The Royal Golf Club Residential Development

Environmental Assessment Worksheet

October 17, 2016

Responsible Governmental Unit (RGU)

City of Lake Elmo
Planning and Zoning Department
3800 Laverne Avenue North
Lake Elmo, Minnesota 55042
http://www.lakeelmo.org/

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Memo

To: Minnesota Environmental Quality Board
Environmental Review Distribution List

From: Stephen Wensman, Planning Director

Date: October 17, 2016

Subject: The Royal Golf Club Residential Development EAW

As the Responsible Governmental Unit (RGU), the City of Lake Elmo is issuing this Environmental Assessment Worksheet (EAW) for The Royal Golf Club Residential Development. The public comment period on this EAW begins when the public notice is published in the Minnesota Environmental Quality Board (EQB) Monitor on October 24, 2016. A press release (or public notice) has been submitted for publication in the Oakdale-Lake Elmo Review. Public comments on this EAW will be accepted by the City of Lake Elmo until 4:30pm on November 23, 2016.

Environmental Assessment Worksheet (EAW)

The Royal Golf Club Residential Development

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Environmental Assessment Worksheet (EAW)

The Royal Golf Club Residential Development

This Environmental Assessment Worksheet (EAW) form and EAW Guidelines are available at the Environmental Quality Board's website at: http://www.eqb.state.mn.us/EnvRevGuidanceDocuments.htm. The EAW form provides information about a project that may have the potential for significant environmental effects. The EAW Guidelines provide additional detail and resources for completing the EAW form.

Cumulative potential effects can either be addressed under each applicable EAW Item, or can be addresses collectively under EAW Item 19.

Note to reviewers: Comments must be submitted to the RGU during the 30-day comment period following notice of the EAW in the *EQB Monitor*. Comments should address the accuracy and completeness of information, potential impacts that warrant further investigation and the need for an EIS.

1. Project Title: **The Royal Golf Club Residential Development**

2. Proposer:	HC Golf Development, LLC	**RGU:**	City of Lake Elmo
Contact person:	Rick Packer	Contact person:	Stephen Wensman
Title:	President	Title:	Planning Director
Address:	11074 Radisson Road NE	Address:	3800 Laverne Avenue North
	Blaine, MN 55449		Lake Elmo, MN 55042
Phone:	(763) 783-9000	Phone:	(651) 747-3911
Fax:	(763) 783-8248	Fax:	(651) 747-3901
Email	rpacker@royalgolfclubmn.com	Email	swensman@lakeelmo.org

4. Reason for EAW Preparation

Required:
- ☐ EIS Scoping
- ☑ Mandatory EAW

Discretionary:
- ☐ Citizen petition
- ☐ RGU discretion
- ☐ Proposer initiated

If EAW or EIS is mandatory give EQB rule category subpart number(s) and name(s):
Minnesota Rules Part 4410.4300, Subp. 19.c (Residential development)

5. Project Location

County: Washington County, Minnesota
City/Township: City of Lake Elmo
PLS Location (¼, ¼, Section, Township, Range): Section 25, T29N, R21W
Watershed (81 major watershed scale): Lower St. Croix River (37)
GPS Coordinates: 44.971280, -92.872716
Tax Parcel Number(s): 25.029.21.12.0001, 25.029.21.14.0001, 25.029.21.21.0001, 25.029.21.31.0001, 25.029.21.42.0001, 25.029.21.43.0001, and 25.029.21.43.0002

At a minimum attach each of the following to the EAW:

- *County map showing the general location of the project;*
- *U.S. Geological Survey 7.5 minute, 1:24,000 scale map indicating project boundaries (photocopy acceptable); and*
- *Site plans showing all significant project and natural features. Pre-construction site plan and post-construction site plan.*

6. Project Description

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

The Royal Golf Club Residential Development is proposed on 222.2 acres of privately-owned land. The project includes 292 single-family residential lots and municipal utilities. The project will involve grading, installation of public and private infrastructure, open space preservation, tree clearing, and stormwater ponding.

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 Royal Golf Club Residential Development is proposed on 222.2 acres of privately-owned land in the eastern part of the City of Lake Elmo, Washington County, Minnesota (**Figure 1**). The project area was previously part of Tartan Park, which was owned by 3M. The project is located in Section 25, T29N, R21W (**Figure 2**). The project area is bordered on the north by 20th Street North; on the east by Manning Trail North; on the south by 10th Street North (CSAH 10); and on the west by Lake Elmo Avenue (CSAH 17).

The project will convert approximately 147.9 acres of golf course, woodland, ball fields, grassland, and wetland to streets, homes, lawns, landscaping, and stormwater ponding (**Figure 3**). The land slated for conversion to residential includes about 93.2 acres of golf course consisting of turf and trees and about 41.1 acres of woodland. The project will include approximately 90.8 acres of private open space consisting of woodland, stormwater ponds, wetlands, grassland, and turf areas. The open space will include wetland buffers and buffers that screen the project from adjacent uses.

Proposed single-family homes will accommodate a broad range of lifestyles choices and range from low-maintenance villas to deluxe homes on premium lots. Custom homes may be constructed in certain areas to optimize tree preservation opportunities. Home types and locations are based on the site's natural features and proximity to the adjoining 18-hole golf course. The project design emphasized preservation of wooded buffers along the exterior boundaries of the site to maintain the character of existing roads and provide buffers from existing residential areas. To the extent practicable, proposed streets have been designed to follow ridges and high points, minimize topographic disruption, and preserve natural amenities. Retaining walls are planned in certain locations to further minimize the extent of grading.

The project area includes 13 wetlands and water bodies that cover approximately 26.1 acres within the site boundary. These features include three Minnesota DNR (MnDNR) pubic water features. The public waters cover about 15.4 acres, including Lake Rose (82-112W), part of an unnamed wetland (82-117W), and part of an unnamed MnDNR watercourse. The project area includes parts of five shoreland overlay districts and two areas of mapped floodplains. The proposed project design complies with shoreland overlay district requirements and minimizes effects on wetlands and floodplains.

Single-family lots will generally range from 80- to 100-feet wide and have a minimum depth of about 140 feet. Lots for smaller homes (villas) are proposed to be 55 to 65 feet wide and about 135 feet deep. Public streets are expected to be 28 feet wide and located within 60-foot rights-of-ways. Trails will connect neighborhoods to the adjoining golf course and the development will operate under a homeowners' association.

Development of the project area will involve installation of public and private infrastructure, including streets, trails, municipal water and sanitary sewer, stormwater systems, electrical lines, and telephone lines. The project area will be served by City of Lake Elmo fire and police services. The project area is served by Stillwater Area Schools. Traffic generated by the project will have little to no impact on the regional transportation system. Intersections surrounding the site will continue to operate at acceptable levels of service with the traffic generated by the proposed project.

It is anticipated that construction of the development will start in 2017 and be phased over approximately 5 years, depending on market conditions. Construction will generally be phased from the west to the east based on the extension of municipal water and sewer. The number of phases will be determined by market demand and absorption. Infrastructure will be installed at the initiation of each construction phase. In most cases, streets, water main, and sanitary sewer will only be installed to serve the upcoming phase of construction. It may be necessary to initiate stormwater system construction at the start of each construction phase to properly treat stormwater and minimize potential effects of stormwater runoff.

c. *Project magnitude:*

Table 1. Project Magnitude

Characteristic	Number of Units
Total Project Acreage	222.2
Linear project length	NA
Number and type of residential units	292 (single-family detached)
Commercial building area (square feet)	0
Industrial building area (square feet)	0
Institutional building area (square feet)	0
Other uses – specify (acres)	NA
Structure height(s) (feet)	20-35

d. *Explain the project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries.*

The purpose of The Royal Golf Club Residential Development is to provide a unique residential development with natural open spaces in proximity to transportation corridors and quality schools. The project will be carried out by a private entity.

e. *Are future stages of this development including development on any other property planned or likely to happen?* ☐ Yes ☑ No
If yes, briefly describe future stages, relationship to present project, timeline and plans for environmental review.

Future stages are not planned or likely.

f. *Is this project a subsequent stage of an earlier project?* ☐ Yes ☑ No
If yes, briefly describe the past development, timeline and any past environmental review.

The project is not a subsequent stage of an earlier project.

7. Cover Types

Estimate the acreage of the site with each of the following cover types before and after development:

Table 2. Cover Types

Land Cover	Before (acres)[1]	After (acres)[2]
Golf course (turf and trees)	93.2	0.0
Other turf/lawns	0.00	104.9
Woodland	77.3	36.2
DNR public waters	15.4	15.4
Other wetlands	10.7	8.5
Impervious surface (developed)	10.2	48.8
Ball fields and sport courts	9.3	0.0
Grassland/meadow	6.1	4.0
Stormwater ponds	0.0	4.4
Totals	222.2	222.2

[1] Existing impervious surface includes roads, parking, and tennis courts.

[2] After development wetland acreage assumes about 2.2 acres of onsite wetlands will be filled or converted to stormwater features. Three of the five wetlands to be impacted are created golf course ponds that are incidental under the Minnesota Wetland Conservation Act. Required wetland replacement and 2.3 acres of stormwater ponds will be located offsite.

Existing cover types are shown on **Figure 4**. Delineated wetland and waters are shown on **Figure 5**.

8. Permits and Approvals Required

List all known local, state and federal permits, approvals, certifications and financial assistance for the project. Include modifications of any existing permits, governmental review of plans and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure. All of these final decisions are prohibited until all appropriate environmental review has been completed. See Minnesota Rules, Chapter 4410.3100.

Table 3. Permits and Approvals Required

Unit of Government	Type of Application	Status
City of Lake Elmo	EAW Final Declaration	To be applied for
City of Lake Elmo	Comprehensive Plan Amendment	Submitted
City of Lake Elmo	Rezoning	To be applied for
City of Lake Elmo	Concept Plan Approval	Submitted
City of Lake Elmo	Plat Approval	To be applied for
City of Lake Elmo	PUD Approval	To be applied for
City of Lake Elmo	Grading Permit	To be applied for
City of Lake Elmo	Building Permit	To be applied for
City of Lake Elmo	Stormwater Management and Erosion Control Approval	To be applied for
City of Lake Elmo	Municipal Water Connection Permit	To be applied for
City of Lake Elmo	Sanitary Sewer Connection Permit	To be applied for
Valley Branch Watershed District	Wetland Boundary / Type Determination	Approved
Valley Branch Watershed District	Grading, Stormwater and Erosion Control Permit	To be applied for
Valley Branch Watershed District	Wetland Replacement Plan Decision	Submitted
Washington County	Right-of-Way Permit (CSAH 17)	To be applied for
Washington County	Access Permit (CSAH 17)	To be applied for
Metropolitan Council	Comprehensive Plan Amendment	Submitted
Minnesota Department of Health	Water Main Extension Approval	To be applied for
Minnesota Department of Natural Resources	Water Appropriation Permit	To be applied for (if needed)
Minnesota Pollution Control Agency	NPDES/SDS General Permit	To be applied for
Minnesota Pollution Control Agency	Sanitary Sewer Extension Approval	To be applied for
Federal Emergency Management Agency	Letter of Map Revision Based on Fill	To be applied for
U. S. Army Corps of Engineers	Wetland Delineation Concurrence / Jurisdictional Determination	Approved

Cumulative potential effects may be considered and addressed in response to individual EAW Item Nos. 9-18, or the RGU can address all cumulative potential effects in response to EAW Item No. 19. If

addressing cumulative effect under individual items, make sure to include information requested in EAW Item No. 19

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.

The project area includes part of a private 27-hole golf course and recreational facility that was previously known as Tartan Park. Tartan Park was developed during 1964-1968 as a private park for 3M employees. It includes the golf course, tennis courts, softball fields, bocce ball courts, picnic shelters, parking lots, and a club house. The project area includes about a third of the golf course and the entire sports complex (**Figure 4**). The balance of the site includes approximately 77.3 acres of woodland, 26.1 acres of wetlands and public waters, and 6.1 acres of grassland (**Figures 4 and 5**).

Adjacent land uses consist mostly of golf course, single-family residential, and rural residential development (**Figure 6**). The adjoining part of the golf course will continue to operate as an 18-hole course. The 3.5-square-mile Lake Elmo Park Reserve is located west of the site and the Oakdale Gun Club is located immediately south of the Park Reserve. Oak Land Junior High School is located south of the project area and St. Lucas Community Church is situated east of the site. Other nearby land uses are predominantly residential and interspersed with woodlands, wetlands, and small areas of cropland.

Farmland ratings for soils mapped in the project area are listed in **Table 5** under **Item 10b** of this EAW. Of the 22 soil map units present in the project area, six soils that cover approximately 20% of the area are prime farmland, two soils that cover approximately 8% of the area are prime farmland if drained, three soils that cover about 10% of the site are farmland of statewide importance, and 11 soils that cover about 62% of the site are not prime farmland. Most prime farmland soils mapped on the site are located in the existing golf course. Alternatives to conversion of prime farmland are limited because the project area is not guided for agricultural use. The Web Soil Survey indicates that farmland classifications are intended to identify soils best suited to food, feed, fiber, forage, and oilseed crops. No prime farmland preservation measures have been considered.

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.

The City of Lake Elmo 2030 Comprehensive Plan shows the planned land use of the site as Public/Park. This planned land use considers the past use of the site as 3M's Tartan Park. However, the Lake Elmo Comprehensive Parks and Recreation Plan does not show planned municipal parks or Natural Resource DNR Priorities within the site boundary. The City of Lake Elmo 2030 Park System Plan shows Neighborhood Parks and a Community Sports Complex planned for locations situated north and south of the project area. The Washington County Land and Water Legacy Program Conservation Priorities Plan (2010) shows steep slopes in the project area to be a priority for land protection. The site is not located within a planned conservation corridor and the MnDNR

Biological Survey does not show sensitive natural communities or rare species located on the site. The nearest natural community mapped by the MnDNR is an oak forest located approximately 1 mile east of the site.

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

Zoning Overview

The City of Lake Elmo Zoning Map shows that the project area is currently zoned PF – Public and Quasi-Public Open Space. The residential development would require rezoning and the project proponent has proposed to rezone the residential portion of the property to LDR/PUD – Urban Low Density Residential/Planned Unit Development. The project area does not fall in or near a wild and scenic river, critical area, or agricultural preserve. However, the project area includes multiple areas of shoreland overlay districts and floodplains.

Shorelands

Development in shorelands is regulated under the City of Lake Elmo Shoreland Management Overlay District Ordinance and Minnesota Rules Part 6120. The purpose of the Shoreland Management Overlay District is to preserve and enhance the quality of surface waters and conserve the economic and natural environmental values of shorelands through:

1. regulating sanitary and waste treatment facilities in shorelands to prevent pollution and public health hazards;
2. regulating alteration of shorelands to prevent excessive sediment pollution, nutrient pollution, and water runoff;
3. preserving and enhancing the unique aesthetic appearance and ecological value of shorelands; and
4. regulating building construction and land use changes in shorelands to minimize property damage during periods of high water.

The Minnesota state legislature has delegated authority for regulation of development in shorelands of public waters to local government units as a means to preserve and enhance the quality of surface waters, conserve the economic and natural environmental values of shorelands, and provide for the wise use of waters and related land resources. However, the Lake Elmo Shoreland Management District Ordinance defers to the MnDNR for approval of shoreland PUDs.

Shoreland regulations specify minimum standards for development in shorelands. Key standards include setbacks from pubic waters and residential lot sizes. **Table 4** lists five Shoreland Overlay Districts that overlap the site and residential lot standards that apply to the proposed project. The City of Lake Elmo Shoreland Management Overlay District Ordinance is currently under revision and review in consultation with the MnDNR. Although the current draft of the ordinance lists shoreland for DNR public waters wetland 82-417W, this basin is not included in the MnDNR Shoreland Classification list. A shorland classification may not be appropriate for DNR wetland 82-417W because it covers only 7 acres, which is smaller than the 10-acre size specified for shoreland standards in the MnDNR Guide for Buying and Managing Shoreland. Consequently, DNR wetland

82-417W may be removed from the City's shoreland ordinance. Wetland 82-417W was omitted from this assessment pending its removal from the City's shoreland ordinance.

Table 4. Shoreland Overlay Districts in the Project Area

DNR PWI No.	Name	Shoreland Classification	Tier Width (ft)	OHWL	Minimum	
					Structure Setback from OHWL (ft)	Non-Riparian Lot Size (ft^2)
82-106P	Lake Elmo	Recreational Development	267	885.6	75	15,000
DNR Watercourse	Unnamed Tributary	Tributary	267	Edge, bank of channel	75	Same as underling zoning district
82-110W	Downs Lake	Natural Environment	320	889.1	150	20,000
82-112W	Lake Rose	Natural Environment	320	± 878.0	150	20,000
82-74P	Horseshoe Lake	Natural Environment	320	876.8	150	20,000

The project proponent will file an application to have the residential project area rezoned to LDR/PUD – Urban Low Density Residential/Planned Unit Development with the future preliminary plat application. The City's ordinance allows for PUDs in shorelands, subject to: (1) the Planned Unit Development Ordinance; and (2) the density evaluation procedures for PUDs set forth under Minnesota Rules Part 6120.3800, Subparts 4 to 6. PUDs are allowed for new projects in shorelands, provided that the project density does not exceed the allowable density, and that the development includes measures to protect water resources. Water resource protection measures may include a property owners' association, increased setbacks from public waters, and centralized surface water-oriented uses such as mooring facilities.

The City's ordinance also requires that shoreland PUDs be connected to public water and sewer systems, and that least 50% of the shoreland area be maintained as open space. Open space cannot include road rights-of-way, impervious surfaces, or structures; but it can include outdoor recreation facilities.

Much of the shoreland in the project area is currently open space and will remain as open space under the proposed development plan (**Figure 7**). The proposed project does not include riparian lots. Four areas of shoreland are proposed for development: (1) Lake Elmo/DNR Watercourse (Recreational Development/Tributary); (2) Downs Lake (Natural Environment); (3) Lake Rose/Horseshoe Lake West (Natural Environment); and (4) Horseshoe Lake East (Natural Environment).

