hazardous waste use. No gas stations are anticipated in the study area. This type of development would be required to adhere to State regulations for these uses.

d) Project related generation/storage of hazardous wastes - Describe hazardous wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from hazardous waste handling, storage, and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of hazardous waste including source reduction and recycling.

<u>Contamination/Hazardous Materials/Wastes Mitigation Plan</u>

- If contamination is encountered during project grading or development, grading activities will be suspended until material can be characterized and then disposed on in conformance with state requirements.

- The municipal waste hauler company will make residential and commercial recycling programs available to the area. General municipal waste will be removed by these waste hauler companies.

- Hazardous waste spills will be reported immediately to emergency response agencies via emergency dispatch service and addressed in conformance with state requirements.

13. FISH, WILDLIFE, PLANT COMMUNITIES

a. Describe rare features such as state-listed (endangered, threatened or special concern) species, native plant communities, Minnesota County Biological Survey Sites of Biodiversity Significance, and other sensitive ecological resources on or within close proximity to the site. Provide the license agreement number (LA-____) and/or correspondence number (ERDB <u>20140153</u>) from which the data were obtained and attach the Natural Heritage letter from the DNR. Indicate if any additional habitat or species survey work has been conducted within the site and describe the results.

b. Discuss how the identified fish, wildlife, plant communities, rare features and ecosystems may be affected by the project. Include a discussion on introduction and spread of invasive species from the project construction and operation. Separately discuss effects to known threatened and endangered species.

c. **Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to fish, wildlife, plant communities, and sensitive ecological resources.**

<u>Existing Conditions</u>

The existing fish, wildlife, and ecologically sensitive resources have been analyzed based on previous studies, historical aerial photos, information from the DNR, and site visits during 2013. The habitat available for wildlife is a function of the vegetation and land cover present. The habitat on the site is described below.

- **Forest and Woodland Communities:** The study area contains 31 acres of a Maple-Basswood Forest, a native plant community that is considered imperiled in Minnesota. A portion of this area has been identified as a Site of High Biodiversity Significance (**Figure 13-1**). The wooded area is also identified as a Regionally Significant Ecological Area (RSEA). This area is also connected to the Henry's Woods to the north, which is in a conservation easement. Based on historic aerial photos, the existing wooded area in the study area was much sparser in the 1930's and 1950's. Over time, this wooded area has become more dense.

- **Wetlands:** Approximately six acres of the site contains wetlands. One larger wetland complex is located within the wooded area on the western half of the project (**Figure 13-1**). The wetlands on the site are dominated by reed canary grass, sedge species, cattails, and green ash. This indicates they have likely been degraded by adjacent agricultural activity or other impacts. **Figure 13-1** shows the National Wetlands Inventory. Adjacent to the site to the east is Grass Lake (DNR 135P). Grass Lake provides a large cattail wetland complex with some open water habitat.

- **Agricultural Area:** Approximately 93 acres of the site are in agricultural production. Most of these areas have been in agricultural production since at least 1930's. The agricultural areas are expected to provide limited habitat value, except for resting areas during bird migration. The area provides limited cover with an occasional and monotypic food source. The tilling and mowing that occurs in the area results in wildlife at the site that are accustomed to frequent disturbance.

- **Rare/Endangered Species:** The DNR Natural Heritage Database was consulted to determine if rare or endangered species are present in the area. The information from the DNR is included in **Appendix B**. Based on this information, trumpeter swans (*Cygnus buccinators*) and Blanding's Turtles (*Emydoidea blandingii*) were noted in the vicinity of the area. Trumpeter swans are a state-listed species of special concern. Blanding's turtles area state-listed threatened species.

Scenario 1

This development scenario, along with anticipated short-term roadway improvements, will alter the vegetation within the study area. There are also longer term roadway projects that could impact the vegetation in this area (**Figure 6-2**). The study area will be converted to buildings, homes, lawns, impervious surfaces, and storm water management features. Some wetland impact is likely between 1-3 acres, although exact acreage is not known. Commercial, industrial, and roadway infrastructure will result in removing up to 26 acres of the wooded area as well as causing fragmentation of the existing contagious wooded area. This will result in habitat changes and wildlife will be displaced from the study area.

Regarding Trumpeter Swans, Grass Lake and Diamond Lake may provide the needed habitat for these birds. No impact to these areas is anticipated. There is no suitable habitat within the study area. Blandings turtles use wetlands and sandy upland areas. Most of the soils with in the study area are loams and are frequently disturbed by agricultural activities. Based on the type of habitat present, Blandings turtles are not anticipated to use the study area.

Fish, wildlife, plant communities, and sensitive ecological resources Mitigation Plan

- Wetlands will need to be delineated in conformance with the Wetland Conservation Act as part of the development process. The City will review and verify the wetland delineation.
- Wetland impact is anticipated to be minimized to the maximum extent possible throughout the review area. Wetland impact and mitigation will need to meet the requirements of the Wetland Conservation Act (WCA).
- Storm water management features should incorporate native plantings of grasses, trees, and shrubs.
- The City will encourage development to retain portions of the wooded areas for habitat and buffer and also encourage a buffer near Grass Lake.
- The Blanding's turtle fact sheet will be provided to developers and contractors when development occurs in the study area.

14. HISTORIC PROPERTIES

Describe any historic structures, archeological sites, and/or traditional cultural properties on or in close proximity to the site. Include: 1) historic designations, 2) known artifact areas, and 3) architectural features. Attach letter received from the State Historic Preservation Office (SHPO). Discuss any anticipated effects to historic properties during project construction and operation. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to historic properties.

Information from the State Historic Preservation Office (SHPO) has been obtained and is contained in **Appendix B.** Based on the SHPO database review, there are no archaeological sites or historic structures identified in the search area. The sites noted by SHPO are south of the project area, south of I-94 and will not be impacted by development in the study area. No mitigation measures are necessary.

Historic Properties Mitigation Plan

- If during any earth moving or construction activities, any archeological or historic resources are found that indicate the site is likely to yield information important to pre-history or history, the site shall be reported to the City. The City reserves the right to stop work authorized in its approval until the site is appropriately investigated and work is re-authorized.

15. VISUAL

Describe any scenic views or vistas on or near the project site. Describe any project related visual effects such as vapor plumes or glare from intense lights. Discuss the potential visual effects from the project. Identify any measures to avoid, minimize, or mitigate visual effects.

Only routine visual impacts associated with construction of typical residential, commercial, and light industrial land uses are anticipated by development within the area. The development of commercial and light industrial properties may also result in parking lot and building lighting. The City's adopted lighting ordinance will be applied to new development. A park, Henry's Woods, is located north of the study area. Development could impact the immediate view from the park when on the south side of the park. However, with the wooded nature of the park, the viewshed is not anticipated to be significantly impacted.

Visual Impacts Mitigation Plan

- Through the plan review process, the City shall require appropriate screening and buffers of development in the study area to screen for visual impacts between adjacent land uses.

16. AIR

a. Stationary source emissions - Describe the type, sources, quantities and compositions of any emissions from stationary sources such as boilers or exhaust stacks. Include any hazardous air pollutants, criteria pollutants, and any greenhouse gases. Discuss effects to air quality including any sensitive receptors, human health or applicable regulatory criteria. Include a discussion of any methods used assess the project's effect on air quality and the results of that assessment. Identify pollution control equipment and other measures that will be taken to avoid, minimize, or mitigate adverse effects from stationary source emissions.

AUAR Guidance: This item is not applicable to an AUAR. Any stationary air emission source large enough to merit environmental review requires individual review. These types of uses are not anticipated by this project.

b. Vehicle emissions - Describe the effect of the project's traffic generation on air emissions. Discuss the project's vehicle-related emissions effect on air quality.

Identify measures (e.g. traffic operational improvements, diesel idling minimization plan) that will be taken to minimize or mitigate vehicle-related emissions.

In addition to controlling air pollutants for which there are National Ambient Air Quality Standards, EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories).

Controlling air toxic emissions became a national priority with the passage of the 1990 Clean Air Act Amendments, whereby Congress mandated that the U.S. Environmental Protection Agency regulate 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (February 26, 2007) and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System. In addition, EPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers. These are acrolein, benzene, 1,3-butadiene, diesel particulate matter, plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules.

The 2007 EPA rule mentioned above requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. According to an FHWA analysis using EPA's MOBILE6.2 model, even if vehicle activity increases by 145 percent as assumed, a combined reduction of 72 percent in the total annual emission rate for the priority MSAT is projected from 1999 to 2050.

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how the potential health risks posed by MSAT exposure should be factored into project-level decision-making within the context of the National Environmental Policy Act. The FHWA will continue to monitor the developing research in this emerging field.

Because of the uncertainties outlined above, a quantitative assessment of the effects of air toxic emissions impacts on human health cannot be made at the project level. While available tools do allow us to reasonably predict relative emissions changes between alternatives for larger projects, the amount of MSAT emissions from each of the study scenarios and MSAT concentrations or exposures created by each of the study scenarios cannot be predicted with enough accuracy to be useful in estimating health impacts. Therefore, the relevance of the unavailable or incomplete information is that it is not possible to make a determination of whether any of the scenarios would have "significant adverse impacts on the human environment."

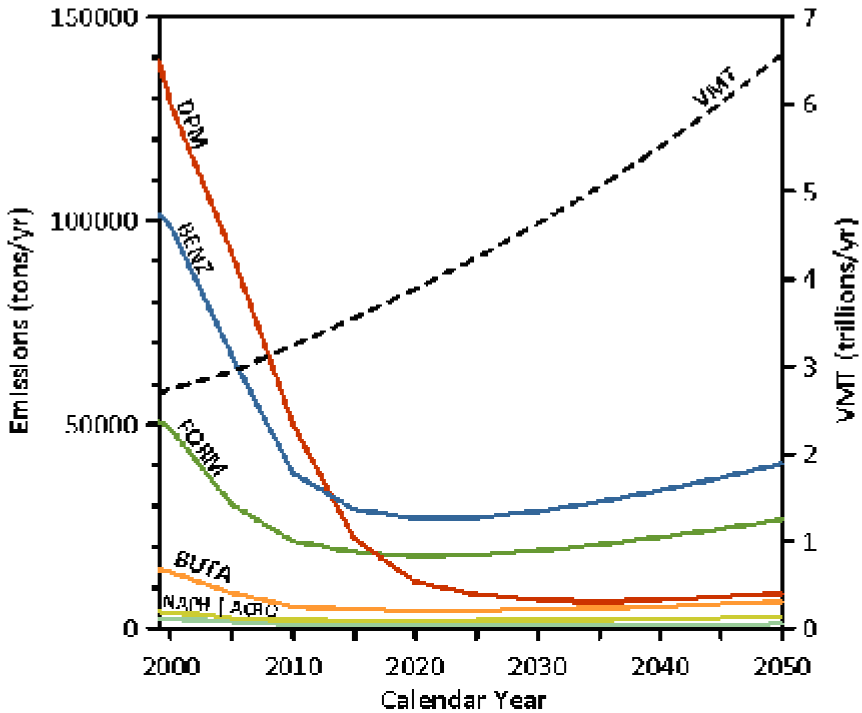
This document acknowledges that the build scenarios may result in increased exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain, and because of this uncertainty, the health effects from these emissions cannot be estimated.

Although a qualitative analysis cannot identify and measure health impacts from MSATs, it can give a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various scenarios. The qualitative assessment presented below is derived in part from a study conducted by the FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives*.

For this AUAR, the amount of MSAT emitted would be proportional to the average daily traffic (ADT). The ADT estimated for the scenario is higher than that for the no build condition, because the interchange facilitates new development that attracts trips that would not otherwise occur in the area. This increase in ADT means MSAT under the build scenarios would probably be higher than the no build condition in the study area. There could also be localized differences in MSAT from indirect effects of the project such as associated access traffic, emissions of evaporative MSAT (e.g., benzene) from parked cars, and emissions of diesel particulate matter from delivery trucks. Travel to other destinations would be reduced with subsequent decreases in emissions at those locations.

For the scenario, emissions are virtually certain to be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by 72 percent from 1999 to 2050, as shown in the following graph. The magnitude of the EPA-projected reductions is so great (even after accounting for ADT growth) that MSAT emissions in the study area are likely to be lower in the future than they are today.

NATIONAL MSAT EMISSION TRENDS 1999 - 2050
FOR VEHICLES OPERATING ON ROADWAYS
USING EPA's MOBILE6.2 MODEL



Note:
(1) Annual emissions of polycyclic organic matter are projected to be 561 tons/yr for 1999, decreasing to 373 tons/yr for 2050.
(2) Trends for specific locations may be different, depending on locally derived information representing vehicle-miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors

Source: U.S. Environmental Protection Agency. MOBILE6.2 Model run 20 August 2009.

The U.S. Environmental Protection Agency has designated all of Hennepin, Ramsey, Anoka and portions of Carver, Scott, Dakota, Washington and Wright counties as a maintenance area for carbon monoxide. The AUAR study area is in Hennepin County that is in this carbon monoxide maintenance area.

The EPA has approved a screening method to determine which intersections need a hotspot analysis. A hot spot analysis is required if the intersection is above the benchmark average annual daily traffic (AADT) threshold or listed as one of the "Top Ten" intersections. All of the top ten intersections are within the Twin Cities carbon monoxide maintenance area. Below is a list of the top ten intersections and their 2007 AADT.

1. TH 169 at CSAH 81 – 79,400
2. TH 7 at CSAH 101 – 66,600
3. TH 252 at 85th Avenue – 66,800
4. University Avenue at Snelling Avenue – 59,700
5. TH 252 at Brookdale Drive – 61,300

6. Cedar Avenue at County Road 42 – 75,100
7. TH 7 at Williston Road – 54,900
8. University Avenue at Lexington Avenue – 59,700
9. TH 252 at 66th Avenue – 72,500
10. Hennepin Avenue at Lake Street – 37,000

The screening method demonstrates that because this project has less than the benchmark AADT of 79,400 and does not involve or affect the "Top Ten Intersections," a hotspot analysis is not needed.

In summary, under all build scenarios in the design year it is expected there would be slightly higher MSAT emissions in the study area relative to the no build condition due to increased ADT. There also could be increases in MSAT levels in a few localized areas where ADT increases. However, EPA's vehicle and fuel regulations will bring about significantly lower MSAT levels for the area in the future when compared to today.

c. Dust and odors - Describe sources, characteristics, duration, quantities, and intensity of dust and odors generated during project construction and operation. (Fugitive dust may be discussed under item 16a). Discuss the effect of dust and odors in the vicinity of the project including nearby sensitive receptors and quality of life. Identify measures that will be taken to minimize or mitigate the effects of dust and odors.

AUAR Guidance: Dust and odors need not be addressed.

17. NOISE

Describe sources, characteristics, duration, quantities, and intensity of noise generated during project construction and operation. Discuss the effect of noise in the vicinity of the project including 1) existing noise levels/sources in the area, 2) nearby sensitive receptors, 3) conformance to state noise standards, and 4) quality of life. Identify measures that will be taken to minimize or mitigate the effects of noise.

The construction activities associated with construction of the proposed project will result in increased noise levels relative to existing conditions. These impacts will primarily be associated with construction equipment. The contractor will work within allowable working hours established by the city.

The following table shows peak noise levels monitored at 50 feet from various types of construction equipment. This equipment is primarily associated with site grading/site preparation, which is generally the roadway construction phase associated with the greatest noise levels.

Table 17-1 – Typical Construction Equipment Noise Levels at 50 feet

Equipment Type	Manufacturers Sampled	Total Number of Models in Sample	Peak Noise Level (dBA)	
			Range	Average
Backhoes	5	6	74-92	83
Front Loaders	5	30	75-96	85
Dozers	8	41	65-95	85
Graders	3	15	72-92	84
Scrapers	2	27	76-98	87
Pile Drivers	N/A	N/A	95-105	101

Source: United States Environmental Protection Agency and Federal Highway Administration

The existing land uses surrounding the proposed area are commercial/industrial and agricultural. There is a house east of Brockton along 124th Avenue. Mitigation of the short-term noise impacts can be managed through proper coordination and construction planning, and therefore would not impact the quality of life within the project area.

Noise Impacts Mitigation Plan

- Development activities will be required to adhere to the City's construction work hours and noise guidelines.

18. TRANSPORTATION

a. Describe traffic-related aspects of project construction and operation. Include: 1) existing and proposed additional parking spaces, 2) estimated total average daily traffic generated, 3) estimated maximum peak hour traffic generated and time of occurrence, 4) indicate source of trip generation rates used in the estimates, and 5) availability of transit and/or other alternative transportation modes.

1) This question is not applicable to the AUAR process.
2) See the attached Henry Area Traffic Impact Study provided in **Appendix C** for average daily traffic generated by the Henry Area development.
3) See the attached Henry Area Traffic Impact Study provided in **Appendix C** for peak hour traffic generated by the Henry Area development.
4) See the attached Henry Area Traffic Impact Study provided in **Appendix C** for the trip generation rates and sources that were used in the trip generation for the Henry Area development.
5) The City's Park and Trail System Plan proposes a future trail generally within the study area. As development occurs, consideration for trail linkages will be considered.

b. **Discuss the effect on traffic congestion on affected roads and describe any traffic improvements necessary. The analysis must discuss the project's impact on the regional transportation system.**
If the peak hour traffic generated exceeds 250 vehicles or the total daily trips exceeds 2,500, a traffic impact study must be prepared as part of the EAW. **Use the format and procedures described in the Minnesota Department of Transportation's Access Management Manual, Chapter 5** ***(available at: http://www.dot.state.mn.us/accessmanagement/resources.html)*** **or a similar local guidance.**

The Henry Area development will generate over 2,500 daily trips and 250 peak hour trips. A Traffic Impact Study was prepared for this development and is provided in **Appendix C.** The Traffic Impact Study discusses the effect of the development on traffic congestion on area roadways.

c. **Identify measures that will be taken to minimize or mitigate project related transportation effects.**

The Henry Area Traffic Impact Study determined the mitigation required to accommodate development traffic on the roadway network. See the conclusions of the Traffic Impact Study located in **Appendix C** for more information.

19. CUMULATIVE POTENTIAL AFFECTS

This item is addressed as applicable throughout the AUAR.

20. OTHER POTENTIAL ENVIRONMENTAL AFFECTS

If the project may cause any additional environmental effects not addressed by items 1 to 19, describe the effects here, discuss the how the environment will be affected, and identify measures that will be taken to minimize and mitigate these effects.

Not applicable

Appendix A Figures

Path: K:\02169-210\GIS\Maps\Figure 5-1 GeneralLocationMap.mxd Date: 12/31/2013

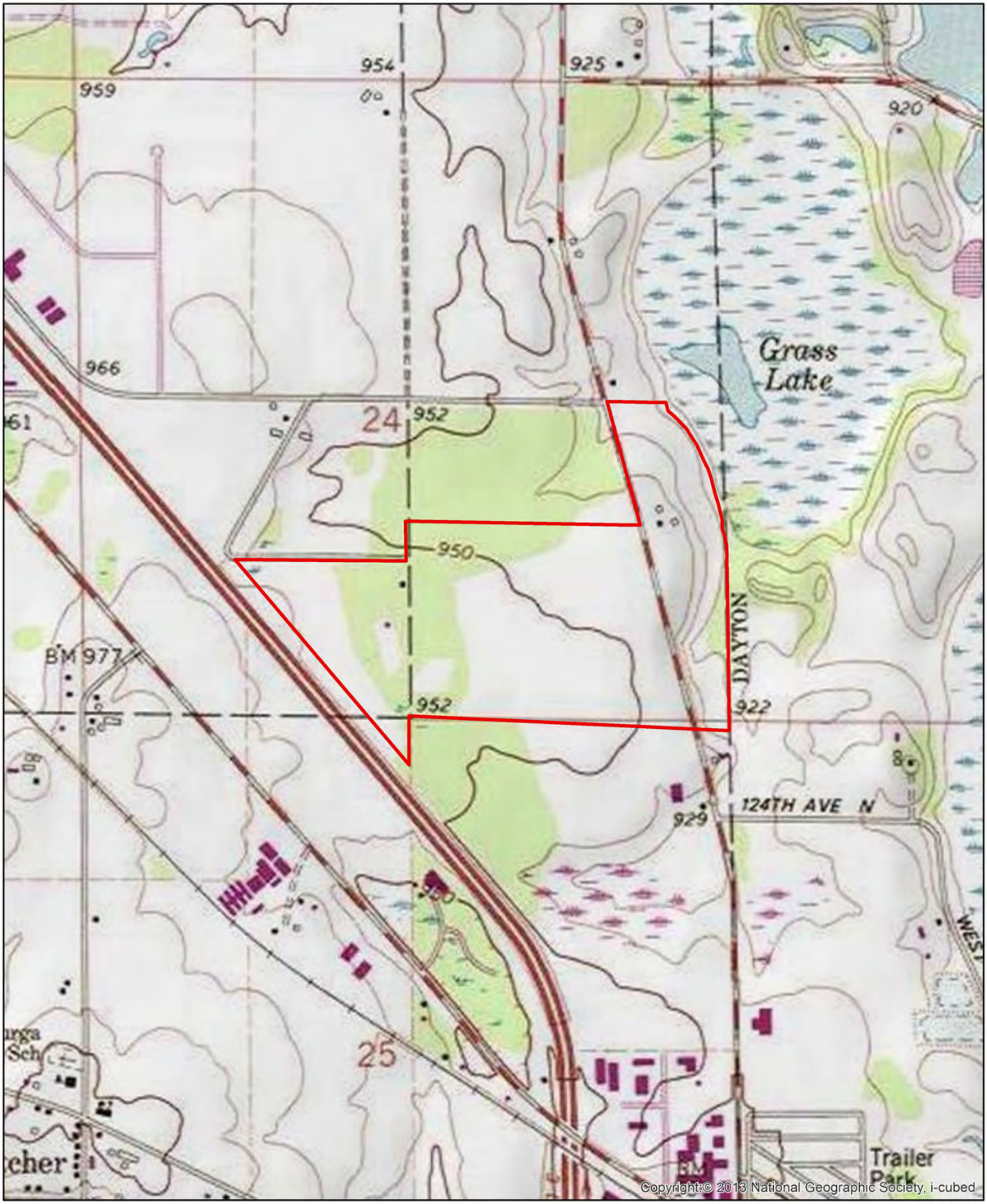
THE CITY OF ROGERS MINNESOTA

Figure 5-1: General Location Map
Henry Area AUAR
City of Rogers, MN

N

0 2 4 Miles

WSB & Associates, Inc.



Path: K:\02169-210\GIS\Maps\Figure 5-2 USGSMap.mxd Date: 12/31/2013

THE CITY OF ROGERS MINNESOTA

Figure 5-2: USGS Map
Henry Area AUAR
City of Rogers, MN

0 500 1,000 Feet

WSB & Associates, Inc.

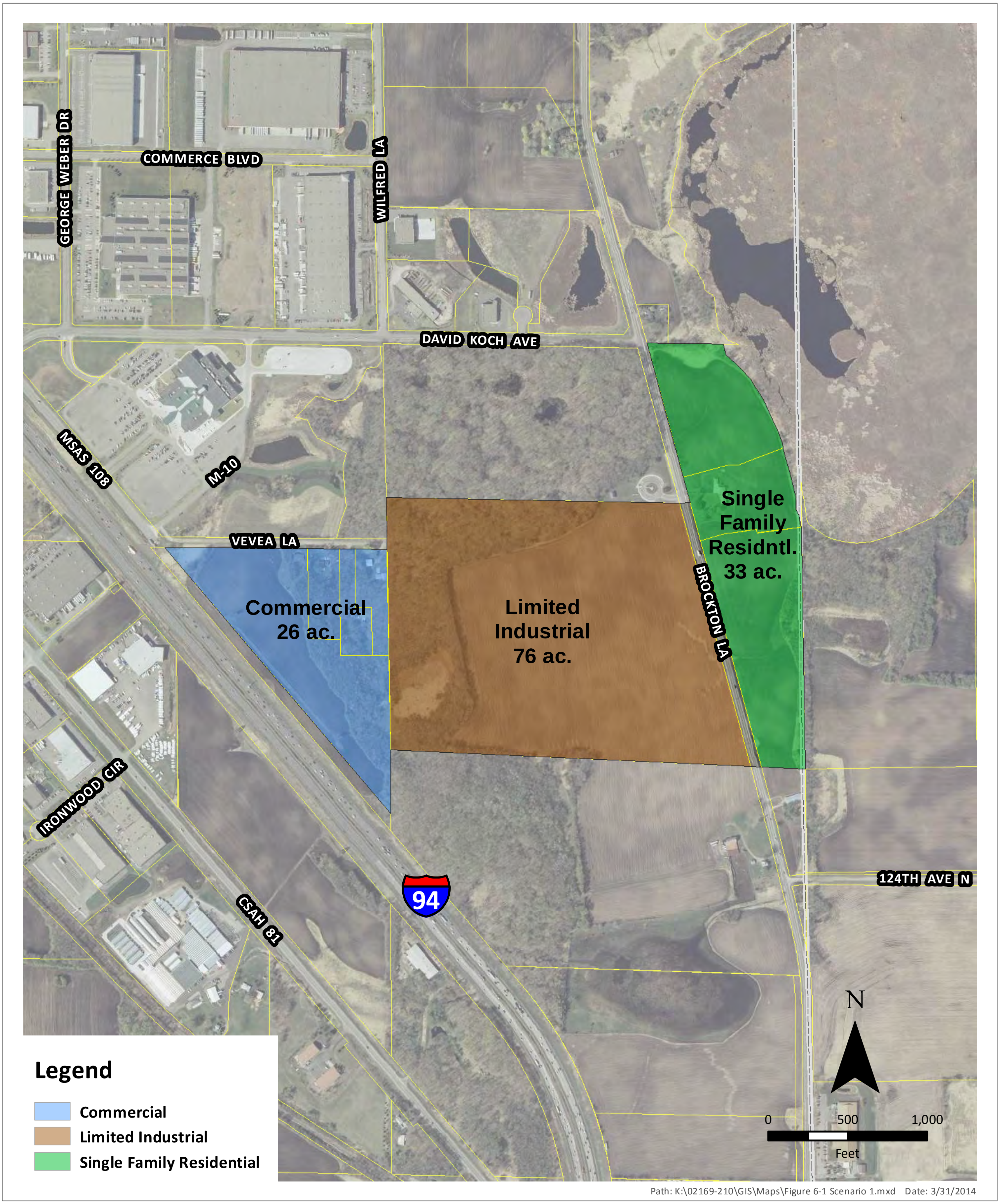
Path: K:\02169-210\GIS\Maps\Figure 5-3 Aerial Photo Map.mxd Date: 12/31/2013

THE CITY OF ROGERS MINNESOTA

Figure 5-3: Aerial Photo Map
Henry Area AUAR
City of Rogers, MN

0 500 1,000 Feet

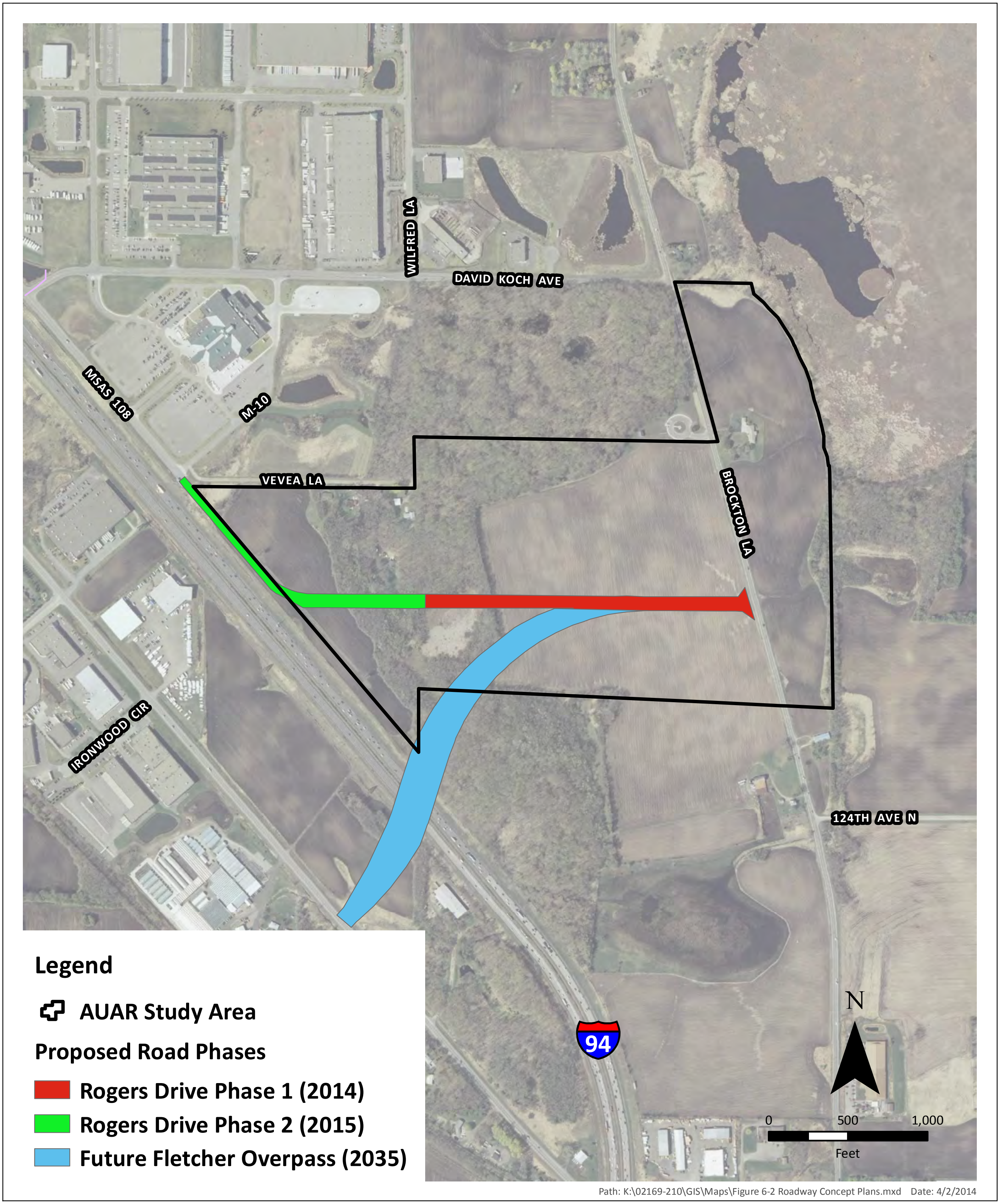
WSB & Associates, Inc.



THE CITY OF ROGERS MINNESOTA

Figure 6-1: Scenario 1
Henry Area AUAR
City of Rogers, MN

WSB & Associates, Inc.

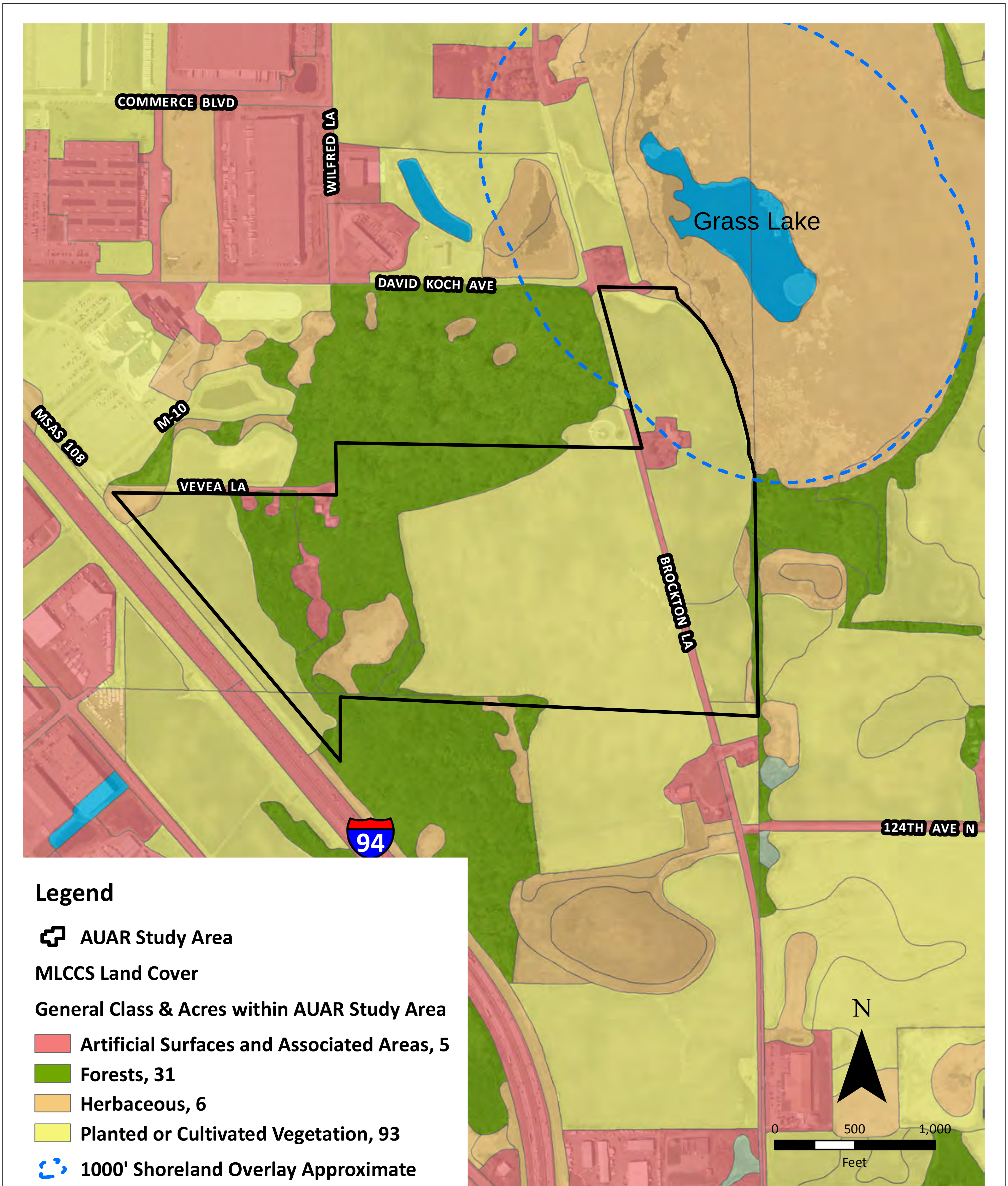


Path: K:\02169-210\GIS\Maps\Figure 6-2 Roadway Concept Plans.mxd Date: 4/2/2014

Figure 6-2 Roadway Concept Plans
Henry Area AUAR
City of Rogers, MN

THE CITY OF ROGERS MINNESOTA

WSB & Associates, Inc.