The shoreland density evaluation requires dividing the shorelands into tiers and dividing the suitable development area in each tier by the minimum lot size to determine the allowable density of residential lots. Shoreand tiers are shown on **Figure 7** and the overall shoreland density evaluation is provided in (**Table 5**). Tables detailing the tiered density evaluation for each of the four shoreland areas are provided in **Appendix A**. The suitable development area does not include wetlands or bluffs. Net open space, excluding impervious areas and street right-of-way, accounts for 66% of the overall shoreland development area (**Table 6**). Detailed tables in **Appendix A** show that every tier

containing proposed residential lots will be least 61% open space. This open space does not include any of the additional riparian open space that will remain within the golf course on adjoining lands.

Table 5. Overall Shoreland Density Evaluation

Shoreland	Total Area (sq.ft.)	Wetlands (sq.ft.)	Bluffs (sq.ft.)	Net Suitable Area (sq.ft.)	Required Lot Size (sq. ft.)	Allowable Base Density	Proposed Density
Lake Elmo/DNR Watercourse	1,223,356	15,246	42,997	1,165,113	15,000	77.7	31
Downs Lake	250,566	27,443	0	223,123	20,000	11.2	7
Lake Rose/Horseshoe Lake W	2,399,274	741,391	0	1,657,883	20,000	82.9	41
Horseshoe Lake E	657,286	0	0	657,286	20,000	32.9	33
Total	4,530,482	784,080	42,997	3,703,405		204.7	112

Table 6. Overall Open Space Calculation

Shoreland	Net Suitable Area (sq.ft.)	Number of Proposed Lots	Not Open Space		Net Open Space (sq.ft.)	% Open Space
			4,000 sq. ft. Impervious per Lot	Street Right-of-Way (sq.ft.)		
Lake Elmo/DNR Watercourse	1,165,113	31	124,000	185,695	855,418	73.4
Downs Lake	223,123	7	28,000	30,753	164,370	73.7
Lake Rose/Horseshoe Lake W	1,657,883	41	164,000	476,990	1,016,893	61.3
Horseshoe Lake E	657,286	33	132,000	110,548	414,738	63.1
Total	3,703,405	112	448,000	803,986	2,451,419	66.2

The shoreland density analysis shows that:

1. 112 of the 292 proposed lots fall within shorelands;
2. the overall proposed density in shorelands is substantially less than the allowable base density
3. the tiered residential density evaluation shows the proposed density is equal to or less than the allowable density in every case; and
4. shoreland tiers with proposed residential lots will be at least 50% open space.

Floodplains

Flood Insurance Rate Map (FIRM) panels revised by the Federal Emergency Management Agency (FEMA) on February 3, 2010 show three areas of Flood Zone A mapped within the project area (**Figure 7**). Flood Zone A includes special flood hazard areas subject to inundation by the 1% annual chance of flood. The flood zone that corresponds to DNR public waters wetland 82-417W (Wetland 11) will not be affected by the proposed project.

The project will affect flood zones associated with Downs Lake, located north of the project, and Lake Rose, located on the southern part of the project. The Downs Lake Flood Zone is Zone AE and it has a base flood elevation of 893.0 feet. Downs Lake is located about 735 feet north of the project area and its flood zone overlaps the northeastern part of the project area. The Lake Rose Flood Zone

is Zone A. FEMA has not determined a base flood elevation for this for Lake Rose, but the Valley Branch Watershed District has estimated the base flood elevation of Lake Rose at 886.0. feet.

Downs Lake and Lake Rose have general floodplains and are still water basins. The City of Lake Elmo Flood Plain Ordinance states that the floodway for lake and wetland basins in the City shall be the floodplain below the ordinary high water level (OHWL). The Flood Plain Ordinance requires that compensatory flood storage be provided for fill placed in the floodplain, or that it be determined that the project will not increase the flood elevation.

Downs Lake (DNR public waters wetland 82-110W) has an OHWL of 889.1 (NGVD 29 datum), which translates to a floodway elevation of 889.2 (NAVD 88 datum). Although Lake Rose (DNR public waters wetland 82-112W) does not have an official OHWL, the project proponent coordinated with the MnDNR Area Hydrologist to establish an estimated OHWL of 978.0 for use as the floodway elevation on this project. In both cases, the floodplain located above the OHWL is considered Flood Fringe.

The project is proposing to place about 14.0 acre-feet of fill in the flood fringe of Downs Lake to elevate an area for construction of 15 residential lots and adjoining streets. Construction of a municipal street around the east side of Lake Rose will require about 1.6 acre-feet of fill in the flood fringe of Lake Rose. In each case, excavation will be completed to provide at least 1:1 flood storage replacement for the volume of flood storage impact. Approximately 16.9 acre-feet of flood storage replacement will be provided in the Downs Lake floodplain. This flood storage mitigation is proposed within the golf course that adjoins the project area, in and near Wetlands 16 and 17. About 2.0 acre-feet of flood storage replacement will be provided in the Lake Rose floodplain, on the south side of Wetland 2 (**Figure 7**). As a result, the project will not adversely affect the volume of flood storage or increase the flood elevation onsite.

New homes and infrastructure will be elevated above base flood elevations and protected from foreseeable flood impacts. Homes and streets elevated on fill above the floodplain will comply with the City's Flood Plain Ordinance and Valley Branch Watershed District Rules, which require that lowest floor elevations be at or above the regulatory flood protection elevation and that minimum building elevations be at least 2 feet above the flood elevation. The project will be required to obtain a Letter of Map Revision based on Fill (LOMR-F) for properties constructed on fill and elevated above the floodplain elevation. The project is designed to compensate for effects on floodplains and is not expected to diminish the capacity of the project area to accommodate flooding.

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 City of Lake Elmo 2030 Comprehensive Plan shows the planned land use of the site as Public/Park, which reflects the site's historical use as Tartan Park, but the Comprehensive Plan does not show planned municipal parks within the site boundary. The project area is currently zoned PF (Public and Quasi-Public Open Space). Although the proposed residential development is not compatible with the existing Comprehensive Plan or zoning, the project is designed to be compatible with nearby land uses, as discussed under **Item 9c** below.

c. *Identify measures incorporated into the proposed project to mitigate any potential incompatibility as discussed in Item 9b above.*

The project will require a Comprehensive Plan Amendment to guide the residential development area for Village Urban Low Density, which is defined as a net density of 1.5-2.49 units/acre. The project proponent has initiated the Comprehensive Plan Amendment process and anticipates that the residential area will be rezoned from PF – Public and Quasi-Public Open Space to LDR/PUD – Urban Low Density Residential/Planned Unit Development. The proposed project is compatible with the proposed land use, zoning, and surrounding land uses. The project is designed to preserve considerable forested buffers adjacent to surrounding roadways. These vegetated buffers will enhance the compatibility of the project with nearby land uses and help preserve the forested character of the area. Land use conflicts are not anticipated.

10. Geology, Soils and Topography / Land Forms

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.*

The Geologic Atlas of Washington County, Minnesota (University of Minnesota Geological Survey 1990) indicates the surficial geology of the area is characterized by sand, loamy sand, and gravel. The bedrock geology of the site falls in the Prairie Du Chien Group and is characterized by dolostone.

The estimated depth to bedrock in the project area generally ranges between 50 and 200 feet. As indicated under **Item 11.a.ii**, the depth to bedrock in five nearby commercial wells averages 104 feet and range from 85 to 158 feet. The depth to static groundwater in 14 groundwater wells located near site ranges from 18 to 65 feet and averages 39.2 feet (see **Item 11.a.ii)**.

Sinkholes and karst lands are known to occur in Washington County. Minnesota Karst Lands and Sinkhole Mapping prepared by Calvin Alexander and others (2006) shows covered and transitional karst in the project area. The area is underlain by carbonate bedrock, generally with 50 to 150 feet of sediment cover. Sinkholes can occur when caves in carbonate or sandstone bedrock collapse, potentially due to solution weathering, a sudden shock, or lowering of the water table. No sinkholes are known to exist in the immediate vicinity of the project and no mitigation measures are proposed.

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.*

The Web Soil Survey indicates the project area includes 22 soil mapping units that consist of mostly sandy loams, loamy sands, and silt loams (**Table 7, Figure 8**).

Table 7. Soil Classifications

Symbol	Soil Name	% of Area	% Hydric	Hydric Category	Farmland Category
49	Antigo silt loam, 0-2% slopes	1.4	1	Predominantly non-hydric	Prime farmland
49B	Antigo silt loam, 2-6% slopes	16.4	1	Predominantly non-hydric	Prime farmland
49C	Antigo silt loam, 6-12% slopes	4.3	1	Predominantly non-hydric	Farmland of statewide importance
120	Brill silt loam	1.3	5	Predominantly non-hydric	Prime farmland
189	Auburndale silt loam	2.7	93	Predominantly hydric	Not prime farmland
170	Blomford loamy fine sand	0.7	92	Predominantly hydric	Not prime farmland
452	Comstock silt loam	0.7	4	Predominantly non-hydric	Prime farmland if drained
507	Poskin silt loam	4.4	3	Predominantly non-hydric	Prime farmland if drained
1033	Udifluvents	4.8	0	Non-hydric	Not prime farmland
1847	Barronett silt loam, sandy substratum	0.7	90	Predominantly hydric	Not prime farmland
155B	Chetek sandy loam, 0-6% slopes	4.2	0	Non-hydric	Farmland of statewide importance
155C	Chetek sandy loam, 6-12% slopes	25.6	0	Non-hydric	Not prime farmland
155D	Chetek sandy loam, 12-25% slopes	7.7	0	Non-hydric	Not prime farmland
301B	Lindstrom silt loam, 2-4% slopes	1.5	4	Predominantly non-hydric	Prime farmland
302B	Rosholt sandy loam, 1-6% slopes	0.9	3	Predominantly non-hydric	Prime farmland
342C	Kingsley sandy loam, 6-12% slopes	1.8	0	Non-hydric	Farmland of statewide importance
367B	Campia silt loam, 0-8% slopes	0.9	2	Predominantly non-hydric	Prime farmland
454D	Mahtomedi loamy sand, 12-25% slopes	10.5	0	Non-hydric	Not prime farmland
454F	Mahtomedi loamy sand, 25-40% slopes	0.5	0	Non-hydric	Not prime farmland
858C	Urban land-Chetek complex, 3-15% slopes	7.0	0	Non-hydric	Not prime farmland
896D	Mahtomedi-Kingsley complex. 12-25% slopes	0.9	0	Non-hydric	Not prime farmland
W	Water	1.7	NA	NA	NA

These soils have varying levels of limitations for dwelling units and local streets due to factors such as slope, depth to saturated zone, and shrink-swell. The project proponent is considering soil correction to address these limitations where necessary. Soils with depth to saturation limitations are often associated with wetlands, which are addressed under **Item 11.a.i** below. Soils in the project area are generally considered moderately susceptible to the sheet and rill erosion by water, as indicated by K factors that range between 0.10 and 0.49.

Grading operations for residential development construction are expected to affect 137.5 acres and involve movement of about 750,000 to 1 million cubic yards of soil to construct streets, residential building pads, and stormwater ponds. Grading is expected to avoid disturbance on 84.4 acres within the project area. This area includes most wetlands and substantial tree cover. This area will be partially maintained in its existing condition and partially converted to native vegetation and protected as wetland buffer.

Elevations in the project area range from 944 feet above mean sea level at the tops of hills within the golf course to about 874 feet near the edges of open water wetlands and lakes. Review of two-foot contour mapping indicates that steep slopes occur in several parts of the project area. The northwestern part of the project area includes 0.99 acre of bluffs (**Table 5, Figure 7**). Soils mapping shows that slopes of 12% or more cover about 20% of the project area (**Table 7, Figure 8**).

Development of the project area will disturb more than one acre of land and therefore will require application for coverage under the National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) General Permit administered by the Minnesota Pollution Control Agency (MPCA) prior to initiation of earthwork. In compliance with the General NPDES Permit for construction activities, the project proponent and construction contractor will need to implement Best Management Practices (BMPs) to reduce erosion and sedimentation and stabilize exposed soils after construction. Erosion and sedimentation control BMPs related to stormwater runoff are discussed in greater detail within **Item 11.b.ii**.

NOTE: For silica sand projects, the EAW must include a hydrogeologic investigation assessing the potential groundwater and surface water effects and geologic conditions that could create an increased risk of potentially significant effects on groundwater and surface water. Descriptions of water resources and potential effects from the project in EAW Item 11 must be consistent with the geology, soils *and topography/land forms and potential effects described in EAW Item 10.*

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.

The project area includes 13 delineated wetlands and waters, three of which are identified on MnDNR public waters inventory maps (**Figure 5**). Kjolhaug Environmental Services delineated wetlands and waters in the project area during March and April, 2016 (**Table 8)**. Several of the

water bodies in the project area have steep, excavated, or rip-rapped shorelines. Of the 13 wetlands and waters, eight correspond to wetland locations shown on National Wetlands Inventory (NWI) mapping (**Figure 9**), three have been excavated, and three contain open water (**Table 8**). There are no listed or mapped trout streams/lakes, wildlife lakes, migratory waterfowl feeding/resting lakes, or outstanding resource value waters in or near the project area.

Delineated wetland boundaries have been approved by the Valley Branch Watershed District (VBWD) and the U.S. Army Corps of Engineers (USACE). **Appendix B** includes the VBWD notice of decision approving the wetland boundary, type, and incidental determinations; and the USACE jurisdictional determination. Five of the 13 wetlands and water bodies on the site have been determined incidental under the Minnesota Wetland Conservation Act, and six have been found to be isolated and outside the jurisdiction of the USACE (**Appendix B**). MnDNR public waters on the site include Lake Rose (82-112W), part of Wetland 11 (Unnamed, 82-417W), and part of an Unnamed public watercourse that drains from Lake Elmo to Horseshoe Lake (**Table 8**).

Table 8. Wetlands and Waters on The Royal Golf Club Residential Development site

Map ID	DNR ID & Name	Acres Onsite	Classification			Dominant Vegetation
			Circ. 39	Cowardin	Eggers and Reed	
1	82-112W Lake Rose	11.19	2/3/5	PEMB/C/ UBG**x**	Wet meadow, Shallow marsh, Shallow open water	Reed canary grass, cattail, sedge
2		4.28	3/6	PEMC/SS 1C	Shallow marsh, Shrub-carr	Willow, reed canary grass, green bulrush, woolgrass
3		1.04	3	PEMC	Shallow marsh	Reed canary grass, cattail, smartweed
4		0.51	3	PEMC	Shallow marsh	Cattail, willow
5		3.44	5	PUBG**x**	Shallow open water	Reed canary grass, willow
6		0.33	2	PEMB	Wet meadow	Reed canary grass, giant goldenrod
8		0.33	1	PEMA	Wet meadow	Reed canary grass
Area C	Watercourse Unnamed	0.30	NA	R3UB	Watercourse	None
9		0.05	1	PFO1A	Seasonally flooded basin	Reed canary grass
11	82-417W Unnamed	3.88	3/5	PEMC/UB G**x**	Shallow marsh, Shallow open water	Cattail
17		0.63	1/3	PEMA/C	Wet meadow, Shallow marsh	Cattail, reed canary grass
20		0.03	1	PEMA	Seasonally flooded basin	None
21		0.07	1	PEMA	Seasonally flooded basin	None
Total		26.08				

Impaired waters listed by the Minnesota Pollution Control Agency (MPCA) and located within 1 mile of the site include Lake Elmo (82-0106-00), Downs Lake (82-0110-00), and Kramer Lake (82-0117-00). Lake Elmo is suitable for swimming and wading, with good clarity and low algae levels throughout the open water season. However, concentrations of perfluorooctansulfonate (PFOS) and mercury in fish tissue from Lake Elmo exceed the water quality standard. Downs Lake and Kramer

Lake are not always suitable for swimming and wading due to low clarity or excessive algae caused by the presence of nutrients such as phosphorus in the water.

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.

Depth to groundwater varies across the project area. Surficial groundwater is at the surface in open water basins like Lake Rose and Wetland 11, which correspond to MnDNR public waters. Water elevations in these basins typically range between about 871 and 878 feet. Elevations across the site vary from 944 feet down to the water levels. Depth to surficial groundwater varies from about 66 to 0 feet. Depth to static groundwater levels based on groundwater wells located on and near the project area ranges from 18 to 65 feet and averages 39.2 feet (**Tables 9-11, Appendix C**).

Table 9. Groundwater Wells Located Onsite Near the Sports Complex

Well No.	Surface Elevation (feet)	Depth (feet)			Past Use
		Well	Static Water	Bedrock	
208459	894	282	23	90	Potable water: pavilion
233566	934	227	65	158	Potable water: sports complex

Table 10. Groundwater Wells Located on the Adjoining Golf Course

Well No.	Permitted Volume (MGY)	Surface Elevation (feet)	Depth (feet)			Past Use
			Well	Static Water	Bedrock	
208460	100	919	320	48	85	Potable water: maintenance building and groundkeeper home
208461	100	884	255	18	103	Golf course irrigation
233565	100	898	305	NA	84	Potable water: club house and fire protection system

Table 11. Selected Domestic Water Wells Located Near the Project Area

Well No.	Surface Elevation (feet)	Depth (feet)	Cased Depth (feet)	Depth to Static Water Level (feet)	Location (Direction from Site)	Aquifer
139256	905	110	90	25	South	Prairie Du Chien
177922	920	125	101	44	North	Prairie Du Chien
241944	890	112	108	20	South	Prairie Du Chien
406243	899	86	77	56	East	Prairie Du Chien
430515	909	110	89	35	West	Prairie Du Chien
431243	896	95	90	40	North	Prairie Du Chien
447252	912	78	72	43	East	St. Peter-Prairie
447264	922	102	91	52	North	Prairie Du Chien
571958	932	135	121	50	West	Prairie Du Chien
597115	912	120	74	30	West	Prairie Du Chien

The project area includes two groundwater wells that have supplied potable water for the Tartan Park sports complex and pavilions in the past (**Table 9**). To mitigate the potential for groundwater contamination, these two wells will be sealed and abandoned in compliance with Minnesota Department of Health regulations during the early part of the construction process. Nearby wells that serve the golf course are covered under existing MnDNR water appropriation permit 1960-0671 (**Table 10**). The golf course has also drawn irrigation water from three open water basins under MnDNR water appropriation permit 2002-6083 (**Table 12**). Review of the Minnesota County Well Index did not identify any other active or abandoned domestic wells within the project area.