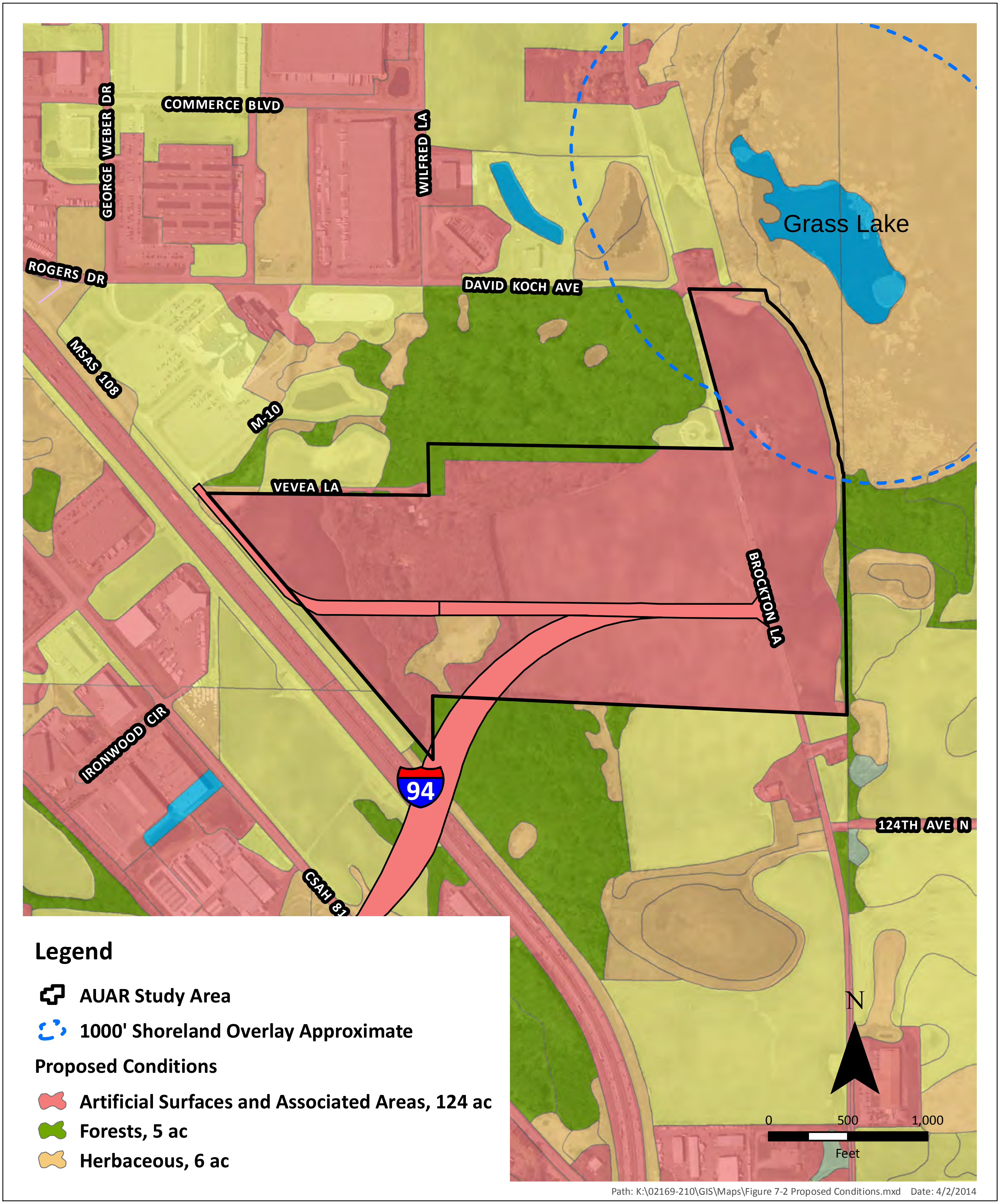


Path: K:\02169-210\GIS\Maps\Figure 7-1 Existing Conditions.mxd Date: 4/1/2014

THE CITY OF ROGERS MINNESOTA

Figure 7-1 Existing Conditions
Henry Area AUAR
City of Rogers, MN

WSB & Associates, Inc.



THE CITY OF ROGERS MINNESOTA

Figure 7-2 Proposed Conditions
Henry Area AUAR
City of Rogers, MN

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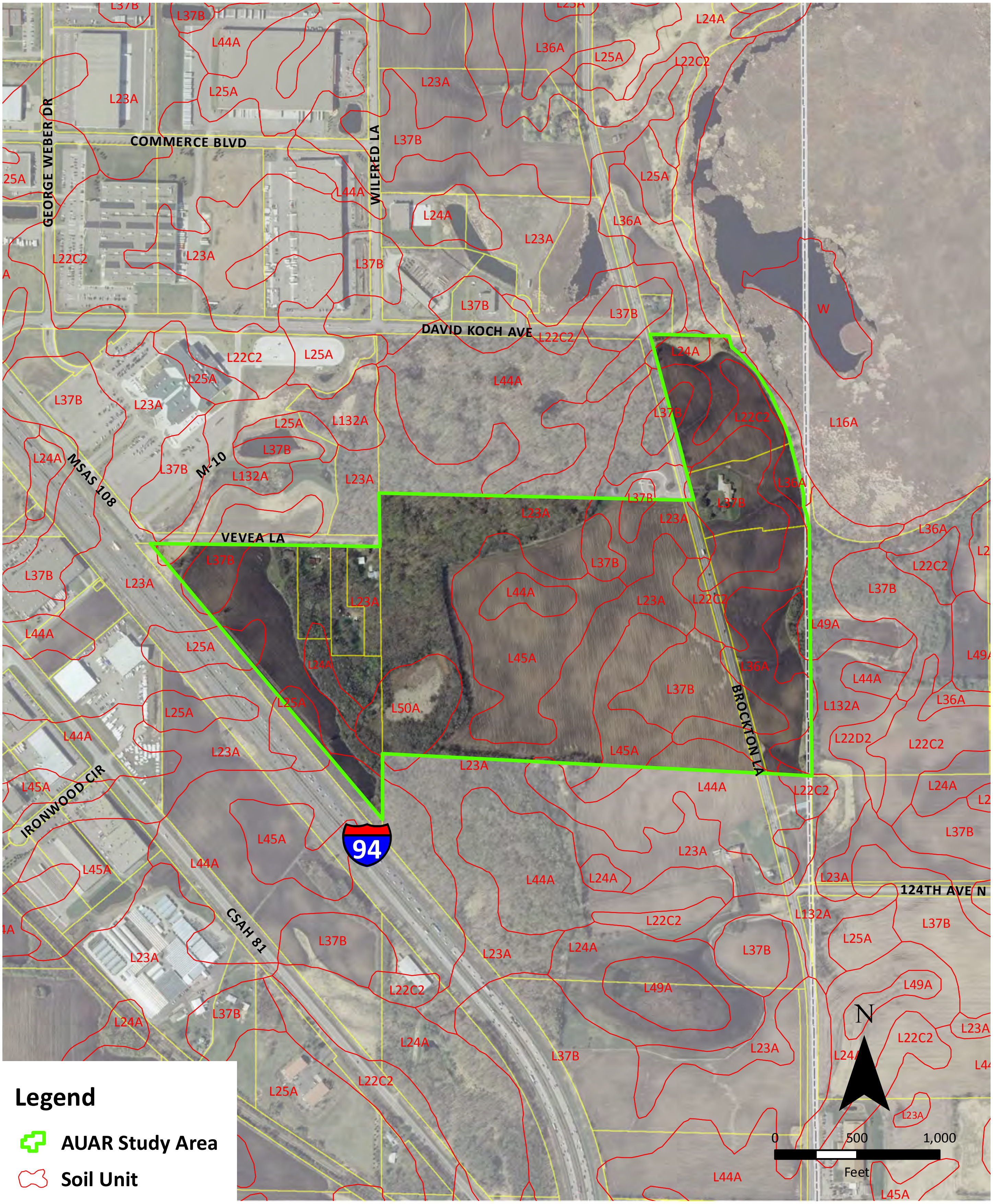


Path: K:\02169-210\GIS\Maps\Figure 10-1 Soil Types Map.mxd Date: 3/31/2014

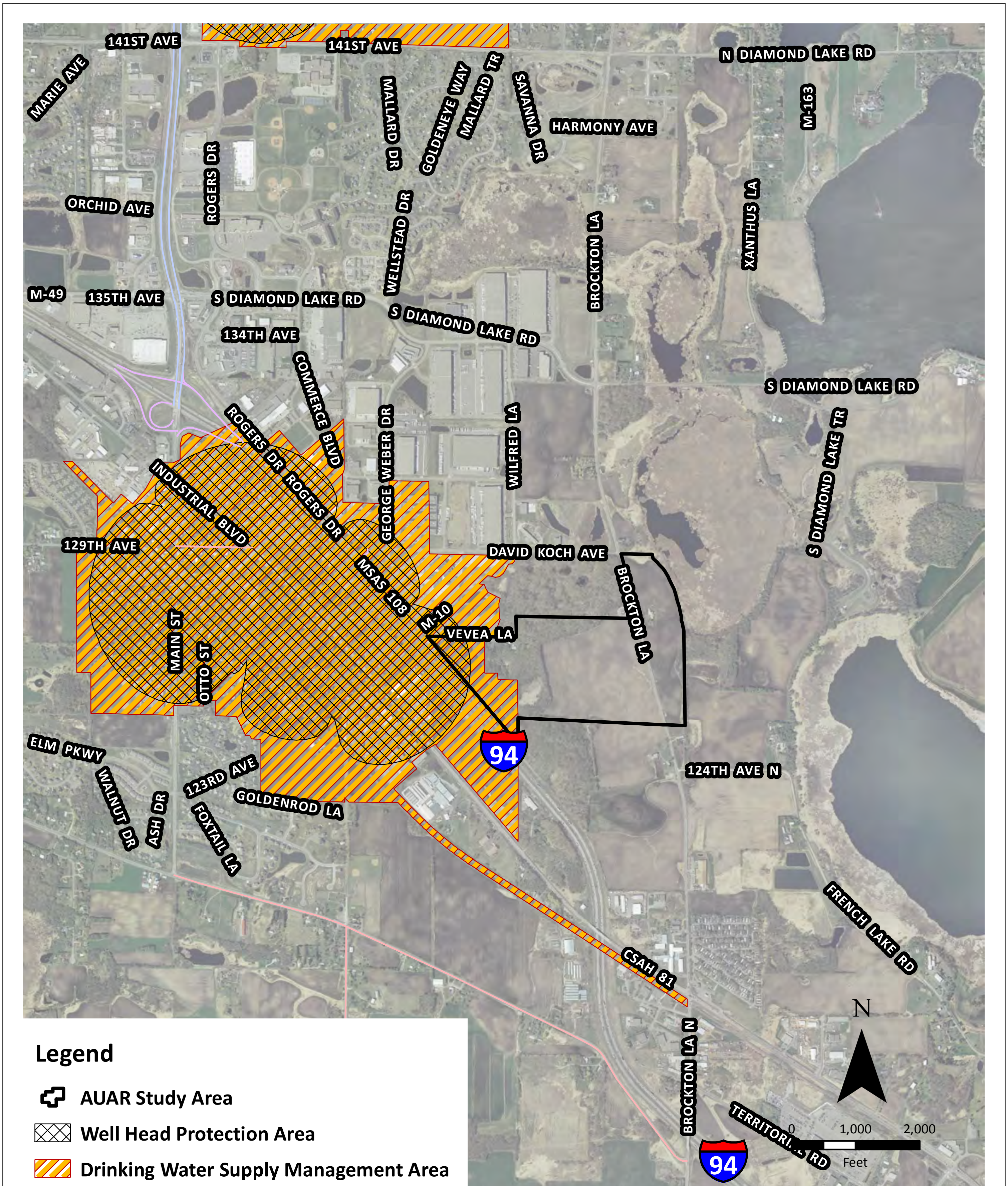
THE CITY OF ROGERS MINNESOTA

Figure 10-1 Soil Types Map

Henry Area AUAR

City of Rogers, MN

WSB & Associates, Inc.



Path: K:\02169-210\GIS\Maps\Figure 13-2 Municipal Wells and DWSMA.mxd Date: 3/31/2014

THE CITY OF ROGERS MINNESOTA

Figure 11-1 Municipal Wells & Drinking Water Supply Management Area
Henry Area AUAR
City of Rogers, MN

WSB & Associates, Inc.

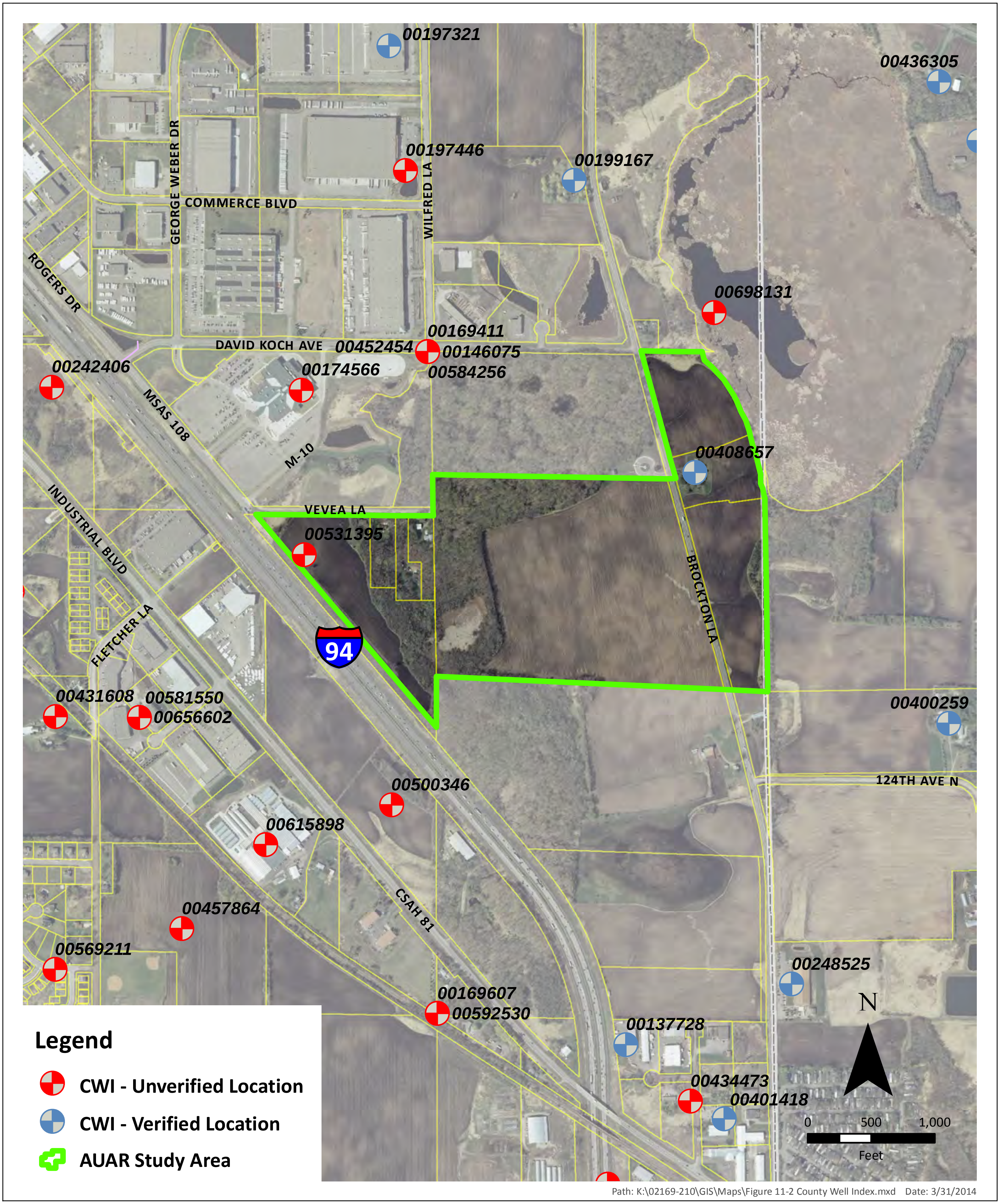
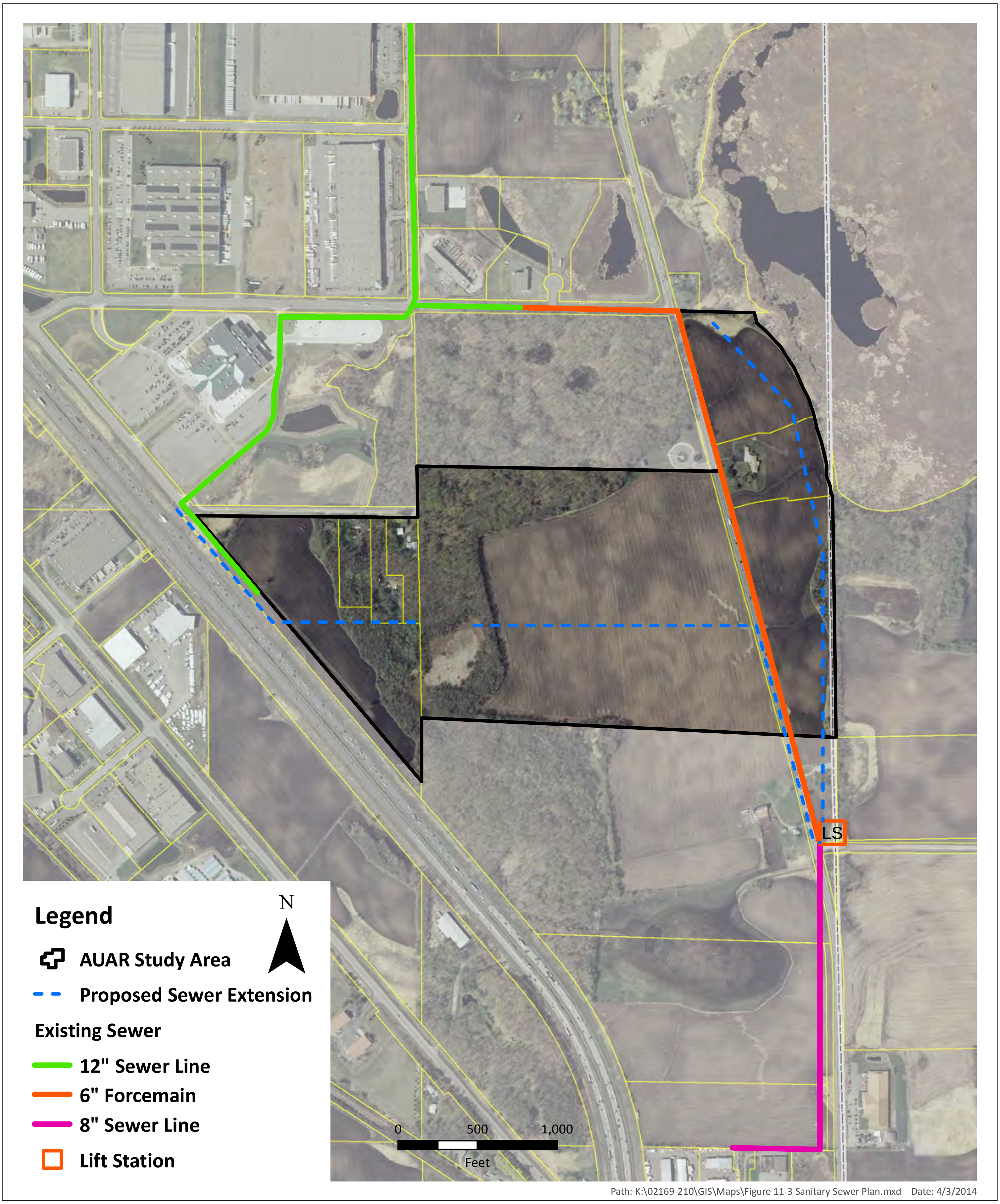


Figure 11-2 County Well Index
Henry Area AUAR
City of Rogers, MN

THE CITY OF ROGERS MINNESOTA

WSB & Associates, Inc.



Path: K:\02169-210\GIS\Maps\Figure 11-3 Sanitary Sewer Plan.mxd Date: 4/3/2014

THE CITY OF ROGERS MINNESOTA

Figure 11-3 Sanitary Sewer Plan

Henry Area AUAR

City of Rogers, MN

WSB & Associates, Inc.

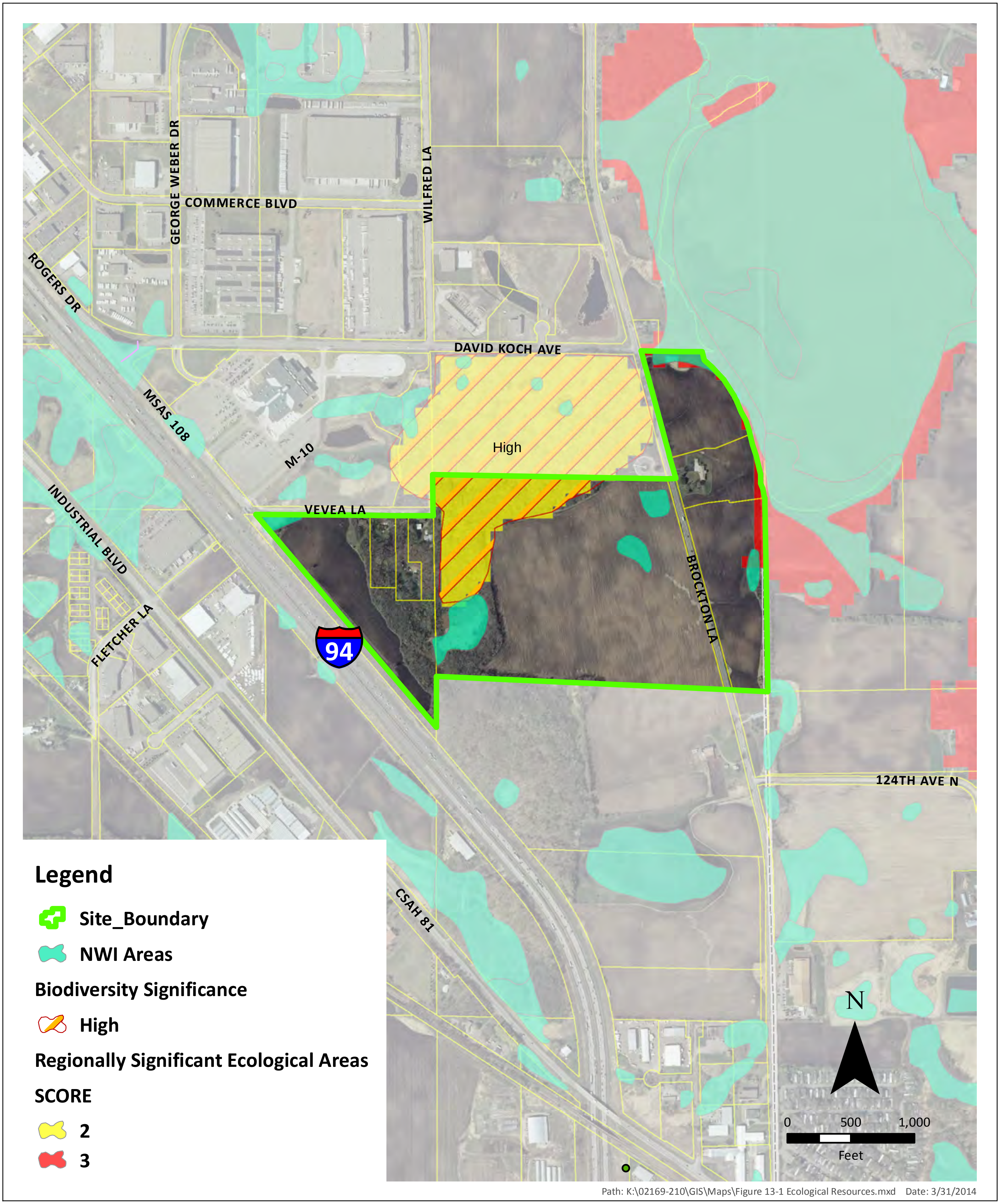


Figure 13-1 Ecological Resources
Henry Area AUAR
City of Rogers, MN

THE CITY OF ROGERS MINNESOTA

WSB & Associates, Inc.

Appendix B Agency Correspondence

Andi Moffatt

From:	Thomas Cinadr <thomas.cinadr@mnhs.org>
Sent:	Thursday, December 12, 2013 10:17 AM
To:	Addison Lewis
Subject:	Re: Request of historic properties and Resources - Rogers
Attachments:	Historic.rtf

THIS EMAIL <u>IS NOT A PROJECT CLEARANCE</u>.

This message simply reports the results of the cultural resources database search you requested. The database search produced results for only previously known archaeological sites and historic properties. Please read the note below carefully.

No archaeological sites were identified in a search of the Minnesota Archaeological Inventory and Historic Structures Inventory for the search area requested. **A report containing the historic properties identified is attached.**

The result of this database search provides a listing of recorded archaeological sites and historic architectural properties that are included in the current SHPO databases. Because the majority of archaeological sites in the state and many historic architectural properties have not been recorded, important sites or structures may exist within the search area and may be affected by development projects within that area. Additional research, including field survey, may be necessary to adequately assess the area's potential to contain historic properties.

If you require a comprehensive assessment of a project's potential to impact archaeological sites or historic architectural properties, you may need to hire a qualified archaeologist and/or historian. If you need assistance with a project review, please contact Kelly Gragg-Johnson in Review and Compliance @ 651-259-3455 or by email at kelly.graggjohnson@mnhs.org.

The Minnesota SHPO Survey Manuals and Database Metadata and Contractor Lists can be found at **http://www.mnhs.org/shpo/survey/inventories.htm**

SHPO research hours are 8:00 AM – 4:00 PM Tuesday-Friday.

The Office is closed on Mondays.

Tom Cinadr
Survey and Information Management Coordinator
Minnesota State Historic Preservation Office

Minnesota Historical Society
345 Kellogg Blvd. West
St. Paul, MN 55102

651-259-3453

On Tue, Dec 10, 2013 at 2:35 PM, Addison Lewis <ALewis@wsbeng.com> wrote:

Tom,

Could you please send me information on any historic properties or resources within Sections 24 and 25 of Township 120N, Range 23W?

Thanks,

Addison

Addison Lewis
Planner
d: 763-231-4873 | c: 612-209-3006
WSB & Associates, Inc. | 701 Xenia Avenue South, Suite 300 | Minneapolis, MN 55416

WSB and McGhie & Betts, Inc. have joined forces! McGhie & Betts is now a Division of WSB, providing a presence in Rochester and Northfield, MN.

This email, and any files transmitted with it, is confidential and is intended solely for the use of the addressee. If you are not the addressee, please delete this email from your system. Any use of this email by unintended recipients is strictly prohibited. WSB & Associates, Inc. does not accept liability for any errors or omissions which arise as a result of electronic transmission. If verification is required, please request a hard copy.

History/Architecture Inventory

PROPERTY NAME	ADDRESS	Twp	Range	Sec	Quarters	USGS	Report	NRHP	CEF	DOE	Inventory Number
COUNTY: Hennepin											
CITY/TOWNSHIP: Hassan Twp.											
St. Walburga Church	12016 Fletcher Lane	120	23	25	NW-NW-SW	Rogers	HE-92-4H		Y		HE-HAT-004
St. Walburga's Rectory	12020 Fletcher Lane	120	23	25	NW-NW-SW	Rogers	HE-92-4H		Y		HE-HAT-005
Fletcher Historic District	Co. Rd. 116 & Fletcher Lane	120	23	25	W-NW-SW	Rogers	HE-92-4H		Y		HE-HAT-016
John Hagel Farmstead	11900 Fletcher Lane	120	23	25	NW-SW-SW	Rogers	HE-92-4H				HE-HAT-020
Andrew and Margaret Stenglein Farmstead	12000 Fletcher Lane	120	23	25	SW-NW-SW	Rogers	HE-92-4H		Y		HE-HAT-025

Minnesota Department of Natural Resources
Division of Ecological and Water Resources, Box 25
500 Lafayette Road
St. Paul, Minnesota 55155-4025
Phone: (651) 259-5109 E-mail: lisa.joyal@state.mn.us

March 14, 2014 **Correspondence # ERDB 20140153**

Ms. Addison Lewis
WSB & Associates, Inc.
701 Xenia Avenue South, Suite 300
Minneapolis, MN 55416

RE: Natural Heritage Review of the proposed Scannell AUAR,
T120N R23W Sections 24 & 25; Hennepin County

Dear Ms. Lewis,

As requested, the Minnesota Natural Heritage Information System has been queried to determine if any rare species or other significant natural features are known to occur within an approximate one-mile radius of the proposed project. Based on this query, rare features have been documented within the search area (for details, please visit the Rare Species Guide at http://www.dnr.state.mn.us/rsg/index.html for more information on the biology, habitat use, and conservation measures of these rare species). Please note that the following **rare features *may* be adversely affected** by the proposed project:

- The Minnesota Biological Survey (MBS) has identified a Site of High Biodiversity Significance within T120N R23W Section 24 (please see enclosed map). Sites of Biodiversity Significance have varying levels of native biodiversity and are ranked based on the relative significance of this biodiversity at a statewide level. Sites ranked as High contain very good quality occurrences of the rarest species, high quality examples of the rare native plant communities, and/or important functional landscapes. In 1995 this particular Site contained Sugar Maple Forest (Big Woods), a native plant community that is considered imperiled in Minnesota, and known occurrences of a state-listed plant of special concern.

  Given the ecological significance of this area, the DNR recommends that the MBS Site be kept as open space within the AUAR so that development within the MBS Site can be avoided. Indirect impacts from surface runoff or the spread of invasive species should also be considered during project design and implementation. Actions to further minimize disturbance may include, but are not limited to, the following recommendations:

  - Do not park equipment or stockpile supplies within the MBS Site;
  - Do not place spoil within the MBS Site;
  - Use effective erosion prevention and sediment control measures;
  - Revegetate disturbed soil with native species suitable to the local habitat as soon after construction as possible; and
  - Use only weed-free mulches, topsoils, and seed mixes.

- The above MBS Site has also been identified as a Central Region Regionally Significant Ecological Area (RSEA) that is ranked High. Also, just northeast of the project boundary is a RSEA that is ranked Outstanding. The DNR Central Region (in partnership with the Metropolitan Council for the 7-county metro area), identified these ecologically significant terrestrial and wetland areas by conducting a landscape-scale assessment based on the size and shape of the ecological area, land cover within the ecological area, adjacent land cover/use, and connectivity to other ecological areas. The purpose of the data is to inform regional scale land use decisions, especially as it relates to balancing development and natural resource protection. A GIS shapefile of this data layer can be downloaded from the DNR Data Deli at http://deli.dnr.state.mn.us. Additional information, including pdf versions of the RSEA maps, is available at http://www.dnr.state.mn.us/rsea/index.html. If you would like help interpreting the RSEA data or would like assistance with designing the project's greenspace, please contact Hannah Texler, Regional Plant Ecologist for DNR's Central Region, at 651-259-5811 or hannah.texler@state.mn.us. To minimize disturbance to the adjacent RSEA, please consider the recommendations listed in the previous bullet.

- Trumpeter swans (*Cygnus buccinator*), a state-listed species of special concern, have been documented nesting near the project boundary. During the breeding season, trumpeter swans select small ponds and lakes with extensive beds of cattails, bulrush, sedges, and/or horsetail. Ideal habitat includes about 100 m (328 ft.) of open water for take-off, stable levels of unpolluted water, emergent vegetation, low levels of human disturbance, and the presence of muskrat (*Ondatra zibethicus*) houses and American beaver (*Castor canadensis*) lodges for use as nesting platforms. If any of the wetlands on site provide suitable habitat, swans may choose to nest in these wetlands. If so, construction activities could disrupt nesting swans if construction occurs during the breeding season.

- Blanding's turtles (*Emydoidea blandingii*), a state-listed threatened species, have been reported from the vicinity of the proposed project and may be encountered on site. For your information, I have attached a Blanding's turtle fact sheet that describes the habitat use and life history of this species. The fact sheet also provides two lists of recommendations for avoiding and minimizing impacts to this rare turtle. **Please refer to the first list of recommendations for your project**. In addition, if erosion control mesh will be used, the DNR recommends that the mesh be limited to wildlife-friendly materials (see enclosed fact sheet). If greater protection for turtles is desired, the second list of additional recommendations can also be implemented.

  The attached flyer should be given to all contractors working in the area. If Blanding's turtles are found on the site, please remember that state law and rules prohibit the destruction of threatened or endangered species, except under certain prescribed conditions. If turtles are in imminent danger they should be moved by hand out of harm's way, otherwise they should be left undisturbed.

- The AUAR should address whether the proposed project has the potential to adversely affect the above rare features and, if so, any avoidance or mitigation measures that will be implemented.

- Please include a copy of this letter in any DNR license or permit application.

The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota's rare natural features, is maintained by the Division of Ecological and Water Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. However, the NHIS is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. Therefore, ecologically significant features for which we have no records may exist within the project area. **If additional information becomes available regarding rare features in the vicinity of the project, further review may be necessary.**

For environmental review purposes, the Natural Heritage letter is valid for one year; it is only valid for the project location (noted above) and the project description provided on the NHIS Data Request Form. Please contact me if project details change or for an updated review if construction has not occurred within one year.

The Natural Heritage Review does not constitute review or approval by the Department of Natural Resources as a whole. Instead, it identifies issues regarding known occurrences of rare features and potential effects to these rare features. To determine whether there are other natural resource concerns associated with the proposed project, please contact your DNR Regional Environmental Assessment Ecologist (contact information available at http://www.dnr.state.mn.us/eco/ereview/erp_regioncontacts.html). Please be aware that additional site assessments or review may be required.

Thank you for consulting us on this matter, and for your interest in preserving Minnesota's rare natural resources. An invoice will be mailed to you under separate cover.

Sincerely,

Lisa Joyal

Lisa Joyal
Endangered Species Review Coordinator

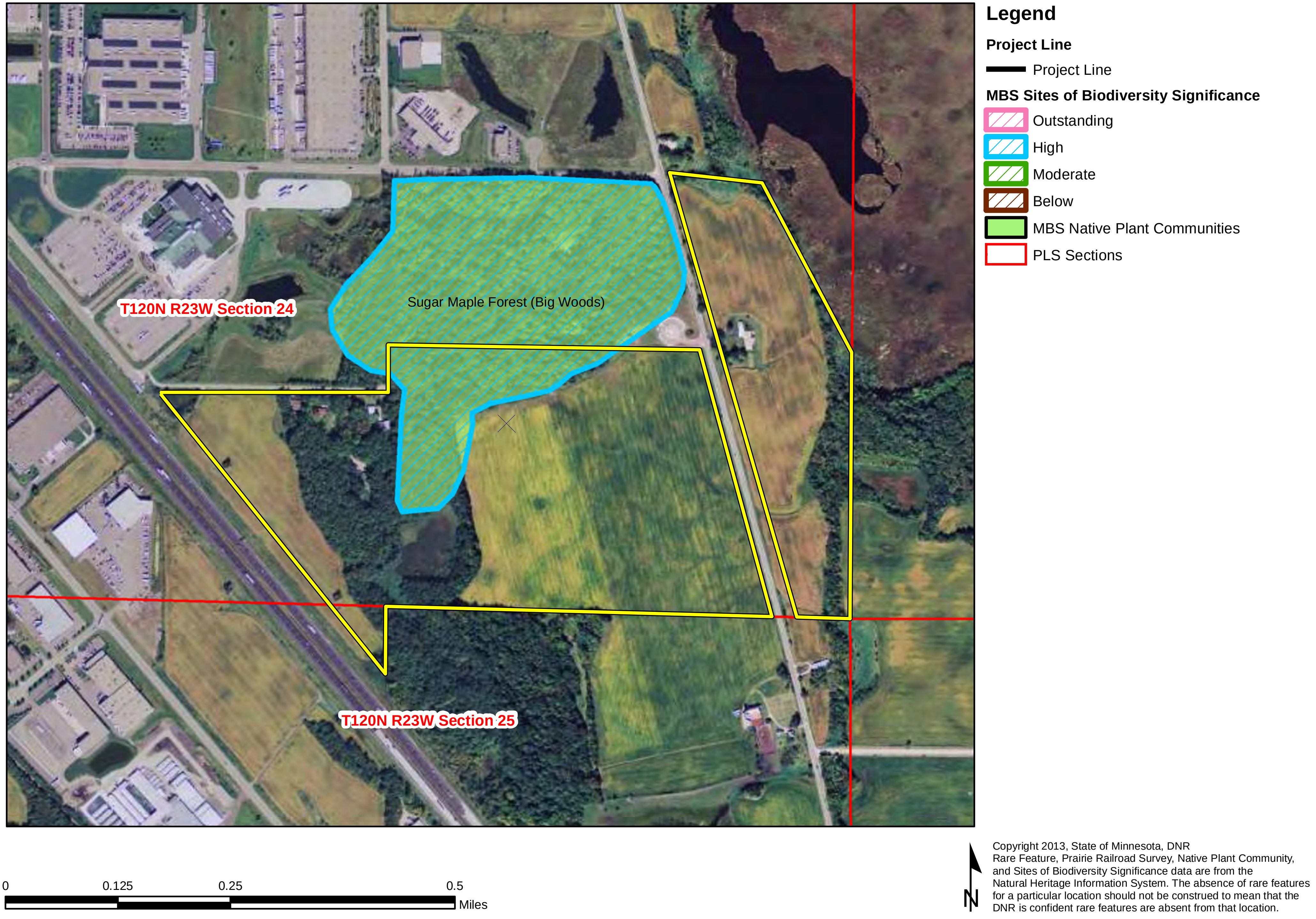
enc. Blanding's Turtle Fact Sheet and Flyer
Wildlife Friendly Erosion Control
Map

cc: Brooke Haworth
Erica Hoaglund
Hannah Texler

Links: MBS Sites of Biodiversity Significance
http://www.dnr.state.mn.us/eco/mcbs/biodiversity_guidelines.html
MBS Native Plant Communities
http://www.dnr.state.mn.us/npc/index.html

ERDB# 20140153 - Scannell AUAR
T120N R23W Sections 24 & 25
Hennepin County

GIS shapefiles of MBS Sites of Biodiversity Significance and MBS Native Plant Communities can be downloaded from the DNR Data Deli at http://deli.dnr.state.mn.us.



Copyright 2013, State of Minnesota, DNR
Rare Feature, Prairie Railroad Survey, Native Plant Community, and Sites of Biodiversity Significance data are from the Natural Heritage Information System. The absence of rare features for a particular location should not be construed to mean that the DNR is confident rare features are absent from that location.

Appendix C Traffic Impact Study

Henry Area AUAR Traffic Impact Study

Final Report

May 2014

Prepared for
City of Rogers

Prepared by
WSB & Associates, Inc.
701 Xenia Avenue South, Suite 300
Minneapolis, MN 55416
763-541-4800

EXECUTIVE SUMMARY

The objective of this study is to determine operational impacts of the proposed Henry Area development on nearby intersections based on geometric and capacity evaluations.

In order to achieve these objectives, traffic counts were performed on 6 existing intersections in the study area, and traffic volumes were projected for the opening day of the proposed development (2019) and a future year (2035) to determine the ability of proposed short-term improvements to accommodate long-term traffic volumes. Traffic volumes were projected for no development and post-development conditions. 2035 operations were also analyzed with and without the proposed Fletcher Overpass. Projected traffic volumes were then modeled using Synchro/SimTraffic software, and the results of the modeling was used to determine the intersection and roadway segment improvements needed to accommodate future traffic volumes.

The results of the study include short-term and long-term improvements at the following intersections and roadway segments due to forecasted background growth and the trips produced by the proposed Henry Area development:

Intersections:

a. South Diamond Lake Road at Rogers Drive
b. CSAH 13 at CSAH 144
c. CSAH 13 at South Diamond Lake Road
d. CSAH 13 at David Koch Avenue
e. CSAH 13 at Rogers Drive
f. CSAH 13 at CSAH 81

Segments:

a. CSAH 13 (south of CSAH 81 to CSAH 144)
b. CSAH 81 (Maple Grove Parkway to Memorial Drive)

A detailed description of the methodology and alternatives considered in the analysis are included in the full report. Improvements needed for opening day (2019) of the middle parcel of the Henry Area development are as follows. Improvements needed in 2035 can be found in Section 5 beginning on page 42 of the report.

Improvements needed for opening day (2019) of middle parcel of Henry Area development:

- Upgrade CSAH 13 to 4-lane divided section between CSAH 81 and proposed Rogers Drive
- Reconstruct CSAH 13/CSAH 144 intersection with adequate capacity (see page 42 for needed lane geometry)
- Construct CSAH 13/Rogers Drive intersection with adequate capacity (see page 43 for needed lane geometry)
- Reconstruct CSAH 81/CSAH 13 intersection with adequate capacity (see page 44 for needed lane geometry)
- Construct Rogers Drive between CSAH 13 and Robert Lane

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1. Introduction

The Henry Area development in the City of Rogers is a proposed development site located in the southeast area of Rogers north of County State-Aid Highway (CSAH) 81 between Interstate 94 and CSAH 13 (Brockton Lane). The location of the development and the study area is identified in **Figure 1.1**. The Henry Area development site is on approximately 135 acres. The area is proposed to be developed with a mixture of light commercial, warehousing, and residential land uses. The proposed land use areas are shown in **Figure 1.2**. Access to the development site will be provided via CSAH 13, an extension of Rogers Drive from its current end to CSAH 13, and an extension of David Koch Avenue east of CSAH 13.

A Traffic Impact Study (TIS) was recently completed for the Kinghorn Development area immediately to the south of the Henry Area. Traffic generation and impacts were evaluated due to the construction of the Kinghorn Development and due to other system improvements in the future, such as the planned interchange at I-94 and Brockton Lane and the Fletcher Lane overpass. The results of the Kinghorn TIS were used as a base for this TIS. It is assumed that the Kinghorn development will be constructed and occupied by 2019 for the planning purposes of this TIS since the TIS was accepted by the City of Rogers.

The Henry Area site is located in the developing area along CSAH 13 between Rogers and Dayton. Both cities have identified major growth for this area by year 2035. That anticipated growth and development in this area has prompted the planning process for numerous roadway improvements in various stages of study. This TIS is being completed in conjunction with an AUAR to determine the impacts of the proposed development on the surrounding roadway system. The TIS is required to satisfy the requirements of the AUAR process because the trips generated by the proposed development are greater than 2,500 daily trips. This study will evaluate both regional improvements and local intersection improvements necessary to support the Henry Area development and other growth in the area.

The Henry Area development is expected to be completed in stages starting with the middle industrial area followed by the commercial and residential areas. For the purposes of this study, the industrial parcel is expected to be fully built out by 2019, and the remaining parcels are expected to be built out by 2035.

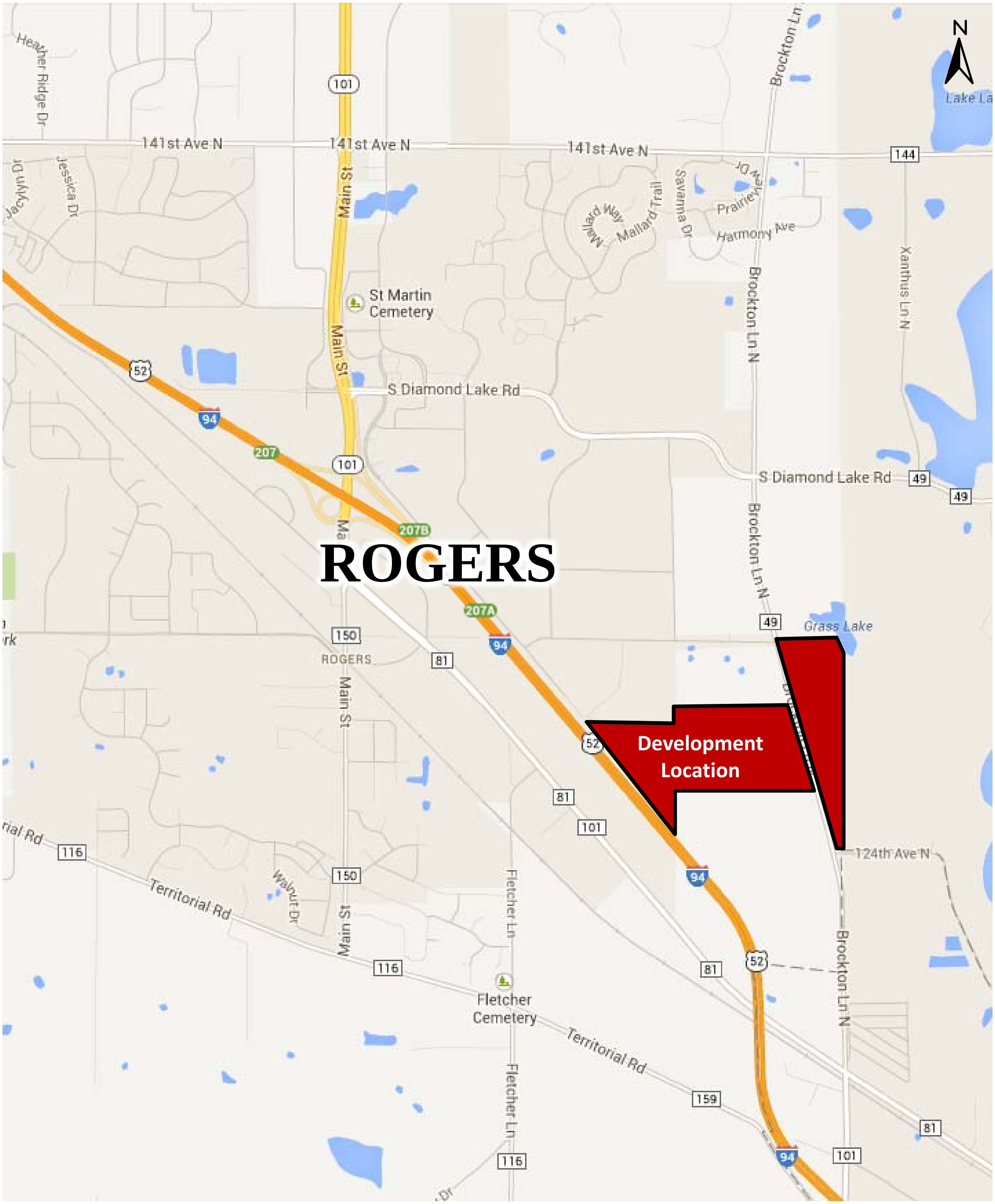

Figure 1.1

Study Area Location Map

Henry Area Development Traffic Impact Study

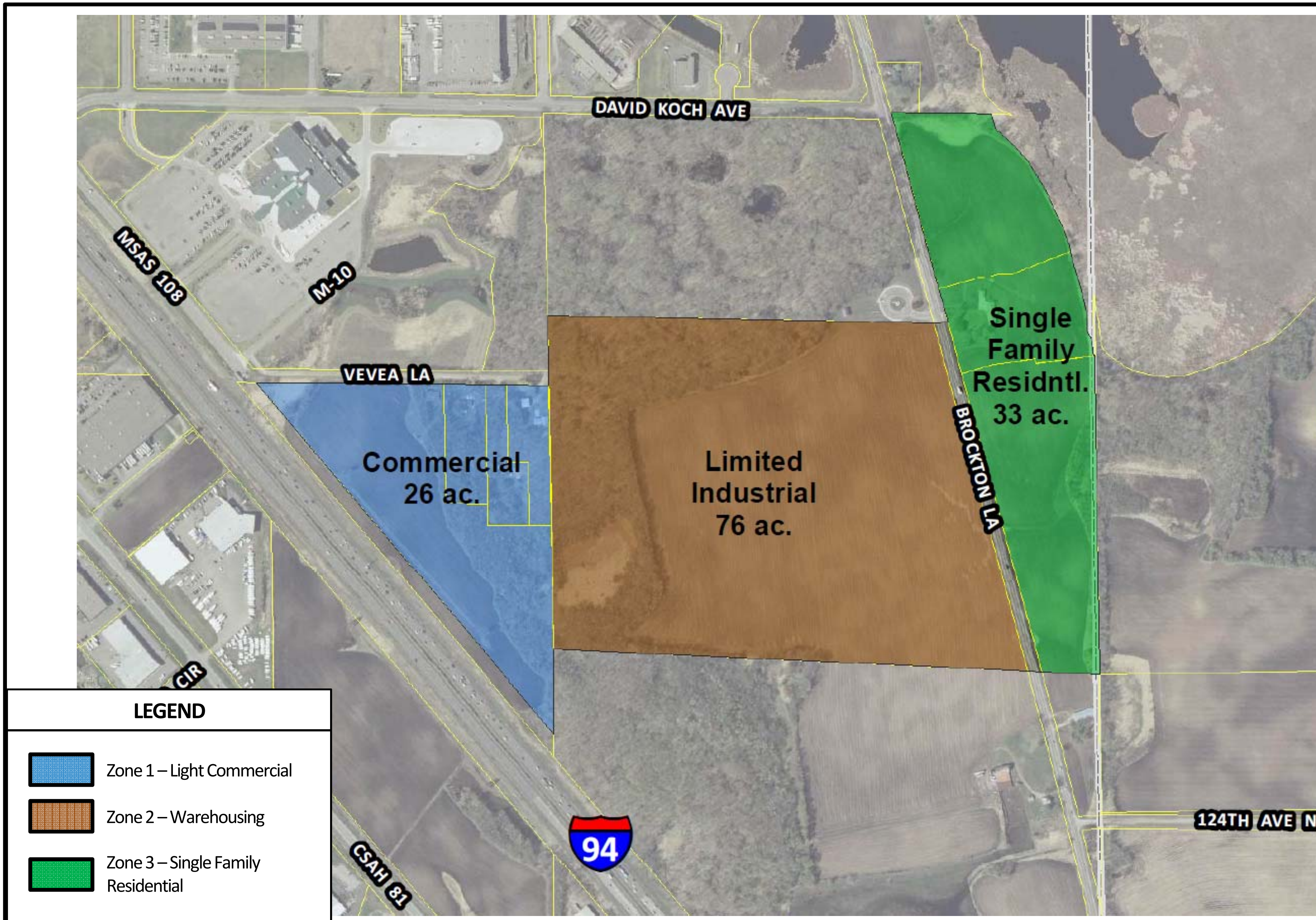

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Figure 1.2
Proposed Development Area
Henry Area Development Traffic Impact Study

2. Regional Transportation Needs

The Kinghorn Development TIS evaluated the regional transportation network to determine the needed improvements to the support the growth in the study area due to the build-out of the Kinghorn Development site as well as due to construction of improvements to the regional roadway network. The Kinghorn Development TIS used the Metropolitan Council Collar County Travel Demand Model and local comprehensive plan socioeconomic data to develop traffic forecasts for study area roadways.

The Kinghorn Development TIS assumed that the Henry Area was not developed in 2019 but was developed in 2035. Changes in traffic growth and movement patterns were then made to the forecasts in the Kinghorn Development TIS based on the updated land use information and development timeline for the Henry Area development. The regional transportation network was then re-evaluated to determine the needed improvements to support the growth in the study area. Daily traffic volumes on roadway segments were compared to planning level capacity thresholds to determine the facility types (number of lanes) needed to carry the traffic demand. Daily traffic volumes were estimated for the years 2019 and 2035 for roadways in the study area.

2.1 Existing Daily Traffic Volumes

The daily traffic volumes for the study area were based on 2013 daily tube counts and peak hour turning movement counts at key intersections. A review of the historical MnDOT traffic flow map count data was also performed as a check for reasonableness. The most current traffic flow map volumes were from year 2011. The estimated 2013 daily traffic volumes are shown in **Figure 2.1**.

2.2 Proposed Roadway Assumptions

The existing congestion and proposed development in the area has led to numerous studies identifying future roadway improvements. Previous studies identifying the need for improvements include:

- I-94 / Brockton Lane Interchange Study
- Northwest Hennepin County I-94 Sub-Area Transportation Study
- Rogers 2030 Comprehensive Plan

Identified improvements affecting the study area, as shown on **Figure 2.2**, include:

Downtown Rogers Bypass - The Downtown Rogers Bypass involves realigning Fletcher Lane from just south of Territorial Road to CSAH 81. The new junction with CSAH 81 would be approximately ½ mile southeast of its present junction. This is planned to occur prior to full build-out of the Henry Area Development and is assumed part of the base for all modeling.

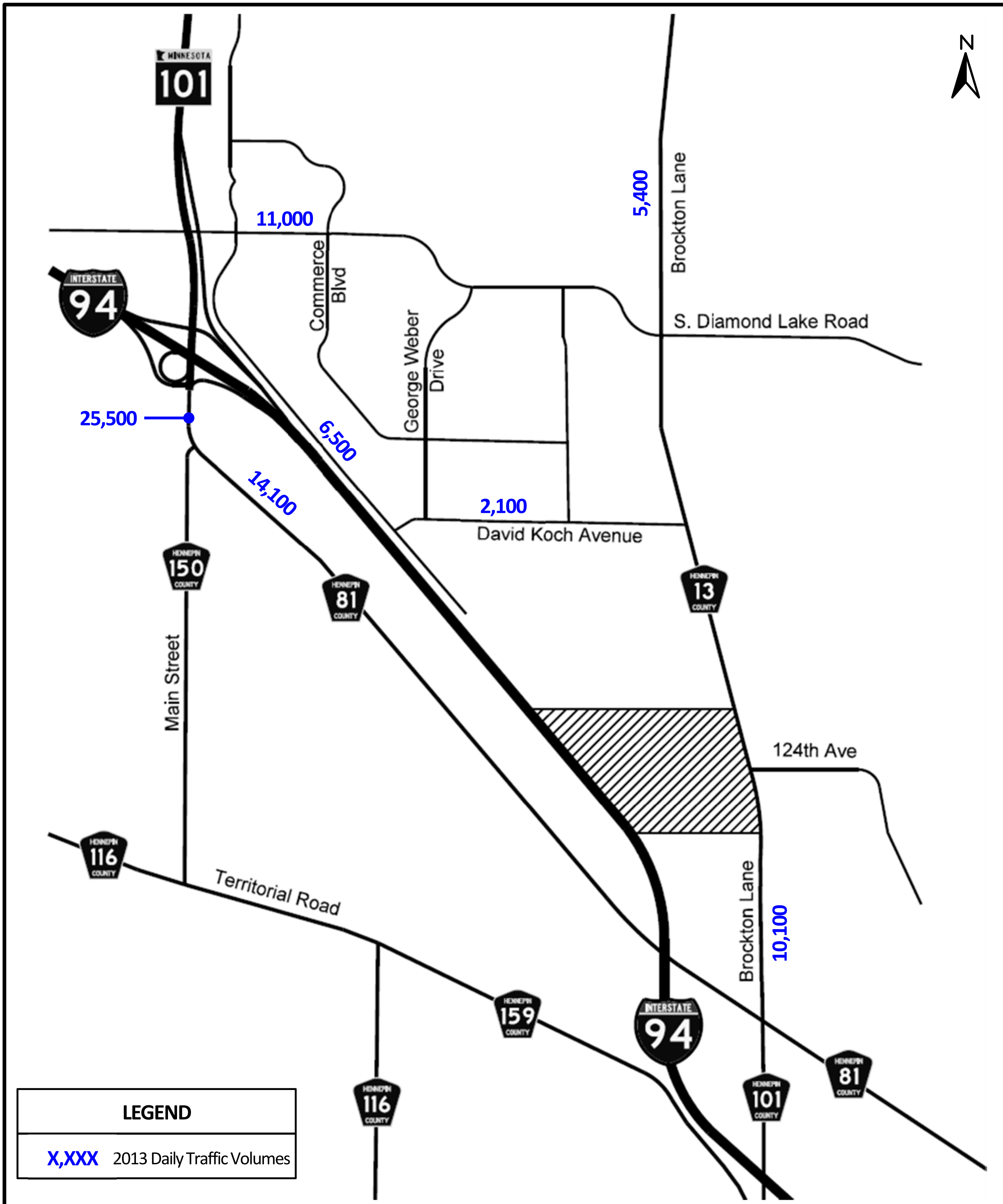

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Figure 2.1
Existing (2013) Daily Traffic Volumes
Henry Area Development Traffic Impact Study

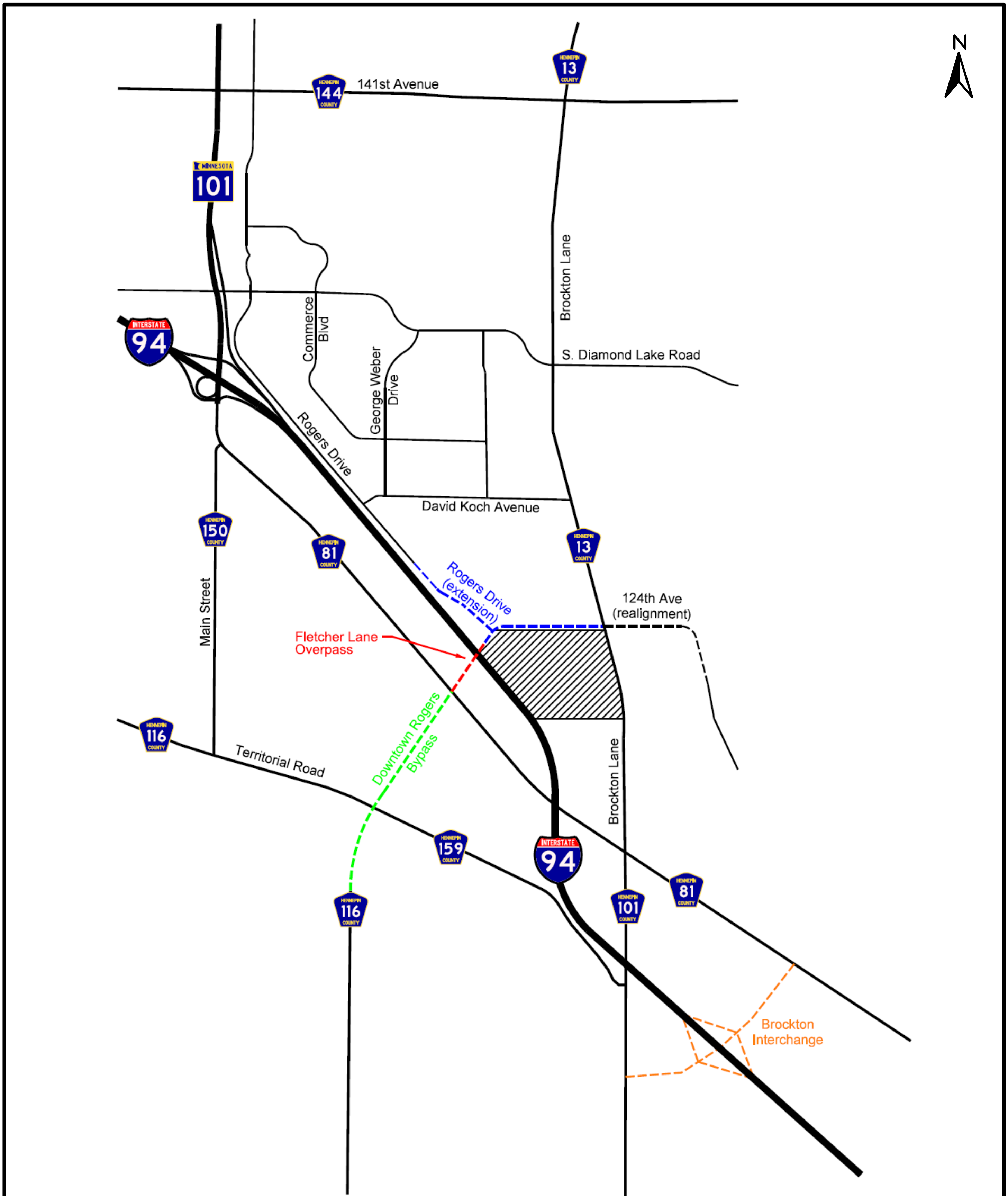

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Figure 2.2
Future Roadway Improvements
Henry Area Development Traffic Impact Study

Extension of Rogers Drive - The extension of Rogers Drive will consist of constructing a new roadway segment from its present terminus 1/3 mile southeast of David Koch Avenue to CSAH 13. The proposed extension is planned to be constructed as part of the Kinghorn development. There are several proposed alignments for the Rogers Drive extension intersecting CSAH 13. The proposed connections to CSAH 13, shown on **Figure 2.3** and **Figure 2.4**, include:

- Connecting Rogers Drive to the existing intersection of CSAH 13 and 124th Avenue,
- Connecting Rogers Drive to a realigned 124th Avenue intersection north of its existing location, or
- Connecting Rogers Drive to CSAH 13 approximately ¼ mile north of the existing CSAH 13 and 124th Avenue intersection (¼ mile intersection spacing meets the County intersection spacing guidelines).

The Rogers Drive extension is assumed to be part of the base for all future modeling. The actual alignment does not greatly impact the traffic forecasts and modeling results. For the analyses in this study, it was assumed that the Rogers Drive extension connects to a realigned 124th Avenue.

Fletcher Overpass - From the new intersection of CSAH 81 and the Downtown Rogers Bypass, the Fletcher Overpass (I-94 overpass) would connect CSAH 81 to Rogers Drive, providing an additional bridge crossing over I-94 (shown on **Figure 2.4**). This overpass is in the planning stage. The impacts of this overpass will be analyzed for years 2019 and 2035.

Brockton Interchange - An interchange near Brockton Lane and I-94 is being considered to improve access to the interstate. Brockton Lane is in the middle of a 6-mile stretch of I-94 that does not currently have an interchange. This is considered a long-term improvement which this study assumed would occur between the years 2019 and 2035. The Brockton Interchange was assumed to be part of the 2035 full build models.

2.3 Daily Traffic Forecasts

Daily traffic forecasts were developed for the roads in the study area for the years 2019 and 2035 as a part of the Kinghorn Development TIS. These forecasts were updated based on the Henry Area development trip generation and development timing. The daily traffic volumes forecasts are provided in **Figure 2.5** and **Figure 2.6** for 2019 and 2035 volumes, respectively.

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Figure 2.3
Rogers Drive Concepts
Henry Area Development Traffic Impact Study

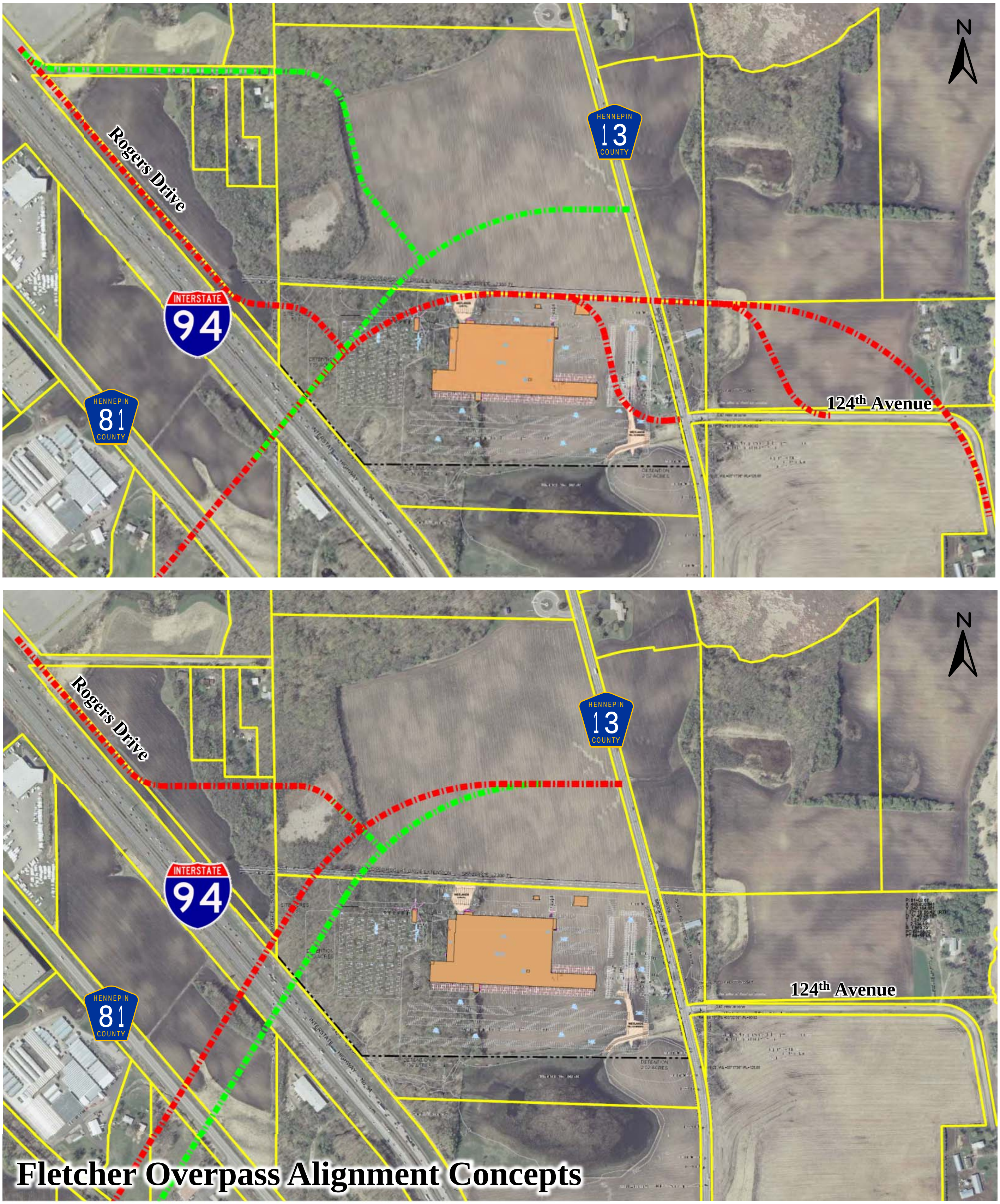

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Figure 2.4
Fletcher Overpass Concepts
Henry Area Development Traffic Impact Study

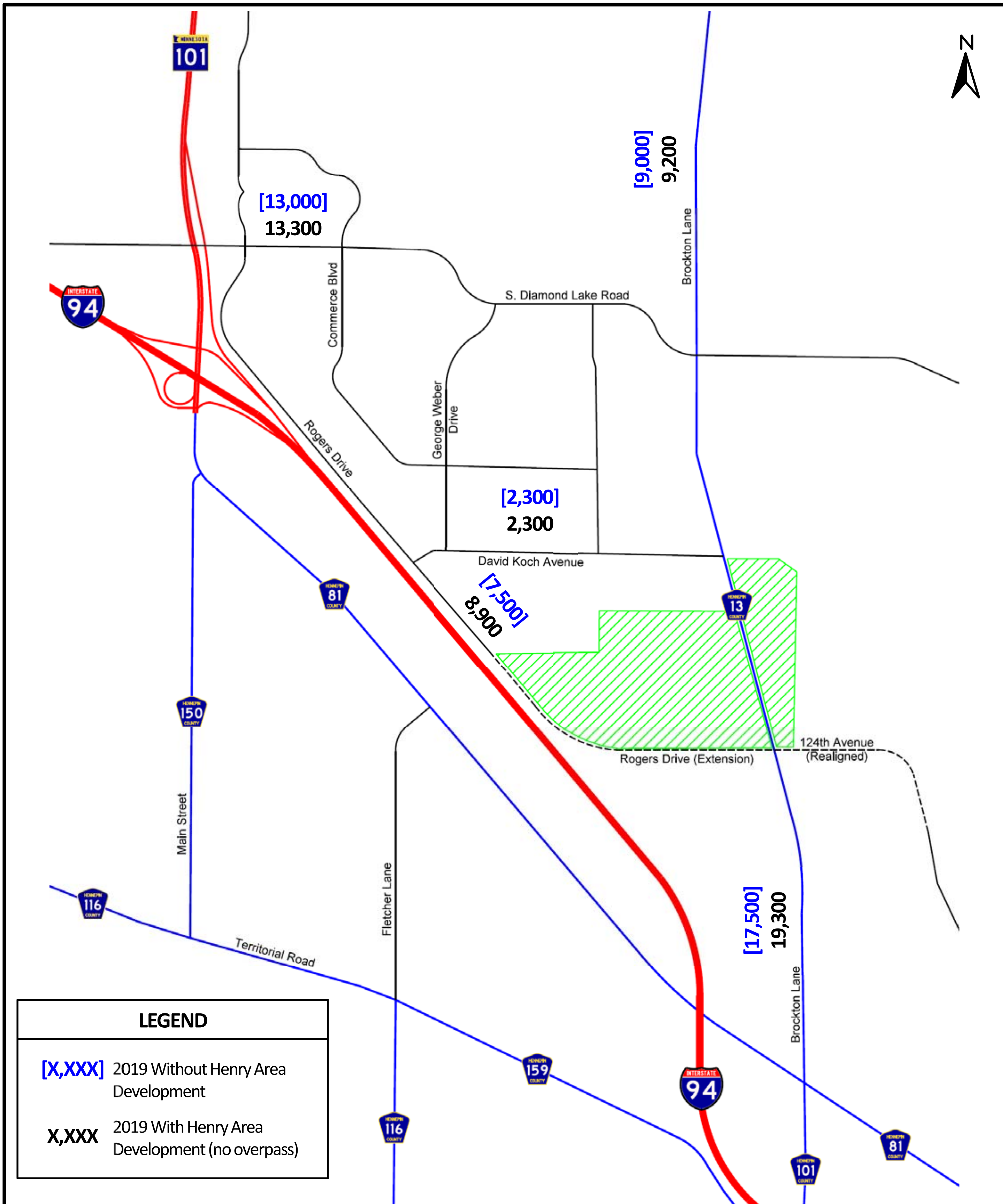

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Figure 2.5
Year 2019 Daily Traffic Forecasts
Henry Area Development Traffic Impact Study