Table 12. Golf Course Permitted Surface Water Appropriations

DNR Water Appropriation Permit No.	Use	Source	Permitted Volume (MGY)
2002-6083	Irrigation	Excavated Pond	42
2002-6083	Irrigation	DNR Wetland 82-17W	42
2002-6083	Irrigation	DNR Wetland 82-18W	42

The project will be served by the City of Lake Elmo municipal water supply and no new wells are proposed in the project area. The City of Lake Elmo Wellhead Protection Plan, Parts I and II, does not show any wellhead protection areas in the project vicinity. Municipal Wells 1, 2, 3, and 4 are located about 1.3 miles northwest, 3.5 miles north, 2.3 miles southwest, and 2.3 miles north of the project area, respectively.

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.*

The project is expected to produce normal domestic wastewater. This wastewater is expected to be typical of residential developments. The project will not include industrial wastewater production or onsite wastewater treatment.

Domestic wastewater will be routed through an existing 16-inch sanitary trunk force main located along Lake Elmo Avenue N. The proposed project will require a lift station to route sanitary waste to the force main at Lake Elmo Avenue until a gravity sanitary trunk main is installed up to 10th Street N from Hudson Boulevard. The sanitary sewer extension to 10th Street N. within the project area will likely follow the right-of-way of the street that will access 10th Street N.

The City of Lake Elmo Sewer Plan is based on a Memorandum of Understanding approved by the City of Lake Elmo and the Metropolitan Council in 2005 and subsequently amended as necessary. A sanitary sewer force main has been extended along Lake Elmo Avenue adjacent to Tartan Park to

serve the Old Village area and could be available to serve the project area with the construction of a lift station and force main at 10th Street.

Sanitary wastewater production for the project was estimated using methods described in the Sewer Availability Charge (SAC) 2015 Procedure Manual (Metropolitan Council 2015). Metropolitan Council has established 274 gallons per day (GPD) as the average daily wastewater production from a typical single-family home. Based on this residential equivalent, the project is expected to generate a maximum of 80,008 gallons of wastewater per day.

Wastewater from the project will be routed through the Lake Elmo sanitary sewer system and ultimately to the Metropolitan Wastewater Treatment Plant (MWWTP) located on the Mississippi River near Pig's Eye Lake in St. Paul. With the capacity to treat 251 million gallons of wastewater per day (MGD), this is the largest wastewater treatment facility in Minnesota. The MWWTP is owned and operated by Metropolitan Council. The Metropolitan Council's 2040 Water Resources Policy Plan includes a specific plan to serve the region's projected growth through 2040 and a general plan to serve the region's growth far beyond 2040. The City of Lake Elmo and Metropolitan Council have planned for increased capacity to convey and treat sanitary wastewater. The proposed project is not expected to require expansion of wastewater treatment infrastructure or raise wastewater treatment capacity concerns.

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.*

Wastewater will not be discharged to subsurface sewage treatment systems.

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.*

Wastewater will be treated in the MWWTP described above and then discharged to the Mississippi River. The MWWTP is an advanced secondary wastewater treatment plant located on the east bank of the Mississippi River, approximately three miles south of downtown St. Paul. The plant began treating wastewater and incinerating sewage sludges in 1938. Treatment capability is maintained during times of flood by a levee and floodwall that protect the plant treatment area.

The plant uses an activated sludge process to remove phosphorus and ammonia nitrogen from wastewater prior to discharge to the Mississippi River. Sludge is processed by thickening, centrifugal dewatering, and fluidbed incineration with energy recovery (steam and electricity). These processing facilities were completed in 2004 as part of a major rehabilitation and upgrade program at the plant. At that time, six outdated multiple hearth incinerators were replaced with three fluid bed sludge incinerators, state-of-the-art air pollution control systems and an alkaline stabilization system that produces biosolids for agricultural utilization. Ash from incineration is landfilled.

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.

Pre-Construction Site Runoff

Runoff from parts of the project area that exist as golf course, sports complex, and impervious surface likely contains pesticides, fertilizers, and other nutrients. Parts of the project area that support woodlands, wetlands, and grassland likely have more clean runoff. Existing runoff drains overland from the project area to local wetlands and waters. Nearby receiving waters for the project area include Lake Rose, Horseshoe Lake, and Downs Lake. Ultimately, the project area drains to the St. Croix River. The Valley Branch Watershed District (VBWD) constructed an outlet from Horseshoe Lake under a flood-relief project that links certain lakes in the VBWD to the St. Croix River. Discharge from Horseshoe Lake flows to a pipe owned by MnDOT that runs along Interstate 94 and eventually discharges to the St. Croix River. Lake Rose overflows to Horseshoe Lake when its water elevation reaches 888 feet. Downs Lake has a manually operated outlet valve and gates that allow for the Downs Lake water level to be lowered under certain conditions.

Post-Construction Site Runoff

Ultimately, compliance with VBWD, City of Lake Elmo, and NPDES requirements will minimize and mitigate potential adverse effects on receiving waters. Project development change the land use from golf course, woodland, and sports complex to single-family residential use and open space. This land use change is expected to have mixed effects on runoff water volume and quality. Residential development may reduce concentrations of lawn chemicals somewhat from the current golf course runoff, but may increase the loading of suspended solids, particularly during construction. Other typical components of impervious surface runoff such as hydrocarbons and heavy metals may also increase. Post-development runoff water quality will be typical of suburban developments, and will likely be slightly degraded by pollutants carried in runoff from streets, roofs, driveways, and similar impervious surfaces.

Residential project construction will remove about 10.2 acres of existing impervious surface from the sports complex area in the northwestern part of the site, and add about 48.8 acres of impervious surface, consisting of streets, homes, and driveways. The net increase in impervious surface is estimated at 38.6 acres.

The increased impervious surface area is expected to result in an increase in urban runoff pollutants and an increase in the volume of runoff during significant storm events. However, it is anticipated that stormwater rate and volume controls that comply with City of Lake Elmo and VBWD requirements will limit increases in runoff volume and associated pollutant transport primarily to large storm events that occur infrequently. The creation of stormwater features and the preservation of wetland buffers and other open spaces is expected to mitigate potential adverse effects from the increase in impervious surface.

The project will include approximately 5.7 acres of stormwater ponds and infiltration areas in compliance City of Lake Elmo and VBWD requirements (**Figures 3 and 7**). Two of the stormwater

ponds and 2.3 acres of stormwater treatment area will be located offsite within the adjoining golf course. The City of Lake Elmo Stormwater and Erosion and Sediment Control Ordinance requires that the volume of stormwater discharging from the site after development not increase from existing conditions for the 2-, 10-, and 100-year storm events. City of Lake Elmo ordinances also require that stormwater rate control and water quality measures meet NPDES Construction Stormwater Permit requirements. City and VBWD rules require development projects to capture and retain 1.1 inches of runoff from new impervious surfaces onsite, but allow flexibility in cases where infiltration is infeasible or ill-advised due to certain site conditions. VBWD rules also require stormwater treatment before it discharges to infiltration areas, and that infiltration areas are required to drain down within 48 hours.

Potential adverse effects of runoff volume and quality will be mitigated by the construction of stormwater basins designed to manage peak runoff rates, runoff volume, and water quality, as required by the City of Lake Elmo, VBWD, and MPCA. Impervious surface runoff from storm events will be retained in eight stormwater ponds and four infiltration basins until it is discharged at or below existing peak runoff rates. Wetlands on the site provide potential for additional runoff storage and infiltration. As described under **Item 11.b.iv**, Wetlands 3, 4, 6, and 16 are expected to be converted for use as stormwater ponds to protect water quality. Of these wetlands, only Wetland 16 regulated under the Minnesota Wetland Conservation Act. None of the wetland impacts are regulated under Section 404 of the Federal Clean Water Act (see **Appendix B**). Other BMPs such as vegetative buffer strips are expected to filter sediment and nutrients from runoff before it reaches wetlands and surface waters, mitigating potential effects on water quality. Temporary sediment basins and stormwater discharge during construction will be required to comply with the MPCA General Stormwater Permit for Construction Activity.

Stormwater ponds designed to NURP criteria are considered effective in removing sediment, pollutants, and nutrients, as discussed in Protecting Water Quality in Urban Areas: Best Management Practices for Dealing with Storm Water Runoff from Urban, Suburban and Developing Areas of Minnesota (MPCA 2000). The NURP research projects conducted by the U.S. EPA concluded that 90% removal of total suspended solids was an attainable goal, and that significant removal of other pollutants, such as phosphorus, was also achievable. Although nutrient removal efficiency varies with site conditions, well-designed wet ponds and constructed wetland treatment systems are effective in removing sediment and associated pollutants, such as trace metals, nutrients and hydrocarbons. Stormwater basins also remove or treat oxygen-demanding substances, bacteria and dissolved nutrients.

The following mitigation measures are expected to minimize potential adverse effects of stormwater runoff of receiving water bodies:

1. construction of onsite stormwater management facilities to meet requirements of the City of Lake Elmo and VBWD;
2. preservation of wetlands, waters, and vegetated open space covering approximately 90.8 acres; and
3. sediment basins and BMPs that comply with the General NPDES/SDS Permit for Construction Activities, as discussed below.

Stormwater and Erosion Control BMPs

Because project construction will involve disturbance of more than one acre of land, the project proponent will be required to apply to the MPCA for coverage under the National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) General Permit prior to initiating earthwork on the site. BMPs will be employed during construction to reduce erosion and sediment loading of stormwater runoff. Inspection of BMPs will be required after each rainfall exceeding 0.5 inches in 24 hours, and on a routine basis every 7 days. The NPDES permit will also require perimeter sediment control maintenance and sediment removal. BMPs to be implemented during construction include:

1. Construction of temporary sediment basins in the locations proposed for stormwater ponding, and development of these basins for permanent use following construction.
2. Installation of silt fence and other perimeter erosion controls prior to initiation of earthwork and maintenance of these controls until viable turf or ground cover is established on exposed areas.
3. Periodic street cleaning and installation of a rock construction entrance to reduce tracking of dirt onto public streets.
4. Stabilization of exposed soils within the time limits specified in the General NPDES permit.
5. Energy dissipation, such as riprap, installed at storm sewer outfalls.
6. Use of cover crops, native seed mixes, sod, and landscaping to stabilize exposed surface soils after final grading.

Erosion control plans will be reviewed and accepted by the City of Lake Elmo and the VBWD prior to project construction. Potential adverse effects from construction-related sediment and erosion on water quality will be minimized by implementation of the above BMPs during and after construction.

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.

Surface/Groundwater Appropriations and Dewatering

Project construction will involve groundwater appropriation if dewatering becomes necessary to install sanitary sewer, but the project will not involve installation of new water wells. Project development will require a MnDNR water appropriation permit if dewatering required for installation of utilities exceeds 10,000 gallons/day or 1,000,000 gallons/year. If construction dewatering does not exceed 50 million gallons in total and a duration of one year from the start of pumping, the project proponent will be eligible for coverage under the amended MnDNR General Permit 1997-0005 for temporary water appropriations. Although the extent and duration of construction dewatering that may be necessary is unknown at this time, construction dewatering is expected to be temporary. Groundwater appropriated for construction dewatering will be discharged

to temporary sediment basins within the project area. It is not anticipated that construction dewatering will be extensive or continue long enough to affect nearby domestic or municipal wells.

Connection to a Public Water Supply

The project will be connected to the City of Lake Elmo municipal water supply. The City of Lake Elmo draws its public water supply from the Prairie Du Chien aquifer. The City currently maintains three municipal wells that are located 1.3 to 3.5 miles from the project area (**Table 13**). These existing wells have a combined permitted capacity to pump 780 million gallons of water per year (MGY). During 2010-2015, these wells used a maximum of 195 million gallons per year. Based on past use and permitted capacity, the existing municipal well field has sufficient surplus capacity to serve the proposed project. As indicated under **Item 11.a.ii**, the City of Lake Elmo Wellhead Protection Plan does not show any wellhead protection areas in the project vicinity.

Table 13. Lake Elmo Municipal Water Appropriation Permits

Permit No.	Well No.	Permitted Volume (MGY)	Max Use 2010-2015 (MGY)
1961-1031	208448	260	25.915
1961-1031	603085	260	139.237
1961-1031	767874	260	29.704
Total		780	194.856

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.

Background

Wetlands in and near the project area are generally regulated by the Valley Branch Watershed District (VBWD), which administers the Minnesota Wetland Conservation Act (WCA) in the project area; the U.S. Army Corps of Engineers (USACE), which administers Section 404 of the Federal Clean Water Act (CWA), and MnDNR, which administers the Minnesota Public Water Resources Act. Wetlands and waters are identified on **Figure 5**.

Regulatory characteristics of wetlands and waters on the site are listed in **Table 14**. As mentioned under **Item 11.a.i**, five of the 13 wetlands and water bodies on the site have been determined incidental under the WCA, and six have been found to be isolated and fall outside the jurisdiction of the USACE (**Table 14, Appendix B**). Incidental wetlands are exempt from WCA regulations under Minnesota Rules Part 8420.0105, Subpart 2.D.

MnDNR public waters on the site include Lake Rose (82-112W), part of Wetland 11 (Unnamed, 82-417W), and part of an Unnamed public watercourse that drains from Lake Elmo to Horseshoe Lake. Much of the Unnamed public watercourse drains through a pipe underground; but the part on the surface corresponds to Area C (**Figure 5**).

Table 14. Regulatory Characteristics of Onsite Wetlands and Waters

Wetland ID	Jurisdiction[1]			VBWD Management Classification	Buffer Width (feet)[2]	Potential Physical Effects
	VBWD (WCA)	USACE (CWA)	MnDNR Name, No.			
1	Yes	Yes	Lake Rose 82-112W	Manage 2	50	
2	No	Yes		Manage 1	0	
3	No	No		Manage 2	0	Fill, Stormwater runoff
4	No	No		Manage 2	0	Fill, Stormwater runoff
5	Yes	Yes		Manage 2	50	
6	No	No		Manage 2	0	Fill, Excavate, Stormwater runoff
8	No	No		Manage 2	0	
Area C	No	Yes	Unnamed Tributary	Manage 2	50	
9	Yes	Yes		Manage 1	75	
11	Yes	Yes	Unnamed 82-417W	Manage 2	50	
17	Yes	Yes		Manage 1	75	
20	Yes	No		Manage 2	50	
21	Yes	No		Manage 2	50	Fill, Residential lots

[1]Incidental wetlands, storm ponds, and watercourses without hydrophytic vegetation are not regulated under the WCA

[2]Average required width is listed. Minimum required width is 25 feet for wetlands and 10 feet for stormwater ponds. Incidental wetlands do not require buffers.

Many of the wetlands and waters on the project site were altered when Tartan Park was constructed during 1964-1968. Golf course construction activities included wetland excavation and grading; installation of riprap along pond and wetland shorelines; construction of irrigation systems and stormwater ponds; and disturbance of wetland hydrology, soils, and vegetation. Kjolhaug Environmental Services (KES) and the VBWD reviewed historic aerial photographs and USGS topographic maps to evaluate past land uses and determine what wetlands and waters are naturally occurring or artificially constructed. This historical review supported the finding that five of the 13 wetland and water features are incidentally created and exempt under the WCA.

Wetland requirements of the VBWD are set forth in their Rules and Regulations. The VBWD requires that wetlands be assigned management classifications according to wetland function ratings based on the results of MnRAM (Minnesota Routine Assessment Methodology for Evaluating Wetland Functions) analyses. KES completed a MnRAM 3.4 analysis for a subset of wetlands that had not been previously inventoried by the VBWD or that had management classifications that seemed inconsistent with observed site conditions. The results were submitted to the VBWD and

reviewed in consultation with the Technical Evaluation Panel (TEP). Resulting wetland management classifications and buffers are listed in **Table 14**.

Physical Effects and Alterations

It is anticipated that project construction will physically affect two small wetlands that are regulated under the WCA and cover a total of 0.35 acre. Neither of these wetlands are regulated by the USACE. The proposed project will avoid adverse physical effects on MnDNR pubic waters.

The project proponent submitted a Wetland Replacement Plan Application to the VBWD on September 23, 2016, and the VBWD distributed the application to the Technical Evaluation Panel for comments on September 29, 2016. The project proposes to excavate and enlarge Wetland 16 (0.28 acre) to provide stormwater ponding and flood storage replacement, and fill Wetland 21 (0.07 acre) to provide residential lots. Wetland 21 is a small isolated basin in the northwestern part of the site. Wetland 16 is an isolated basin located in the floodplain of Downs Lake in the northeastern part of the golf course (**Figures 5 and 7**). The location of Wetland 16 is proposed as offsite water quality and flood storage mitigation for the project. Flood storage replacement is described under **Item 9.a.i**.

The project will affect an additional 1.88 acre of incidental isolated wetlands that are not regulated under the WCA or by the USACE. Wetlands 3, 4, and 6 will be affected by stormwater discharge, partial fill, and/or partial excavation (**Table 14, Figures 3 and 5**). The site's variable topography and drainage patterns limit locations and practical design alternatives available for stormwater storage, rate control, volume control, and infiltration.

The proposed stormwater management system will have relatively minor effects on ecological wetland functions. Wetlands proposed to be altered generally have low quality vegetation and are dominated by common plant species, some of which are considered invasive, including reed canary grass, cattail, willow, smartweed, and giant goldenrod. Environmental effects will be associated with project construction. After construction, environmental benefits will be associated with stormwater management compliance and flood storage replacement. Stormwater management and erosion and sediment control practices discussed under **Item 11.b.ii** are expected to minimize potential short-term effects and mitigate potential long-term effects on the watershed.