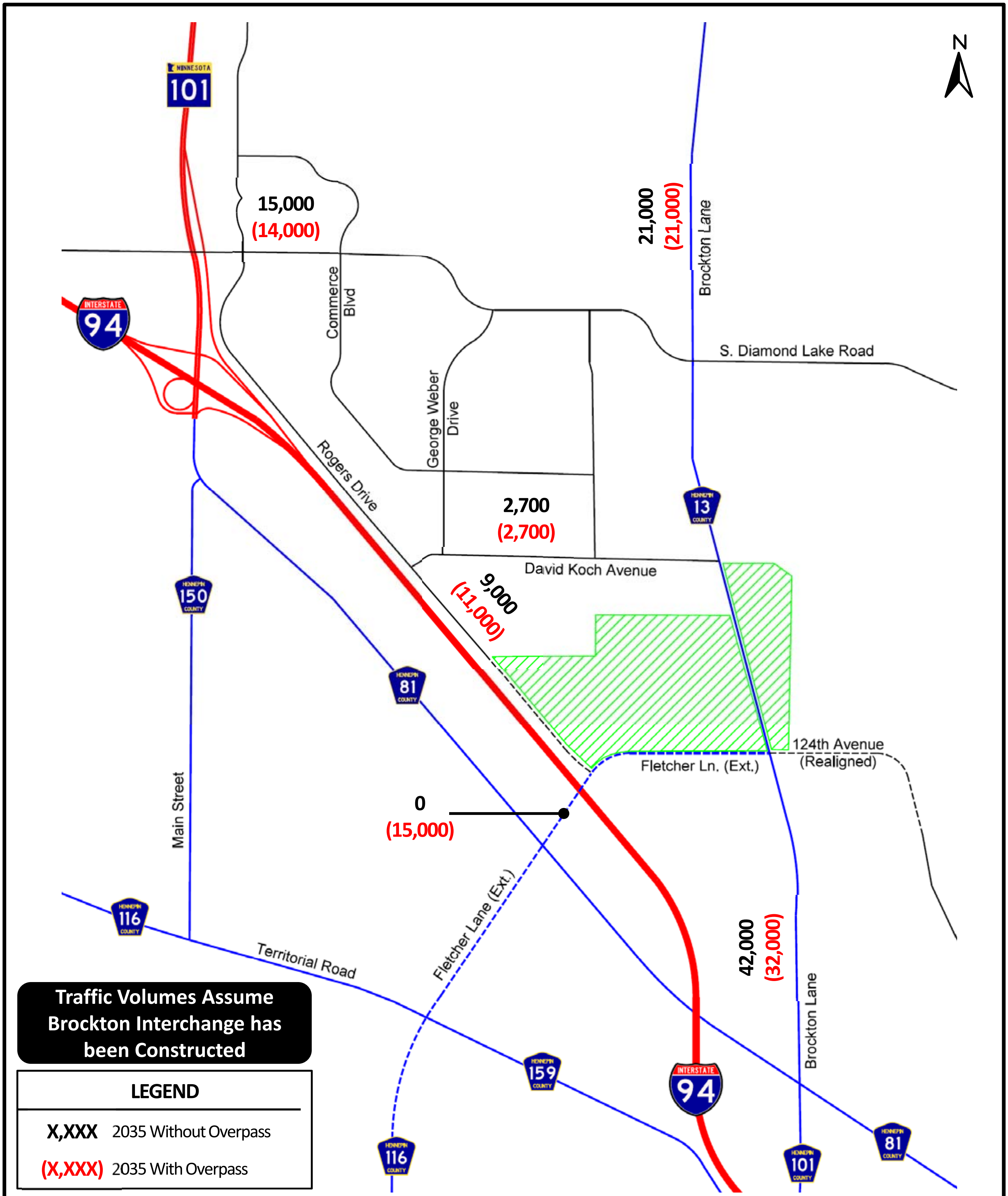

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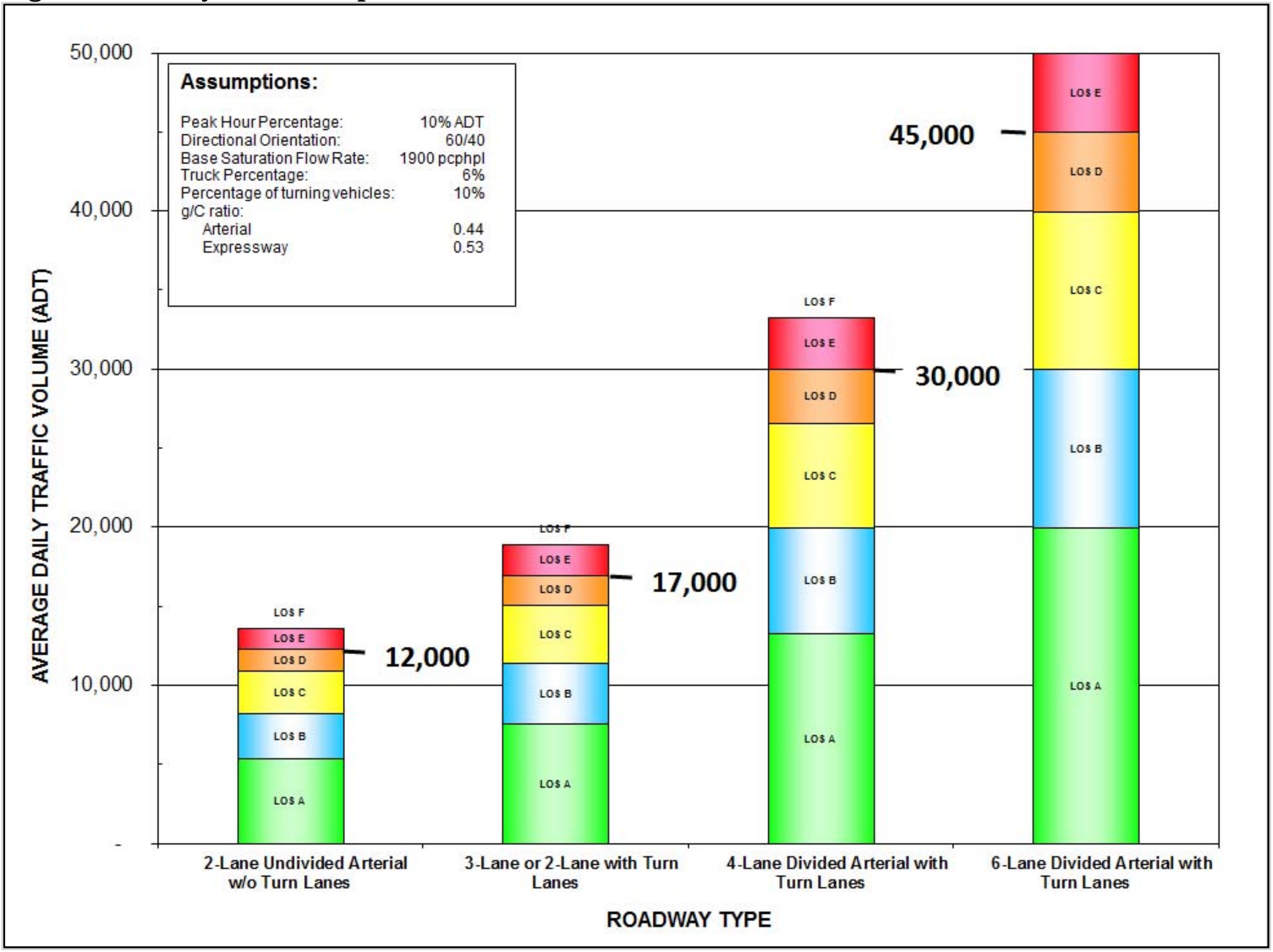
Figure 2.6
Year 2035 Daily Traffic Forecasts
Henry Area Development Traffic Impact Study

2.4 Capacity Analysis

Daily traffic volumes and forecasts were compared to standard level of service (LOS) capacities for different roadway facilities to determine the congestion level and number of lanes needed to accommodate the forecast traffic demand. The capacity chart, provided in **Figure 2.**, was developed from the 2000 Highway Capacity Manual (HCM) for common roadway characteristics in an urbanized area.

Figure 2.7: Daily Traffic Capacities



2.4.1 Existing Roadway Deficiencies

Table 2.1: Existing Segment Capacity Analysis shows the existing daily traffic volume, number of lanes, and the segment LOS based on the capacity table.

Table 2.1: Existing Segment Capacity Analysis

Roadway	From	To	Daily Traffic Volume 2013	Existing Lanes	Segment LOS	Required # of Lanes for LOS D or Better
CSAH 13	CSAH 81	S. Diamond Lake Rd	10,100	2	C	OK
CSAH 13	S. Diamond Lake Rd	CSAH 144	5,400	2	B	OK
S. Diamond Lake Rd	Rogers Drive	Commerce Blvd	11,000	4	A	OK
Proposed Rogers Drive Extension	Robert Ln	CSAH 81	NA			
Proposed Fletcher Overpass Over I-94	CSAH 81	*Proposed* Rogers Dr Extension	NA			

Note: "OK" indicates existing lanes adequate to accommodate daily traffic volume

All listed roadway segments in the study area are operating at a LOS of D or better. Segments operating at a LOS of D or better indicate that the roadway has the ability to handle the traffic under free flow conditions. Because the roadways have the capacity to handle the traffic, this does not indicate the intersections are optimally designed. The peak-hour traffic operations analysis of intersections, later on in this report, will further identify needed intersection improvements.

2.4.2 2019 Roadway Segment Analysis

Year 2019 daily traffic volumes and the corresponding number of lanes were compared to the capacity table to determine LOS and potential improvements needed. **Table 2.2**: 2019 Segment Capacity Analysis without Henry Area Development Traffic shows the capacity analysis for the network without the Henry Area development traffic. **Table 2.3** shows the capacity analysis for the network with the Henry Area development traffic.

Table 2.2: 2019 Segment Capacity Analysis without Henry Area Development Traffic

Roadway	From	To	Daily Traffic Volume 2019	Existing Lanes	Segment LOS	Required # of Lanes for LOS D or Better
CSAH 13	CSAH 81	Rogers Drive	17,500	2	D/E	2+ or 3
CSAH 13	Rogers Drive	S. Diamond Lake Rd	12,000	2	D	OK
CSAH 13	S. Diamond Lake Rd	CSAH 144	9,000	2	C	OK
S. Diamond Lake Rd	Rogers Drive	Commerce Blvd	13,000	4	B	OK
Proposed Rogers Drive Extension	Robert Ln	CSAH 13	7,500	2	B	OK
Proposed Fletcher Overpass Over I-94	CSAH 81	*Proposed* Rogers Dr Extension	NA			

Note: "OK" indicates existing lanes adequate to accommodate daily traffic volume

Table 2.3: 2019 Segment Capacity Analysis with Henry Area Development Traffic

Roadway	From	To	Daily Traffic Volume 2019	Existing Lanes	Segment LOS	Required # of Lanes for LOS D or Better
CSAH 13	CSAH 81	Rogers Drive	19,300	2	F	4
CSAH 13	Rogers Drive	S. Diamond Lake Rd	12,500	2	E	2+
CSAH 13	S. Diamond Lake Rd	CSAH 144	9,200	2	C	OK
S. Diamond Lake Rd	Rogers Drive	Commerce Blvd	13,000	4	B	OK
Proposed Rogers Drive Extension	Robert Ln	CSAH 13	9,000	2	C	OK
Proposed Fletcher Overpass Over I-94	CSAH 81	*Proposed* Rogers Dr Extension	NA			

Note: "OK" indicates existing lanes adequate to accommodate daily traffic volume

In 2019, without the base roadway network, CSAH 13 is anticipated to carry a daily traffic volume of 17,500 vpd and operate at a LOS of E between Rogers Drive and CSAH 81. This volume is very near the LOS D/E threshold for a three-lane or two-lane with turn lanes section (17,000 vpd). With the addition of the trips generated by the development of the middle parcel of the Henry Area development, CSAH 13 between CSAH 81 and Rogers Drive will carry 19,300 trips per day which is above the threshold where a four-lane facility is needed. This segment should be monitored as development occurs to determine when to expand CSAH 13 to a four-lane facility.

2.4.3 2035 Roadway Segment Analysis

Year 2035 forecast daily traffic volumes were analyzed by segment, the number of lanes, and the segment LOS based on the capacity table to determine needed improvements. **Table 2.4**: 2035 Segment Capacity Analysis without Fletcher Overpass**4** shows the capacity analysis for roadway segments in the study area without the Fletcher Overpass. **Table 2.5**: 2035 Segment Capacity Analysis with Fletcher Overpass**5** shows the capacity analysis for roadway segments in the study area with the Fletcher Overpass.

Table 2.4: 2035 Segment Capacity Analysis without Fletcher Overpass

Roadway	From	To	Daily Traffic Volume 2035	Existing Lanes	Segment LOS	Required # of Lanes for LOS D or Better
CSAH 13	CSAH 81	Rogers Drive	42,000	2	F	6
CSAH 13	Rogers Drive	S. Diamond Lake Rd	25,000	2	F	4
CSAH 13	S. Diamond Lake Rd	CSAH 144	21,000	2	F	4
S. Diamond Lake Rd	Rogers Drive	Commerce Blvd	15,000	4	B	OK
Proposed Rogers Drive Extension	Robert Ln	CSAH 13	9,000	2	B	OK
Proposed Fletcher Overpass Over I-94	CSAH 81	*Proposed* Rogers Dr Extension	NA			

Note: "OK" indicates existing lanes adequate to accommodate daily traffic volume

Table 2.5: 2035 Segment Capacity Analysis with Fletcher Overpass

Roadway	From	To	Daily Traffic Volume 2035	Existing Lanes	Segment LOS	Required # of Lanes for LOS D or Better
CSAH 13	CSAH 81	Rogers Drive	32,000	2	F	4+
CSAH 13	Rogers Drive	S. Diamond Lake Rd	23,000	2	F	4
CSAH 13	S. Diamond Lake Rd	CSAH 144	21,000	2	F	4
S. Diamond Lake Rd	Rogers Drive	Commerce Blvd	14,000	4	B	OK
Proposed Rogers Drive Extension	Robert Ln	*Proposed* Fletcher Overpass	11,000	2	C/D	OK
Proposed Fletcher Overpass Over I-94	CSAH 81	*Proposed* Rogers Dr Extension	15,000	2+	C/D	OK

Note: "OK" indicates existing lanes adequate to accommodate daily traffic volume

In 2035, with the base roadway network, CSAH 13 operates at a LOS of F from CSAH 81 north to CSAH 144. Based on the planning level capacity thresholds discussed previously, CSAH 13 from Rogers Drive to CSAH 81 would likely need six lanes to accommodate the forecasted traffic. CSAH 13 from Rogers Drive to CSAH 144 is anticipated to need four lanes to accommodate the forecasted traffic.

If the Fletcher Overpass over I-94 is constructed, it is estimated to carry 15,000 vpd in 2035. This would relieve 10,000 vpd from CSAH 13 and 5,000 vpd from the TH 101/I-94 interchange area. This would relieve some of the congestion from CSAH 81 and CSAH 13. With the overpass, CSAH 13 from CSAH 81 to Rogers Drive is anticipated to need four lanes (plus adequate access control and turn lanes) and not six lanes, which is more in line with Hennepin County's current policy to not build six-lane facilities.

2.5 Recommended Improvements on Regional Network

The main question for the daily capacity analysis is will the Fletcher Overpass over I-94 benefit the regional network. The City of Rogers and other cooperating agencies do not currently have funding identified for the Fletcher Overpass, so the construction of the Fletcher Overpass would not likely occur until after year 2019.

In 2035, the analysis shows the Fletcher Overpass will carry 15,000 vpd. These trips are directly removed from the I-94/101 interchange area and CSAH 13. Approximately 10,000 trips will be removed from CSAH 13 north of CSAH 81 resulting in a forecast volume 32,000 vpd with the overpass. This is near the capacity for a four-lane roadway with a likely LOS at the D/E boundary. Without the overpass, CSAH 13 is forecasted to carry 42,000 vpd. Based on the planning level capacity thresholds, a four-lane roadway would be over capacity and may require a six-lane facility to accommodate the forecasted traffic.

It is recommended to preserve the right of way to construct the Fletcher Overpass at a future date, as development warrants. The modeling shows that as the congestion grows at the I-94/TH 101 interchange, most of the traffic using the interchange will be regional traffic reducing the ability for people traveling to and from Rogers to efficiently reach their destination. The construction of the Fletcher Overpass will provide an alternate route for people with destinations requiring crossing I-94 in Rogers and Dayton. The Fletcher Overpass will benefit both the State highway system and the County highway system by providing a new crossing over I-94 to further distribute traffic crossing the freeway.

Overall recommended improvements by 2035 or as traffic growth warrants:

- Fletcher Overpass (preserve right of way for future construction)
- Expand CSAH 13 to a four-lane facility between CSAH 81 and CSAH 144
- Expand CSAH 81 to a four-lane facility from Memorial Drive in Rogers to Maple Grove Parkway in Maple Grove.

3. Peak-Hour Traffic Operations Analysis

WSB identified six existing key intersections and two proposed intersections for detailed intersection operations analysis near the proposed Henry Area development site as shown in **Figure 3.1**. These intersections were chosen for analysis because they are on likely travel routes between I-94, TH 101, and the development site. The a.m. and p.m. peak-hours were used as the critical periods for the traffic analysis. The existing a.m. and p.m. peak-hour signal timing and phasing plans were obtained for each intersection. WSB performed peak-hour turning movement counts at key intersections in May 2013. Lane geometry was obtained from aerial photography and field verified. The eight key intersections and traffic controls are as follows:

• Rogers Drive / South Diamond Lake Road	Signal
• CSAH 13 (Brockton Lane) / 141st Avenue (CSAH 144)	All Way Stop
• CSAH 13 (Brockton Lane) / South Diamond Lake Road	Signal
• CSAH 13 (Brockton Lane) / David Koch Avenue	Thru Stop
• CSAH 13 (Brockton Lane) / CSAH 81	Signal
• Rogers Drive / David Koch Avenue	Thru Stop
• Rogers Drive and CSAH 13	Future Intersection
• Rogers Drive and Fletcher Lane	Future Intersection

3.1 Existing Conditions

It was determined that the a.m. and p.m. peak-hours would be the critical periods for this traffic analysis. Based on the counts obtained, the peak-hours occur from 6:45 to 7:45 a.m. in the morning and 4:30 to 5:30 p.m. in the evening. After the peak-hours were determined, the counted volumes were balanced between intersections, where appropriate. The existing turning movement volumes and intersection geometrics for each of the key intersections during the a.m. and p.m. peak-hours are shown in **Figure 3.1**. The 3-hour a.m. and p.m. peak period turning movement counts can be found in the Kinghorn Development TIS.

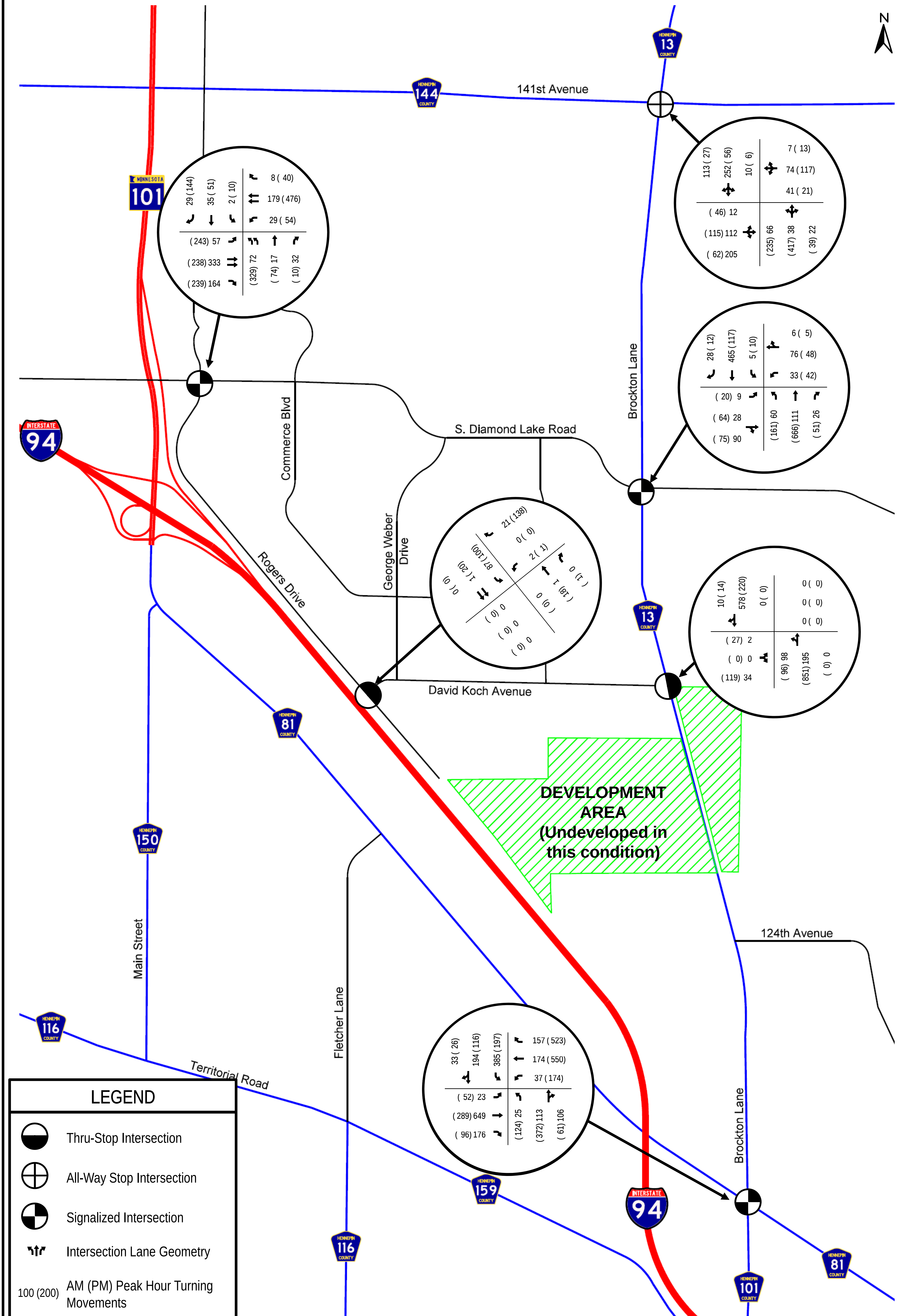


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Figure 3.1
Existing (2013) Traffic Volumes
Kinghorn Area Traffic Study

3.1.1 Operations Analysis Methodology

In order to determine the impacts of proposed development on the transportation network, a traffic operations analysis is performed on the surrounding roadway network. The analysis process includes determining level of service (LOS) and queue length for each movement at each of the key intersections for existing and post-development conditions during the a.m. and p.m. peak-hours. The results of the operations analysis were used to identify potential improvements. Intersection improvements may include changing the traffic control, adding or lengthening turn lanes and adding through lanes.

The approach to the traffic operations analysis is derived from the established methodologies documented in the HCM. The manual contains a series of analysis techniques that are used to evaluate the operation of transportation facilities under specified conditions. Synchro, a software package that implements the HCM methodologies, was used to build the roadway network and as an input database for all the lane geometrics, turn-movement volumes, traffic control, and signal timing characteristics in the study area. In addition, the signal timing parameters for future year conditions were optimized using Synchro. This information was then transferred to SimTraffic, the traffic simulation model, to produce the analysis results for each intersection.

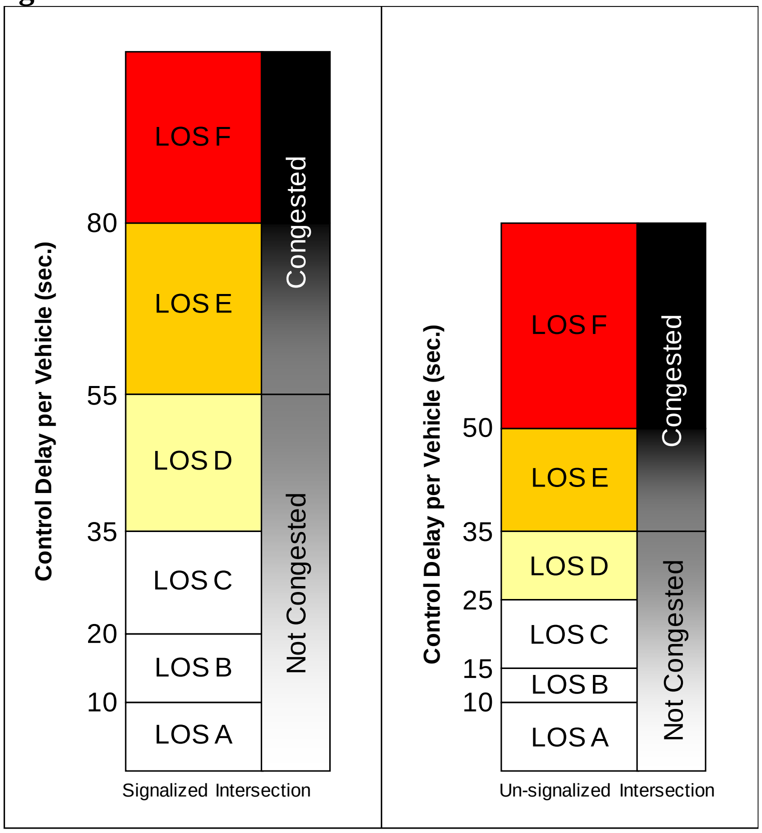
SimTraffic is a microscopic computer model that simulates each individual vehicle's characteristics and behavior in response to traffic volumes, signal operations, turning movements, pedestrians, and intersection configuration. The model can simulate drivers' behaviors and responses to surrounding traffic flow as well as different vehicle types and speeds. It can reasonably estimate vehicle delay and queue lengths at intersections and can create visual animations of the traffic operations. This analysis can be used to help the public and policy makers understand where operational issues may occur and to help identify potential improvements that could mitigate identified issues.

In this study, SimTraffic was used to report results for all intersections in the study. By simulating the individual vehicles, SimTraffic is able to most closely approximate the impacts of queuing at adjacent intersections.

One of the primary measures of effectiveness used to evaluate intersection traffic operations, as defined in the HCM, is level of service (LOS), a qualitative letter grade (A-F) based on seconds of vehicle delay due to the traffic control device at an intersection. By definition, LOS A conditions represent high-quality operations (i.e., motorists experience very little delay or interference) and LOS F conditions represent very poor operations (i.e., extreme delay or severe congestion). **Figure 3.2** depicts a graphical interpretation of delay times that define intersection level of service. Level of service analysis will identify capacity constraints and help determine where improvements are needed.

Generally, the LOS D/E boundary is an indicator of acceptable traffic operations in an urban or urbanizing area.

Figure 3.2: Level of Service Criteria



SOURCE: Level of Service thresholds from the Highway Capacity Manual.

As part of the operations analysis, vehicle queue lengths were reviewed to determine if left and right turn lanes are long enough to store the queue of vehicles. Maximum queues greater than the storage provided are noted in the summary.

Detailed results of the operational analysis, that include queuing and delay information by movement, are provided in **Appendix A**.

3.1.2 Existing Traffic Operations

Existing traffic operations were taken from the Kinghorn Development TIS. The Kinghorn Development TIS included impacts from the TH 101/S. Diamond Lake Road intersection which impacts the operations of nearby intersections. **Table 3.1** provides the a.m. and p.m. operations from the Synchro / SimTraffic micro-simulation model for the key intersections being studied.

Table 3.1: LOS Service Summary for Existing (2013) Condition

Intersection			AM Peak Hour				PM Peak Hour			
Control	Location	Approach	LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)		LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
All-Way Stop	141st St / CSAH 144 & Brockton Lane	NB	9	A	10	B	43	E	29	D
		WB	8	A			10	B		
		SB	13	B			8	A		
		EB	9	A			9	A		
Signalized	S Diamond Lake Road & Rogers Drive	NB	31	C	18	B	>200	F	117	F
		WB	18	B			40	D		
		SB	16	B			12	B		
		EB	15	B			22	C		
Signalized	S Diamond Lake Road & Brockton Lane	NB	12	B	12	B	25	C	23	C
		WB	23	C			28	C		
		SB	12	B			17	B		
		EB	7	A			20	C		
Thru-Stop	David Koch Ave & Rogers Drive	NB	1	A	1	A	1	A	2	A
		WB	0	A			2	A		
		SB	1	A			2	A		
		EB	0	A			0	A		
Thru-Stop	David Koch Ave & Brockton Lane	NB	5	A	3	A	3	A	4	A
		WB	0	A			0	A		
		SB	2	A			1	A		
		EB	3	A			13	B		
Signalized	CSAH 81 & Brockton Lane	NB	66	E	116	F	192	F	92	F
		WB	24	C			69	E		
		SB	>200	F			75	E		
		EB	63	E			43	D		

Note: Operations at the S. Diamond Lake Road/Rogers Drive intersection are influenced by the TH 101/S. Diamond Lake Road intersection nearby. The intersection would operate better without the impacts of the TH 101/S. Diamond Lake Road intersection.

The LOS analysis for the existing (2013) condition indicates that many of the key intersections in the network are currently operating at acceptable conditions during the a.m. and p.m. peak-hours. However, operational issues are occurring in the existing conditions at the following intersections:

- **S. Diamond Lake Road at Rogers Drive:** Intersection operations are heavily influenced by the nearby intersection of TH 101 and S. Diamond Lake Road. Delays shown at the S. Diamond Lake Road/Rogers Drive intersection are due to the queues from the TH 101 intersection backing into the Rogers Drive intersection.
- **CSAH 13 at CSAH 144:** The northbound approach to the intersection operates at LOS E due to high volumes of left-turning vehicles stopping and queuing at the all-way stop controlled intersection. Due to these traffic queues, an additional impact of this condition is northbound to westbound vehicles cutting through the nearby neighborhood in an attempt to lessen the delay they experience at the intersection.
- **CSAH 13 at CSAH 81:** The intersection operates at LOS F in both the a.m. and p.m. peak-hours due to insufficient lane geometry and turn lane lengths at the intersection.

The operational analysis shows that the following queues exceed the existing storage capacity (turn bay storage | largest maximum queues):

- **S. Diamond Lake Road at Rogers Drive:** Northbound left-turn queue (250 ft | 375 ft)
- **S. Diamond Lake Road at CSAH 13:** Northbound left-turn queue (150 ft | 200 ft)
- **CSAH 13 at CSAH 81:** Northbound left-turn queue (275 ft | 325 ft), southbound left-turn queue (150 ft | 550 ft[1]), westbound left-turn queue (250 ft | 300 ft)

3.1.3 Existing Condition Needs

The purpose of this section is to identify potential improvements at the key intersections that will allow them to operate acceptably under existing conditions. Hennepin County's position is that short-term improvements need to be consistent with the long-term needs on their system. Therefore, it is likely that if an intersection is being reconstructed, improvements will need to be designed to accommodate traffic levels approximately 20 years into the future or be easily expandable to the ultimate design. Actual recommended improvements are provided at the end of this report and incorporate existing, year 2019, and year 2035 needs which are identified in subsequent sections of this report.

The operational analysis shows that the intersection of TH 101 and S. Diamond Lake Road currently operates poorly and adding more turn lanes at the intersection is not feasible due to geometric constraints and traffic patterns in the area. Construction of an interchange at the intersection would reduce delay on both TH 101 and S. Diamond Lake Road and would likely provide enough capacity to serve traffic levels into the foreseeable future. The ultimate configuration of this intersection is highly dependent on the future configuration of the I-94 and TH 101 system interchange which is 1,700 feet south of S. Diamond Lake Road. Concepts have been proposed with costs over $100 million (funding is not likely to be secured in the foreseeable future).

[1] The maximum queue on the southbound approach at CSAH 13 and CSAH 81 is estimated at 550 feet which is greater than the 200 foot value reported by SimTraffic. SimTraffic will only report maximum queues for turn lanes up to a certain amount over the storage length before it adds the queue length to the through movement queue.

Improvements at TH 101 and S. Diamond Lake Road will likely reduce the spillback through the S. Diamond Lake Road and Rogers Drive's intersection, thus improving operations at the Rogers Drive junction.

Existing needs at the CSAH 13/CSAH 81 intersection include addition of right-turn lanes on the northbound and southbound approaches (300 feet), an additional southbound left-turn lane (dual left-turn lanes at 300 feet), and lengthening of the northbound left-turn lane (from 275 feet to 500 feet). The lengthening of the northbound left-turn lane is due to the northbound through queues backing up beyond the entrance to the left-turn lane, causing additional left-turning vehicles to queue with the through vehicles even though the left-turn storage has not been completely filled. Lengthening of the northbound left-turn lane was deemed to have less impacts as compared to the alternative of developing an additional northbound through lane.

The intersection of CSAH 13 and CSAH 144 is beginning to reach unsatisfactory LOS in the p.m. peak-hour. A traffic signal along with a northbound left-turn lane and an eastbound right-turn lane are needed to provide satisfactory LOS conditions.

3.2 Peak-Hour Traffic Forecasting

Future year a.m. and p.m. peak-hour traffic volumes were estimated for each scenario to analyze operations and determine intersection level improvements necessary to accommodate the future traffic.

The traffic forecasting process consisted of the following key components:

- Existing traffic volumes
- Background traffic growth
- Site-generated traffic
- Trip distribution of site-generated traffic
- Intersection assignment of site-generated traffic

3.2.1 Background Traffic Growth

The first step of the traffic forecasting process is to determine the expected background growth in traffic. Traffic growth in the vicinity of a proposed development will occur between existing conditions and any given future year due to other growth and development in the region. This growth is typically termed as "background growth" and must be accounted for as part of future volumes. The local background growth was estimated for each roadway based on the daily traffic forecasts developed from the sub-area travel demand model discussed in the Kinghorn TIS.