The project proponent has submitted an application under WCA to the VBWD to demonstrate compliance with the WCA sequencing process for the 0.35 acre of proposed regulated wetland impacts. The application included an evaluation of design alternatives to show wetland impact avoidance and minimization to the extent practicable. The project proponent will be required to implement BMPs or other management practices that help reduce and eliminate wetland impacts over time. The proposed project design minimizes and mitigates wetland impacts by:

1. completely avoiding most jurisdictional wetlands and waters in the project area;
2. aligning roadways to follow ridges and avoid wetlands wherever practicable;
3. orienting lots so that wetlands are situated behind lots in open spaces wherever practicable;
4. using 3:1 slopes and retaining walls to minimize grading;

5. implementing sedimentation and water quality protection BMPs to reduce and eliminate secondary wetland impacts over time;
6. treating stormwater from impervious surfaces to remove sediment and nutrients prior to discharge to most regulated wetlands;
7. defining upland buffers adjacent to wetlands, seeding disturbed buffers with native vegetation, and marking wetland buffers with monuments to protect wetlands; and
8. replacing unavoidable regulated wetland acreage and functions.

The project proponent has proposed to replace wetland impacts at a 2:1 ratio with wetland bank credits to be purchased from a local wetland bank that is owned by the VBWD. The proposed wetland replacement is located within the same county, major watershed, and bank service area as the wetland impacts. Use of credits from this wetland bank would provide wetland replacement in advance of wetland impacts.

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.

Anticipated physical effects on surface water features are discussed above under **Item 11.b.iv.a**. Direct effects on surface water resources will be minimized as discussed above. The proposed project will avoid adverse physical effects on MnDNR pubic waters. The project area does not include county ditches, judicial ditches, or private ditches or drainageways, except those features shown on **Figure 5**.

The project proponent will need to provide details in the project SWPPP (Stormwater Pollution Prevention Plan) to more fully describe the BMPs listed under **Item 11.b.ii**, which minimize turbidity, sedimentation, and secondary impacts. It will be necessary to submit the entire SWPPP to the MPCA for review at least 30 days prior to beginning project construction because the project will involve approximately 137.5 acres of grading near Lake Elmo, which is an impaired water body.

There are no public access points, private docks, or private boat launches on Lake Rose or Horseshoe Lake, and these lakes currently receive little to no watercraft use. The proposed project does not include any riparian lots, lake access lots, docks, or marinas. Consequently, the project is not expected to increase the number or type of watercraft on lakes in the project vicinity.

12. Contamination / Hazardous Materials / Wastes

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.

Tanks, Leaks, and Listed Sites

A review of the MPCA's "What's in My Neighborhood" (WIMN) database identified two Leak Sites and a Small to Minimal Quantity Hazardous Waste Generator (**Table 15**). Leak Site 4524 was a release of gasoline associated with the golf course that was reported to the MPCA in 1991 and the MPCA closed the file on this leak in 1992. Leak Site 9052 was a release of hydraulic fluid reported in 1995 and the MPCA closed the file on this leak in 1997. The Small to Minimal Quantity Hazardous Waste Generator related to aerosols on the golf course and the file remains active.

Past petroleum release sites at the golf course have been properly investigated and closed by the MPCA. Available information suggests that the contamination from the sites listed above have not resulted in long-term effects on the proposed project area. Contamination is not known to exist at any of these sites.

The WIMN database also identified one Tank Site that includes three active underground storage tanks located on the nearby golf course (**Table 16**). These tanks are associated with golf course operations and have a combined petroleum product storage capacity of 7,560 gallons. The WIMN database listed other underground storage tanks associated with the golf course, including five tanks installed between 1965 and 1985 and removed during 1989-1991, and two tanks installed in 1984 and removed in 1999.

Table 15. What's in My Neighborhood Sites in the Project Area

Type	Number	Status	Name	Product	Date	
					Reported	Closed
Leak Site	4524	Inactive	3M Tartan Park	Gasoline	09/11/91	10/08/92
Leak Site	9052	Inactive	3M Tartan Park	Hydraulic Fluid	12/21/95	10/23/97
Small-Minimal Haz Waste Generator	MND010337145	Active	3M - Club of St. Paul	Aerosols	2014	05/03/16
State Assessment Site	SA257	Inactive	3M - Club of St. Paul	Unknown		

Table 16. Active Underground Storage Tanks in the Project Area

Tank Site	Tank	Install Date	Capacity (Gallons)	Product
4273	455	9/25/91	560	Used/Waste Oil
4273	460	9/25/91	2,000	Diesel
4273	465	9/25/91	5,000	Gasoline

The project area includes a natural gas pipeline that runs north-south across the southern part of the site. The pipeline is located within a blanket easement that covers the West half of the Northeast

Quarter of Section 25, with no mention of Government Lot 3. The project proponent has proposed a 150-foot-wide easement to encompass this pipeline route and better define the pipeline's location.

Investigation History

The project area includes part of a 27-hole golf course that has been the subject of a Phase I Environmental Site Assessment (ESA) and a Phase II Investigation.

These investigations are discussed below. Correspondence from the Minnesota Department of Agriculture (MDA) and documentation of the investigations is included in **Appendix D**. The investigations identified and addressed the following environmental concerns:

1. A septic system connected to the former maintenance building;
2. Floor drains in the former maintenance building;
3. Herbicide and pesticide storage and handling associated with the former maintenance building;
4. Possible onsite disposal area that was later confirmed to be located on the adjoining property to the southeast; and
5. Historical use of herbicides and pesticides on golf course tee boxes, fairways and greens.

Phase II Investigation

The Phase II field investigation included collection of soil and groundwater samples for field screening and laboratory analysis. Samples were analyzed to determine whether the soils met MPCA and MDA land use screening criteria and whether groundwater samples met Minnesota Department of Health (MDH) drinking water standards. Soil and groundwater samples were analyzed for a variety of volatile organic compounds (VOCs), Resource Conservation and Recovery Act (RCRA) metals, hydrocarbons, nitrates, and organochlorine pesticides.

Mercury and selenium (RCRA metals) were the only analytes that exceeded their respective screening limits. These samples came from the greens, fairways and tee boxes. Persistent mercury and selenium levels likely resulted from fungicides used on greens to control snow mold and a common pesticide (heptachlor epoxide) used to control insects on golf greens.

Soil samples collected from the former maintenance building area detected concentrations of arsenic, barium, chromium, lead and mercury, but none were above their respective screening limits, and all fell within ranges generally accepted as naturally occurring. Contaminants were not detected in groundwater samples from borings near the former maintenance building.

Response Action Plan

The investigation determined that soil from 26 greens, two tee boxes, one fairway, and one soil storage area required remediation. Carlson McCain prepared a Response Action Plan (RAP) and submitted it to MDA on May 18, 2016. MDA approved the RAP on August 15, 2016.

Remediation of the part of the golf course to be converted to residential use is expected to generate about 4,300 cubic yards of contaminated soil. The contaminated soil will be managed on the nearby

golf course site in a Regulated Soil Management Area. Management of contaminated soil onsite is expected to help protect human health, safety, and the environment.

PFCs and Area Groundwater Contamination

Perfluorochemical (PFC)-containing wastes were disposed of at the 3M Oakdale Disposal Site in Oakdale and the former Washington County Landfill in Lake Elmo between early 1950 and 1974. The Washington County disposal site is located approximately 2.5 miles northwest of the project area, and the Oakdale site is located about 4.2 miles west-northwest of the project area.

Selected wells on the former Tartan Golf Course were sampled for PFCs in December of 2015. A summary these sampling results is included in **Appendix D**. The results did not identify elevated PFC levels at above the existing advisory levels established by MDH and the EPA and the use of the chemicals on a golf course would not be expected to contribute to elevated PFC levels. Groundwater monitoring of PFCs is an ongoing program. The proposed project will mitigate risks to new residents by providing access to municipal drinking water.

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.*

Project construction activities will generate wastes typical of residential development operations. Neither the construction process nor the proposed residential development is expected to generate substantial solid or hazardous wastes, solid animal manure, sludge, or ash. The construction contractor will be required to dispose of wastes generated at the site during construction using approved methods and facilities. The contractor will minimize and mitigate adverse effects from solid waste generation and storage by recycling construction waste to the degree practicable.

After project construction, solid waste generation will be typical of residential developments. The majority of solid waste is expected to include organics, paper, other waste, and plastic (**Table 17**).

Table 17. Estimated Solid Waste Composition

Waste Type	Estimated %
Organic	31.0
Paper	24.5
Other	18.3
Plastic	17.9
Hazardous	0.4
Metal	4.5
Glass	2.2
Electronics	1.2
Total	100.0

Source: 2013 Statewide Waste Characterization (Burns & McDonnell for MPCA 2013).

Residents and in the new development will contract individually with waste haulers for solid waste collection and recycling services under the city's open trash and recycling collection system, which uses eight licensed waste haulers. Curbside recycling, including paper, plastics, glass, and metals is available to Lake Elmo residents through their solid waste collector. Participation in the recycling program by future residents of the project area is expected to reduce costs for solid waste trucking and disposal.

Waste generated in Washington County is delivered to the Resource Recovery Facility in Newport, Minnesota. The majority of the waste is processed into Refuse Derived Fuel (RDF). This fuel is burned in place of coal at Xcel power plants in either Red Wing or Mankato, Minnesota.

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.*

Development of the project area is not expected to generate or require storage of substantial amounts of hazardous wastes or materials. Future residential development is expected to result in the storage or generation of small amounts of typical household cleaners, paints, lubricants, and small engine fuels over time. Petroleum storage tanks and commercial petroleum-based businesses are not envisioned for the project area.

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.*

Outside of those materials and the materials described under **Item 12.c** above, project development is not anticipated to generate or require the storing, handling or disposal of hazardous wastes during or after construction. Consequently, this EAW does not consider measures to avoid, minimize or mitigate adverse effects from the generation/storage of hazardous waste.

13. Fish, Wildlife, Plant Communities and Sensitive Ecological Resources (Rare Features)

a. *Describe fish and wildlife resources as well as habitats and vegetation on or in near the site.*

Fish and wildlife resources on and near the site are related to the composition, quality, size, and connectivity of plant communities such as manicured turf, woodlands, wetlands, and grasslands. Vegetation cover type mapping in the project area was based on aerial photography, the wetland delineation, and field reviews (**Figure 4**). The majority of the project area consists of golf course (turf and trees, 42%), woodlands (35%), and wetlands and waters (12%). Together, these features and plant communities cover 89% of the project area. Habitats in the project area are used by a

variety of wildlife species common to east-central Minnesota, including species adapted to mowed turf, woodlands, emergent wetlands, and open water, such as white-tailed deer, songbirds, waterfowl, small mammals, and amphibians.

The project area falls in the Eastern Broadleaf Forest Province of the MDNR Ecological Classification System and the St Croix Outwash Plain and Stagnation Plains Level IV Ecoregion of the U.S. EPA. This region historically consisted of rolling hills interspersed with depressions of small lakes and wetlands. Today, it includes extensive urban and suburban development, pasture, crops, and woodland.

About 51% of the project area has limited wildlife habitat value because it is occupied by golf course, ball fields, and impervious surface. The former Tartan Golf Course consists mostly of manicured turf dominated by species like Kentucky bluegrass and bentgrass. The golf course also includes a variety of planted and naturally occurring deciduous and coniferous trees. Deciduous trees include bur oak, red oak, green ash, quaking aspen, silver maple, and a few planted river birch and Kentucky coffee trees. Conifers include blue and white spruce and some planted larches. Trees on the golf course range from about 6 to 30 inches in diameter.

The composition of forested areas outside of the golf course varies by location. The northwestern woodland is dominated by red oak, red maple, white oak, and bur oak trees, with diameters generally ranging between 12 and 30 inches. The understory is dominated by common buckthorn, green ash, ferns, and gooseberry.

The northeastern woodland is dominated by quaking aspen trees generally ranging between 12 and 18 inches in diameter, with a dense understory of common buckthorn.

Woodland in the southern part of the site near the shore of Lake Rose is dominated by red oak and quaking aspen, generally ranging between 6 and 24 inches in diameter, with an understory of common buckthorn and quaking aspen.

Wetlands in the project area consist mostly of open water, cattails, reed canary grass, and common buckthorn (**see Table 5**). Small areas of unmowed grassland are dominated by smooth brome, Kentucky bluegrass, and Canada goldenrod, with scattered small red cedar trees and prickly ash shrubs.

*b. 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-732**) and/or correspondence number (**ERDB 20170079**) 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.*

The MnDNR queried the Natural Heritage Inventory System (NHIS) to assess whether known locations of rare plant or animal species or other significant natural features are known to occur within an approximate one-mile radius of the project area (**Appendix E**). Kjolhaug Environmental Services also queried a licensed copy of the NHIS database. The NHIS review identified nine

records of rare species and sensitive communities. These include two records of Blanding's turtles, two records of rare fish, and two records of rare spiders. These rare species were mostly located in the Lake Elmo Park Reserve, which is located west of the project area (**Figure 10**). None of these species are listed as federally threatened and endangered.

Two observations of Blanding's turtles (*Emydoidea blandingii*), a state threatened reptile, were recorded in 1991 on land in or near the Lake Elmo Park Reserve and on land located south of the project. Blanding's turtles prefer calm shallow water, rich aquatic vegetation, and select open grassy uplands with sandy soils for nesting. The project area includes potential Blanding's turtle habitat consisting of wetlands and sandy soils. The best Blanding's turtle habitat includes wetland complexes larger than 10 acres that are surrounded by open sandy uplands. Blanding's turtles do not typically lay eggs under forest cover.

The rare fish include a pugnose shiner (*Notropis anogenus*), which is a state threatened minnow, and a least darter (*Etheostoma microperca*), which is a state special concern fish. These fish were found during a survey of Lake Elmo in 2013. Both of these species prefer clear, freshwater lakes and streams with submerged aquatic vegetation.

Two species of rare jumping spiders (*Marpissa grata* and *Pelegrina arizonensis*) were found in the Lake Elmo Park Reserve about 0.8 mile west of the project area in 1996. These species are typically associated with emergent wetland and prairie vegetation.

The NHIS query identified three records of natural communities located within a mile of the project area (**Figure 10**). These include a sand beach on the south shore of Lake Elmo, an oak woodland on the west shore of Lake Elmo, and an Oak Forest located about one mile east of the project area in West Lakeland Township.

Online information on rare species information maintained by the U.S. Fish and Wildlife Service (USFWS) was also reviewed for the project area. The project area provides potential suitable habitat for the federally threatened northern long-eared bat (*Myotis septentrionalis*). The northern long-eared bat (NLEB) roosts and forages in forests during spring and summer and hibernates in caves and mines during winter., sometimes swarming in wooded areas near caves in autumn. The USFWS listed the NLEB as threatened under the Federal Endangered Species Act (ESA) on April 2, 2015. The USFWS also promulgated a Final 4(d) Rule that defines the "take" prohibitions for NLEB under the ESA. Although the project area includes about 106 acres of woodland and is located in the white-nose syndrome zone defined under the Final 4(d) Rule, there are no known records of NLEBs occurring within one mile of the project area.

c. *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.*

Residential development is expected to convert about 93.2 acres of golf course, 41.1 acres of woodland, and 9.3 acres of ball fields, 2.2 acres of wetlands/incidental ponds, and 2.1 acres of grassland to residential land uses, including roads, homes, lawns, and stormwater ponding. This

habitat conversion is expected affect the number and type of wildlife species in the area, but changes in wildlife abundance are not expected to be regionally significant. The 93.2 acres of golf course includes extensive areas of manicured turf with limited wildlife habitat value. Wildlife species that depend on a manicured turf, woodlands, and wetlands could be displaced during project construction. Species adapted to suburban habitats are expected to be affected primarily by short-term construction impacts. Non-migratory species with small home ranges such as small mammals may experience more adverse effects, including mortality during project construction.

Development of the project area is not expected to have substantial effects on rare species and sensitive natural communities. Seven of the nine rare occurrences identified during the MnDNR NHIS review were associated with the Lake Elmo Park Reserve, which is managed and protected as a natural area. These include one of the Blanding's turtles, the rare fish, the rare spiders, and two of the three sensitive natural communities. The Lake Elmo Park Reserve is located up-watershed from the project area and will not be physically affected by the project. The two species of rare jumping spiders are not expected to be affected by the project because they were found in the Lake Elmo Park Reserve and they are typically associated with higher quality wetland and grassland habitats than occur on the project site, such as sedge meadows and native prairies. The three records of natural communities identified in the NHIS review, a sand beach, an oak woodland, and an oak forest, are all located offsite and will not be physically affected by the proposed project.

The project may have effects on Blanding's turtles that may occur in the area. To minimize potential adverse effects on turtles and their mobility, the project will avoid most wetlands, implement stringent sediment and erosion controls, consider the use of surmountable curbs on roadways, and consider erosion control materials constructed of organic fibers rather than plastic.

The project may affect the northern long-eared bat (NLEB) because the project includes potential suitable NLEB habitat, but the project is not likely to adversely affect the NLEB or substantially affect its habitat. The woodlands in the project area are not known or likely to support a NLEB maternity roost colony. The project includes measures to minimize potential effects on the NLEB and its habitat. It is estimated that the project will avoid and preserve approximately 36.2 acres of woodland. Additional woodland may be preserved though development of custom lots. Most tree removal activities are expected to avoid the time between June 1 and July 31 when NLEBs are typically reproducing and raising young. The white nose syndrome buffer zone map and the Minnesota NLEB bat occurrence maps available from the USFWS and the MnDNR indicate there are no NLEB maternity roost colonies or hibernacula known to occur within 1 mile of the project area. Under the USFWS Final 4(d) Rule, the ESA does not prohibit the incidental take of NLEBs if it results from tree removal activities that occur more than 150 feet from a known occupied maternity roost tree between June 1 and July 31, or from tree removal activities located more than 0.25 mile from a hibernaculum. Tree clearing may affect habitat for this species, but it is not expected to substantially affect essential NLEB behavioral patterns such as breeding, feeding, or sheltering.

Although project construction is expected to slightly increase the potential for the spread of invasive and weedy species, much of the project area has been previously disturbed by golf course construction. BMPs may include the cleaning of construction equipment before transport, which might reduce the potential spread of invasive species.

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

Measures to minimize and mitigate adverse effects on wildlife include the preservation of about 36.2 acres of woodland and 23.9 acres of wetlands/waters, preservation or establishment of woodland and grassland buffers along wetland edges, and creation of approximately 5.7 acres of stormwater ponds and infiltration areas. The project will avoid direct effects on public waters wetlands. To the extent practicable, tree clearing will occur between October and April, when migratory songbirds and bats are not nesting or reproducing. Consideration will be given removal of buckthorn from the understory of some woodlands, but buckthorn may be left in the understory along exterior roadways to provide visual screening. Consultation with the USFWS regarding effects on NLEBs will be initiated under Section 7 of the Endangered Species Act when the project proponent applies to the Federal Emergency Management Agency for a LOMR-F (Letter of Map Revision based on fill).

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.

A search of the historical property information/database was requested for the project area from the Minnesota State Historic Preservation Office (SHPO) to assess whether known historic structures or archaeological sites exist in the vicinity of the proposed project. Correspondence from the SHPO is included in **Appendix F**.

The SHPO database search identified one known archaeological site near Horseshoe Lake, located in the SE ¼ of Sec. 25, T29N, R21W. The database search did not indicate the precise location of the archaeological site, whether it is located onsite, or whether it is potentially eligible for the State or National Register.

Given the prominent topography of the site and its proximity to lakes, the project proponent has retained a cultural resources consultant to conduct an investigation of the site. The methods and results of this investigation will be coordinated with the SHPO staff and the Office of the State Archaeologist (OSA). If the project requires wetland impact approval under Section 404 of the Federal Clean Water Act, the results of the Cultural Resources Investigation will also be shared with the U.S. Army Corps of Engineers (USACE). The project area does not include known archaeological sites or historic sites listed on the National Register of Historic Places (NRHP).

Although the potential effects of the project on historic properties and archaeological resources is not fully understood at this time, the initial cultural resource screening did not identify effects on known historic resources. Depending on the outcome of the cultural resources investigation and coordination with the SHPO, OSA, FEMA, and/or USACE, measures to minimize or mitigate effects on historic properties may become necessary.

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.

There are no scenic views or vistas located on or adjacent to the project area, and substantial effects on visual resources are not anticipated in conjunction with project development. Although views of some distance are available from higher elevations in the project area, the abundance of trees and other vegetation throughout the site generally obscures long views of lakes and open landscapes.

Although the proposed project may affect some views from nearby homes, the project proponent has included design elements in the project to minimize visual effects on nearby homeowners. The project includes a 450- to 650-foot separation and vegetative buffer between proposed homes and existing homes near the southwestern portion of the project. The project design includes additional forested buffers in other locations that are intended to visually separate the proposed project from adjoining land uses. Although consideration is being given to removal of buckthorn from the understory of some woodlands, buckthorn may persist and provide visual screening along exterior roadways.

Project development is expected to result in routine effects on visual resources. The project will not involve installation of intense lights that would cause glare, nor will it include industries that would emit vapor plumes. Tree preservation measures intended to soften visual transitions have been integrated into the project design. This action is expected to mitigate effects on views from nearby lakes and roadways.

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.*

The proposed project does not include heavy industrial facilities or stationary source air emissions.

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.*

The increased traffic will generate a relatively small corresponding increase in carbon monoxide and other vehicle-related air emissions. Project development is expected to have a negligible impact on air quality. Consequently, the project area does not include baseline air quality monitoring, predictive air quality modeling, or measures to mitigate air quality impacts.

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.*

The project is not expected to generate dust or odors at levels considered unusual for suburban development construction practices. Odors, noise, or dust produced during construction is expected to be consistent with applicable regulations of the MPCA and local governments. Dust, odors, and noise levels are expected to be slightly higher during project construction than project operations.

The construction process is expected to generate some fugitive dust, but dust is not expected to be generated in objectionable quantities. The dust receptors nearest to the project area include the residential neighborhoods located near the project boundaries. Odors routinely generated during construction will be typical of those associated with construction activity, such as exhaust from diesel and gasoline powered construction equipment.

Consideration will be given to suppression of airborne dust by application of water if fugitive dust generation during site grading exceeds levels typically expected during normal construction practices.

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.

It is anticipated that local noise levels will temporarily increase during project construction, but noise levels are expected to be at or near existing levels after construction is complete. Noise levels on and adjacent to the project area will vary considerably during construction, depending on the amount of construction that occurs simultaneously, the time of operation, and the distance between construction equipment and receptors. The noise receptors nearest to the project area include the residential neighborhoods located near the project boundaries. Noise generated by construction equipment and residential building construction will be limited primarily to daylight hours when noise levels are commonly higher than at night.

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.*

Spack Consulting completed a Traffic Impact Study to estimate the trips generated by the proposed residential development and evaluate the potential need for transportation or roadway improvements. The complete Traffic Impact Analysis is included in **Appendix G**.

Existing and Proposed Parking Spaces

Project construction will remove the southern parking area and 188 parking stalls from the former Tartan Park. The proposed 292 single-family lots will include off-street parking and garages to accommodate parking for the residential units.

Estimated Traffic Generation

Trip generation was estimated using the methodology outlined in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition (2012). Future trip generation estimates were based on traffic generated by 292 proposed single-family residential units. The traffic study included in **Appendix G** also addressed the continued operation of the 18-hole golf course. These residential development is expected to generate a total of 2,780 average daily trips, including 1,390 vehicles entering the site and 1,390 vehicles exiting the site (**Table 18**).

Table 18. Project Trip Generation Estimates

ITE Code	Land Use	No. of Units	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
				In	Out	Total	In	Out	Total
210	Single-family detached housing	292	2,780	55	164	219	184	108	292

Spack Consulting has completed trip generation studies in the Twin Cities Metropolitan Area and found local trip generation rates for residential uses to be lower than the comparable ITE rates. For the purposes of this study, ITE trip generation rates were used to provide a conservatively high estimate.

The peak hour traffic in the study area occurs between 4:30 and 5:30PM. Based on recent traffic counts, it is expected that traffic from the project will also peak during this time. Within this peak hour, the residential project is expected to generate 292 trips, consisting of 184 entering vehicles and 108 exiting vehicles. The Traffic Impact Study included in **Appendix G** provides a full description and analysis of the peak hour traffic and traffic recommendations.

Availability of Transit and Alternative Transportation

Transit and alternative transportation modes are not available for this site. The nearest transit stop is located roughly 1.5 miles north of the project area along Trunk Highway 5 in downtown Lake Elmo.

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.*

Effects on Traffic and Roadways

The Traffic Impact Study concluded that the proposed project will have minimal effects on adjacent public roads and that nearby intersections will continue to operate at an overall Level of Service (LOS) A (**Appendix G**). The principle findings of the Traffic Impact Study are:

1. Lake Elmo Avenue N, 20th Street N, and Manning Trail N are all well within their capacity range and the proposed development traffic is not predicted to cause significant delays or congestion on the local roadway system.
2. Study area intersections, as described in the Traffic Impact Study, are expected to continue to operate at an overall LOS A during the AM and PM peak hours.
3. The proposed site access points are sufficient to service the expected site generated traffic.

The Traffic Impact Study included an extended traffic forecast to the year 2030. The extended forecast included traffic generated by the proposed project and background traffic growth. Under this forecast, some individual traffic movements are predicted to fall to a LOS E or F during peak hours of operation. In particular, traffic heading southeast on Manning Trail N and turning left on onto north-bound Manning Avenue N during the PM peak hour is expected to experience a less-than-ideal LOS. However, this delay does not pose a serious concern because: (1) this movement will have a low volume of traffic, (2) few vehicles will experience this delay, and (3) the predicted 95th percentile queue length at this turning movement is less than one vehicle.

The traffic that will be generated by the proposed project does not raise capacity or safety concerns. Traffic generated by the project will have little effect on the regional transportation system. Intersections surrounding the site will continue to operate at acceptable levels of service with the addition of traffic generated by the proposed project.

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

The Traffic Impact Study concluded that the study area intersections and roadways have sufficient capacity to accommodate the expected daily and peak hour trips. The study predicted that the existing road network surrounding the project area will safely and efficiently accommodate the traffic generated by the proposed development without safety or capacity improvements.

The Traffic Impact Study included a review of the MnDOT Access Management Manual and related turn treatment warrants, and recommended shoulder strengthening along 20th Street N near project access points and the intersection of 20th Street N and Manning Trail. Shoulder strengthening could involve construction of 8- to 10-foot-wide shoulders using the same pavement section as the mainline street for a distance extending 50 to 100 feet from each intersection. In addition, sufficient

right-of-way could be provided to allow the widened shoulders to be expanded to standard turn lanes if and when warranted. The City of Lake Elmo and the project proponent will coordinate the necessary details to address street improvements at these locations. The full turn lane analysis is provided near the back of **Appendix G.**

The project will include internal pedestrian/bicycle trails to help facilitate safe pedestrian, bicycle, and traffic mobility within and between the residential project and the adjoining golf course. The addition of internal sidewalk/trail connections will help improve safety and stimulate use of alternative modes of transportation, lowering the overall number of vehicle trips expected at the site.

The detailed Traffic Impact Study includes a full description of the existing and future traffic, with recommendations for the proposed project (**Appendix G**).

19. Cumulative Potential Effects

Preparers can leave this item blank if cumulative potential effects are addressed under the applicable EAW Items.

a. Describe the geographic scales and timeframes of the project related environmental effects that could combine with other environmental effects resulting in cumulative potential effects.

The City of Lake Elmo is not aware of other developments of comparable magnitude that have been proposed or initiated in the project vicinity recently. However, the remaining part of the Tartan Golf Course is being rehabilitated for use as an 18-hole golf course. Reasonably foreseeable effects of the 18-hole golf course on wastewater and traffic are described under **Item 19.b** below.

It is anticipated that the project area will develop over the next five years, although the timing of development could vary, depending on the demand for housing and market conditions. At least some other projects are expected to develop in the Lake Elmo area in the next five years and coincide with the development of the project area.

b. Describe any reasonably foreseeable future projects (for which a basis of expectation has been laid) that may interact with environmental effects of the proposed project within the geographic scales and timeframes identified above.

Although reasonably foreseeable future projects of comparable magnitude have not yet been identified, the former 27-hole Tartan Golf Course is under rehabilitation and predicted to re-open as an 18-hole golf course. While the repurposed golf course is not expected to involve a change in land use or result in cumulative effects on cover types, geology, soils, surface water resources, environmental contaminants, fish and wildlife, or historic resources, the golf course is expected to connect to the municipal water supply, generate municipal wastewater, and continue to generate traffic. Based on an 18-hole golf course with a dining room, bar, and grill, and … sac units, the golf course is expected to generate up to 1,370 gallons of wastewater per day and approximately 500,000 gallons of wastewater per year.

Sanitary wastewater production for the golf course was estimated using methods described in the Sewer Availability Charge (SAC) 2015 Procedure Manual (Metropolitan Council 2015). Based on an 18-hole golf course with a club house, dining room, and bar and grill, the golf course is expected to generate a maximum of 1,370 gallons of wastewater per day. The rehabilitated 18-hole golf course is expected to generate 644 average daily vehicle trips and 53 average daily vehicle trips during the PM peak hour. The Traffic Impact Study included in **Appendix G** accounts for the cumulative effects of this traffic and background traffic growth out to the year 2030. The cumulative effects of the golf course in combination with the proposed residential development do not change the overall conclusions of this EAW.

Neither the City of Lake Elmo nor the project proponent are aware of other developments proposed in the project vicinity in the foreseeable future. The City of Lake Elmo will consider the timing and staging of specific development proposals within the context of the Comprehensive Plan and related growth management tools at the time that such proposals are brought forward. It is currently uncertain what specific land use proposals will arise at what time. Over time, much of Lake Elmo may develop into a combination of residential, commercial, and public uses.

c. Discuss the nature of the cumulative potential effects and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to these cumulative effects.

The potential for cumulative effects varies with the type of resource affected and the geographic area of impact. Projects typically combine to produce cumulative effects on municipal resources like water and wastewater treatment, but the City of Lake Elmo has planned for growth and the increased capacity to address these cumulative effects.

Potential cumulative effects of anticipated future projects on ecological and water resources depend largely on the type, density, and location of future developments. Potential cumulative effects on natural resources such as wetlands and wildlife habitat typically vary with project location and habitat diversity. The lack of specific knowledge regarding the design and mitigation measures associated with unforeseen future developments outside the project area limits the predictability of project interactions that may cause potential cumulative effects. Consequently, direct effects of the project on wetlands and wildlife resources are not likely to combine with effects in other projects in a manner that will result in discernable local cumulative effects.

Surface water runoff from the project area discharges to Horseshoe Lake and eventually to the St. Croix River. The highly regulated nature of stormwater runoff and the ubiquitous nature of BMPs implemented to control erosion and sedimentation is expected to minimize cumulative effects of post-development runoff on downstream waters. The policies and regulations set forth by the City of Lake Elmo, the Valley Branch Watershed District, and other government agencies provide the impetus for other mitigation measures discussed throughout this EAW. These mitigation measures will help ensure the minimization of cumulative effects on the environment and the capacity for municipal services.

The Draft Scoping Document of the Generic Environmental Impact Statement on Urban Development in Minnesota (Urban Development GEIS Steering Committee, September 2000) acknowledged that quantitative analysis of cumulative effects is not always possible:

> A recent, high-profile national literature summary on urban sprawl concluded there is a lack of empirical, quantitative study on urban development. This summary also concluded that the ability to measure and quantify many urban development impacts and isolate the relative influence of individual policies on urban development form is an extraordinarily difficult goal to accomplish.

20. Other Potential Environmental Effects

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.

No other additional environmental effects are anticipated as a result of development of the project area. Potential environmental effects have been addressed in **Items 1** through **19**.

RGU CERTIFICATION.

*(The Environmental Quality Board will only accept **SIGNED** Environmental Assessment Worksheets for public notice in the EQB Monitor.)*

I hereby certify that:

- *The information contained in this document is accurate and complete to the best of my knowledge.*
- *The EAW describes the complete project; there are no other projects, stages or components other than those described in this document, which are related to the project as connected actions or phased actions, as defined at Minnesota Rules, parts 4410.0200, subparts 9c and 60, respectively.*
- *Copies of this EAW are being sent to the entire EQB distribution list.*

Signature Stephen Wenner Date 10/18/16

Title PLANNING DIRECTOR

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Figures 1 – 10

The Royal Golf Club Residential Development EAW

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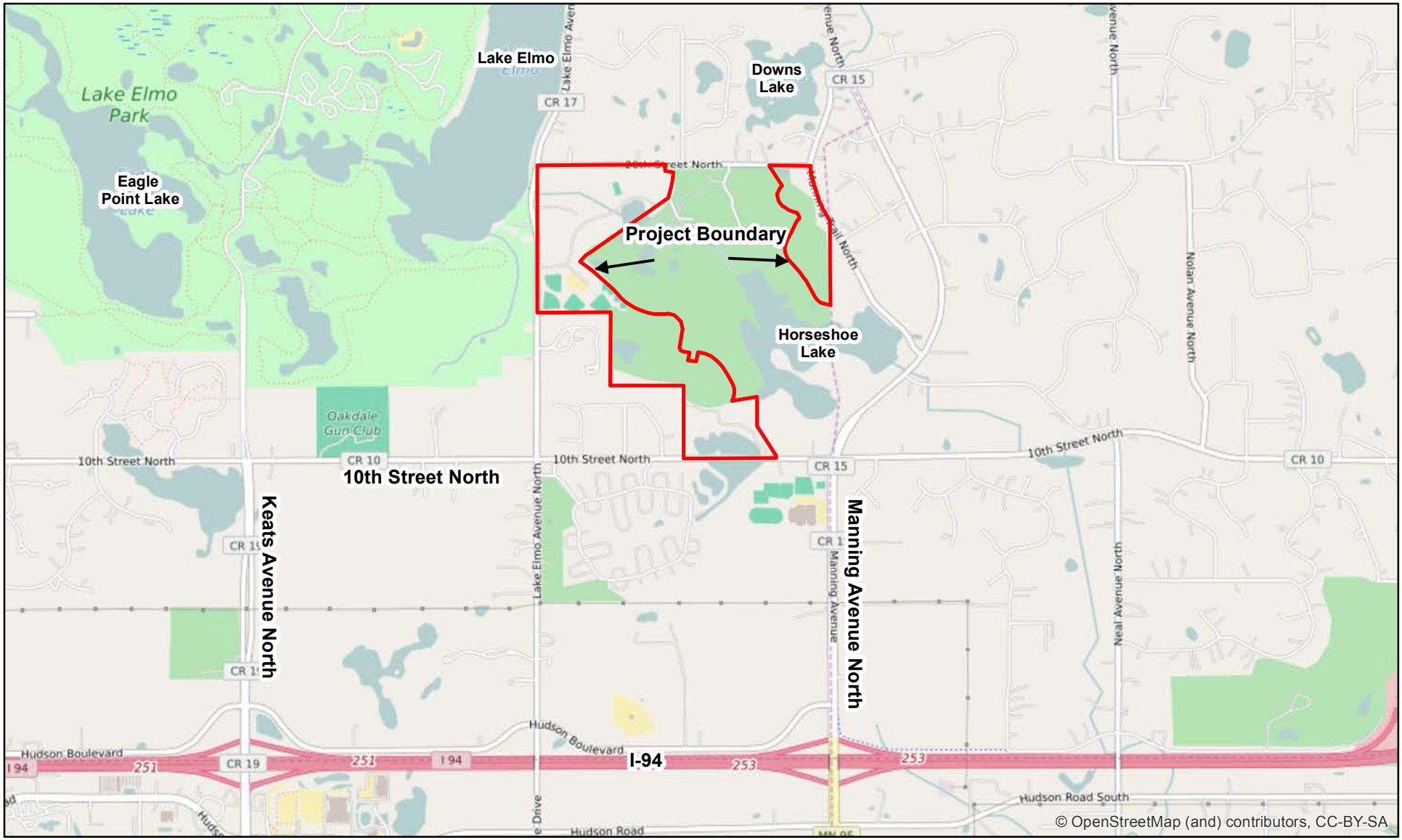

Figure 1 - Project Location

N

0 2,500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: ESRI Streets Basemap

The Royal Golf Club Residential Development
Lake Elmo, Minnesota

Note: Boundaries on this figure are approximate and do not constitute an official survey product. (KES 2016-034)