The trip generation for the Kinghorn Development is documented in the Kinghorn Development TIS. The Kinghorn Development is assumed to be fully built out by 2019 and is included in both the no-development and post-development conditions.

3.2.2 Trip Generation

The Henry Area development site is proposed to be constructed as light commercial on the western parcel (Vivea site), industrial warehousing in the middle parcel, and single-family residential in the east parcel. The daily and peak-hour trip generation was generated using the rates from the *ITE Trip Generation Manual* (9^{th} Edition) for the warehousing and residential land uses.

Trip generation for the light commercial parcel was estimated using trip generation rates from similar developments. The light commercial use assumed for the area is meant to approximately correspond to a recreational equipment sales store and lot similar to the existing Camping World and Link Recreational businesses on Rogers Drive. The *ITE Trip Generation Manual* does not provide adequate information for these types of businesses, and thus the trips produced were estimated. Analysis showed that the trips estimated to be generated by a 120,000 sq. ft. light commercial land use were similar to a 380,000 sq. ft. warehousing land use.

Daily and peak-hour trip generation for each parcel is shown in **Table 3.2**.

Table 3.2: Trip Generation

Land Use	Total Land Use Units	Time of Day	Trip Generation Rate (1)			Trips Generated		
			Total	In	Out	Total	In	Out
Zone 1 (Light Commercial Area - Vivea Site)								
Warehousing (2)	380 ,000 sf	Daily	3.56	1.78	1.78	1352	676	676
		AM Peak Hour	0.30	0.24	0.06	114	90	24
		PM Peak Hour	0.32	0.08	0.24	121	30	91
Zone 2 (East Industrial Area)								
Warehousing	1,100 ,000 sf	Daily	3.56	1.78	1.78	3916	1958	1958
		AM Peak Hour	0.30	0.24	0.06	330	261	69
		PM Peak Hour	0.32	0.08	0.24	352	88	264
Zone 3 (Residential Area)								
Single Family Detached	100 units	Daily	9.52	4.76	4.76	952	476	476
		AM Peak Hour	0.75	0.19	0.56	75	19	56
		PM Peak Hour	1.00	0.63	0.37	100	63	37

(1) Trip Generation Rates taken from ITE Trip Generation Manual, 9th Edition Land Uses 150 and 210 for Warehousing and Single Family Detached, respectively.

(2) Same trip generation rate as 120,000 sq ft of light commercial

The middle parcel (Zone 2) is expected to be fully built out by 2019, and the other parcels are expected to be built out by 2035.

Truck trip generation for the Henry Area development was assumed to be the same as for the Kinghorn development. See the Kinghorn Development TIS for truck trip generation by time of day.

3.2.3 Trip Distribution

The percentages used to distribute the new trips from the Henry Area development site is assumed to be the same as the Kinghorn development and is shown in **Figure 3.3**. The distribution of trips was developed using existing turning movement counts, local travel patterns, previous studies, and the Met Council's Collar County Travel Demand Model.

Of note is that there is a Middle School and High School on opposite sides of CSAH 144 just east of TH 101. Based on assumptions made in the Kinghorn Development TIS, some trucks will be going to or coming from the north on TH 101 on a daily basis. CSAH 144 would be a direct / convenient route between TH 101 and the development site. Safety concerns related to adding additional large trucks going past the schools have been raised by the public and the City Council. To address this issue, it is recommended that the occupier of the development site consider adopting a policy to not route large trucks on CSAH 144 past the schools.

3.2.4 Trip Assignment / Forecast Volumes

The final step of the traffic forecasting process is to assign the estimated new site-generated trips to the surrounding roadway system based on the directional trip distribution of traffic. The estimated trips are assigned for each movement at each intersection within the study area. The process assigns the future vehicle trips to the most logical travel route, for both arriving and departing directions, and takes into account the following:

- Directional access to local and regional roadways
- Intersection control
- Roadway functionality and characteristics

Applying the new development trips to the background traffic produces the estimated post-development traffic volumes. The forecast traffic volumes for each of the scenarios evaluated in this analysis will be presented in subsequent sections of this report.

3.2.5 Checks for Reasonableness

Checks for reasonableness were made as recommended by the memorandum titled "Twin Cities Travel Demand Forecasts Prepared for MnDOT Metro: Model Output Checks for Reasonableness and Post Processing Adjustments" April 10, 2006. These reasonable checks focus on whether the peak-hour percentages and directional splits of the forecast traffic are reasonable and reflect the future congested conditions that are likely to exist on the regional highway system. In general, it is expected that peak-hour percentages will decrease and directional splits will get close to 50-50 as traffic increases in non-peak times and non-peak directions while peak-hour volumes and peak-direction volumes are constrained by the existing capacity. The checks for reasonableness were performed for CSAH 13 between CSAH 81 and the proposed Rogers Drive intersection since that roadway is the most impacted by the proposed development.

The peak-hour percentage of daily traffic for CSAH 13 north of CSAH 81 is currently about 14 percent of the daily traffic volume. Most trips on CSAH 13 are work trips and occur in the a.m. and p.m. peak hours. This percentage is expected to be reduced to approximately 10% in the future due to changing traffic patterns in the area in the future.

The directional split of peak-hour traffic is about 75% northbound/25% southbound on CSAH 13 in the PM peak hour north of CSAH 81. This percentage split is projected to be reduced to approximately 60%/40% as the parcels along CSAH 13 are developed due to traffic flow from CSAH 81 to the developments.

Capacities of roadway segments beyond the limits of the project were considered in the forecasting process. The forecasts were developed with the Twin Cities Regional Travel Demand Model which is a capacity constrained model. Facilities in the area are also assumed to be improved according to the recommendations in the Brockton Interchange study.

The growth on CSAH 13 north of CSAH 81 between 1998 (the first year data is readily available) and 2011 (the most recent ADT year) is approximately 100% or double the traffic volume between 1998 and 2011. Extrapolation of that growth rate to 2035 results in an ADT of approximately 31,000 vehicles. The projected ADT in 2035 is above that ADT level, but it is reasonable to assume that this ADT can be reached due to the construction of the Brockton Interchange and regional roadway improvements allowing higher traffic volumes to use CSAH 13 north of CSAH 81.

The projected traffic volumes in the study area are considered reasonable due to the reasons explained in this section.

3.3 Year 2019 No-Development Conditions

The traffic operations analysis for Year 2019 No-Development Conditions looked at the approach and intersection LOS and queue lengths at each of the key intersections for the 2019 a.m. and p.m. peak-hour traffic volumes. The No-Development Conditions assumes that the Kinghorn development area is built out, but the Henry Area development is not built out with any development. The Rogers Drive extension is assumed to be built due to the Kinghorn development being in place. Background traffic was assumed to consist of other future developments nearby in the Cities of Rogers and Dayton and estimated using the sub-area model. The Year 2019 No-Development Conditions turning movement volumes are shown in **Figure 3.4**.

For the future no-development conditions, impacts from the intersection operations at the TH 101/S. Diamond Lake Road intersection were not included. The Kinghorn Development TIS showed that the TH 101/S. Diamond Lake Road intersection is in need of conversion to an interchange or other grade separation due to lengthy intersection delays and queues caused by high traffic volumes. Since the distance between the TH 101/S. Diamond Lake Road and S. Diamond Lake Road/Rogers Drive intersections is relatively small, operations at the S. Diamond Lake Road/Rogers Drive intersection are highly dependent on the operations of the TH 101/S. Diamond Lake Road intersection. The S. Diamond Lake Road/Rogers Drive intersection would likely be reconfigured with intersection or interchange improvements at TH 101 and S. Diamond Lake Road.

3.3.1 Traffic Operations Analysis

This section documents how the existing roadway, intersection lane geometrics, and traffic control would accommodate the forecasted Year 2019 No-Development Conditions traffic volumes. **Table 3.3** shows a summary of the operational analysis for the 2019 No-Development Conditions. These conditions do not assume any of the potential improvements mentioned in the existing conditions section have been implemented.

The analysis shows the following operational issues for the 2019 No-Development Conditions:

- **CSAH 13 at Rogers Drive:** The intersection performs poorly with through/stop traffic control due to high traffic volumes on Rogers Drive.
- **CSAH 13 at CSAH 81:** The intersection operates at LOS F in both the a.m. and p.m. peak-hours due to insufficient lane geometry and turn lane lengths at the intersection.
- **CSAH 13 at CSAH 144:** The intersection operates at LOS F in the p.m. peak-hour due to excessive delays on the northbound approach. These delays are due to the large traffic volume on the northbound approach, lack of turn lanes, and the all-way stop control at the intersection.

The operational analysis shows that the following queues exceed the existing storage capacity (turn bay storage | largest maximum queues):

- **S. Diamond Lake Road at Rogers Drive:** Northbound left-turn queue (250 ft | 400 ft), southbound left-turn queue (125 ft | 175 ft), eastbound left-turn queue (150 ft | 200 ft)
- **S. Diamond Lake Road at CSAH 13:** Northbound left-turn queue (150 ft | 200 ft)
- **CSAH 13 at CSAH 81:** Northbound left-turn queue (275 ft | 325 ft [2]), southbound left-turn queue (150 ft | 200 ft [3]), westbound left-turn queue (250 ft | 300 ft)

Mitigation for the 2019 No-Development Condition was proposed in the Kinghorn Development TIS under the 2019 Post-Development Condition. The mitigation included the following:

- **CSAH 13 at CSAH 81**: Addition of northbound and southbound right-turn lanes, an additional southbound left-turn lane, additional westbound through lane, and lengthened northbound left-turn lane.
- **CSAH 13 at CSAH 144**: Installation of a traffic signal, addition of a northbound left-turn lane and eastbound right-turn lane.
- **CSAH 13 at Rogers Drive**: Installation of a traffic signal when the intersection is constructed, provide left- and right-turn lanes on all approaches.

The 2019 No-Development Condition will be adequately served with the addition of these mitigation measures.

[2] SimTraffic reported 325 feet (storage lane full) with additional turning vehicles queuing in the through lanes.
[3] SimTraffic reported 200 feet (storage lane full) with additional turning vehicles queuing in the through lanes.

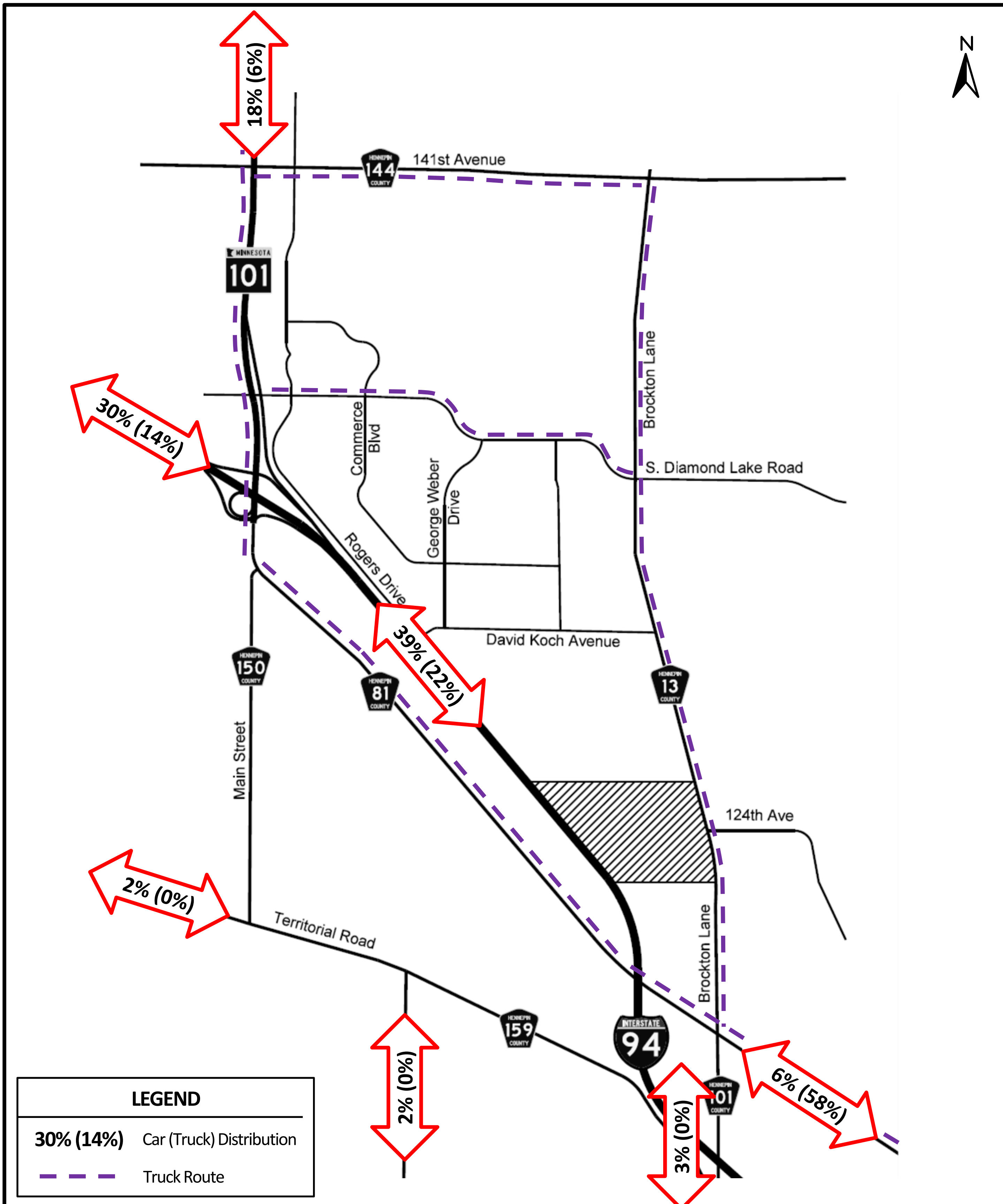


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Figure 3.3
Site Trip Distribution
Henry Area Development Traffic Impact Study

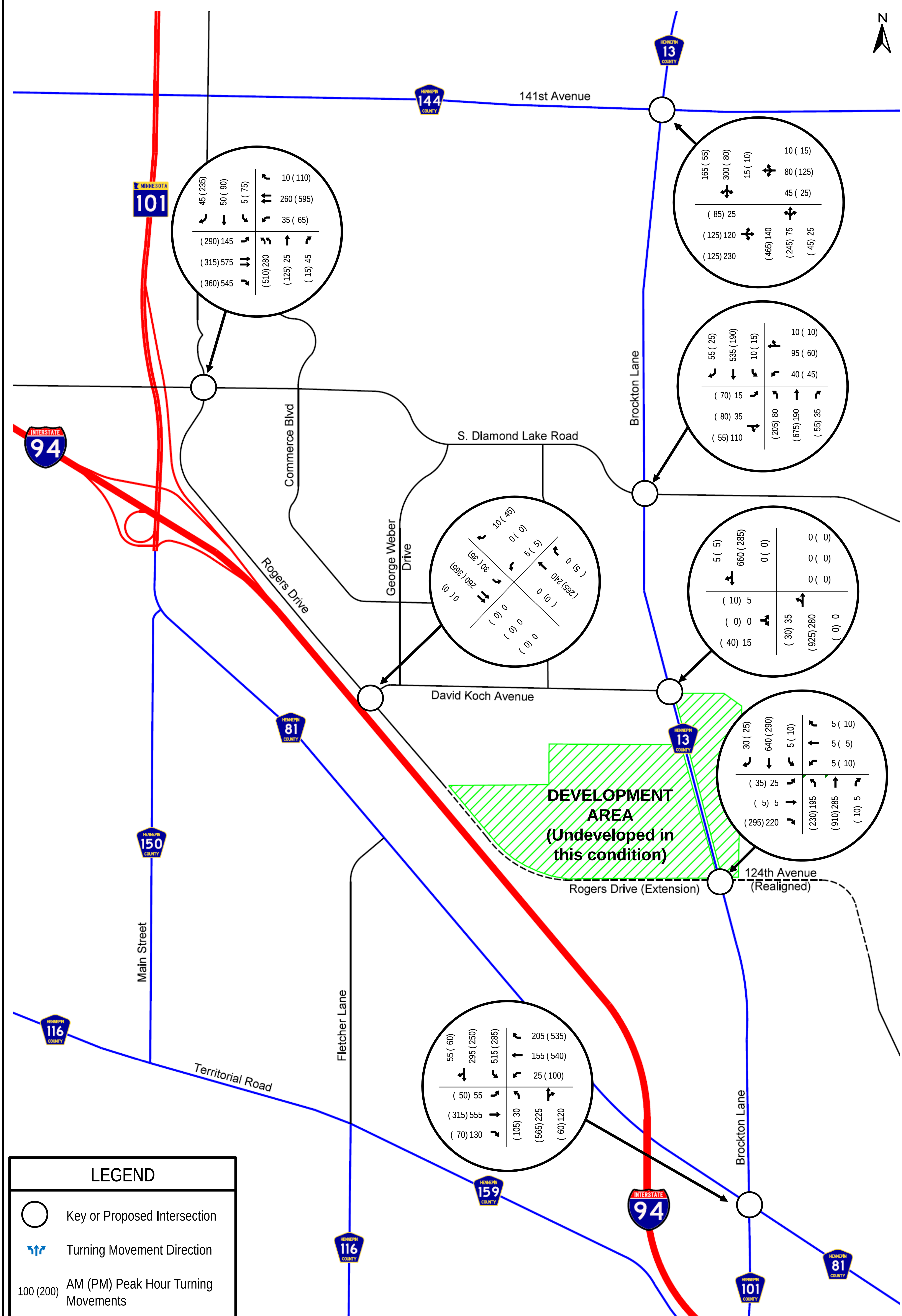

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Figure 3.4
2019 No-Development Traffic Volumes
Henry Area Development Traffic Impact Study

Table 3.3: LOS Summary for 2019 No-Development Conditions

Control	Location	Approach	AM Peak Hour LOS by Approach (Sec/Veh) Delay	AM LOS by Approach LOS	AM LOS by Intersection (Sec/Veh) Delay	AM LOS by Intersection LOS	PM Peak Hour LOS by Approach (Sec/Veh) Delay	PM LOS by Approach LOS	PM LOS by Intersection (Sec/Veh) Delay	PM LOS by Intersection LOS
All-Way Stop	141st St / CSAH 144 & Brockton Lane	NB	13	B	16	C	113	F	62	F
		WB	10	B			11	B		
		SB	22	C			9	A		
		EB	13	B			12	B		
Signalized	S Diamond Lake Road & Rogers Drive *	NB	32	C	17	B	50	D	37	D
		WB	21	C			49	D		
		SB	14	B			20	C		
		EB	13	B			26	C		
Signalized	S Diamond Lake Road & Brockton Lane	NB	16	B	18	B	21	C	22	C
		WB	24	C			30	C		
		SB	18	B			17	B		
		EB	17	B			25	C		
Thru-Stop	David Koch Ave & Rogers Drive	NB	1	A	1	A	1	A	1	A
		WB	2	A			3	A		
		SB	1	A			1	A		
		EB	0	A			0	A		
Thru-Stop	David Koch Ave & Brockton Lane	NB	5	A	14	B	3	A	2	A
		WB	0	A			0	A		
		SB	18	C			1	A		
		EB	19	C			6	A		
Thru-Stop	Rogers Drive & Brockton Lane	NB	7	A	171	F	3	A	30	D
		WB	>200	F			35	E		
		SB	157	F			16	C		
		EB	>200	F			126	F		
Signalized	CSAH 81 & Brockton Lane	NB	192	F	231	F	187	F	258	F
		WB	33	C			>200	F		
		SB	>200	F			>200	F		
		EB	92	F			80	F		

* Operations at this intersection do not include interaction with the TH 101/S. Diamond Lake Road intersection in this condition and thus are shown as performing "better" than in the existing condition. The TH 101/S. Diamond Lake Road intersection is outside of the scope of this TIS, and improvements to that intersection will need to be made without the impacts of the Henry Area development.

3.4 Year 2019 Post-Development Conditions

The 2019 Post-Development Condition assumes that the middle industrial warehouse site of the Henry Area development area is built-out. The rest of the land use and roadway network is assumed to be the same as the 2019 No-Development Condition. The 2019 Post-Development turning movement volumes are shown in **Figure 3.5**.

3.4.1 Traffic Operations Analysis

This section documents how the existing roadway and intersection lane geometrics and traffic control would accommodate the forecasted Year 2019 Post-Development Conditions traffic volumes. It also identifies potential improvements for intersection movements that may negatively impact traffic operations at that intersection as well as at nearby intersections.

For the future post-development conditions, impacts from the intersection operations at the TH 101/S. Diamond Lake Road intersection were not included. The Kinghorn Development TIS showed that the TH 101/S. Diamond Lake Road intersection is in need of conversion to an interchange or other grade separation due to lengthy intersection delays and queues caused by high traffic volumes. Since the distance between the TH 101/S. Diamond Lake Road and S. Diamond Lake Road/Rogers Drive intersections is relatively small, operations at the S. Diamond Lake Road/Rogers Drive intersection are highly dependent on the operations of the TH 101/S. Diamond Lake Road intersection. The S. Diamond Lake Road/Rogers Drive intersection would likely be reconfigured with intersection or interchange improvements at TH 101 and S. Diamond Lake Road.

Table 3.4 shows a summary of the operational analysis for the 2019 Post-Development Conditions. These conditions assume that the potential improvements mentioned in the 2019 No-Development Condition section have been implemented

In addition to the deficiencies noted in the 2019 No-Development conditions (detailed in *italics* in the following list), the following deficiencies were identified for the 2019 Post-Development conditions:

- **CSAH 13 at CSAH 81:** *The intersection operates at LOS F in both the a.m. and p.m. peak-hours due to insufficient lane geometry and turn lane lengths at the intersection.* The additional traffic from the Henry Area development causes an increase in delays to the intersection overall and especially on the southbound approach.
- **CSAH 13 at CSAH 144:** *The intersection operates at LOS F in the p.m. peak-hour due to excessive delays on the northbound approach. These delays are due to the large traffic volume on the northbound approach, lack of turn lanes, and the all-way stop control at the intersection.*
- **CSAH 13 at Rogers Drive:** *The intersection performs poorly with through/stop traffic control due to high traffic volumes on Rogers Drive.* The a.m. peak-hour queues from the CSAH 13/CSAH 81 intersection extend into the CSAH 13/Rogers Drive intersection causing side-street traffic to not be able to access CSAH 13. In the p.m. peak-hour, the eastbound approach operates at unsatisfactory LOS due to a lack of gaps in traffic on CSAH 13.

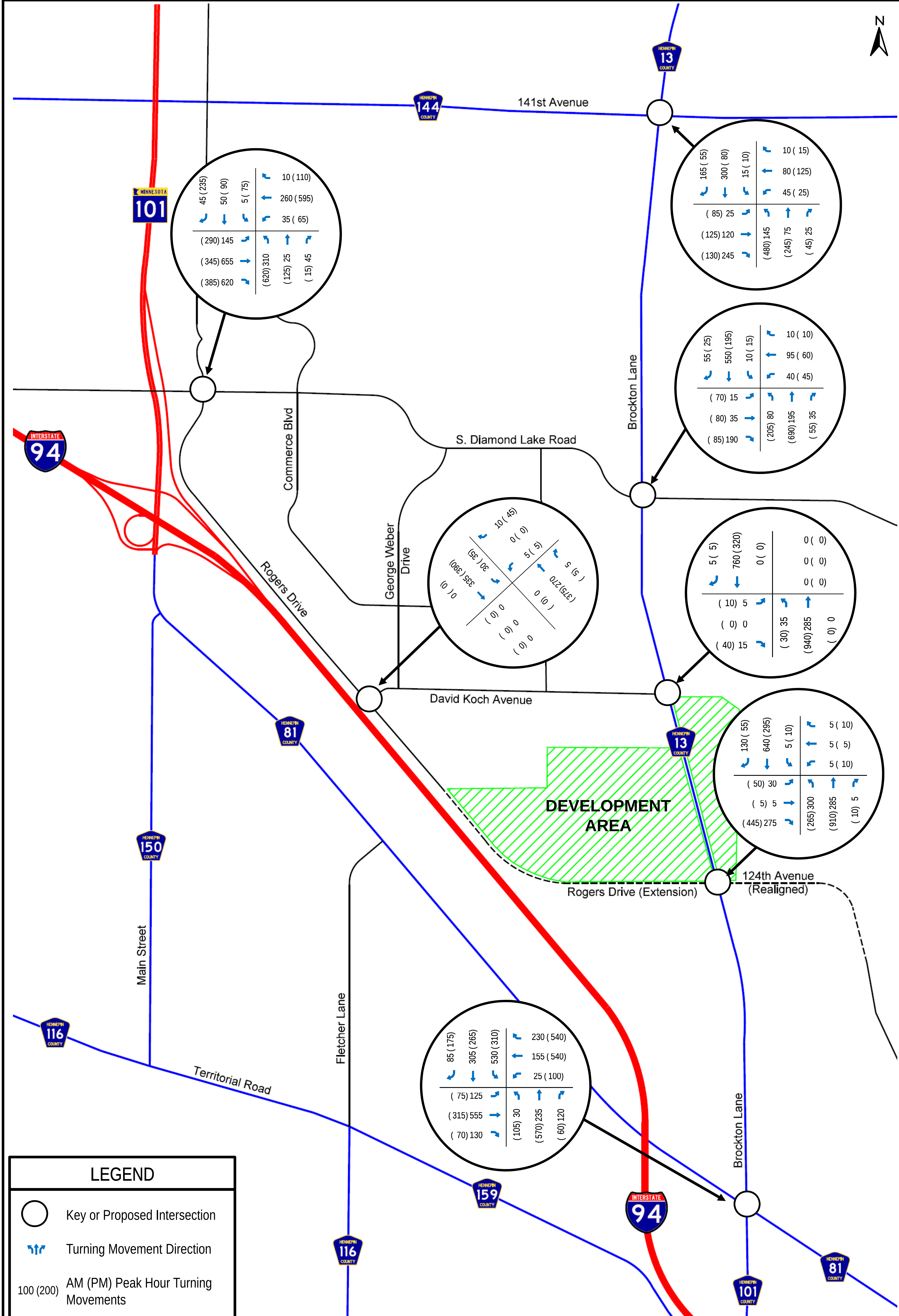

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Figure 3.5
2019 Post-Development Traffic Volumes
Henry Area Development Traffic Impact Study

Table 3.4: LOS Summary for 2019 Post-Development Conditions

Intersection			AM Peak Hour				PM Peak Hour			
Control	Location	Approach	LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)		LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Signalized	141st St / CSAH 144 & Brockton Lane	NB	11	B	16	B	17	B	21	C
		WB	30	C			32	C		
		SB	18	B			22	C		
		EB	14	B			27	C		
Signalized	S Diamond Lake Road & Rogers Drive	NB	30	C	17	B	44	D	32	C
		WB	21	C			42	D		
		SB	17	B			19	B		
		EB	13	B			20	C		
Signalized	S Diamond Lake Road & Brockton Lane	NB	15	B	19	B	25	C	25	C
		WB	26	C			33	C		
		SB	19	B			18	B		
		EB	22	C			28	C		
Thru-Stop	David Koch Ave & Rogers Drive	NB	1	A	1	A	2	A	2	A
		WB	3	A			4	A		
		SB	1	A			1	A		
		EB	0	A			0	A		
Thru-Stop	David Koch Ave & Brockton Lane	NB	3	A	2	A	3	A	3	A
		WB	0	A			0	A		
		SB	2	A			1	A		
		EB	6	A			5	A		
Signalized	Rogers Drive & Brockton Lane	NB	36	D	30	C	20	C	19	B
		WB	57	E			47	D		
		SB	26	C			18	B		
		EB	25	C			17	B		
Signalized	CSAH 81 & Brockton Lane	NB	45	D	48	D	66	E	50	D
		WB	25	C			35	D		
		SB	58	E			50	D		
		EB	49	D			61	E		

The operational analysis showed that the following deficiencies are present even with the mitigated lane geometry from the 2019 No-Development Condition:

- **CSAH 13 at CSAH 81**: Some approaches operate at LOS E during the peak hours while the intersection LOS is within acceptable levels.
- **CSAH 13 at Rogers Drive**: The westbound approach operates at LOS E in the a.m. peak hour. This approach is low-volume and is influenced by the signal cycle length, which is relatively long to coordinate with the CSAH 13/CSAH 81 intersection.

The following additional mitigation is needed to address the poor approach LOS caused by the Henry Area development:

- **CSAH 13 at CSAH 81**: Addition of a second northbound through lane. This will require a second receiving lane on CSAH 13 north of CSAH 81.

All approaches operate at LOS D or better at all intersections due to the additional mitigation.

3.4.2 Direct Access to Development from CSAH 13

Construction of a direct access from CSAH 13 to the Henry Area development west of CSAH 13 is also recommended to remove left-turning vehicles from northbound CSAH 13 to westbound Rogers Drive. This will delay the need for additional left-turn capacity at this intersection.

Hennepin County's Access Management Guidelines state that partial-access intersections (such as right-in/right-out and ¾ intersections) are allowed every 1/8 mile, and full-access intersections are allowed every 1/4 mile. The distance between David Koch Avenue and the likely alignment of the proposed Rogers Drive is about four-tenths of a mile, which would allow a partial access intersection to be constructed along CSAH 13 between David Koch Avenue and the proposed Rogers Drive. The spacing would not allow a full-access intersection.

A ¾ intersection would allow northbound left-turning traffic to access the Henry Area development in the a.m. peak hour, which is a high turning movement.

3.5 Year 2035 Conditions

The traffic operations analysis for Year 2035 Conditions looked at the LOS and queuing information at each of the key intersections for the 2035 a.m. and p.m. peak-hour traffic volumes. The No-Development Conditions were not analyzed for 2035 because development of the Henry Area and Kinghorn sites and surrounding land is likely even without the specific proposed development.

Two improvement scenarios were analyzed with forecasted 2035 traffic volumes:

- **With Brockton Interchange:** A new interchange that would connect I-94 to Brockton Lane and CSAH 81 southeast of the existing CSAH 13/CSAH 81 intersection is currently in the planning stage. This interchange would likely be constructed after 2019 and before 2035 due to a current lack of funding for the interchange. This condition also assumes that the Rogers Drive extension to CSAH 13 and realignment of 124^{th} Avenue to meet the

CSAH 13/Rogers Drive intersection are constructed, as these will go in with the proposed development.

- **With Brockton Interchange and Fletcher Overpass:** This condition assumes that both the Brockton Interchange and Fletcher Overpass (as described earlier in this report) are constructed.

Forecast peak-hour turning movements were developed utilizing the daily traffic volume forecasts documented earlier in this report. The a.m. and p.m. peak-hours were generally considered to represent eight percent and ten percent, respectively, of the year 2035 daily traffic volumes. Turning percentages on each intersection approach were generally developed by using existing turning movement percentages and site specific travel patterns for the proposed development supplied by the developer. Turning movement counts were then adjusted to balance where appropriate.

3.5.1 With Brockton Interchange

This section documents the ultimate build-out roadway network needed to serve the forecasted year 2035 traffic volumes. The year 2035 turning movement volumes, with the Brockton Interchange, are shown in **Figure 3.6**.

Based on the daily traffic volumes, a facility type (e.g., two-lane, three-lane, four-lane, six-lane road) was determined for each of the roadways in the network. Roadway needs to accommodate year 2035 traffic volumes with the Brockton Interchange include the following:

- Reconstruction of Brockton Lane to a four-lane facility south of CSAH 81
- Reconstruction of CSAH 13 to a six-lane facility between CSAH 81 and Rogers Drive
- Reconstruction of CSAH 13 to a four-lane facility between Rogers Drive and CSAH 144
- Reconstruction of CSAH 81 to a four-lane facility west of CSAH 13 and a six-lane facility east of CSAH 13
- Construction of Rogers Drive extension as a two-lane facility with turn lanes provided at intersections

Additional turn lanes and traffic control at intersections were also needed. These needed improvements include the following:

- **CSAH 13 at CSAH 144:** Traffic signal, left-turn lanes on all approaches, right-turn lanes on the northbound, southbound, and eastbound approaches.
- **CSAH 13 at S. Diamond Lake Road:** Extend the northbound left-turn lane from 150 feet to 350 feet.
- **CSAH 13 at David Koch Avenue:** Addition of east approach to serve new residential development, addition of left-turn lanes on all approaches, addition of northbound and southbound right-turn lanes.
- **CSAH 13 at Rogers Drive (proposed intersection):** Traffic signal, left-turn lanes on all approaches, dual left-turn lane northbound, and right-turn lanes on the northbound, southbound and eastbound approaches.
- **CSAH 13 at CSAH 81:** New traffic signal; third through lane on northbound, eastbound, and westbound approaches; dual northbound and southbound left-turn lanes; single

eastbound and westbound left-turn lanes; single right-turn lanes for the northbound, southbound, and eastbound approaches; and dual westbound right-turn lanes.

3.5.1.1 Traffic Operations Analysis

This section documents how the improved roadway network, including the Brockton interchange, accommodates the forecasted Year 2035 traffic volumes. **Table 3.5** shows a summary of the operational analysis.