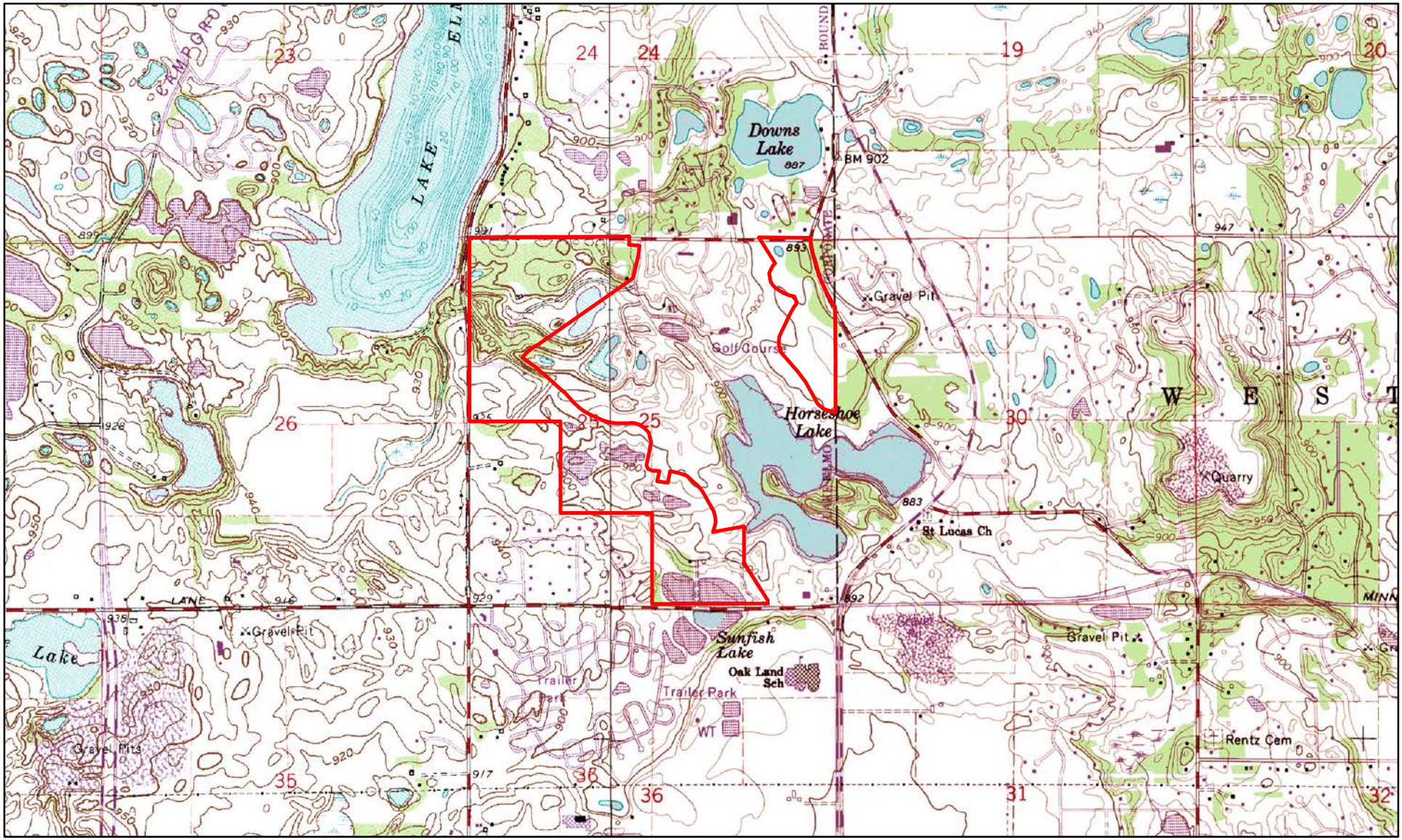

Figure 2 - USGS Topography

N

0 2,000 Feet

Project Boundary

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

The Royal Golf Club Residential Development
Lake Elmo, Minnesota

Note: Boundaries on this figure are approximate and do not constitute an official survey product. (KES 2016-034)

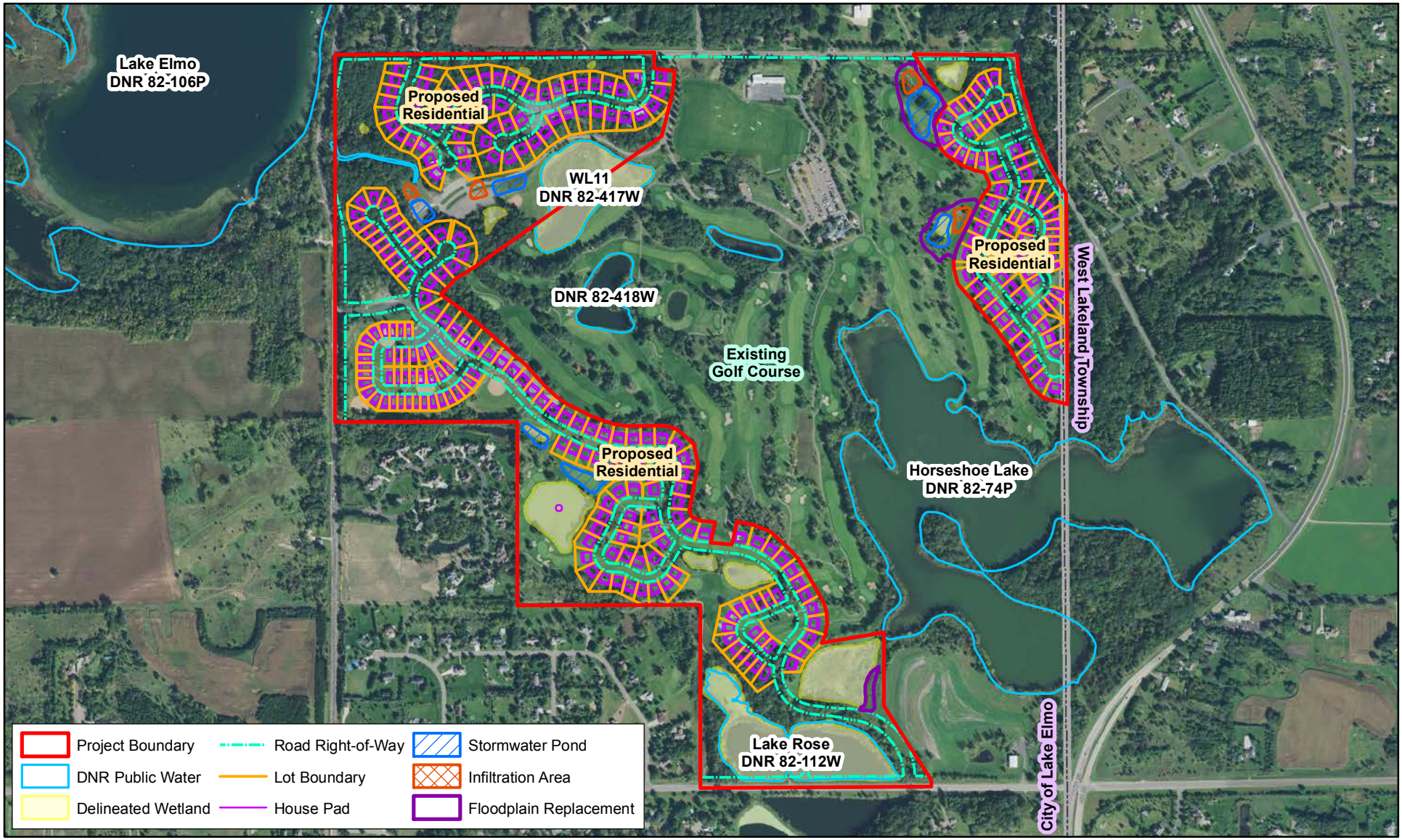

Figure 3 - Site Plan

N

0 1,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

The Royal Golf Club Residential Development
Lake Elmo, Minnesota

Note: Boundaries on this figure are approximate and do not constitute an official survey product. (KES 2016-034)

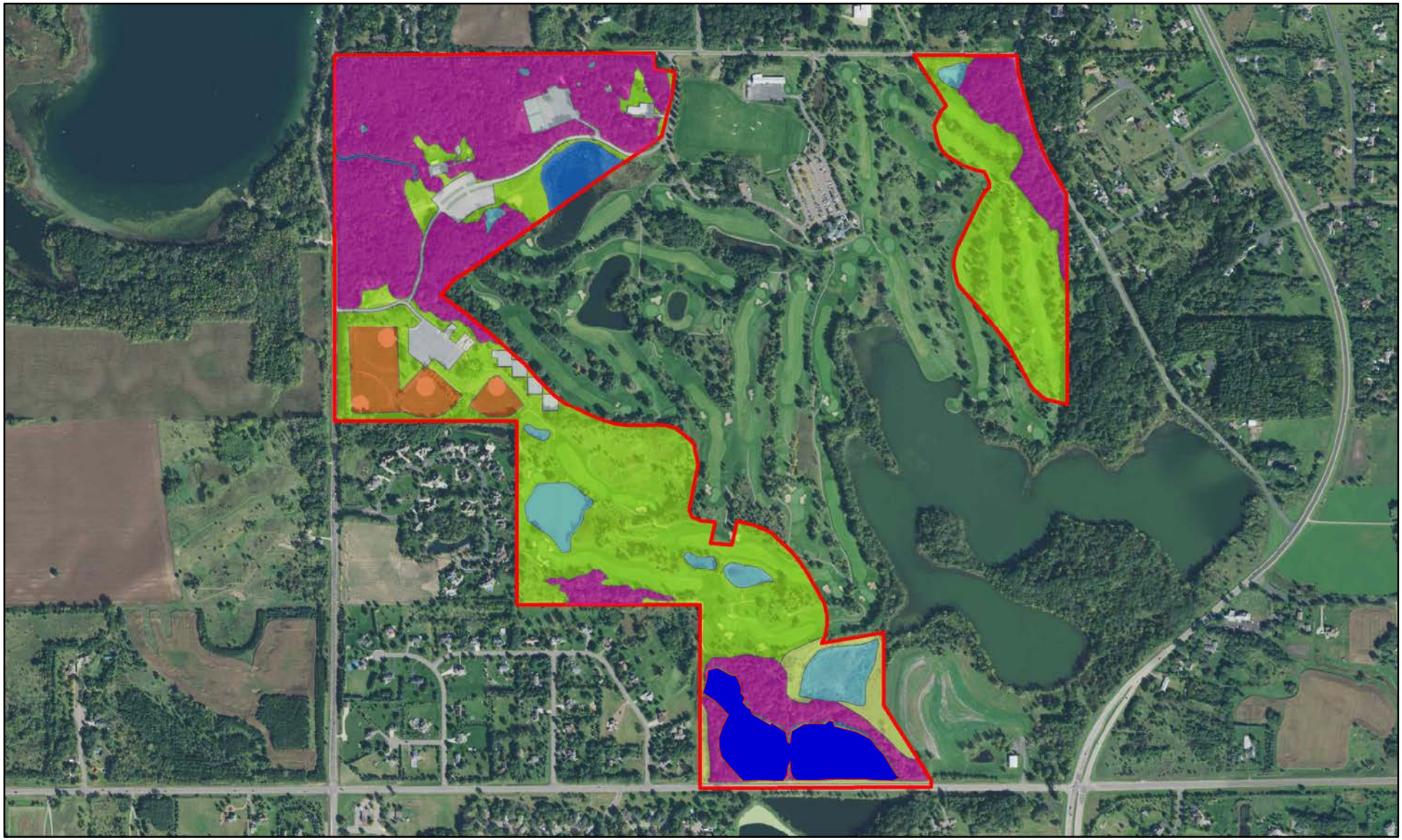

Figure 4 - Existing Cover Types

N

0 1,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

The Royal Golf Club Residential Development
Lake Elmo, Minnesota

- Project Boundary
- Ball Field
- DNR Public Waters
- Golf Course (Turf & Trees)
- Grassland/Meadow
- Impervious Surface
- Wetland
- Woodland

Note: Boundaries on this figure are approximate and do not constitute an official survey product. (KES 2016-034)

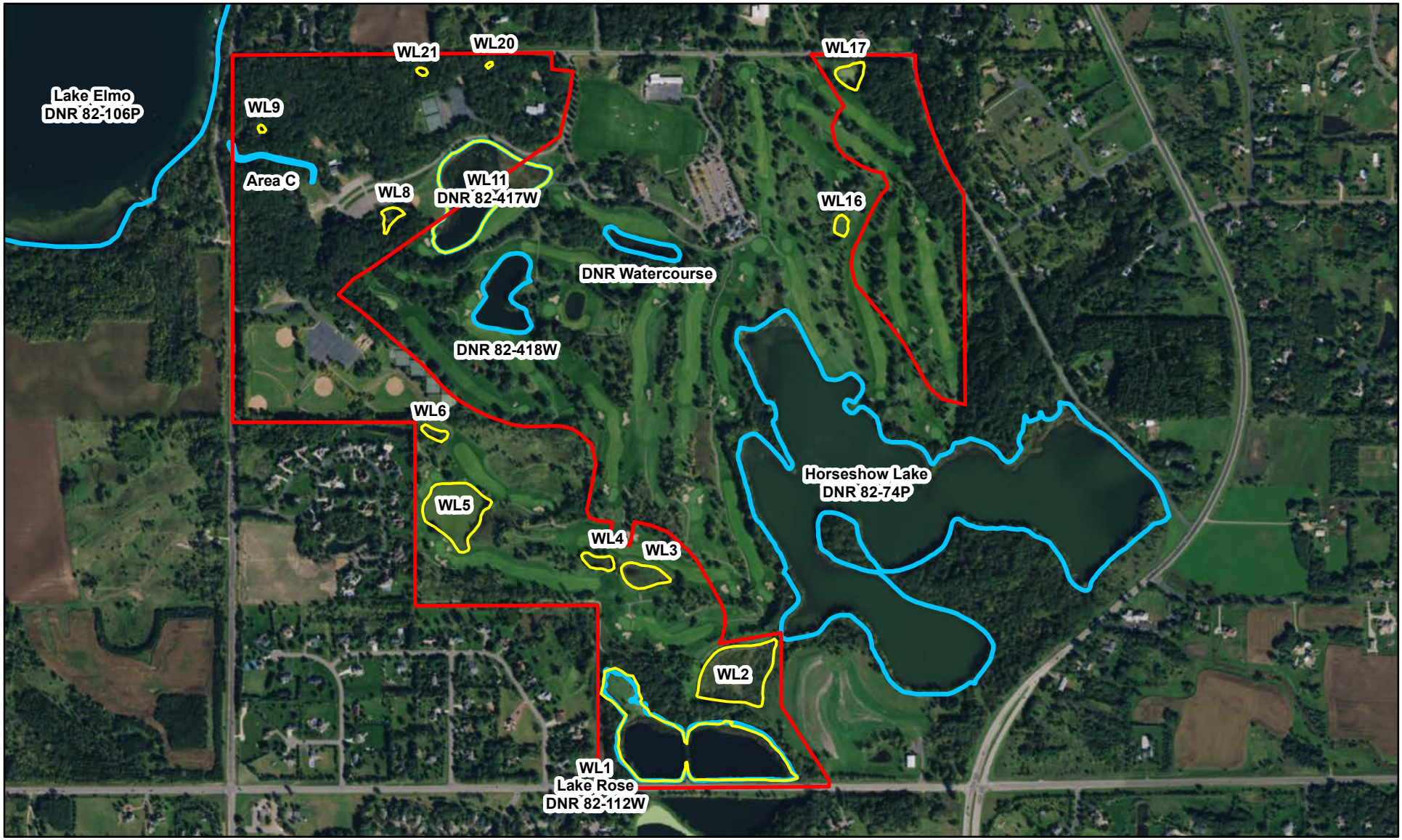

Figure 5 - Delineated Wetlands and Waters

N

0 1,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Project Boundary

Delineated Wetland

DNR Public Water

Royal Golf Club Residential Development
Lake Elmo, Minnesota

Note: Boundaries on this figure are approximate and do not constitute an official survey product. (KES 2016-034)

Figure 6 - Existing Land Use

N

0 1,500 Feet

Project Boundary

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

The Royal Golf Club Residential Development
Lake Elmo, Minnesota

Note: Boundaries on this figure are approximate and do not constitute an official survey product. (KES 2016-034)