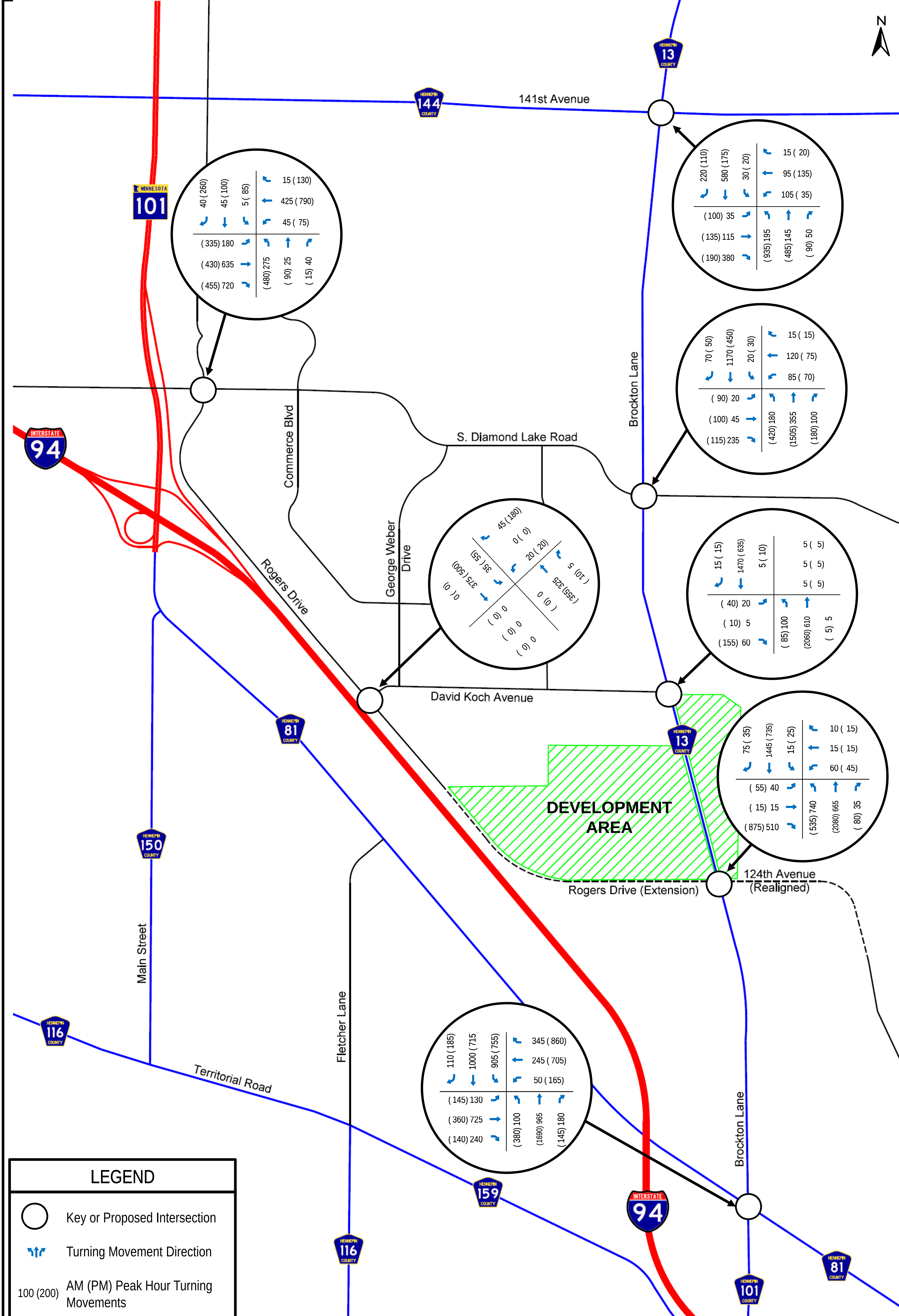

Figure 3.6
2035 Post-Development Traffic Volumes With Brockton Interchange
Henry Area Development Traffic Impact Study

Table 3.5: LOS Summary for 2035 Post-Development Traffic Volumes with Brockton Interchange Included

Intersection			AM Peak Hour				PM Peak Hour			
Control	Location	Approach	LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)		LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Signalized	141st St / CSAH 144 & Brockton Lane	NB	36	D	26	C	35	D	33	C
		WB	40	D			44	D		
		SB	22	C			30	C		
		EB	20	C			27	C		
Signalized	S Diamond Lake Road & Rogers Drive	NB	31	C	18	B	48	D	33	C
		WB	22	C			45	D		
		SB	18	B			21	C		
		EB	13	B			20	C		
Signalized	S Diamond Lake Road & Brockton Lane	NB	22	C	27	C	28	C	31	C
		WB	43	D			48	D		
		SB	26	C			32	C		
		EB	27	C			34	C		
Thru-Stop	David Koch Ave & Rogers Drive	NB	2	A	2	A	3	A	3	A
		WB	7	A			8	A		
		SB	1	A			1	A		
		EB	0	A			0	A		
Signalized	David Koch Ave & Brockton Lane	NB	11	B	9	A	15	B	14	B
		WB	33	C			35	D		
		SB	7	A			5	A		
		EB	34	C			34	C		
Signalized	Rogers Drive & Brockton Lane	NB	28	C	34	C	23	C	28	C
		WB	62	E			79	E		
		SB	42	D			25	C		
		EB	19	B			38	D		
Signalized	CSAH 81 & Brockton Lane	NB	41	D	41	D	58	E	61	E
		WB	33	C			62	E		
		SB	43	D			65	E		
		EB	44	D			59	E		

As an additional option for potential consideration beyond year 2035, the CSAH 81 / CSAH 13 intersection was modeled with the northbound and southbound approaches operating as a Continuous Flow Intersection (CFI). With the two-approach CFI geometry, the northbound and southbound left-turning vehicles that conflict with the opposing through movements are moved out of the main intersection, thus increasing the main intersection's capacity. The left-turning traffic crosses over the opposing traffic approximately 300 feet north of the main intersection, eliminating the northbound and southbound left-turn signal phases at the main intersection. This type of geometric improvement is typically used at junctions of high volume roadways where heavy through and left-turning movements exist making it difficult to achieve acceptable operations with a conventional traffic signal. **Figure 3.7** shows an example of a Continuous Flow Intersection constructed in Salt Lake City, Utah. **Table 3.7** shows the operational analysis of the CFI for the 2035 post-development condition.

Figure 3.7: Continuous Flow Intersection

Intersection of 3500 South and Bangerter Highway, Salt Lake City, UT – Simulation image and Aerial Photo)

Table 3.7: LOS Summary for Continuous Flow Intersection Operations for 2035 Post-Development Traffic Volumes with Brockton Interchange Included

Intersection			AM Peak Hour				PM Peak Hour			
Control	Location	Approach	LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)		LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Signalized	CSAH 13 & CSAH 81	NB	25	C	34	C	42	D	44	D
		WB	20	C			39	D		
		SB	44	D			55	D		
		EB	33	C			39	D		

3.5.2 With Brockton Interchange and Fletcher Overpass

This section documents the ultimate build-out roadway network needed to serve the forecasted year 2035 traffic volumes. The year 2035 turning movement volumes, with the Brockton Interchange and the Fletcher Overpass, are shown in **Figure 3.8**.

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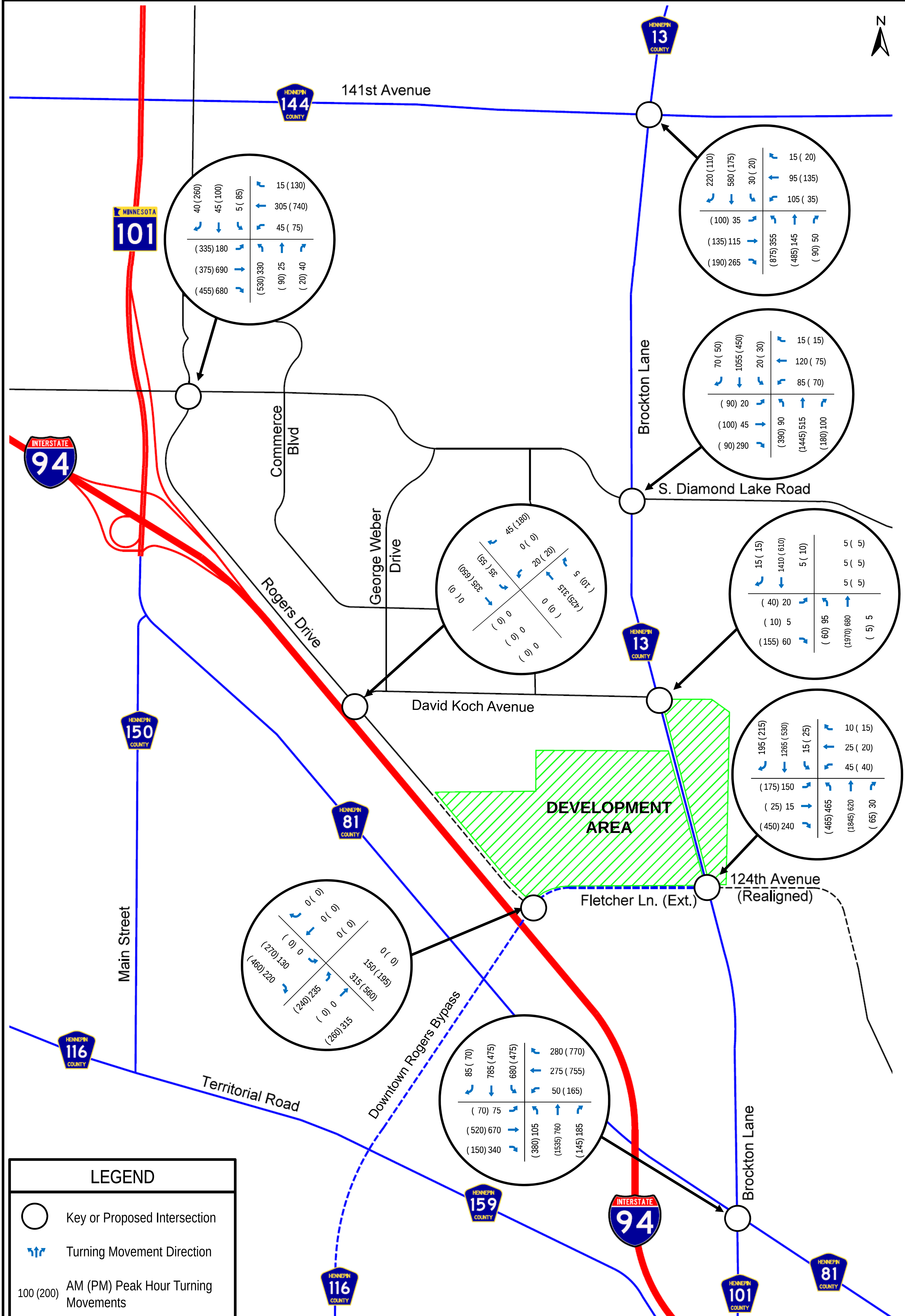
Based on the daily traffic volumes, a facility type (e.g., two-lane, three-lane, four-lane, six-lane road) was determined for each of the roadways in the network. Roadway needs to accommodate year 2035 traffic volumes with the Brockton Interchange include the following:

- Reconstruction of CSAH 13/Brockton Lane to a four-lane facility from south of CSAH 81 to CSAH 144
- Reconstruction of CSAH 81 to a four-lane facility west of CSAH 13 and a six-lane facility east of CSAH 13.
- Construction of the Fletcher Overpass as a two-lane facility with turn lanes provided at all intersections
- Construction of the Rogers Drive extension as a two-lane facility with turn lanes provided at Fletcher Lane

Additional turn lanes and traffic control identified were the same as without the Fletcher Overpass improvement, except that a third eastbound through lane at the CSAH 13/CSAH 81 intersection is not needed in this case.

3.5.2.1 Traffic Operations Analysis

Table 3.6 shows a summary of the operational analysis with the forecasted year 2035 traffic volumes on the improved roadway network which includes the Brockton Interchange and Fletcher Overpass.



WSB & Associates, Inc.

THE CITY OF ROGERS MINNESOTA

Figure 3.8

2035 Post-Development Traffic Volumes With Brockton Int. and Fletcher Overpass

Henry Area Development Traffic Impact Study

Table 3.6: LOS Summary for 2035 Post-Development Traffic Volumes with Brockton Interchange and Fletcher Overpass Included

Control	Location	Approach	AM Peak Hour LOS by Approach (Sec/Veh) Delay	AM LOS by Approach LOS	AM LOS by Intersection (Sec/Veh) Delay	AM LOS by Intersection LOS	PM Peak Hour LOS by Approach (Sec/Veh) Delay	PM LOS by Approach LOS	PM LOS by Intersection (Sec/Veh) Delay	PM LOS by Intersection LOS
Signalized	141st St / CSAH 144 & Brockton Lane	NB	37	D	28	C	35	D	33	C
		WB	40	D			43	D		
		SB	23	C			28	C		
		EB	21	C			25	C		
Signalized	S Diamond Lake Road & Rogers Drive	NB	33	C	18	B	48	D	30	C
		WB	20	C			36	D		
		SB	17	B			24	C		
		EB	13	B			18	B		
Signalized	S Diamond Lake Road & Brockton Lane	NB	13	B	20	C	20	C	27	C
		WB	43	D			51	D		
		SB	17	B			42	D		
		EB	29	C			34	C		
Thru-Stop	David Koch Ave & Rogers Drive	NB	2	A	2	A	3	A	3	A
		WB	6	A			9	A		
		SB	1	A			2	A		
		EB	0	A			0	A		
Signalized	David Koch Ave & Brockton Lane	NB	12	B	11	B	11	B	13	B
		WB	42	D			38	D		
		SB	10	B			16	B		
		EB	27	C			23	C		
Signalized	Rogers Drive & Brockton Lane	NB	21	C	29	C	25	C	26	C
		WB	46	D			51	D		
		SB	32	C			25	C		
		EB	34	C			27	C		
Signalized	CSAH 81 & Brockton Lane	NB	37	D	32	C	47	D	45	D
		WB	24	C			40	D		
		SB	34	C			51	D		
		EB	30	C			46	D		

4. Study Summary

4.1 Regional Improvement Needs

It was determined in the Kinghorn Development TIS that by year 2035, the Fletcher Lane Overpass will benefit the I-94 / TH 101 interchange and Brockton Lane by providing relief in the form of an additional I-94 crossing connecting southern Rogers to northern Rogers.

By year 2035, this study assumes that the Brockton Interchange has been constructed and development in northwestern and southwestern Rogers, along with Dayton, has led to increased traffic volumes on the roadway network, principally CSAH 81 and CSAH 13. The modeling shows that the Fletcher Overpass will relieve Brockton Lane enough to avoid needing a 6-lane section between CSAH 81 and the proposed Rogers Drive extension.

The regional roadway network recommendations include the following:

- Preserve right-of-way for the future construction of the Fletcher Lane Overpass. Several alternatives for locations have been identified and will need to be discussed with the property owners on both sides of I-94 to determine where the right-of-way should be preserved.
- Reconstruct CSAH 81 as recommended in the Kinghorn Development TIS.

4.2 Local Segment Improvement Needs

The following improvements on roadway segments within the study area will be needed in either the short-term (by 2019) or long-term (by 2035). The short-term improvements would be constructed to accommodate the long-term improvement needs without significant reconstruction.

1. **Rogers Drive Extension**: Construction of a four-lane undivided urban roadway from Robert Lane to CSAH 13 is needed to provide access from TH 101 and CSAH 13 to the Kinghorn development site and to the existing businesses along Rogers Drive.

2. **CSAH 13**: In the short-term, the segment of CSAH 13 between CSAH 81 and the proposed Rogers Drive intersection will need to be monitored for operational and safety issues. Proper access management and turn lane construction will be needed at all intersections on CSAH 13 to allow CSAH 13 to efficiently function without conversion to a larger facility. The segment ADT analysis shows that if/when the middle parcel of the Henry Area development is built, CSAH 13 will need to be upgraded to a four-lane facility between CSAH 81 and Rogers Drive. In the long-term, CSAH 13 will need to be reconstructed to at least a 4-lane facility from south of CSAH 81 to CSAH 144, and a 6-lane facility would be needed between CSAH 81 and the proposed Rogers Drive intersection if the Fletcher Lane Overpass is not built.

4.3 Local Intersection Improvement Needs

Six existing and two proposed intersections were evaluated for operations and geometric impacts associated with the proposed development. Below are recommended improvements needed for the short-term (by 2019) and long-term (by 2035). The short-term improvements would be constructed to accommodate the long-term improvement needs without significant reconstruction. An example of this is constructing wider medians where dual left-turn lanes will be needed and converting right-turn lanes into future through lanes (new right-turn lanes will need to be added to the outside). Signal poles and other intersection items will need to be designed to accommodate the ultimate configuration which will be implemented when further expansion is warranted.

1. **S. Diamond Lake Road at Rogers Drive:** No intersection improvements are needed to address congestion due to traffic volumes at this intersection. The intersection experiences delay caused by interaction with the TH 101/S. Diamond Lake Road intersection. When the TH 101/S. Diamond Lake Road intersection is converted to a grade separated facility, the intersection of S. Diamond Lake Road and Rogers Drive will need to be further analyzed for traffic impacts.

2. **CSAH 13 at CSAH 144:** Short-term needs include installing a signal and adding a northbound left-turn lane and eastbound right-turn lane. Corner radii will need to be increased to accommodate large trucks (WB 67). Long-term needs include adding left-turn and right-turn lanes to all approaches. It is recommended that all these improvements be constructed in the short-term.

3. **CSAH 13 at S. Diamond Lake Road:** A recommended short-term improvement includes extending the northbound left-turn lane from 150 feet to 250 feet (restriping) and increasing the southwest corner radius to accommodate large trucks (WB 67). This improvement will also require the relocation of one signal pole. When CSAH 13 is reconstructed to a four-lane divided facility, the northbound left-turn lane at this intersection will need to be lengthened to 350 feet. No additional improvements were identified in the long-term.

4. **CSAH 13 at David Koch Avenue:** Recommended short-tern improvements include a northbound left-turn lane or bypass lane and an eastbound right-turn lane. These improvements are to improve safety and mobility by removing left-turning vehicles from the northbound traffic stream and allowing eastbound right-turning vehicles to enter the southbound traffic stream when an eastbound left-turning vehicle is stopped at the intersection. The timing of these improvements is related to the growth in traffic on CSAH 13. Safety and mobility at the intersection should be monitored as traffic volumes grow to determine the appropriate time for implementation. When the residential development is constructed east of CSAH 13, this intersection will need to be reconstructed to add a left-turn lane to the southbound approach and a right-turn lane to the northbound approach. The new west approach to the intersection will require a left-turn lane and a shared through/right-turn lane. Traffic volume will need to be monitored to determine when the installation of a signal or roundabout would be needed to accommodate increased traffic volumes on CSAH 13 and David Koch Avenue. The likely timing of this improvement will be when CSAH 13 is expanded to a four-lane facility.

5. **CSAH 13 at Rogers Drive** *(proposed intersection)*: This intersection is the result of extending Rogers Drive to meet up with CSAH 13. Recommended short-term improvements include constructing the intersection to include a traffic signal, left-turn lanes on all approaches, and right-turn lanes on the southbound and eastbound

approaches. Long-term improvements include construction of a dual-left turn lane northbound to accommodate future background and development-specific traffic. A southbound left-turn lane and northbound right-turn lane will need to be added when the residential development east of CSAH 13 is constructed. If 124th Avenue is not constructed to connect to this intersection, the east leg of the intersection will need to be constructed in conjunction with the residential development east of CSAH 13.

6. **CSAH 13 at CSAH 81:** Recommended short-term improvements include reconstruction of the intersection to include dual northbound and westbound through lanes; single southbound and eastbound through lanes; dual southbound left-turn lanes; single northbound, eastbound, and westbound left-turn lanes; single right-turn lanes on all approaches with a yield-controlled westbound to northbound right-turn lane; and a new traffic signal system that is interconnected with a widened railroad crossing on the south leg. Maintain reasonable access to the properties along CSAH 13 and CSAH 81 in the vicinity of the intersection, until a time in which it is feasible to implement a frontage / backage road system. A long-term concept for these access roads was completed and any future designs should remain consistent with the previous design efforts.   Long-term needs include adding an additional through lane for northbound, southbound, and eastbound; an additional northbound left-turn lane (dual lefts); and converting the westbound to northbound right-turn lane into dual rights.

7. **Rogers Drive at Fletcher Lane** *(proposed intersection)*: This intersection is not assumed to be constructed in the short-term since it is a result of the Fletcher Overpass, which is a long-term improvement. It is recommended that the right-of-way be preserved for the intersection and approaches. When the intersection is built, it is recommended that it be signalized and include turn lanes where appropriate.

8. **Rogers Drive at David Koch Avenue:** No recommended improvements were identified in either the short-term or long-term.

9. Construct a direct access ¾ intersection on CSAH 13 to the Henry Area development to the west.

APPENDIX A

Detailed Traffic Operational Analysis Results

Table A.1: Capacity Analysis Summary for Existing Conditions (2013)

AM Peak Hour		Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
141st St / CSAH 144 & Brockton Lane													
Approach Name		Brockton Lane NB			Brockton Lane SB			141st St / CSAH 144 EB			141st St / CSAH 144 WB		
Approach Volume		66	38	22	10	252	113	12	112	205	41	74	7
Lane Configuration			✥			✥			✥			✥	
Storage Length (ft)													
All-Way Stop	Average Queue (ft)		45			74			63			38	
	Max Queue (ft)		103			185			146			91	
	Movement Delay (s)	7.8	11.6	5.9	9.2	15.5	7.6	7.7	13.6	6.9	5.4	10.1	2.5
	Movement LOS	A	B	A	A	C	A	A	B	A	A	B	A
	Intersection Delay (LOS)	10.4 (B)											
S Diamond Lake Road & Rogers Drive													
Approach Name		Rogers Drive NB			Rogers Drive SB			S Diamond Lake Road EB			S Diamond Lake Road WB		
Approach Volume		72	17	32	2	35	29	57	333	164	29	179	8
Lane Configuration		↰↰	↑↱		↰	↑	↱	↰	↑↑	↱	↰	↑↑↱	
Storage Length (ft)		125			125			150		400	175		
Traffic Signal	Average Queue (ft)	29	25			23	15	29	65	1	13	41	
	Max Queue (ft)	91	80		5	80	48	118	164	10	52	114	
	Movement Delay (s)	45.0	19.3	9.4	8.2	27.8	2.2	17.9	19.3	5.9	16.6	18.0	10.8
	Movement LOS	D	B	A	A	C	A	B	B	A	B	B	B
	Intersection Delay (LOS)	17.8 (B)											
S Diamond Lake Road & Brockton Lane													
Approach Name		Brockton Lane NB			Brockton Lane SB			S Diamond Lake Road EB			S Diamond Lake Road WB		
Approach Volume		60	111	26	5	465	28	9	28	90	33	76	6
Lane Configuration		↰	↑	↱	↰	↑	↱	↰	↑↱		↰	↑↱	
Storage Length (ft)		150		150	200		200				100		
Traffic Signal	Average Queue (ft)	39	20	4	2	108	6	4	37		19	36	
	Max Queue (ft)	114	93	35	21	277	43	20	152		67	100	
	Movement Delay (s)	31.3	5.5	1.4	34.3	12.2	2.1	28.2	4.9	10.0	25.5	23.7	10.2
	Movement LOS	C	A	A	C	B	A	C	A	B	C	C	B
	Intersection Delay (LOS)	12.0 (B)											
David Koch Ave & Rogers Drive													
Approach Name		Rogers Drive NB			Rogers Drive SB						David Koch Ave WB		
Approach Volume		0	1	0	87	1	0	0	0	0	2	0	21
Lane Configuration			↑	↱	↰	↑↑					↰		↱
Storage Length (ft)													
Thru-Stop	Average Queue (ft)										1		10
	Max Queue (ft)										22		31
	Movement Delay (s)	0.0	0.6	0.0	1.0	0.4	0.0	0.0	0.0	0.0	1.6	0.1	1.0
	Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
	Intersection Delay (LOS)	0.5 (A)											

PM Peak Hour		Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
141st St / CSAH 144 & Brockton Lane													
Approach Name		Brockton Lane NB			Brockton Lane SB			141st St / CSAH 144 EB			141st St / CSAH 144 WB		
Approach Volume		235	417	39	6	56	27	46	115	62	21	117	13
Lane Configuration			✥			✥			✥			✥	
Storage Length (ft)													
All-Way Stop	Average Queue (ft)		279			30			47			39	
	Max Queue (ft)		594			63			87			79	
	Movement Delay (s)	39.2	44.6	41.2	4.1	10.8	3.3	6.9	12.1	4.3	6.2	11.0	4.7
	Movement LOS	E	E	E	A	B	A	A	B	A	A	B	A
	Intersection Delay (LOS)	29.0 (D)											
S Diamond Lake Road & Rogers Drive													
Approach Name		Rogers Drive NB			Rogers Drive SB			S Diamond Lake Road EB			S Diamond Lake Road WB		
Approach Volume		329	74	10	10	51	144	243	238	239	54	476	40
Lane Configuration		↰↰	↑↱		↰	↑	↱	↰	↑↑	↱	↰	↑↑↱	
Storage Length (ft)		125			125			150		400	175		
Traffic Signal	Average Queue (ft)	242	144		7	28	44	119	50	1	28	153	
	Max Queue (ft)	375	300		41	81	116	199	171	18	83	320	
	Movement Delay (s)	525.2	384.5	342.6	19.8	27.8	6.6	41.7	20.0	5.8	22.9	42.3	37.5
	Movement LOS	F	F	F	B	C	A	D	C	A	C	D	D
	Intersection Delay (LOS)	117.4 (F)											
S Diamond Lake Road & Brockton Lane													
Approach Name		Brockton Lane NB			Brockton Lane SB			S Diamond Lake Road EB			S Diamond Lake Road WB		
Approach Volume		161	666	51	10	117	12	20	64	75	42	48	5
Lane Configuration		↰	↑	↱	↰	↑	↱	↰	↑↱		↰	↑↱	
Storage Length (ft)		150		150	200		200				100		
Traffic Signal	Average Queue (ft)	108	237	21	6	42	6	8	51		25	25	
	Max Queue (ft)	199	554	164	33	110	29	41	143		60	72	
	Movement Delay (s)	47.1	20.9	8.6	43.5	16.2	1.7	21.8	30.9	10.6	28.6	29.4	9.8
	Movement LOS	D	C	A	D	B	A	C	C	B	C	C	A
	Intersection Delay (LOS)	23.4 (C)											
David Koch Ave & Rogers Drive													
Approach Name		Rogers Drive NB			Rogers Drive SB						David Koch Ave WB		
Approach Volume		0	18	1	100	20	0	0	0	0	1	0	138
Lane Configuration			↑	↱	↰	↑↑					↰		↱
Storage Length (ft)					250								
Thru-Stop	Average Queue (ft)				2								27
	Max Queue (ft)				26						4		62
	Movement Delay (s)	0.0	0.7	0.0	2.3	1.2	0.0	0.0	0.0	0.0	0.0	0.0	1.9
	Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
	Intersection Delay (LOS)	1.6 (A)											

Table A.1: Capacity Analysis Summary for Existing Conditions (2013) (Continued)

AM Peak Hour		Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
David Koch Ave & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**David Koch Ave EB**					
Approach Volume		98	195	0	0	578	10	2	0	34	0	0	0
Lane Configuration			↰↑			↑↱			↰↱				
Storage Length (ft)													
Thru-Stop	Average Queue (ft)		40					12					
	Max Queue (ft)		161			14		53					
	Movement Delay (s)	5.5	4.3	0.0	0.0	2.2	0.8	9.8	0.4	5.2	0.0	0.0	0.0
	Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
	Intersection Delay (LOS)	3.0 (A)											
CSAH 81 & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**CSAH 81 EB**			**CSAH 81 WB**		
Approach Volume		25	113	106	385	194	33	23	649	176	37	174	157
Lane Configuration		↰	↑	↱	↰	↑	↱	↰	↑↱		↰	↑↱	
Storage Length (ft)		275			150			250		575	250		500
Traffic Signal	Average Queue (ft)	19	201		196	1388		24	641	82	31	72	6
	Max Queue (ft)	67	396		200	2420		214	1168	625	105	211	65
	Movement Delay (s)	72.7	72.9	55.9	296.3	238.8	222.0	130.9	73.1	17.8	81.6	31.2	3.1
	Movement LOS	E	E	E	F	F	F	F	E	B	F	C	A
	Intersection Delay (LOS)	116.5 (F)											

PM Peak Hour		Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
David Koch Ave & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**David Koch Ave EB**					
Approach Volume		96	851	0	0	220	14	27	0	119	0	0	0
Lane Configuration			↰↑			↑↱			↰↱				
Storage Length (ft)													
Thru-Stop	Average Queue (ft)		26					43					
	Max Queue (ft)		148					115					
	Movement Delay (s)	2.8	3.4	0.0	0.0	1.5	0.3	26.3	0.0	10.2	0.0	0.0	0.0
	Movement LOS	A	A	A	A	A	A	D	A	B	A	A	A
	Intersection Delay (LOS)	4.1 (A)											
CSAH 81 & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**CSAH 81 EB**			**CSAH 81 WB**		
Approach Volume		124	372	61	197	116	26	52	289	96	174	550	523
Lane Configuration		↰	↑	↱	↰	↑	↱	↰	↑↱		↰	↑↱	
Storage Length (ft)		275			150			250		575	250		500
Traffic Signal	Average Queue (ft)	152	896		166	203		35	175	4	212	627	260
	Max Queue (ft)	324	1484		200	598		105	395	41	300	1887	550
	Movement Delay (s)	198.7	189.1	195.4	87.7	61.7	42.8	84.7	50.3	4.7	140.8	72.2	41.0
	Movement LOS	F	F	F	F	E	D	F	D	A	F	E	D
	Intersection Delay (LOS)	92.0 (F)											

Table A.2: Capacity Analysis Summary for 2019 No-Development Conditions

AM Peak Hour		Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
141st St / CSAH 144 & Brockton Lane													
Approach Name		Brockton Lane NB			Brockton Lane SB			141st St / CSAH 144 EB			141st St / CSAH 144 WB		
Approach Volume		145	75	25	15	300	165	25	120	270	45	80	10
Lane Configuration													
Storage Length (ft)													
All-Way Stop	Average Queue (ft)		68			138			86			42	
	Max Queue (ft)		151			333			250			82	
	Movement Delay (s)	11.8	16.0	7.6	16.6	25.0	18.3	13.2	17.6	10.7	7.2	11.8	4.2
	Movement LOS	B	C	A	C	D	C	B	C	B	A	B	A
	Intersection Delay (LOS)	16.3 (C)											
S Diamond Lake Road & Rogers Drive													
Approach Name		Rogers Drive NB			Rogers Drive SB			S Diamond Lake Road EB			S Diamond Lake Road WB		
Approach Volume		335	25	45	5	50	45	145	835	805	35	260	10
Lane Configuration													
Storage Length (ft)		125			125			150			175		
Traffic Signal	Average Queue (ft)	76	28		2	28	20	62	113	14	24	33	
	Max Queue (ft)	153	85		28	93	63	168	211	118	63	79	
	Movement Delay (s)	37.8	16.8	7.2	23.0	25.7	2.5	19.0	19.8	3.9	18.4	21.7	16.1
	Movement LOS	D	B	A	C	C	A	B	B	A	B	C	B
	Intersection Delay (LOS)	16.9 (B)											
S Diamond Lake Road & Brockton Lane													
Approach Name		Brockton Lane NB			Brockton Lane SB			S Diamond Lake Road EB			S Diamond Lake Road WB		
Approach Volume		80	195	35	10	575	55	15	35	370	40	95	10
Lane Configuration													
Storage Length (ft)		150		150	200		200				100		
Traffic Signal	Average Queue (ft)	60	44	8	9	162	23	8	66		31	47	
	Max Queue (ft)	164	135	49	82	328	179	29	166		80	129	
	Movement Delay (s)	36.8	8.5	2.4	39.8	18.7	5.4	23.8	30.0	13.1	25.5	24.7	10.1
	Movement LOS	D	A	A	D	B	A	C	C	B	C	C	B
	Intersection Delay (LOS)	18.0 (B)											
David Koch Ave & Rogers Drive													
Approach Name		Rogers Drive NB			Rogers Drive SB						David Koch Ave WB		
Approach Volume		0	295	5	30	520	0	0	0	0	5	0	10
Lane Configuration													
Storage Length (ft)					250								
Thru-Stop	Average Queue (ft)				4						2		6
	Max Queue (ft)				40						22		21
	Movement Delay (s)	0.0	1.2	0.1	1.3	0.7	0.0	0.0	0.0	0.0	3.7	0.0	1.8
	Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
	Intersection Delay (LOS)	1.0 (A)											

PM Peak Hour		Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
141st St / CSAH 144 & Brockton Lane													
Approach Name		Brockton Lane NB			Brockton Lane SB			141st St / CSAH 144 EB			141st St / CSAH 144 WB		
Approach Volume		510	245	45	10	80	55	85	125	135	25	125	15
Lane Configuration													
Storage Length (ft)													
All-Way Stop	Average Queue (ft)		676			42			74			48	
	Max Queue (ft)		1256			91			168			101	
	Movement Delay (s)	113.7	112.0	116.8	6.8	12.6	4.9	11.5	16.3	8.5	7.4	12.3	5.2
	Movement LOS	F	F	F	A	B	A	B	C	A	A	B	A
	Intersection Delay (LOS)	62.2 (F)											
S Diamond Lake Road & Rogers Drive													
Approach Name		Rogers Drive NB			Rogers Drive SB			S Diamond Lake Road EB			S Diamond Lake Road WB		
Approach Volume		900	125	15	75	90	235	290	355	400	65	595	110
Lane Configuration													
Storage Length (ft)		125			125			150			175		
Traffic Signal	Average Queue (ft)	214	95		55	74	58	170	144	9	43	171	
	Max Queue (ft)	382	285		137	188	126	200	365	89	150	288	
	Movement Delay (s)	55.3	33.3	18.8	31.0	47.9	6.4	48.2	31.6	2.6	29.0	50.8	48.9
	Movement LOS	E	C	B	C	D	A	D	C	A	C	D	D
	Intersection Delay (LOS)	36.8 (D)											
S Diamond Lake Road & Brockton Lane													
Approach Name		Brockton Lane NB			Brockton Lane SB			S Diamond Lake Road EB			S Diamond Lake Road WB		
Approach Volume		205	720	55	15	200	25	70	80	95	45	60	10
Lane Configuration													
Storage Length (ft)		150		150	200		200				100		
Traffic Signal	Average Queue (ft)	110	162	16	10	70	10	41	76		32	37	
	Max Queue (ft)	199	480	125	48	156	48	89	189		84	95	
	Movement Delay (s)	38.5	16.8	6.7	39.6	17.6	3.0	25.2	32.0	15.4	27.6	35.5	15.1
	Movement LOS	D	B	A	D	B	A	C	C	B	C	D	B
	Intersection Delay (LOS)	21.8 (C)											
David Koch Ave & Rogers Drive													
Approach Name		Rogers Drive NB			Rogers Drive SB						David Koch Ave WB		
Approach Volume		0	655	5	35	405	0	0	0	0	5	0	45
Lane Configuration													
Storage Length (ft)					250								
Thru-Stop	Average Queue (ft)				5						3		20
	Max Queue (ft)				34						26		54
	Movement Delay (s)	0.0	1.5	0.1	1.9	0.9	0.0	0.0	0.0	0.0	6.4	0.0	2.6
	Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
	Intersection Delay (LOS)	1.3 (A)											

Table A.2: Capacity Analysis Summary for 2019 No-Development Conditions (Continued)