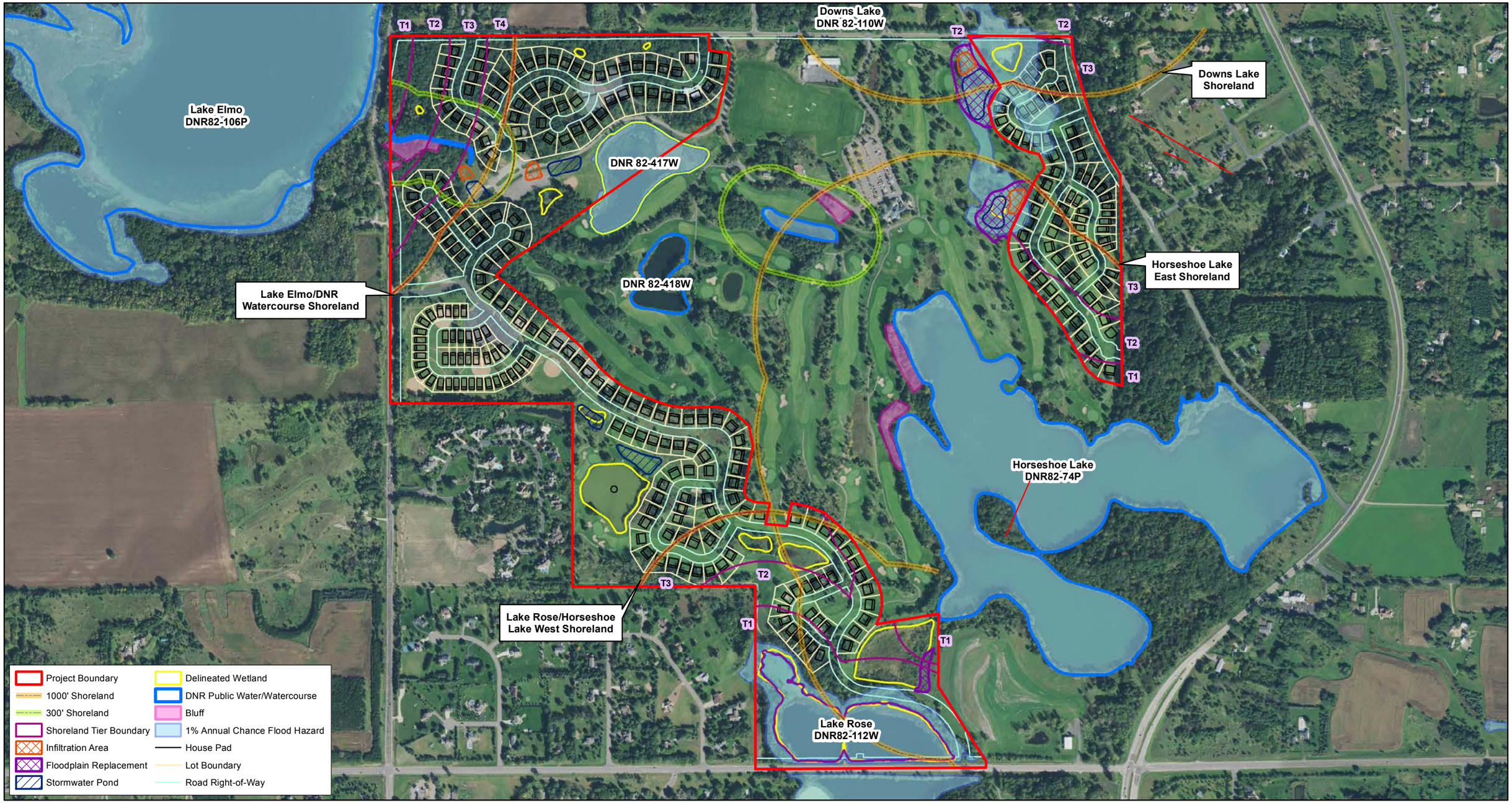

Figure 7 - Shorelands and Floodplains

N

0 675 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

The Royal Golf Club Residential Development
Lake Elmo, Minnesota

Note: Boundaries on this figure are approximate and do not constitute an official survey product. (KES 2016-034)

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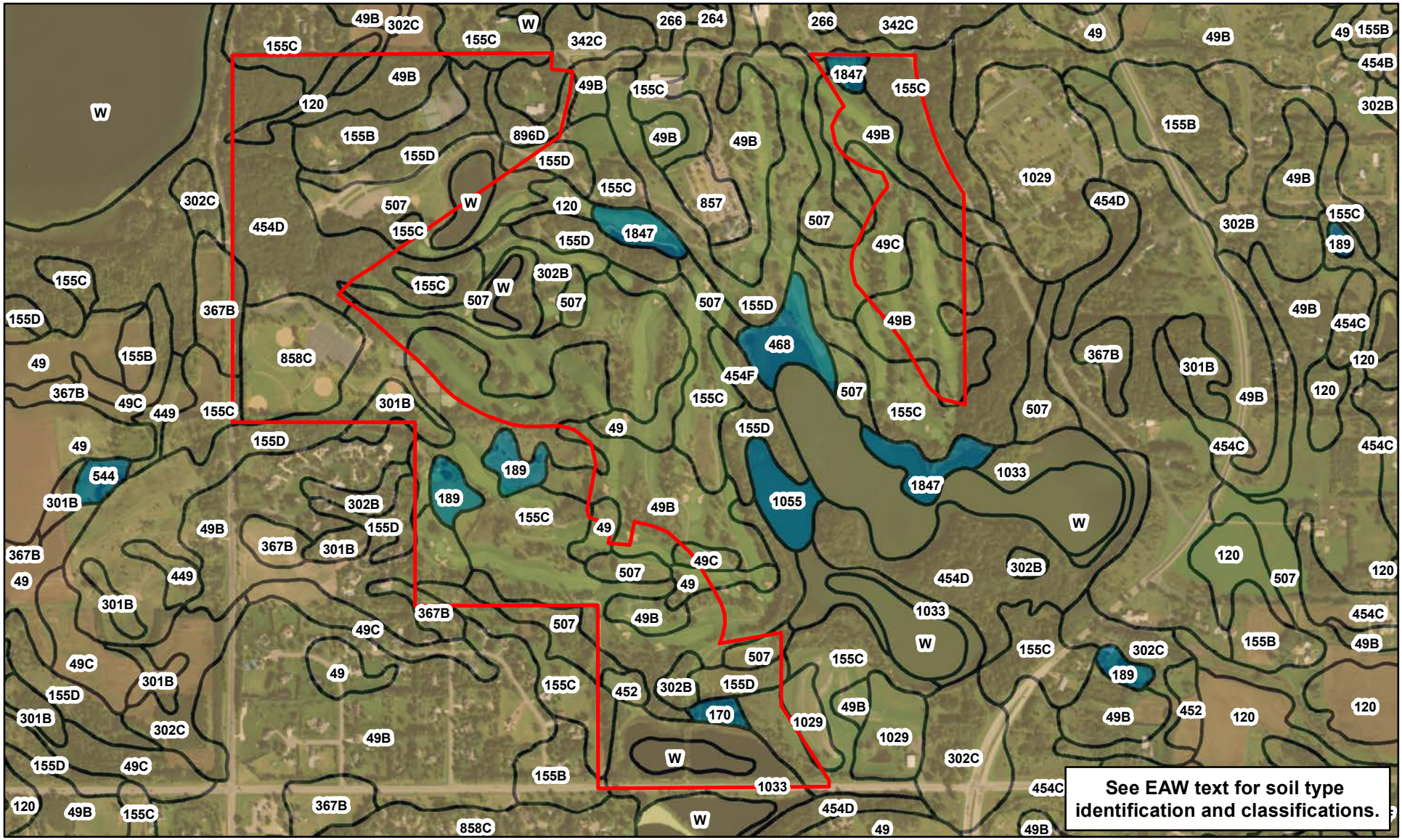

Figure 8 - Soil Types

N

0 1,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Hydric/Predominantly Hydric

Partially Hydric

Non-Hydric/Predominantly Non-Hydric

Royal Golf Club Residential Development
Lake Elmo, Minnesota

Note: Boundaries on this figure are approximate and do not constitute an official survey product. (KES 2016-034)

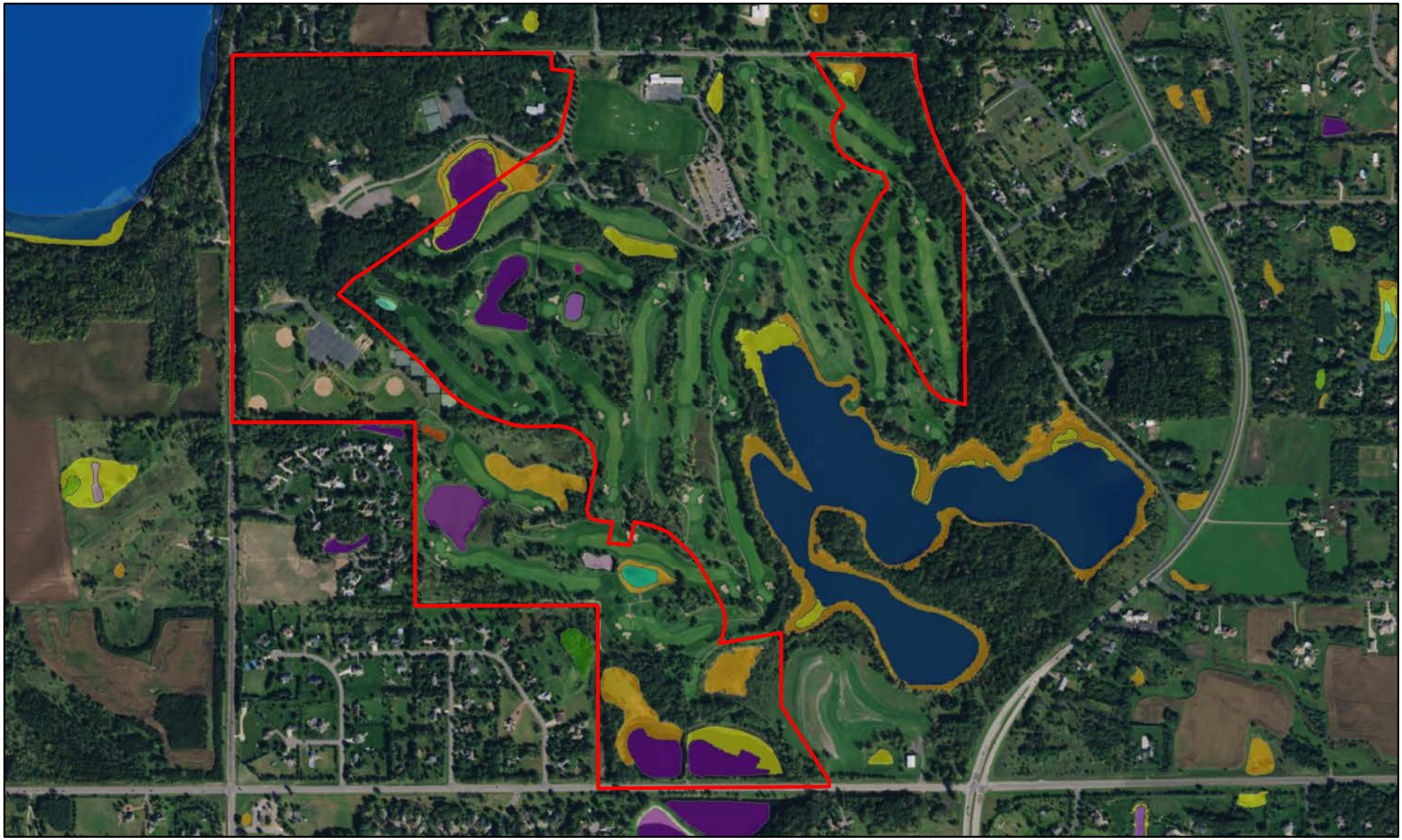

Figure 9 - National Wetlands Inventory

N

0 1,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

L1UBH	PABG	PFO1/EM1A	PUBG
L2ABH	PABGx	PFO1A	PUBGx
L2UBH	PEM1A	PUBF	
PABF	PEM1C	PUBFx	

Royal Golf Club Residential Development
Lake Elmo, Minnesota

Note: Boundaries on this figure are approximate and do not constitute an official survey product. (KES 2016-034)

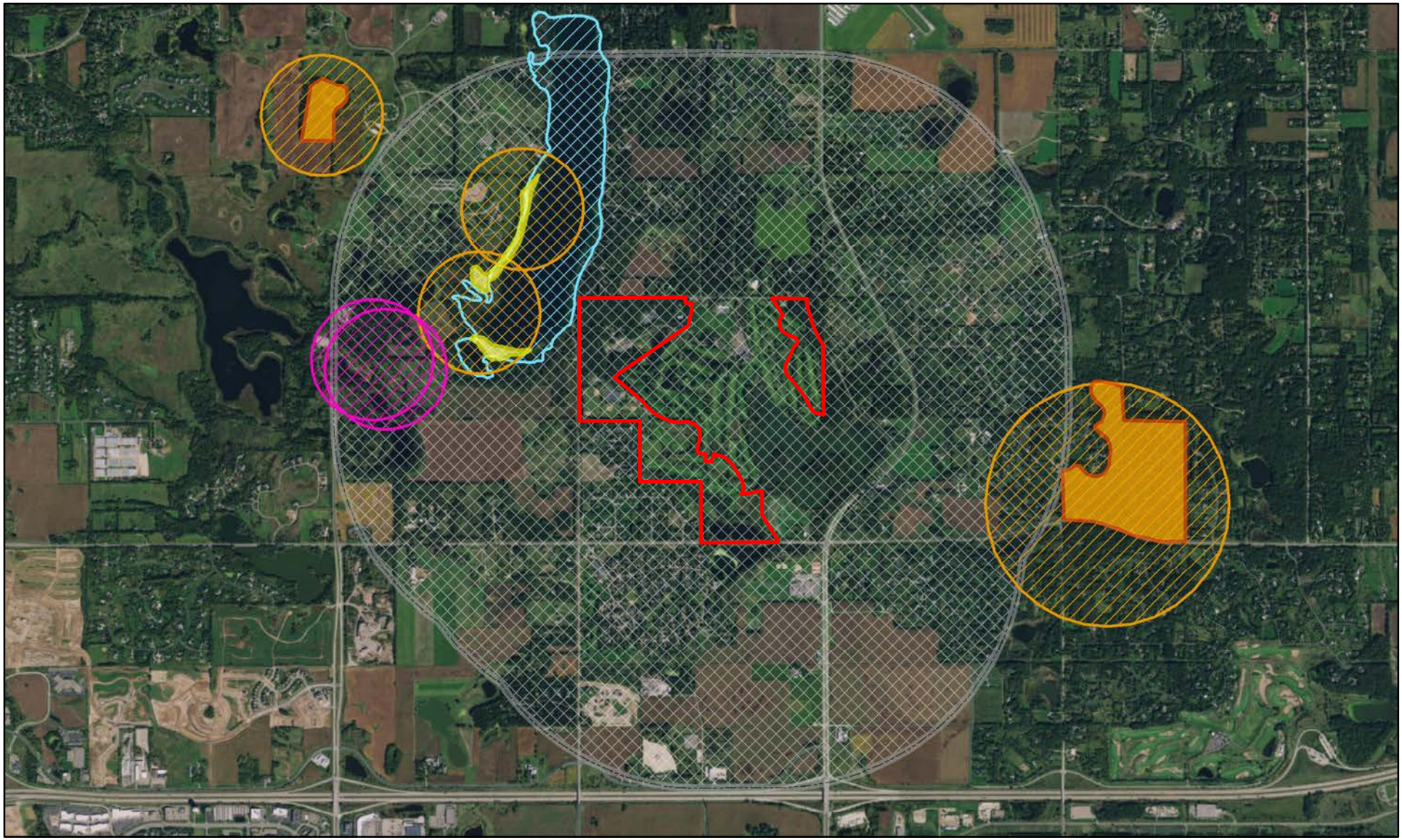

Figure 10 - Rare Species and Sensitive Habitats

N

0 3,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Project Boundary
1 Mile Buffer
Lake Beach, Sand Subtype
Oak Forest

Taxanomic Category
Rare Invertebrate Animal
Rare Terrestrial Community - Other Classification
RareVertebrate Animal

The Royal Golf Club Residential Development
Lake Elmo, Minnesota

Note: Boundaries on this figure are approximate and do not constitute an official survey product. (KES 2016-034)

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Appendix A
Tiered Shoreland Density Evaluation Tables

The Royal Golf Club Residential Development EAW

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Tiered Shoreland Density Evaluation
The Royal Golf Club Residential Development

Table 1. Lake Elmo Shoreland Density Evaluation

Tier	Total Area (sq.ft.)	Wetlands (sq.ft.)	Bluffs (sq.ft.)	Net Suitable Area (sq.ft.)	Required Lot Size (sq. ft.)	Allowable Base Density	Cumulative Allowable Density	Proposed Density	Cumulative Proposed Density
Tier 1 (0-267 feet)	77,109	1,225	0	75,884	15,000	5.1	5.1	0	0
Tier 2 (267-534 feet)	263,042	7,487	36,913	218,642	15,000	14.6	19.6	5	5
Tier 3 (534-801 feet)	407,684	4,084	6,084	397,516	15,000	26.5	46.1	12	17
Tier 4 (801-1,000 feet)	475,521	2,450	0	473,071	15,000	31.5	77.7	14	31
Total	1,223,356	15,246	42,997	1,165,113		77.7	77.7	31	31

Table 2. Lake Elmo Shoreland Open Space Calculation

Tier	Net Suitable Area (sq.ft.)	Number of Proposed Lots	Not Open Space		Net Open Space (sq.ft.)	% Open Space
			4,000 sq. ft. Impervious per Lot	Street Right-of-Way (sq.ft.)		
Shore Impact Zone (0-37.5 ft)	0	0	0	0	0	NA
Tier 1 (0-267 feet)	75,884	0	0	13,524	62,360	82.2
Tier 2 (267-534 feet)	218,642	5	20,000	10,807	187,835	85.9
Tier 3 (534-801 feet)	397,516	12	48,000	85,451	264,065	66.4
Tier 4 (801-1,000 feet)	473,071	14	56,000	75,913	341,158	72.1
Total	1,165,113	31	124,000	185,695	855,418	73.4

Tiered Shoreland Density Evaluation
The Royal Golf Club Residential Development

Table 3. Downs Lake Shoreland Density Evaluation

Tier	Total Area (sq.ft.)	Wetlands (sq.ft.)	Bluffs (sq.ft.)	Net Suitable Area (sq.ft.)	Required Lot Size (sq. ft.)	Allowable Base Density	Cumulative Allowable Density	Proposed Density	Cumulative Proposed Density
Tier 1 (0-320 feet)	0	0	0	0	20,000	0.0	0.0	0	0
Tier 2 (320-640 feet)	12,081	0	0	12,081	20,000	0.6	0.6	0	0
Tier 3 (640-1,000 feet)	238,485	27,443	0	211,042	20,000	10.6	11.2	7	7
Total	250,566	27,443	0	223,123		11.2	11.2	7	7

Table 4. Downs Lake Shoreland Open Space Calculation

Tier	Net Suitable Area (sq.ft.)	Number of Proposed Lots	Not Open Space		Net Open Space (sq.ft.)	% Open Space
			4,000 sq. ft. Impervious per Lot	Street Right-of-Way (sq.ft.)		
Shore Impact Zone (0-37.5 ft)	0	0	0	0	0	NA
Tier 1 (0-320 feet)	0	0	0	0	0	0.0
Tier 2 (320-640 feet)	12,081	0	0	10,790	1,291	10.7
Tier 3 (640-1,000 feet)	211,042	7	28,000	50,064	132,978	63.0
Total	223,123	7	28,000	60,854	134,269	60.2