AM Peak Hour		Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
David Koch Ave & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**David Koch Ave EB**					
Approach Volume		35	285	0	0	970	5	5	0	15	0	0	0
Lane Configuration			↰↑			↑↱			↰↱				
Storage Length (ft)													
Thru-Stop	Average Queue (ft)		35			111		10					
	Max Queue (ft)		208			696		39					
	Movement Delay (s)	11.0	4.4	0.0	0.0	17.8	7.8	10.7	0.0	21.2	0.0	0.0	0.0
	Movement LOS	B	A	A	A	C	A	B	A	C	A	A	A
	Intersection Delay (LOS)	14.2 (B)											
Rogers Drive & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**Rogers Drive EB**			**Rogers Drive WB**		
Approach Volume		525	285	5	5	640	340	30	5	300	5	5	5
Lane Configuration		↰	↑	↱	↰	↑	↱	↰	↑↱		↰	↑↱	
Storage Length (ft)		300			300		300	300		300	300		
Thru-Stop	Average Queue (ft)	63			1	994	9	10	585	266	17	5	
	Max Queue (ft)	200			19	1680	176	100	952	349	66	30	
	Movement Delay (s)	15.0	2.2	1.9	128.4	159.1	99.2	360.0	770.9	1049.2	619.0	33.5	6.7
	Movement LOS	C	A	A	F	F	F	F	F	F	F	D	A
	Intersection Delay (LOS)	171.0 (F)											
CSAH 81 & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**CSAH 81 EB**			**CSAH 81 WB**		
Approach Volume		30	265	120	530	305	110	285	555	130	25	155	265
Lane Configuration		↰	↑↱		↰	↑↱		↰	↑	↱	↰	↑	↱
Storage Length (ft)		275			150			250		575	250		500
Traffic Signal	Average Queue (ft)	44	808		196	2741		58	698	74	18	106	31
	Max Queue (ft)	279	1213		200	2998		299	1433	625	86	266	129
	Movement Delay (s)	201.6	198.2	179.5	566.6	511.2	483.8	165.9	103.5	31.5	93.7	51.6	9.7
	Movement LOS	F	F	F	F	F	F	F	F	C	F	D	A
	Intersection Delay (LOS)	231.1 (F)											

PM Peak Hour		Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
David Koch Ave & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**David Koch Ave EB**					
Approach Volume		30	970	0	0	335	5	10	0	40	0	0	0
Lane Configuration			↰↑			↑↱			↰↱				
Storage Length (ft)													
Thru-Stop	Average Queue (ft)		11					17					
	Max Queue (ft)		94					66					
	Movement Delay (s)	3.2	2.5	0.0	0.0	1.2	0.3	16.7	0.0	3.7	0.0	0.0	0.0
	Movement LOS	A	A	A	A	A	A	C	A	A	A	A	A
	Intersection Delay (LOS)	2.3 (A)											
Rogers Drive & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**Rogers Drive EB**			**Rogers Drive WB**		
Approach Volume		275	910	10	10	295	70	80	5	810	10	5	10
Lane Configuration		↰	↑	↱	↰	↑	↱	↰	↑↱		↰	↑↱	
Storage Length (ft)		300			300		300	300		300	300		
Thru-Stop	Average Queue (ft)	40			4	67	5	23	223	165	9	11	
	Max Queue (ft)	110	3		37	340	128	71	861	350	42	59	
	Movement Delay (s)	6.9	2.4	0.7	11.2	17.8	1.9	98.8	119.0	128.5	62.0	28.7	15.1
	Movement LOS	A	A	A	B	C	A	F	F	F	F	D	C
	Intersection Delay (LOS)	30.3 (D)											
CSAH 81 & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**CSAH 81 EB**			**CSAH 81 WB**		
Approach Volume		105	570	60	345	300	470	85	315	70	100	540	540
Lane Configuration		↰	↑↱		↰	↑↱		↰	↑	↱	↰	↑	↱
Storage Length (ft)		250			150			250		575	300		300
Traffic Signal	Average Queue (ft)	130	1219		195	2365		70	310	7	166	1737	230
	Max Queue (ft)	299	1314		200	2982		242	603	55	349	1786	350
	Movement Delay (s)	202.6	184.7	174.6	642.6	491.1	511.5	212.2	85.9	9.1	285.1	232.1	180.9
	Movement LOS	F	F	F	F	F	F	F	F	A	F	F	F
	Intersection Delay (LOS)	258.2 (F)											

Table A.3: Capacity Analysis Summary for 2019 With Development Condition - Including Mitigation from Kinghorn TIS

AM Peak Hour		Northbound Approach Left	Northbound Approach Thru	Northbound Approach Right	Southbound Approach Left	Southbound Approach Thru	Southbound Approach Right	Eastbound Approach Left	Eastbound Approach Thru	Eastbound Approach Right	Westbound Approach Left	Westbound Approach Thru	Westbound Approach Right
141st St / CSAH 144 & Brockton Lane													
Approach Name		Brockton Lane NB			Brockton Lane SB			141st St / CSAH 144 EB			141st St / CSAH 144 WB		
Approach Volume		145	75	25	15	300	165	25	120	245	45	80	10
Lane Configuration			↰↑↱			↰↑↱			↰↑↱			↰↑↱	
Storage Length (ft)		300								300			
Traffic Signal	Average Queue (ft)	49	13			150			70	60		79	
	Max Queue (ft)	124	67			334			184	150		176	
	Movement Delay (s)	13.3	7.9	2.9	18.5	20.1	12.9	30.4	24.7	6.9	31.8	31.5	12.1
	Movement LOS	B	A	A	B	C	B	C	C	A	C	C	B
	Intersection Delay (LOS)	16.3 (B)											
S Diamond Lake Road & Rogers Drive													
Approach Name		Rogers Drive NB			Rogers Drive SB			S Diamond Lake Road EB			S Diamond Lake Road WB		
Approach Volume		310	25	45	5	50	45	145	655	620	35	260	10
Lane Configuration		↰↰	↑↱		↰	↑	↱	↰	↑↑	↱	↰	↑↑↱	
Storage Length (ft)		125			125			150			175		
Traffic Signal	Average Queue (ft)	97	31		3	33	21	64	136	32	25	33	
	Max Queue (ft)	172	90		28	92	71	187	248	222	79	91	
	Movement Delay (s)	35.3	15.1	8.0	21.9	29.6	2.8	18.8	20.4	4.8	19.5	21.5	12.0
	Movement LOS	D	B	A	C	C	A	B	C	A	B	C	B
	Intersection Delay (LOS)	17.4 (B)											
S Diamond Lake Road & Brockton Lane													
Approach Name		Brockton Lane NB			Brockton Lane SB			S Diamond Lake Road EB			S Diamond Lake Road WB		
Approach Volume		80	195	35	10	550	55	15	35	190	40	95	10
Lane Configuration		↰	↑	↱	↰	↑	↱	↰	↑↱		↰	↑↱	
Storage Length (ft)		150		150	200		200				100		
Traffic Signal	Average Queue (ft)	60	41	8	7	166	22	9	97		26	52	
	Max Queue (ft)	149	117	34	38	357	181	37	217		83	142	
	Movement Delay (s)	36.1	8.3	1.9	42.6	19.8	6.2	24.9	37.6	18.1	24.9	27.5	13.3
	Movement LOS	D	A	A	D	B	A	C	D	B	C	C	B
	Intersection Delay (LOS)	19.2 (B)											
David Koch Ave & Rogers Drive													
Approach Name		Rogers Drive NB			Rogers Drive SB						David Koch Ave WB		
Approach Volume		0	270	5	30	335	0	0	0	0	5	0	10
Lane Configuration			↑	↱	↰	↑↑					↰		↱
Storage Length (ft)					250								
Thru-Stop	Average Queue (ft)				6						3		5
	Max Queue (ft)				43						22		25
	Movement Delay (s)	0.0	1.4	0.1	1.7	0.8	0.0	0.0	0.0	0.0	5.1	0.0	1.9
	Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
	Intersection Delay (LOS)	1.1 (A)											

PM Peak Hour		Northbound Approach Left	Northbound Approach Thru	Northbound Approach Right	Southbound Approach Left	Southbound Approach Thru	Southbound Approach Right	Eastbound Approach Left	Eastbound Approach Thru	Eastbound Approach Right	Westbound Approach Left	Westbound Approach Thru	Westbound Approach Right
141st St / CSAH 144 & Brockton Lane													
Approach Name		Brockton Lane NB			Brockton Lane SB			141st St / CSAH 144 EB			141st St / CSAH 144 WB		
Approach Volume		480	245	45	10	80	55	85	125	130	25	125	15
Lane Configuration			↰↑↱			↰↑↱			↰↑↱			↰↑↱	
Storage Length (ft)		300								300			
Traffic Signal	Average Queue (ft)	147	48			68			131	35		94	
	Max Queue (ft)	313	209			185			262	77		219	
	Movement Delay (s)	18.8	13.8	7.7	31.5	28.4	12.2	43.6	39.4	4.0	35.3	32.8	17.8
	Movement LOS	B	B	A	C	C	B	D	D	A	D	C	B
	Intersection Delay (LOS)	21.4 (C)											
S Diamond Lake Road & Rogers Drive													
Approach Name		Rogers Drive NB			Rogers Drive SB			S Diamond Lake Road EB			S Diamond Lake Road WB		
Approach Volume		620	125	15	75	90	235	290	345	385	65	595	110
Lane Configuration		↰↰	↑↱		↰	↑	↱	↰	↑↑	↱	↰	↑↑↱	
Storage Length (ft)		125			125			150			175		
Traffic Signal	Average Queue (ft)	228	96		51	77	58	152	107	15	43	150	
	Max Queue (ft)	405	297		143	182	128	200	324	141	145	255	
	Movement Delay (s)	47.2	31.4	18.1	26.3	47.6	6.6	37.6	25.5	3.0	26.3	43.5	41.6
	Movement LOS	D	C	B	C	D	A	D	C	A	C	D	D
	Intersection Delay (LOS)	31.7 (C)											
S Diamond Lake Road & Brockton Lane													
Approach Name		Brockton Lane NB			Brockton Lane SB			S Diamond Lake Road EB			S Diamond Lake Road WB		
Approach Volume		205	690	55	15	195	25	70	80	85	45	60	10
Lane Configuration		↰	↑	↱	↰	↑	↱	↰	↑↱		↰	↑↱	
Storage Length (ft)		150		150	200		200				100		
Traffic Signal	Average Queue (ft)	132	236	24	12	71	12	43	86		28	41	
	Max Queue (ft)	199	630	176	53	168	49	97	175		84	111	
	Movement Delay (s)	44.5	20.6	9.3	38.8	18.5	3.6	26.2	39.6	19.3	29.6	38.1	15.2
	Movement LOS	D	C	A	D	B	A	C	D	B	C	D	B
	Intersection Delay (LOS)	24.9 (C)											
David Koch Ave & Rogers Drive													
Approach Name		Rogers Drive NB			Rogers Drive SB						David Koch Ave WB		
Approach Volume		0	375	5	35	390	0	0	0	0	5	0	45
Lane Configuration			↑	↱	↰	↑↑					↰		↱
Storage Length (ft)					250								
Thru-Stop	Average Queue (ft)				9						3		20
	Max Queue (ft)				47						26		55
	Movement Delay (s)	0.0	1.9	0.1	2.7	1.0	0.0	0.0	0.0	0.0	7.9	0.0	3.4
	Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
	Intersection Delay (LOS)	1.6 (A)											

Table A.3: Capacity Analysis Summary for 2019 With Development Condition - Including Mitigation from Kinghorn TIS (Continued)

AM Peak Hour		Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
David Koch Ave & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**David Koch Ave EB**					
Approach Volume		35	285	0	0	760	5	5	0	15	0	0	0
Lane Configuration			↰↑			↑↱			↰↱				
Storage Length (ft)													
Thru-Stop	Average Queue (ft)		22					10					
	Max Queue (ft)		134					42					
	Movement Delay (s)	6.4	2.6	0.0	0.0	1.8	0.8	9.0	0.0	5.6	0.0	0.0	0.0
	Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
	Intersection Delay (LOS)	2.2 (A)											
Rogers Drive & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**Rogers Drive EB**			**Rogers Drive WB**		
Approach Volume		300	285	5	5	640	130	30	5	275	5	5	5
Lane Configuration		↰	↑	↱	↰	↑	↱	↰	↑	↱	↰	↑↱	
Storage Length (ft)		300		300	300		300	300		300	300		
Traffic Signal	Average Queue (ft)	238	80		1	306	58	27	2	106	4	7	
	Max Queue (ft)	349	626	5	16	698	314	82	27	258	34	37	
	Movement Delay (s)	64.9	7.1	4.2	16.7	28.9	12.4	61.5	62.0	20.7	80.6	69.0	7.9
	Movement LOS	E	A	A	B	C	B	E	E	C	F	E	A
	Intersection Delay (LOS)	29.7 (C)											
CSAH 81 & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**CSAH 81 EB**			**CSAH 81 WB**		
Approach Volume		30	235	120	530	305	85	125	555	130	25	155	230
Lane Configuration		↰	↑	↱	↰↰	↑	↱	↰	↑	↱	↰	↑↑	↱
Storage Length (ft)		300		300	300		300	300		300	300		
Traffic Signal	Average Queue (ft)	13	175	46	220	237	31	95	408	64	7	21	
	Max Queue (ft)	63	380	229	329	677	169	339	884	348	53	85	
	Movement Delay (s)	73.2	59.3	11.6	68.0	52.4	11.0	60.5	53.1	20.5	71.7	52.0	1.4
	Movement LOS	E	E	B	E	D	B	E	D	C	E	D	A
	Intersection Delay (LOS)	47.6 (D)											

PM Peak Hour		Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
David Koch Ave & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**David Koch Ave EB**					
Approach Volume		30	940	0	0	320	5	10	0	40	0	0	0
Lane Configuration			↰↑			↑↱			↰↱				
Storage Length (ft)													
Thru-Stop	Average Queue (ft)		12					16					
	Max Queue (ft)		136					59					
	Movement Delay (s)	3.0	2.9	0.0	0.0	1.2	0.6	16.0	0.0	3.1	0.0	0.0	0.0
	Movement LOS	A	A	A	A	A	A	C	A	A	A	A	A
	Intersection Delay (LOS)	2.6 (A)											
Rogers Drive & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**Rogers Drive EB**			**Rogers Drive WB**		
Approach Volume		265	910	10	10	295	55	50	5	445	10	5	10
Lane Configuration		↰	↑	↱	↰	↑	↱	↰	↑	↱	↰	↑↱	
Storage Length (ft)		300		300	300		300	300		300	300		
Traffic Signal	Average Queue (ft)	223	85	1	3	112	17	47	12	97	7	13	
	Max Queue (ft)	341	505	17	23	288	150	125	258	263	52	61	
	Movement Delay (s)	64.1	7.5	3.4	17.4	20.2	5.8	67.0	56.9	10.5	70.6	74.3	19.9
	Movement LOS	E	A	A	B	C	A	E	E	B	E	E	B
	Intersection Delay (LOS)	19.0 (B)											
CSAH 81 & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**CSAH 81 EB**			**CSAH 81 WB**		
Approach Volume		105	570	60	310	265	175	75	315	70	100	540	540
Lane Configuration		↰	↑	↱	↰↰	↑	↱	↰	↑	↱	↰	↑↑	↱
Storage Length (ft)		300		300	300		300	300		300	300		300
Traffic Signal	Average Queue (ft)	97	541	67	122	185	58	68	250	19	64	169	6
	Max Queue (ft)	349	994	350	224	459	217	314	487	292	166	294	172
	Movement Delay (s)	74.7	68.5	28.8	74.1	48.9	11.4	71.6	68.5	12.7	70.8	57.2	5.7
	Movement LOS	E	E	C	E	D	B	E	E	B	E	E	A
	Intersection Delay (LOS)	49.6 (D)											

Table A.4: Capacity Analysis Summary for 2035 Post-Development Condition with Brockton Interchange

AM Peak Hour		Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
141st St / CSAH 144 & Brockton Lane													
Approach Name		Brockton Lane NB			Brockton Lane SB			141st St / CSAH 144 EB			141st St / CSAH 144 WB		
Approach Volume		195	145	50	30	580	220	35	115	380	105	95	15
Lane Configuration		↰↰	↑	↱	↰	↑	↱	↰	↑	↱	↰	↑	↱
Storage Length (ft)		150		300	300		300	300		300	300		300
Traffic Signal	Average Queue (ft)	78	19	3	30	276	67	26	81	85	75	61	6
	Max Queue (ft)	158	75	27	117	648	348	70	184	213	198	159	26
	Movement Delay (s)	67.0	7.4	1.9	63.4	25.5	6.7	37.0	50.6	9.2	41.9	43.7	2.6
	Movement LOS	E	A	A	E	C	A	D	D	A	D	D	A
	Intersection Delay (LOS)	26.1 (C)											
S Diamond Lake Road & Rogers Drive													
Approach Name		Rogers Drive NB			Rogers Drive SB			S Diamond Lake Road EB			S Diamond Lake Road WB		
Approach Volume		275	25	40	5	45	40	180	635	720	45	425	15
Lane Configuration		↰↰	↑↱		↰	↑	↱	↰	↑↑	↱	↰	↑↑↱	
Storage Length (ft)		200			125			150			175		
Traffic Signal	Average Queue (ft)	94	36		4	31	18	79	125	39	31	62	
	Max Queue (ft)	191	103		33	96	52	190	243	215	76	135	
	Movement Delay (s)	35.6	20.6	10.3	19.9	30.0	3.3	21.0	19.5	5.4	18.7	22.6	21.7
	Movement LOS	D	C	B	B	C	A	C	B	A	B	C	C
	Intersection Delay (LOS)	17.6 (B)											
S Diamond Lake Road & Brockton Lane													
Approach Name		Brockton Lane NB			Brockton Lane SB			S Diamond Lake Road EB			S Diamond Lake Road WB		
Approach Volume		180	355	100	20	1170	70	20	45	235	85	120	15
Lane Configuration		↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑↱	
Storage Length (ft)		250		150	200		200			300	100		
Traffic Signal	Average Queue (ft)	145	64	19	17	243	45	17	34	109	62	90	
	Max Queue (ft)	280	194	61	92	440	220	73	98	230	149	225	
	Movement Delay (s)	52.3	12.6	3.1	60.5	26.7	10.6	41.0	43.9	23.2	43.5	45.5	25.6
	Movement LOS	D	B	A	E	C	B	D	D	C	D	D	C
	Intersection Delay (LOS)	26.9 (C)											
David Koch Ave & Rogers Drive													
Approach Name		Rogers Drive NB			Rogers Drive SB			David Koch Ave EB			David Koch Ave WB		
Approach Volume		0	325	5	35	375	0	0	0	0	20	0	45
Lane Configuration			↑	↱	↰	↑↑					↰		↱
Storage Length (ft)					250								
Thru-Stop	Average Queue (ft)				8						14		20
	Max Queue (ft)				41						60		63
	Movement Delay (s)	0.0	2.2	0.2	2.8	0.9	0.0	0.0	0.0	0.0	11.1	0.0	4.7
	Movement LOS	A	A	A	A	A	A	A	A	A	B	A	A
	Intersection Delay (LOS)	2.0 (A)											

PM Peak Hour		Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
141st St / CSAH 144 & Brockton Lane													
Approach Name		Brockton Lane NB			Brockton Lane SB			141st St / CSAH 144 EB			141st St / CSAH 144 WB		
Approach Volume		935	485	90	20	175	110	100	135	190	35	135	20
Lane Configuration		↰↰	↑	↱	↰	↑	↱	↰	↑	↱	↰	↑	↱
Storage Length (ft)		150		300	300		300	300		300	300		300
Traffic Signal	Average Queue (ft)	292	88	7	20	105	45	64	94	38	29	93	10
	Max Queue (ft)	633	320	41	60	220	135	156	193	78	92	174	39
	Movement Delay (s)	48.8	13.2	5.5	62.9	37.4	12.6	41.5	47.4	3.9	39.5	50.9	5.3
	Movement LOS	D	B	A	E	D	B	D	D	A	D	D	A
	Intersection Delay (LOS)	33.2 (C)											
S Diamond Lake Road & Rogers Drive													
Approach Name		Rogers Drive NB			Rogers Drive SB			S Diamond Lake Road EB			S Diamond Lake Road WB		
Approach Volume		480	90	15	85	100	260	335	430	455	75	790	130
Lane Configuration		↰↰	↑↱		↰	↑	↱	↰	↑↑	↱	↰	↑↑↱	
Storage Length (ft)		200			125			150			175		
Traffic Signal	Average Queue (ft)	176	60		61	81	73	167	141	20	52	211	
	Max Queue (ft)	307	159		169	206	192	200	376	154	142	324	
	Movement Delay (s)	52.1	31.4	15.3	31.7	46.2	7.9	40.3	22.4	3.4	23.7	46.7	50.5
	Movement LOS	D	C	B	C	D	A	D	C	A	C	D	D
	Intersection Delay (LOS)	33.0 (C)											
S Diamond Lake Road & Brockton Lane													
Approach Name		Brockton Lane NB			Brockton Lane SB			S Diamond Lake Road EB			S Diamond Lake Road WB		
Approach Volume		420	1505	180	30	450	50	90	100	115	70	75	15
Lane Configuration		↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑↱	
Storage Length (ft)		350		150	200		200			300	100		
Traffic Signal	Average Queue (ft)	240	352	65	25	129	33	77	85	36	59	66	
	Max Queue (ft)	400	754	200	138	239	246	189	185	97	149	205	
	Movement Delay (s)	42.7	25.5	16.0	58.0	34.2	7.0	46.8	57.9	5.0	46.9	52.2	31.4
	Movement LOS	D	C	B	E	C	A	D	E	A	D	D	C
	Intersection Delay (LOS)	30.5 (C)											
David Koch Ave & Rogers Drive													
Approach Name		Rogers Drive NB			Rogers Drive SB			David Koch Ave EB			David Koch Ave WB		
Approach Volume		0	355	10	55	500	0	0	0	0	20	0	180
Lane Configuration			↑	↱	↰	↑↑					↰		↱
Storage Length (ft)					250								
Thru-Stop	Average Queue (ft)				13						15		54
	Max Queue (ft)				46						53		140
	Movement Delay (s)	0.0	3.1	0.8	3.4	1.2	0.0	0.0	0.0	0.0	14.4	0.0	7.2
	Movement LOS	A	A	A	A	A	A	A	A	A	B	A	A
	Intersection Delay (LOS)	3.1 (A)											

Table A.4: Capacity Analysis Summary for 2035 Post-Development Condition with Brockton Interchange (Continued)

AM Peak Hour		Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
David Koch Ave & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**David Koch Ave EB**			**David Koch Ave WB**		
Approach Volume		100	610	5	5	1470	15	20	5	60	5	5	5
Lane Configuration		↰	↑↑	↱	↰	↑↑	↱	↰	↑↱		↰	↑↱	
Storage Length (ft)		300		300	300		300	300			300		
Traffic Signal	Average Queue (ft)	67	19		3	56	2	8	38		3	6	
	Max Queue (ft)	186	104	7	18	204	22	40	106		24	37	
	Movement Delay (s)	55.4	3.3	0.6	59.0	6.5	3.4	60.9	45.0	23.5	59.5	56.2	6.0
	Movement LOS	E	A	A	E	A	A	E	D	C	E	E	A
	Intersection Delay (LOS)	9.0 (A)											
Rogers Drive & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**Rogers Drive EB**			**Rogers Drive WB**		
Approach Volume		740	665	35	15	1445	75	40	15	510	60	15	10
Lane Configuration		↰↰	↑↑	↱	↰	↑↑↑	↱	↰	↑	↱	↰	↑↱	
Storage Length (ft)		150		300	300		300	300			300		
Traffic Signal	Average Queue (ft)	332	87	9	8	303	51	26	5	127	56	19	
	Max Queue (ft)	557	226	47	78	481	349	87	37	393	140	80	
	Movement Delay (s)	46.9	9.2	1.6	29.4	43.5	17.6	61.9	78.0	13.3	66.9	67.2	21.0
	Movement LOS	D	A	A	C	D	B	E	E	B	E	E	C
	Intersection Delay (LOS)	33.6 (C)											
CSAH 81 & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**CSAH 81 EB**			**CSAH 81 WB**		
Approach Volume		100	965	180	905	1000	110	130	725	240	50	245	345
Lane Configuration		↰	↑↑↑	↱	↰↰	↑↑	↱	↰	↑↑↑	↱	↰	↑↑↑	↱↱
Storage Length (ft)		400		300	200		300	300		300	300		300
Traffic Signal	Average Queue (ft)	50	213	57	319	231	37	73	157	39	27	61	13
	Max Queue (ft)	155	337	189	500	403	279	209	272	152	86	124	75
	Movement Delay (s)	51.4	44.7	13.1	59.8	31.1	6.5	56.2	50.5	18.6	68.3	55.3	11.4
	Movement LOS	D	D	B	E	C	A	E	D	B	E	E	B
	Intersection Delay (LOS)	41.0 (D)											

PM Peak Hour		Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
David Koch Ave & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**David Koch Ave EB**			**David Koch Ave WB**		
Approach Volume		85	2060	5	10	635	15	40	10	155	5	5	5
Lane Configuration		↰	↑↑	↱	↰	↑↑	↱	↰	↑↱		↰	↑↱	
Storage Length (ft)		300		300	300		300	300			300		
Traffic Signal	Average Queue (ft)	66	177		5	20	2	21	85		5	6	
	Max Queue (ft)	235	601	7	36	84	39	80	200		29	30	
	Movement Delay (s)	56.1	13.0	4.9	56.2	3.8	1.2	56.1	67.8	25.0	54.6	30.8	23.5
	Movement LOS	E	B	A	E	A	A	E	E	C	D	C	C
	Intersection Delay (LOS)	13.8 (B)											
Rogers Drive & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**Rogers Drive EB**			**Rogers Drive WB**		
Approach Volume		535	2080	80	25	735	35	55	15	875	45	15	15
Lane Configuration		↰↰	↑↑	↱	↰	↑↑↑	↱	↰	↑	↱	↰	↑↱	
Storage Length (ft)		150		300	300		300	300			300		
Traffic Signal	Average Queue (ft)	250	117	9	16	109	13	48	120	426	47	25	
	Max Queue (ft)	403	309	44	88	242	74	119	862	939	124	77	
	Movement Delay (s)	82.2	8.5	3.7	93.7	24.1	8.4	78.1	71.3	34.9	79.5	102.6	57.2
	Movement LOS	F	A	A	F	C	A	E	E	C	E	F	E
	Intersection Delay (LOS)	27.6 (D)											
CSAH 81 & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**CSAH 81 EB**			**CSAH 81 WB**		
Approach Volume		380	1690	145	755	715	185	145	360	140	165	705	860
Lane Configuration		↰	↑↑↑	↱	↰↰	↑↑	↱	↰	↑↑↑	↱	↰	↑↑↑	↱↱
Storage Length (ft)		400		300	200		300	300		300	300		300
Traffic Signal	Average Queue (ft)	307	445	182	387	252	76	122	100	5	158	212	173
	Max Queue (ft)	425	712	325	600	426	325	244	170	39	308	377	306
	Movement Delay (s)	61.7	60.9	18.5	90.4	51.7	11.3	85.2	67.0	10.6	88.8	82.1	39.9
	Movement LOS	E	E	B	F	D	B	F	E	B	F	F	D
	Intersection Delay (LOS)	**61.1 (E)**											

Table A.5: Capacity Analysis Summary for 2035 Post-Development Condition with Brockton Interchange and Fletcher Overpass

AM Peak Hour		Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
141st St / CSAH 144 & Brockton Lane													
Approach Name		Brockton Lane NB			Brockton Lane SB			141st St / CSAH 144 EB			141st St / CSAH 144 WB		
Approach Volume		355	145	50	30	580	220	35	115	265	105	95	15
Lane Configuration		↰↰	↑	↱	↰	↑	↱	↰	↑	↱	↰	↑	↱
Storage Length (ft)		150		300	300		300	300		300	300		300
Traffic Signal	Average Queue (ft)	139	34	8	32	275	82	24	90	60	70	63	8
	Max Queue (ft)	235	115	46	138	611	350	74	206	140	160	168	36
	Movement Delay (s)	50.9	12.9	2.9	60.8	26.7	7.9	39.1	50.7	7.0	41.8	43.9	2.2
	Movement LOS	D	B	A	E	C	A	D	D	A	D	D	A
	Intersection Delay (LOS)	28.1 (C)											
S Diamond Lake Road & Rogers Drive													
Approach Name		Rogers Drive NB			Rogers Drive SB			S Diamond Lake Road EB			S Diamond Lake Road WB		
Approach Volume		330	25	40	5	45	40	180	690	680	45	305	15
Lane Configuration		↰↰	↑↱		↰	↑	↱	↰	↑↑	↱	↰	↑↑↱	
Storage Length (ft)		200			125			150			175		
Traffic Signal	Average Queue (ft)	110	30		4	28	20	71	132	25	30	40	
	Max Queue (ft)	197	95		29	82	58	176	268	188	86	125	
	Movement Delay (s)	37.0	15.6	7.3	21.9	29.6	3.4	18.9	19.4	5.0	20.1	20.8	15.0
	Movement LOS	D	B	A	C	C	A	B	B	A	C	C	B
	Intersection Delay (LOS)	17.6 (B)											
S Diamond Lake Road & Brockton Lane													
Approach Name		Brockton Lane NB			Brockton Lane SB			S Diamond Lake Road EB			S Diamond Lake Road WB		
Approach Volume		90	515	100	20	1055	70	20	45	290	85	120	15
Lane Configuration		↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑↱	
Storage Length (ft)		300		150	200		200			300	100		
Traffic Signal	Average Queue (ft)	72	33	13	17	144	21	16	40	129	69	97	
	Max Queue (ft)	160	121	39	117	293	181	56	97	272	149	256	
	Movement Delay (s)	62.4	7.3	2.0	64.5	16.9	5.9	45.3	50.7	23.7	43.5	44.7	22.5
	Movement LOS	E	A	A	E	B	A	D	D	C	D	D	C
	Intersection Delay (LOS)	20.0 (C)											
David Koch Ave & Rogers Drive													
Approach Name		Rogers Drive NB			Rogers Drive SB						David Koch Ave WB		
Approach Volume		0	315	5	35	335	0	0	0	0	20	0	45
Lane Configuration			↑	↱	↰	↑↑					↰		↱
Storage Length (ft)					250								
Thru-Stop	Average Queue (ft)				8						13		26
	Max Queue (ft)				48						51		73
	Movement Delay (s)	0.0	1.9	0.1	2.3	0.8	0.0	0.0	0.0	0.0	10.0	0.0	5.2
	Movement LOS	A	A	A	A	A	A	A	A	A	B	A	A
	Intersection Delay (LOS)	1.8 (A)											

PM Peak Hour		Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
141st St / CSAH 144 & Brockton Lane													
Approach Name		Brockton Lane NB			Brockton Lane SB			141st St / CSAH 144 EB			141st St / CSAH 144 WB		
Approach Volume		875	485	90	20	175	110	100	135	190	35	135	20
Lane Configuration		↰↰	↑	↱	↰	↑	↱	↰	↑	↱	↰	↑	↱
Storage Length (ft)		150		300	300		300	300		300	300		300
Traffic Signal	Average Queue (ft)	301	170	14	18	107	42	64	95	41	26	96	13
	Max Queue (ft)	468	340	98	63	214	111	138	221	84	86	222	104
	Movement Delay (s)	45.6	20.6	7.2	59.6	34.4	11.4	40.5	44.3	4.1	39.5	48.7	6.6
	Movement LOS	D	C	A	E	C	B	D	D	A	D	D	A
	Intersection Delay (LOS)	33.0 (C)											
S Diamond Lake Road & Rogers Drive													
Approach Name		Rogers Drive NB			Rogers Drive SB			S Diamond Lake Road EB			S Diamond Lake Road WB		
Approach Volume		530	90	20	85	100	260	335	375	455	75	740	130
Lane Configuration		↰↰	↑↱		↰	↑	↱	↰	↑↑	↱	↰	↑↑↱	
Storage Length (ft)		200			125			150			175		
Traffic Signal	Average Queue (ft)	190	65		60	92	71	163	103	23	46	171	
	Max Queue (ft)	301	159		167	251	159	200	280	130	180	299	
	Movement Delay (s)	52.6	31.8	18.6	34.7	54.2	8.7	36.9	20.3	3.3	20.1	37.0	38.4
	Movement LOS	D	C	B	C	D	A	D	C	A	C	D	D
	Intersection Delay (LOS)	30.3 (C)											
S Diamond Lake Road & Brockton Lane													
Approach Name		Brockton Lane NB			Brockton Lane SB			S Diamond Lake Road EB			S Diamond Lake Road WB		
Approach Volume		390	1445	180	30	450	50	90	100	90	70	75	15
Lane Configuration		↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑↱	
Storage Length (ft)		350		150	200		200			300	100		
Traffic Signal	Average Queue (ft)	228	202	45	29	146	27	61	75	30	58	64	
	Max Queue (ft)	391	564	200	85	261	100	171	192	89	140	208	
	Movement Delay (s)	32.3	17.5	10.2	61.9	44.6	6.9	44.8	50.5	6.7	51.4	53.8	39.6
	Movement LOS	C	B	B	E	D	A	D	D	A	D	D	D
	Intersection Delay (LOS)	26.8 (C)											
David Koch Ave & Rogers Drive													
Approach Name		Rogers Drive NB			Rogers Drive SB						David Koch Ave WB		
Approach Volume		0	425	10	55	650	0	0	0	0	20	0	180
Lane Configuration			↑	↱	↰	↑↑					↰		↱
Storage Length (ft)					250								
Thru-Stop	Average Queue (ft)				18						16		52
	Max Queue (ft)				60						59		123
	Movement Delay (s)	0.0	2.6	0.2	4.1	1.3	0.0	0.0	0.0	0.0	19.5	0.3	7.4
	Movement LOS	A	A	A	A	A	A	A	A	A	C	A	A
	Intersection Delay (LOS)	2.9 (A)											

Table A.5: Capacity Analysis Summary for 2035 Post-Development Condition with Brockton Interchange and Fletcher Overpass (Continued)

AM Peak Hour		Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
David Koch Ave & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**David Koch Ave EB**			**David Koch Ave WB**		
Approach Volume		95	680	5	5	1410	15	20	5	60	5	5	5
Lane Configuration		↰	↑↑	↱	↰	↑↑	↱	↰	↑↱		↰	↑↱	
Storage Length (ft)		300		300	300		300	300			300		
Traffic Signal	Average Queue (ft)	74	23	1	3	131	3	17	28		4	6	
	Max Queue (ft)	176	101	16	26	297	34	72	89		27	34	
	Movement Delay (s)	65.8	3.5	1.0	44.8	9.6	3.9	53.7	46.7	17.7	67.6	52.8	10.5
	Movement LOS	E	A	A	D	A	A	D	D	B	E	D	B
	Intersection Delay (LOS)	11.1 (B)											
Rogers Drive & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**Rogers Drive EB**			**Rogers Drive WB**		
Approach Volume		465	620	30	15	1265	195	150	15	240	45	25	10
Lane Configuration		↰↰	↑↑	↱	↰	↑↑↑	↱	↰	↑	↱	↰	↑↱	
Storage Length (ft)		400		300	300		300	300			300		
Traffic Signal	Average Queue (ft)	177	29	3	5	207	51	127	6	28	30	25	
	Max Queue (ft)	277	118	37	34	403	134	288	40	99	89	83	
	Movement Delay (s)	44.1	5.0	1.1	38.1	35.6	11.6	78.8	65.0	3.5	43.3	59.5	23.2
	Movement LOS	D	A	A	D	D	B	E	E	A	D	E	C
	Intersection Delay (LOS)	29.0 (C)											
CSAH 81 & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**CSAH 81 EB**			**CSAH 81 WB**		
Approach Volume		105	760	185	680	785	85	75	670	340	50	275	280
Lane Configuration		↰	↑↑↑	↱	↰↰	↑↑	↱	↰	↑↑	↱	↰	↑↑↑	↱↱
Storage Length (ft)		400		300	300		300	300		300	300		300
Traffic Signal	Average Queue (ft)	43	151	80	180	166	26	26	127	59	25	45	3
	Max Queue (ft)	118	243	181	295	311	68	102	214	188	99	109	35
	Movement Delay (s)	44.2	39.9	20.9	43.0	29.8	6.0	44.6	35.3	17.9	49.8	36.7	7.1
	Movement LOS	D	D	C	D	C	A	D	D	B	D	D	A
	Intersection Delay (LOS)	32.5 (C)											

PM Peak Hour		Northbound Approach			Southbound Approach			Eastbound Approach			Westbound Approach		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
David Koch Ave & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**David Koch Ave EB**			**David Koch Ave WB**		
Approach Volume		60	1970	5	10	610	15	40	10	155	5	5	5
Lane Configuration		↰	↑↑	↱	↰	↑↑	↱	↰	↑↱		↰	↑↱	
Storage Length (ft)		300		300	300		300	300			300		
Traffic Signal	Average Queue (ft)	46	110	1	4	124	7	33	50		3	7	
	Max Queue (ft)	165	477	13	33	284	50	97	151		30	39	
	Movement Delay (s)	60.2	9.9	6.2	53.7	15.7	5.0	61.5	53.0	11.4	50.2	47.9	26.3
	Movement LOS	E	A	A	D	B	A	E	D	B	D	D	C
	Intersection Delay (LOS)	13.3 (B)											
Rogers Drive & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**Rogers Drive EB**			**Rogers Drive WB**		
Approach Volume		465	1845	65	25	530	215	175	25	450	40	20	15
Lane Configuration		↰↰	↑↑	↱	↰	↑↑↑	↱	↰	↑	↱	↰	↑↱	
Storage Length (ft)		400		300	300		300	300			300		
Traffic Signal	Average Queue (ft)	172	289	23	16	105	54	154	24	20	32	21	
	Max Queue (ft)	356	620	251	74	225	161	305	182	169	84	76	
	Movement Delay (s)	49.9	19.8	7.5	74.9	29.4	8.1	76.7	53.6	5.7	50.5	58.6	44.1
	Movement LOS	D	B	A	E	C	A	E	D	A	D	E	D
	Intersection Delay (LOS)	25.9 (D)											
CSAH 81 & Brockton Lane													
Approach Name		**Brockton Lane NB**			**Brockton Lane SB**			**CSAH 81 EB**			**CSAH 81 WB**		
Approach Volume		380	1535	145	475	475	70	70	520	150	165	755	770
Lane Configuration		↰	↑↑↑	↱	↰↰	↑↑	↱	↰	↑↑	↱	↰	↑↑↑	↱↱
Storage Length (ft)		400		300	300		300	300		300	300		300
Traffic Signal	Average Queue (ft)	247	324	123	183	152	27	34	149	4	128	163	115
	Max Queue (ft)	424	499	325	287	260	78	103	258	48	270	277	258
	Movement Delay (s)	52.7	48.8	18.5	60.7	47.4	7.9	64.8	54.5	8.4	68.9	49.4	24.3
	Movement LOS	D	D	B	E	D	A	E	D	A	E	D	C
	Intersection Delay (LOS)	45.5 (D)											

Appendix D Responses to Comments

Responses to Comments of the Henry Area AUAR
May 19, 2014

Outlined below is a summary of each comment received regarding the AUAR as well as a response to the comment. Complete comment letters are attached for reference. Comments were received from the DNR, PCA, Hennepin County, MnDOT, MDH, Elm Creek Watershed Management Commission.

Summarized Comment	Response
Department of Natural Resources	
1) Forest and Woodland Communities: The DAUAR correctly identifies the occurrence of 31 acres of Maple-Basswood Forest with imperiled conservation status. This forested area provides substantial ecological services to the landscape...Enhancing its landscape value, the forest is part of a larger forest complex, as it is contiguous with the 52-acre Henry's Wood Park to the North. The development scenario is anticipated to remove 26 of these acres, which will reduce a substantial amount of the larger complex and virtually eliminate the native plant community from the project site. Mitigation plans throughout the DAUAR mention consideration of buffer and screening retention. It should be noted that interior trees exposed by clearing (retained in strips or patches) are vulnerable to windthrow. We recommend that	The City will continue to encourage development to provide a contiguous buffer and will also work to minimize wooded area impacts from municipal projects. No changes have been made to the Final AUAR.

the AUAR commit to stronger protection measures regarding the acres of forest to be retained in future development. We recommend that these acres be connected to the larger complex to maintain both the structural integrity of individual trees and to minimize the substantial reduction of the larger forest complex.	
2) <u>Impacts to Surface Waters</u>: While outside of the project site, Grass Lake is immediately adjacent to the project site. The DAUAR states that treated stormwater will be discharged to Grass Lake, with stormwater ponding and treatment in compliance with NPDES and Elm Creek Watershed requirements. It also states that existing soil conditions (Type C) are unsuitable for infiltration. Because of this, we recommend that the AUAR commit to working with future proposers to incorporate designs that address stormwater mitigation. Treatment of stormwater from both the Limited Industrial and the Single Family Residential sections, though different in nature, will require significant attention by developers to adequately protect the water quality of Grass Lake.	The City will work with development in the area to meet local and state storm water management criteria while minimizing impact to Grass Lake. No changes have been made to the final AUAR.

Elm Creek Watershed Management Commission	
The ECWMC has concern regarding impacts to the wooded area. It provides an ecologically significant natural area and resource priority	The City will continue to encourage development to provide a contiguous buffer and will also work to minimize wooded area impacts from municipal projects. Wildlife passage features will be considered. Information from the landowner who owns the Henry AUAR

corridor. All linear manmade structures crossing this corridor must be designed with features than permit wildlife passage.	Study Area and the Henry Woods area has indicated that they have already put a significant piece of the woods into conservation easement (the Henry Woods to the north) already in recognition of this habitat. No changes have been made to the Final AUAR.
The ECWMC has indicated that there will likely be additional stormwater runoff volume. The ECWMC is working on their 3rd generation plan that is anticipated to include more stringent volume control. The soils within the study area are generally not conducive to infiltration. Unconventional abstraction methods may need to be considered.	The City recognizes the ECWMC is updating their plan and that when development occurs in the study area, it will need to meet the current stormwater rules. The City will continue evaluating storm water management options for this area. This is recognized in the AUAR and no changes have been made.
The ECWMC has stated that the mitigation measures that consider screening, buffer, and retaining a portion of the woods are very non-committal. They state that it is important for the woods to be preserved and that the city should develop a preservation plan to protect this corridor.	The City will continue to encourage development to provide a contiguous buffer and will also work to minimize wooded area impacts from municipal projects. Wildlife passage features will be considered. Information from the landowner who owns the Henry AUAR Study Area and the Henry Woods area has indicated that they have already put a significant piece of the woods into conservation easement (the Henry Woods to the north) already in recognition of this habitat. No changes have been made to the Final AUAR.

Minnesota Department of Health

The MDH had no comments	No response is needed.

Minnesota Pollution Control Agency Comments

Demolition of farmsteads, if needed, must be in compliance with state and federal regulations for hazardous material and asbestos, etc. The farmstead may also have the potential for	Any demolition of buildings and farmsteads will comply with these rules. No change to the AUAR is needed.

release of agriculture chemicals and MDA is the regulatory agencies for these issues.	
French Lake is listed as impaired for nutrients and additional storm water treatment may be needed.	As indicated by PCA, this requirement is noted in the AUAR and no change to the AUAR is needed.
The PCA recommends the preparation of a Phase 1 Environmental Site Assessment to assess the potential for undiscovered contamination.	The city thanks the PCA for the recommendation and will take this under consideration.

Minnesota Department of Transportation Comments

MnDOT requests an opportunity to review updated information as well as meet with the city and developer to discuss traffic issues as detailed site plans are developed.	The city will coordinate with MnDOT when specific site plans are developed.
The impacts to I-94 should be addressed in any future traffic study for the site and future traffic impacts to 101 should also be examined.	The city completed a transportation impact study for this area and identified needs for the transportation system. This study is available for additional information if requested.
MnDOT does not have funding or prioritized a I-94/Brockton Interchange or an interchange at TH101/South Diamond Lake Road.	This development is not contingent on development of the Brockton Interchange. The Brockton Interchange was included to determine the potential impacts to the roadway system with the construction of the interchange plus the development in question. A TH 101/S. Diamond Lake Road interchange was not considered in this study since there are many questions about feasibility and design of any interchange at that intersection.
MnDOT does not recommend extending Rogers Drive southerly into I-94 ROW limits for the Henry Development as there is reasonable access to the site without developing a frontage road. The developer and City would have to work with MnDOT regarding a new overpass.	Rogers Drive extends adjacent to the I94 ROW, but not into the ROW. The city is merely preserving ROW to allow for an overpass in the future if the need is determined. Current development patterns suggest that the overpass will provide benefit to the City and County road systems. The city will involve MnDOT in the early stages of any proposal to construct the overpass.
Any work in MnDOT ROW requires a permit.	If work within MnDOT ROW is proposed, the project proposer will be required to obtain the necessary permit. This has been added to Item 8 in the Final AUAR.

Hennepin County Comments	
The level of background growth seems overly optimistic. Since the overall development intensity and phasing is uncertain, these forecasts appear high.	The ADTs used for the 2035 analysis were based on the ADTs provided in the analysis for the Brockton Interchange study with updates to the ADTs based on refinement of the land use in the study area. These ADTs may be conservative, but the City would like to make sure that when Brockton Lane is reconstructed to an ultimate design, it will adequately accommodate traffic to and from the Brockton Interchange. Even without the Brockton Interchange constructed, traffic will likely utilize Brockton Lane to access homes and businesses on the east side of the City of Rogers due to congestion along I-94 and TH 101.
For the existing ADT, the volumes are from 2011. Hennepin County completed 2013 traffic counts on Brockton finding: 10,100 vehicles per day north of CSAH 81 (9,200 estimated in AUAR); 5,400 vehicles per day south of 141st Ave (5,700 in AUAR).	The ADTs on Brockton Lane that were used in the existing analysis were the latest available ADTs provided on the MnDOT traffic volumes website (year 2011). We will update the ADT figures in the Traffic Impact Study to reflect Hennepin County's 2013 counts along Brockton Lane. The turning movement counts used in the operational analysis were collected in 2013 and will not be affected by any changes to the ADT on Brockton Lane.
The forecasts shown without the Fletcher Lane overpass is significantly higher than the County's 2030 forecasts, which also did not assume the over pass.	As mentioned in the response to comment #1, the ADTs were based on the Brockton Interchange study and modified to include impacts due to the specific proposed development. The Hennepin County ADTs are 5 years earlier than the ADTs projected in the Henry AUAR, and the assumptions made to come up with each ADT projection may have been different.
Significant roadway and intersection improvements are proposed in the AUAR. The county currently has not projections identified in the 5-year plan for this area.	The City of Rogers is leading the expansion projects for this area. At this point, the city is working to secure the financing for each identified project and will likely be working closely with the county to determine exact financing amounts and methods. The City has been exploring state economic development funds as well as developer contributions to pay for many of the identified near-term improvements. Agreements between the City and County on funding will need to be determined outside of the scope of this AUAR.
The traffic analysis shows a future 6-lane section for Brockton Lane between CSAH 81 and proposed Rogers Drive intersection (if the Fletcher overpass is not built). Previous studies have anticipated a 4-lane divided roadway. Access management and the provision for turn	As described in the analysis, we feel that traffic volumes over approximately 30,000 vehicles on a 4-lane divided facility will cause operational problems for the roadway segment. Adequate access management and turn lane construction will allow the maximum amount of vehicles to efficiently use the roadway segment and may accommodate more than 30,000 vehicles on that roadway segment; however, the number of vehicles projected for the segment of Brockton Lane between Rogers Drive and CSAH 81 greatly exceeds that limit

lanes will become increasingly important along Brockton Lane.	without the Fletcher Overpass being constructed.
Significant intersection improvements are proposed at CSAH 81/Brockton Lane. Consideration needs to be given to the existing intersections and driveways near the intersection.	The City agrees that access modification should be considered with any project in the area of CSAH 81 and Brockton Lane. Access management will be addressed in the preliminary design process.
A potential option beyond 2035 included a Continuous Flow Intersection at CSAH 81/Brockton Lane. The need for this level of innovative intersection improvement will probably be unnecessary.	Modeling of the Continuous Flow Intersection (CFI) was included as an alternative to potentially reduce the footprint of the ultimate configuration of the intersection while accommodating left-turning movements from Brockton Lane more efficiently than a conventional intersection. The potential need for a CFI occurs with the addition of the Brockton Interchange traffic, and the decision to build or not build a CFI will need to be made when those other roadway network changes are made.
Future traffic signal installations on the county roadway will need to meet warrants.	The City will provide Signal Priority Factor memorandums as needed for signals along the corridor.
The county supports installation of full left and right turn lanes at intersections.	Comment noted.
Construction of a ¾ access is proposed on Brockton Lane. The county's guidelines indicate full access is allowed at ¼ mile spacing for rural arterial roadway, like Brockton existing. For urban divided roadway (future Brockton) limited access may be allowed at 1/8 mile spacing. Details regarding access for the study area will be reviewed and evaluated when the development occurs.	Partial access onto an undivided highway can be attained through signing/striping and/or geometric changes at the intersection (such as adding a splitter "porkchop" island to restrict turning traffic or a short divided section along Brockton Lane). When the developer submits development plans for the Henry area (specifically the "middle" site adjacent to Brockton Lane), further design considerations will be taken to ensure that any access to the site from Brockton Lane will be consistent with Hennepin County's Access Management Guidelines and promote safe and efficient access to the Henry site.

From:	Steve Stahmer
To:	Andi Moffatt; Bret Weiss; John Seifert
Subject:	Fwd: Henry Study Area DAUAR-DNR Comments
Date:	Wednesday, May 14, 2014 1:38:27 PM

Sent from my Galaxy S®III

-------- Original message --------
From: "Haworth, Brooke (DNR)"
Date:05/14/2014 1:18 PM (GMT-06:00)
To: Steve Stahmer
Subject: Henry Study Area DAUAR-DNR Comments

Mr. Stahmer,

The Department of Natural Resources (DNR) has reviewed the Draft AUAR for the Henry Study Area and submits the following comments for your consideration.

1) Forest and Woodland Communities: The DAUAR correctly identifies the occurrence of 31 acres of Maple-Basswood Forest with imperiled conservation status. This forested area provides substantial ecological services to the landscape, including the support of diverse plant and animal communities, habitat connectivity, carbon storage, air pollution removal, rainfall interception and rainwater infiltration. Enhancing its landscape value, the forest is part of a larger forest complex, as it is contiguous with the 52-acre Henry's Wood Park to the North. The development scenario is anticipated to remove 26 of these acres, which will reduce a substantial amount of the larger complex and virtually eliminate the native plant community from the project site.

Mitigation plans throughout the DAUAR mention consideration of buffer and screening retention. It should be noted that interior trees exposed by clearing (retained in strips or patches) are vulnerable to windthrow. We recommend that the AUAR commit to stronger protection measures regarding the acres of forest to be retained in future development. We recommend that these acres be connected to the larger complex to maintain both the structural integrity of individual trees and to minimize the substantial reduction of the larger forest complex.

2) Impacts to Surface Waters: While outside of the project site, Grass Lake is immediately adjacent to the project site. The DAUAR states that treated stormwater will be discharged to Grass Lake, with stormwater ponding and treatment in compliance with NPDES and Elm Creek Watershed requirements. It also states that existing soil conditions (Type C) are unsuitable for infiltration. Because of this, we recommend that the AUAR commit to working with future proposers to incorporate designs that address stormwater mitigation. Treatment of stormwaters from both the Limited Industrial and the Single Family Residential sections, though different in nature, will require significant attention by developers to adequately protect the water quality of Grass Lake.

3) Water Use Mitigation Plan: Water supply based on current availability is addressed in the DAUAR.

However, the project site falls within the I-94 Groundwater Management Area (GWMA) established by state statute in 2012, which addresses the sustainability of the groundwater resources to protect ecosystems, water quality and the needs of future generations. The AUAR should address this broader concept of groundwater management.

Thank you for the opportunity to review this document. Please feel free to contact me if you have any questions regarding these comments.

Sincerely,

Brooke Haworth
Environmental Assessment Ecologist, Central Region
MnDNR Division of Ecological and Water Resources
1200 Warner Road, St. Paul, MN 55106
Phone: 651-259-5755
Email: Brooke.haworth@state.mn.us

From:	Haworth, Brooke (DNR)
To:	sstahmer@ci.rogers.mn.us
Cc:	Andi Moffatt; Drewry, Kate (DNR); Harper, Liz (DNR); Michael Burdorf; Putzier, Paul (DNR)
Subject:	Corection to DNR comments-Henry Study Area DAUAR
Date:	Monday, May 19, 2014 10:02:49 AM

Mr. Stahmer,

On 14May2014 I submitted a comment letter on behalf of the Department of Natural Resources (DNR) for the Henry Study Area Draft AUAR. It has been brought to my attention that Comment 3 regarding water use planning is inaccurate. The correction is that the Henry Study Area does not fall within a groundwater management area currently under study by the DNR. As part of the strategic plan for groundwater management, the DNR is developing three pilot groundwater management area plans. The community of Rogers, however, is not within any of these areas. Information about this effort is available at this link: http://www.dnr.state.mn.us/gwmp/areas.html

The DNR has concerns for the long-term sustainability of aquifers in the state. We do encourage you to consider water use planning as you continue development plans in this area. I apologize for any inconvenience this inaccuracy may have caused. Please feel free to call me with any further questions.

Sincerely,

Brooke Haworth
Environmental Assessment Ecologist, Central Region
MnDNR Division of Ecological and Water Resources
1200 Warner Road, St. Paul, MN 55106
Phone: 651-259-5755
Email: Brooke.haworth@state.mn.us

elm creek
Watershed Management Commission

ADMINISTRATIVE OFFICE
3235 Fernbrook Lane
Plymouth, MN55447
PH: 763.553.1144
FAX: 763.553.9326
www.elmcreekwatershed.org
Email: judie@jass.biz

TECHNICAL OFFICE
Hennepin County DES
701 Fourth Street South, Suite 700
Minneapolis, MN55415-1600
PH: 612.596.1171
FAX: 612.348.8532
Email: Ali.Durgunoglu@hennepin.us

Henry Study Area Draft AUAR
Rogers
Project #2014-012

SUMMARY OF MAJOR ISSUES (page 3)

Fish and Wildlife

About 30+ acres of the AUAR is woodland within the high ranked Regionally Significant Ecological Resource Area. These woodlands are adjacent to Henry Woods conservation area and provides a natural resource and wildlife corridor that connects Mississippi River, Elm Creek Park Reserve and North Fork Rush Creek corridor through Diamond Creek, French Lake and Grass Lake. These woodlands, together with the wooded areas that will be preserved within the FedEx development (Kinghorn) form the ecologically significant natural area and natural resource priority corridor between Mississippi River/Elm Creek Park Reserve and North Fork Rush Creek corridor. From a wildlife perspective, it is very important to preserve and maintain this corridor. All linear manmade structures crossing this corridor must be designed with features that permit wildlife passage.

Stormwater Management

The increase in impervious cover and stormwater runoff volume will be significant especially on the west side of Brockton Lane. By late 2014 or early 2015, Elm Creek Watershed Management Organization would have adopted its 3rd generation watershed management plan. The new plan will require more stringent stormwater runoff volume, rate and water quality standards. Abstraction of stormwater runoff from impervious surfaces will be a requirement. With the proposed high-density commercial/industrial development within the AUAR, unconventional abstraction methods and stormwater reuse technologies may need to be considered.

SUMMARY OF MITIGATION MEASURES (page 6)

The following statements in the AUAR:

#2 - *"Screening and a buffer between the industrial uses and Henry's Woods will be considered."*

and,

24 - *"The City will encourage development to retain portions of the wooded areas for habitat and buffer."*

are very noncommittal.

The wooded area immediately to the south of Henry Woods is a very valuable natural resource. (See comments for Fish and Wildlife). A drainage way that flows through Henry Woods also runs through this wooded area, and drains into Grass Lake. It is important that the woodlands located within the AUAR west of Brockton Lane are preserved. The city needs to develop a preservation plan to protect this natural preserve priority corridor.

#7 - "*Design considerations for comprehensive storm water management should include regional ponding and consideration for infiltration where feasible.*"

Elm Creek WMC 3rd Generation Watershed Management Plan will require strict stormwater runoff abstraction standards. Soil conditions within the AUAR generally are not conducive for infiltration. New added impervious cover within the AUAR area will significantly increase stormwater runoff volumes. The city needs to develop stormwater reuse plans for highly impervious commercial/industrial developments to meet the stormwater abstraction standards that will be implemented by the Elm Creek Watershed Management Commission.

Thank you for giving the Commission the opportunity to comment on the Draft AUAR.

Sincerely,

Hennepin County
Department of Environmental Services

Ali Durgunoğlu

Ali Durgunoğlu, Ph.D., P.E.
Technical Advisor to the Commission

April 22, 2104
Date

Minnesota Pollution Control Agency
520 Lafayette Road North | St. Paul, Minnesota 55155-4194 | 651-296-6300
800-657-3864 | 651-282-5332 TTY | www.pca.state.mn.us | Equal Opportunity Employer

May 12, 2014

Mr. Steve Stahmer
Administrator
City of Rogers
22350 South Diamond Lake Road
Rogers, MN 55374

Re: Henry Study Area Alternative Urban Areawide Review

Dear Mr. Stahmer:

Thank you for the opportunity to review and comment on the Alternative Urban Areawide Review (AUAR) for the Henry Study Area project (Project) located in the city of Rogers, Minnesota. The Project consists of a 135 acre commercial, limited industrial, and single family residential development. Regarding matters for which the Minnesota Pollution Control Agency (MPCA) has regulatory responsibility and other interests, the MPCA staff has the following comments for your consideration.

Land Use (Item 9)

- In the event any of the existing residents or farmsteads will be demolished, please be aware that the demolition must be in compliance with state and federal regulations that require the structure be inspected for hazardous materials such as asbestos, lead based paint, light ballasts, thermostats, stored chemicals, ozone depleting chemicals, etc. Regulated asbestos-containing materials (RACM) should be abated prior to demolition activities. A "Notification of Asbestos Related Work" must be submitted to the Minnesota Department of Health by a licensed asbestos inspector 10 working days prior to conducting abatement activities, if abatement of 160 square feet, 260 linear feet, or 35 cubic feet of RACM is required. A "Notification of Intent to Perform a Demolition" must be submitted to the MPCA 10 working days prior to the commencement of demolition. Flaking lead based paint that may be present on the structure should be encapsulated or removed and properly disposed of offsite at the appropriate disposal facility prior to demolition activities. Any lead based paint chips that are present on the ground following demolition should also be removed and properly disposed of offsite at the appropriate disposal facility. A fact sheet regarding lead paint disposal is available on the MPCA website at: http://www.pca.state.mn.us/index.php/view-document.html?gid=9049. The project proposer should also consider recycling as much of the structure materials as possible to reduce the volume of material disposed of in the landfill. If you have any questions regarding demolition issues or asbestos and lead paint abatement, please contact Sean O'Connor in our St. Paul office at 651-757-2620.

- Please be aware that farmsteads have the potential for releases or threatened releases of agricultural chemicals. The Minnesota Department of Agriculture (MDA) is the regulatory agency charged with managing the response and cleanup of fertilizers and pesticides. Information regarding the MDA is available on the website at: http://www.mda.state.mn.us/en/chemicals/spills/incidentresponse/emergresponse.aspx. For questions regarding agricultural chemicals, please contact Cathy Villas-Horns with the MDA at 651-201-6697. For questions regarding waste pesticide containers, please contact Stan Kaminski with the MDA at 651-201-6562.

Water Resources (Item 11)

As noted in the EAW, French Lake is listed as impaired for nutrients. The impairment will dictate additional increased stormwater treatment during construction and require additional increased permanent treatment post construction. These requirements will be included in the National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) Construction Stormwater Permit. The project proposer should determine that compliance with these increased stormwater water quality treatments can be achieved on the project site or elsewhere. Information regarding the MPCA's Construction Stormwater Program can be found on the MPCA's website at http://www.pca.state.mn.us/water/stormwater/stormwater-c.html. Questions regarding Construction Stormwater Permit requirements should be directed to Roberta Getman at 507-206-2629.

Contamination/Hazardous Materials/Waste (Item 12)

The MPCA recommends, at a minimum, preparation of a Phase I Environmental Site Assessment prior to development to assess the potential for undiscovered soil and/or groundwater contamination from past uses of the project area and nearby properties.

We appreciate the opportunity to review this project. Please be aware that this letter does not constitute approval by the MPCA of any or all elements of the Project for the purpose of pending or future permit action(s) by the MPCA. Ultimately, it is the responsibility of the Project proposer to secure any required permits and to comply with any requisite permit conditions. If you have any questions concerning our review of this AUAR, please contact me at 651-757-2508.

Sincerely,

Karen Kromar

Karen Kromar
Planner Principal
Environmental Review Unit
Resource Management and Assistance Division

KK:bt

cc: Craig Affeldt, MPCA, St. Paul
Theresa McDill, MPCA, St. Paul

Minnesota Department of Transportation
Metropolitan District
Waters Edge Building
1500 County Road B2 West
Roseville, MN 55113

May 8, 2014

Steve Stahmer
City of Rogers
22350 South Diamond Lake Rd.
Rogers, MN 55374

SUBJECT: **Henry Study Area Draft AUAR, MnDOT Review #AUAR14-004**
North of I-94, East of MN 101
City of Rogers, Hennepin County
Control Section 2780

Dear Mr. Stahmer:

Due to the concept level nature of an AUAR, the information determined in the traffic impact study can only be considered as a general indication of environmental impact. The development scenarios may change after the AUAR is completed, therefore rendering the traffic analysis incomplete. Review of the AUAR does not constitute approval of a regional analysis and is not a specific approval for access or new roadway improvements.

When the detailed site plans are developed the traffic analysis should reflect the proposed development. Our agency requests the opportunity to review any updated information, as well as meet with the city and developer to discuss traffic issues.

MnDOT has review development plans for this area in the past; including the Stones Throw Area, reviewed in 2007 and 2008 (#P07-054A). At that time, MnDOT commented that the traffic impact analysis did not analyze the impacts to I-94. This sub-AUAR now proposes development that will generate approximately 2,500 new trips and the traffic study indicates that a large amount of the traffic will be coming from I-94. The impacts to I-94 should be addressed in any future traffic study for the site. In addition to I-94, future traffic studies should examine impacts to TH 101.

The 2035 analysis included the I-94/Brockton Interchange, which is not currently funded nor is it a MnDOT priority. An interchange at TH 101 and South Diamond Lake Road was also included, which there have not been planned by MnDOT.

MnDOT does not recommend extending Rogers Drive southerly into I-94 right of way limits for the Henry Area development. There is reasonable access to the site without developing a frontage road on MnDOT right of way. The developer and the City would have to work with MnDOT concerning a new overpass.

Permits:
Any use of or work within or affecting MnDOT right of way requires a permit. Permit forms are available from MnDOT's utility website at http://www.dot.state.mn.us/utility/. Direct questions regarding permit requirements to Buck Craig, Metro Permits, at 651-234-7911 or buck.craig@state.mn.us.

Review Submittal Options:
MnDOT's goal is to complete the review of plans within 30 days. Submittals sent electronically can usually be reviewed faster. Submit one of the following:

1. One (1) pdf version of the plans. MnDOT can accept the plans via e-mail at metrodevreviews.dot@state.mn.us provided that each e-mail is less than 20 megabytes.
2. Three (3) sets of full size plans. Although submitting seven (7) sets of full size plans will expedite the review process. Send plans to:

   MnDOT – Metro District Planning Section
   Development Reviews Coordinator
   1500 West County Road B-2
   Roseville, MN 55113

3. One (1) compact disk.
4. Plans can also be submitted to MnDOT's external FTP site. Send files to: ftp://ftp2.dot.state.mn.us/pub/incoming/MetroWatersEdge/Planning. Internet Explorer may not work using ftp, using an FTP Client or your Windows Explorer (My Computer). Send a note to metrodevreviews.dot@state.mn.us indicating that the plans have been submitted on the FTP site.

If you have any questions concerning this review, please contact me at 651-234-7789.

Sincerely,

Molly McCartney

Molly McCartney
Sr. Transportation Planner

Copy sent via E-Mail:
Chad Erickson, Traffic
Nancy Jacobson, Design
Brian Kelly, Water Resources
Buck Craig, Permits
Ramankutty Kannankutty, West Area Engineer
Doug Nelson, Right-of-Way
Dave Torfin, Surveys
Tod Sherman, Planning
Russ Owen, Metropolitan Council

Hennepin County Public Works
Strategic Planning & Resources Department
701 Fourth Avenue South, Suite 400
Minneapolis, Minnesota 55415-1843
Phone: 612-348-4077
Fax: 612-348-9710
www.hennepin.us

May 14, 2014

Mr. Steve Stahmer, Administrator
City of Rogers
22350 South Diamond Lake Road
Rogers, MN 55374

Re: Comments to the Draft Areawide Urban Review for the Henry Study Area, as posted by the Environmental Quality Board April 14, 2014

Dear Mr. Stahmer:

This letter provides comments to Question 18 (Transportation) for the Draft Alternative Urban Areawide Review (AUAR) completed for the Henry Study Area and the supporting Henry Area AUAR Traffic Impact Study. The development is proposing commercial, industrial and residential land uses west of Brockton Lane (CSAH 13), between David Koch Avenue and 124th Avenue in the City of Rogers. The county previously provided comments for the Kinghorn Development located immediately to the south of the Henry area. Based on our review of the Henry Study Area Draft AUAR, we provide the following general comments:

- The level of background growth and development assumed in the traffic analysis seems overly optimistic for this area. The yearly growth rate assumption for future traffic forecasts used in the Draft AUAR appears to be near 7 percent on Brockton Lane. Other high growth cites such as Maple Grove and Plymouth have experienced traffic growth rates in the 4-5 percent per year range, and this level was sustained only for relatively short time periods. Since the overall development intensity and phasing is uncertain, it appears that these forecasts are high.

- For the existing average daily traffic volumes (ADT's) shown in Figure 2.1 in the traffic impact study, traffic volumes from the year 2011 flow maps were used as a basis of estimating the year 2013 ADT's. Hennepin County completed 2013 traffic counts on Brockton Lane finding: 10,100 vehicles per day, north of CSAH 81 (9,200 estimated in the AUAR) and 5,400 vehicles per day south of 141st Avenue (CSAH 144), which was estimated to be 5,700 in the Draft AUAR.

- In review of the Year 2035 daily traffic forecasts shown on Brockton Lane in Figure 2.6 of the Henry Area Development Traffic Impact Study, the following average daily traffic volumes (ADT's) are shown: 42,000 vehicles per day (without Fletcher Lane overpass) and 32,000 vehicles per day (with Fletcher Lane overpass), north of CSAH 81. The forecast shown without the Fletcher Lane overpass is significantly higher than Hennepin County's 2030 forecasts, which also did not assume the overpass.

- Significant roadway and intersection improvements are proposed in the Draft AUAR. The county currently has no projects identified in the 5-year approved Capital Improvement Program (CIP) for this area.
- Based on the results of the traffic analysis, a future six-lane section is proposed on Brockton Lane between CSAH 81 and the proposed Rogers Drive intersection (if the Fletcher Lane overpass is not built). Expectations based on previous studies have anticipated a four-lane divided roadway design.

Access management and the provision for turn lanes will become increasingly important for traffic operations and safety along Brockton Lane.

- Significant intersection improvements are proposed at the CSAH 81/Brockton Lane intersection. Consideration needs to be given to the existing intersections and driveways near the intersection. The county supports a general concept to provide a frontage and backage roadway system to allow shared access to Brockton Lane for adjacent properties along the corridor. In addition, for other properties along the corridor, the county supports the development of an east-west local street system that is centered on adjacent property lines to provide additional opportunities for shared access.

- Based on the traffic analysis, a potential option for consideration (beyond year 2035), included a Continuous Flow Intersection (CFI) at the CSAH 81/Brockton Lane intersection. As noted above, the need for this level of innovative intersection improvement will probably be unnecessary.

- The future need for traffic signal installation is identified at the following intersections along Brockton Lane: 141st Avenue, Rogers Drive, and potentially David Koch Avenue. Future traffic signal installations on the county roadway system will need to meet the required warrants and exceed the county priority factor threshold for county approval.

- Additional turn lanes are proposed at the majority of the study intersections. The county supports the installation of full left and right turn lanes at all intersections including Brockton Lane, CSAH 81 and 141st Avenue due to the high traffic speeds and traffic volumes. The county's preference is to provide the safer standard dedicated turn lane design, as opposed to bypass lanes.

- Construction of 3/4-access is proposed on Brockton Lane for the Henry Area development. Based on the county's access management guidelines, full access is allowed at 1/4-mile spacing for a rural arterial roadway (which is the current design of Brockton Lane). For urban divided roadways (which likely would be the design of Brockton Lane in the future), limited access may be allowed at 1/8-mile spacing. The details regarding access for the Henry Study Area will be reviewed and evaluated when the development occurs or when a future roadway project is designed.

It should be noted that these comments on the Draft AUAR do not bind the county regarding future plat and development reviews, access permitting, design configurations or traffic signal approvals.

I appreciate your consideration of Hennepin County comments at this time and look forward to your response. If you have any questions, please contact me a 612-348-5714 or david.jaeger@co.hennepin.mn.us.

Sincerely,

David Jaeger
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