Tiered Shoreland Density Evaluation
The Royal Golf Club Residential Development

Table 5. Lake Rose/Horseshoe Lake West Shoreland Density Evaluation

Tier	Total Area (sq.ft.)	Wetlands (sq.ft.)	Bluffs (sq.ft.)	Net Suitable Area (sq.ft.)	Required Lot Size (sq. ft.)	Allowable Base Density	Cumulative Allowable Density	Proposed Density	Cumulative Proposed Density
Tier 1 (0-320 feet)	1,362,340	608,772	0	753,568	20,000	37.7	37.7	7	7
Tier 2 (320-640 feet)	527,816	67,580	0	460,236	20,000	23.0	60.7	17	24
Tier 3 (640-1,000 feet)	509,118	65,577	0	443,541	20,000	22.2	82.9	17	41
Total	2,399,274	741,929	0	1,657,345		82.9	82.9	41	41

Table 6. Lake Rose/Horseshoe Lake West Open Space Calculation

Tier	Net Suitable Area (sq.ft.)	Number of Proposed Lots	Not Open Space		Net Open Space (sq.ft.)	% Open Space
			4,000 sq. ft. Impervious per Lot	Street Right-of-Way (sq.ft.)		
Shore Impact Zone (0-75 ft)	377,000	0	0	80,548	296,452	78.6
Tier 1 (0-320 feet)	753,568	7	28,000	194,179	531,389	70.5
Tier 2 (320-640 feet)	460,236	17	68,000	49,973	342,263	74.4
Tier 3 (640-1,000 feet)	443,541	17	68,000	104,567	270,974	61.1
Total	1,657,345	41	164,000	348,719	1,144,626	69.1

Tiered Shoreland Density Evaluation
The Royal Golf Club Residential Development

Table 7. Horseshoe Lake East Shoreland Density Evaluation

Tier	Total Area (sq.ft.)	Wetlands (sq.ft.)	Bluffs (sq.ft.)	Net Suitable Area (sq.ft.)	Required Lot Size (sq. ft.)	Allowable Base Density	Cumulative Allowable Density	Proposed Density	Cumulative Proposed Density
Tier 1 (0-320 feet)	39,453	0	0	39,453	20,000	2.0	2.0	2	2
Tier 2 (320-640 feet)	251,109	0	0	251,109	20,000	12.6	14.5	11	13
Tier 3 (640-1,000 feet)	366,724	0	0	366,724	20,000	18.3	32.9	19	32
Total	657,286	0	0	657,286		32.9	32.9	32	32

Table 8. Horseshoe Lake East Open Space Calculation

Tier	Net Suitable Area (sq.ft.)	Number of Proposed Lots	Not Open Space		Net Open Space (sq.ft.)	% Open Space
			4,000 sq. ft. Impervious per Lot	Street Right-of-Way (sq.ft.)		
Shore Impact Zone (0-75 ft)	0	0	0	0	0	NA
Tier 1 (0-320 feet)	39,453	2	8,000	0	31,453	79.7
Tier 2 (320-640 feet)	251,109	11	44,000	49,126	157,983	62.9
Tier 3 (640-1,000 feet)	366,724	19	76,000	61,422	229,302	62.5
Total	657,286	32	128,000	110,548	418,738	63.7

Appendix B
Wetland Delineation Approvals

The Royal Golf Club Residential Development EAW

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Minnesota Wetland Conservation Act
Notice of Decision

Local Government Unit (LGU)	Address
Valley Branch Watershed District (VBWD)	**P.O. Box 838** **Lake Elmo, MN 55042**

1. PROJECT INFORMATION

Applicant Name	Project Name	Date of Application	Application Number
Hollis Cavner, HC Golf Enterprises	**Royal Golf Club at Lake Elmo**	**4/27/16**	

☒ Attach site locator map.

Type of Decision:

☒ Wetland Boundary or Type ☐ No-Loss ☐ Exemption ☐ Sequencing
☐ Replacement Plan ☐ Banking Plan

Technical Evaluation Panel (TEP) Findings and Recommendation (if any):

☐ Approve ☐ Approve with conditions ☐ Deny

Summary (or attach): no TEP Findings

2. LOCAL GOVERNMENT UNIT DECISION

Date of Decision: **5/26/16**

☒ Approved ☐ Approved with conditions (include below) ☐ Denied

LGU Findings and Conclusions (attach additional sheets as necessary):

On behalf of HC Golf Enterprises, Kjolhaug Environmental Services, Inc. submitted a wetland delineation report for the Royal Golf Club at Lake Elmo. The site is located in Section 25, Township 29 North, Range 21 West, City of Lake Elmo, Washington County, Minnesota (previously known as the Tartan Golf Course).

Twenty-two wetlands were delineated within the site boundary with the following type designations:

Wetland ID	Wetland Type			Dominant Vegetation
	Circular 39	Cowardin	Eggers and Reed	
1 (10.81ac)	2/3/5	PEMB/C/UBGx	Fresh wet meadow, shallow marsh, excavated, shallow open-water community	Reed canary grass, cattail, sedge
2 (2.83ac)	3/6	PEMC/SS1C	Shallow marsh, Shrub-carr	Willow, reed canary grass, green bulrush, woolgrass
3 (1.04ac)	3	PEMC	Shallow marsh	Reed canary grass, cattail, smartweed
4 (0.51ac)	3	PEMC	Shallow marsh	Cattail, willow
5 (3.32ac)	5	PUBGx	Excavated, shallow open- water community	Reed canary grass, willow
6 (0.33ac)	2	PEMB	Fresh wet meadow	Reed canary grass, giant goldenrod

7 (0.43ac)	5	PABGx	Excavated, shallow open- water community	Reed canary grass, willow
8 (0.15ac)	1	PEMA	Fresh wet meadow	Reed canary grass
9 (0.06ac)	1	PFO1A	Seasonally flooded basin	Reed canary grass
10 (3.29ac)	5	PUBGx	Excavated, shallow open- water community	Reed canary grass, common buckthorn
11 (7.09ac)	3/5	PEMC/UBGx	Shallow marsh, excavated, shallow open-water community	Cattail
12 (0.65ac)	5	PUBG	Shallow open-water community	No dominant vegetation
13 (0.09ac)	5	PUBFx	Excavated, shallow open- water community	No dominant vegetation
14 (1.16ac)	5	PUBGx	Excavated, shallow open-water community	No dominant vegetation
15 (0.02ac)	1	PEMA	Seasonally flooded basin	Kentucky bluegrass, mowed willow, mowed reed canary grass
16 (0.22ac)	1	PEMA	Fresh wet meadow	Reed canary grass
17 (0.41ac)	1/3	PEMA/C	Fresh wet meadow, shallow marsh	Cattail, reed canary grass
18 (0.52ac)	3	PEMC	Shallow marsh	Cattail, reed canary grass, common buckthorn
19 (0.05ac)	1	PEMA	Seasonally flooded basin/drainageway	Reed canary grass
20 (0.08ac)	1	PEMA	Seasonally flooded basin	No dominant vegetation
21 (0.10ac)	1	PEMA	Seasonally flooded basin	No dominant vegetation
22	1/3	PEMA/C	Fresh wet meadow, shallow marsh, deep-water habitat	Cattail, reed canary grass, red osier dogwood, common buckthorn

The wetland delineation report and Notice of Application were provided to the TEP on 4/28/16 with a 15 business day comment period

A site review was conducted on 5/13/16. Present at the site review were: Jed Chesnut with Washington Conservation District, Ben Meyer with the Board of Water and Soil Resources, Paul Hauser with the U.S. Army Corps of Engineers, Karen Wold with Barr Engineering Co. for the VBWD, Melissa Barrett with Kjolhaug for the applicant, and Jim Felten with Tournament Golf LLC for the applicant.

During the site review, Wetland 14 was found to have a rock bottom and no hydric soil. Therefore, it does not meet wetland criteria. Wetland 14 is part of a DNR public watercourse and should be regulated by the DNR, not the WCA.

The remaining wetland boundaries and types were found to be accurate based on the requirements of the *1987 U.S. Army Corps of Engineers Wetland Delineation Manual*, the 2012 Northcentral and Northeast Regional Supplement, and the 2015 Guidance for Submittal of Delineation Reports to the USACE and WCA LGU in Minnesota, Version 2.0.

The VBWD approves the delineated wetland boundaries and types with the change of Wetland 14 from wetland to public watercourse.

For Replacement Plans using credits from the State Wetland Bank:

Bank Account #	Bank Service Area	County	Credits Approved for Withdrawal (sq. ft. or nearest .01 acre)

Replacement Plan Approval Conditions. In addition to any conditions specified by the LGU, the approval of a Wetland Replacement Plan is conditional upon the following:

☐ **Financial Assurance:** For project-specific replacement that is not in-advance, a financial assurance specified by the LGU must be submitted to the LGU in accordance with MN Rule 8420.0522, Subp. 9 (List amount and type in LGU Findings).

☐ **Deed Recording:** For project-specific replacement, evidence must be provided to the LGU that the BWSR "Declaration of Restrictions and Covenants" and "Consent to Replacement Wetland" forms have been filed with the county recorder's office in which the replacement wetland is located.

☐ **Credit Withdrawal:** For replacement consisting of wetland bank credits, confirmation that BWSR has withdrawn the credits from the state wetland bank as specified in the approved replacement plan.

Wetlands may not be impacted until all applicable conditions have been met!

LGU Authorized Signature:

Signing and mailing of this completed form to the appropriate recipients in accordance with 8420.0255, Subp. 5 provides notice that a decision was made by the LGU under the Wetland Conservation Act as specified above. If additional details on the decision exist, they have been provided to the landowner and are available from the LGU upon request.		
Name David J. Bucheck	Title Valley Branch WD Board President	
Signature	Date 05/26/2016	Phone Number and E-mail 651-770-1730 djbucheck@yahoo.com

THIS DECISION ONLY APPLIES TO THE MINNESOTA WETLAND CONSERVATION ACT. Additional approvals or permits from local, state, and federal agencies may be required. Check with all appropriate authorities before commencing work in or near wetlands.

Applicants proceed at their own risk if work authorized by this decision is started before the time period for appeal (30 days) has expired. If this decision is reversed or revised under appeal, the applicant may be responsible for restoring or replacing all wetland impacts.

This decision is valid for five years from the date of decision unless a longer period is advised by the TEP and specified in this notice of decision.

3. APPEAL OF THIS DECISION

Pursuant to MN Rule 8420.0905, any appeal of this decision can only be commenced by mailing a petition for appeal, including applicable fee, within thirty (30) calendar days of the date of the mailing of this Notice to the following as indicated:

Check one:

☐ Appeal of an LGU staff decision. Send petition and $_____ fee (if applicable) to:	☒ Appeal of LGU governing body decision. Send petition and $500 filing fee to: Executive Director Minnesota Board of Water and Soil Resources 520 Lafayette Road North St. Paul, MN 55155

4. LIST OF ADDRESSEES

☒ SWCD TEP member: **Jed Chesnut - Washington Conservation District**
☒ BWSR TEP member: **Ben Meyer**
☒ DNR TEP member: **Leslie Parris, Jenifer Sorensen**
☐ DNR Regional Office (if different than DNR TEP member)
☒ WD or WMO (if applicable): **John Hanson**
☒ Applicant (notice only) and Landowner (if different): **Hollis Cavner (HC Golf Enterprises), James Felten (Tournament Golf LLC), Rick Packer (Homestead Partners), Melissa Barrett (Kjolhaug)**
☒ Corps of Engineers Project Manager: **Paul Hauser**
☐ BWSR Wetland Bank Coordinator (wetland bank plan decisions only)

5. MAILING INFORMATION

- For a list of BWSR TEP representatives: www.bwsr.state.mn.us/aboutbwsr/workareas/WCA_areas.pdf
- For a list of DNR TEP representatives: www.bwsr.state.mn.us/wetlands/wca/DNR_TEP_contacts.pdf
- Department of Natural Resources Regional Offices:

NW Region:	NE Region:	Central Region:	Southern Region:
Reg. Env. Assess. Ecol. Div. Ecol. Resources 2115 Birchmont Beach Rd. NE Bemidji, MN 56601	Reg. Env. Assess. Ecol. Div. Ecol. Resources 1201 E. Hwy. 2 Grand Rapids, MN 55744	Reg. Env. Assess. Ecol. Div. Ecol. Resources 1200 Warner Road St. Paul, MN 55106	Reg. Env. Assess. Ecol. Div. Ecol. Resources 261 Hwy. 15 South New Ulm, MN 56073

For a map of DNR Administrative Regions, see: http://files.dnr.state.mn.us/aboutdnr/dnr_regions.pdf

- For a list of Corps of Project Managers: www.mvp.usace.army.mil/regulatory/default.asp?pageid=687 or send to:

US Army Corps of Engineers
St. Paul District, ATTN: OP-R
180 Fifth St. East, Suite 700
St. Paul, MN 55101-1678

- For Wetland Bank Plan applications, also send a copy of the application to:

Minnesota Board of Water and Soil Resources
Wetland Bank Coordinator
520 Lafayette Road North
St. Paul, MN 55155

6. ATTACHMENTS

In addition to the site locator map, list any other attachments:
☐

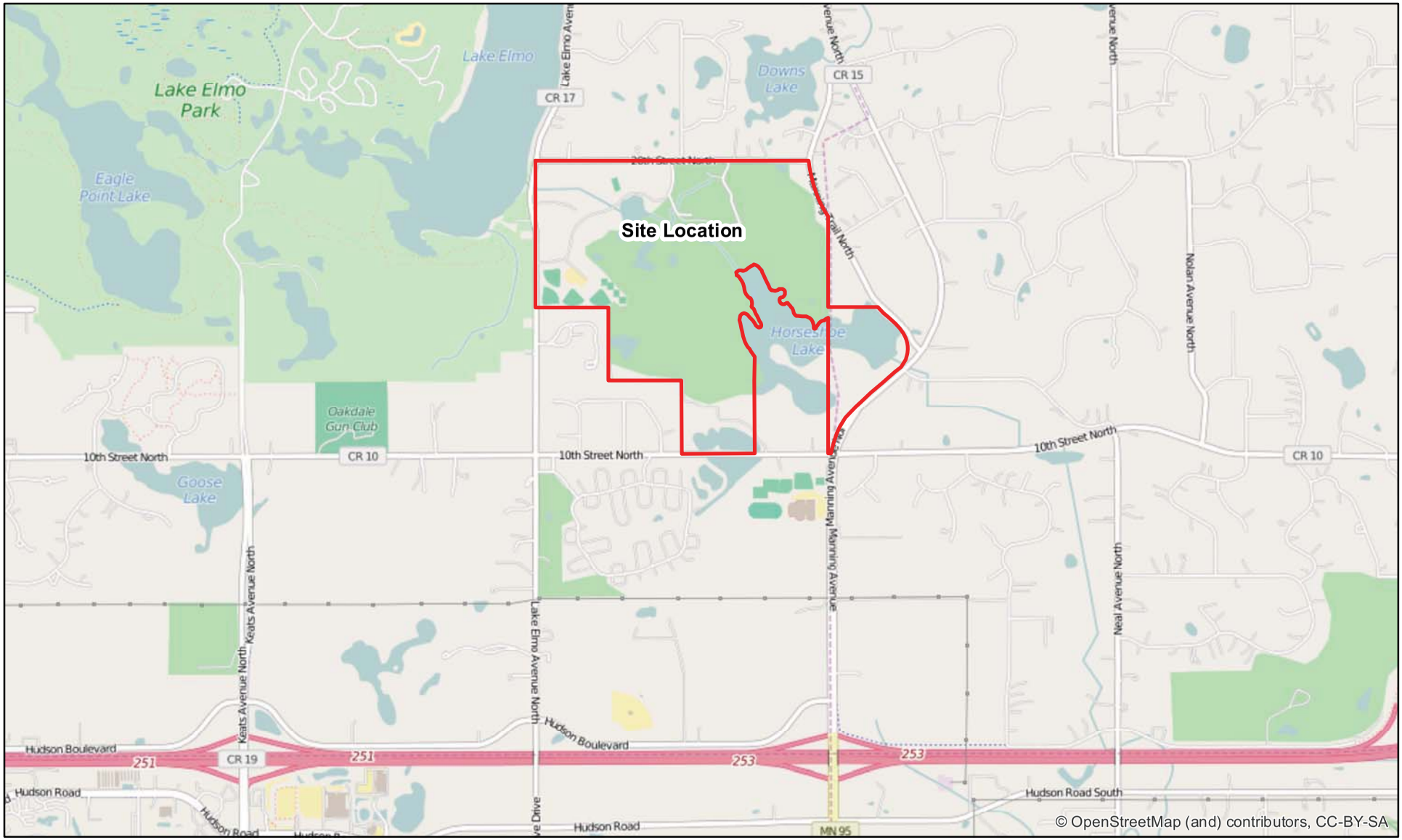

Figure 1 - Site Location

N

0 2,500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: ESRI Streets Basemap

Royal Golf Club at Lake Elmo (KES 2016-014)
Lake Elmo, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Figure 2A - Existing Conditions

N

0 700 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: Minnesota DNR (2013)

Sample Point
DNR Connection Point
Creek
Transect
Lake Edge
Project Boundary
Review Area
Wetland Boundary

Royal Golf Club at Lake Elmo (KES 2016-014)
Lake Elmo, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Minnesota Wetland Conservation Act
Notice of Decision

Local Government Unit (LGU)	Address
Valley Branch Watershed District (VBWD)	**P.O. Box 838** **Lake Elmo, MN 55042**

1. PROJECT INFORMATION

Applicant Name	Project Name	Date of Application	Application Number
Hollis Cavner, HC Golf Enterprises	**Royal Golf Club at Lake Elmo**	**4/28/16**	

☒ Attach site locator map.

Type of Decision:

☐ Wetland Boundary or Type ☒ No-Loss ☐ Exemption ☐ Sequencing
☐ Replacement Plan ☐ Banking Plan

Technical Evaluation Panel (TEP) Findings and Recommendation (if any):

☐ Approve ☐ Approve with conditions ☐ Deny

Summary (or attach): no TEP Findings

2. LOCAL GOVERNMENT UNIT DECISION

Date of Decision: **5/26/16**

☒ Approved ☐ Approved with conditions (include below) ☐ Denied

LGU Findings and Conclusions (attach additional sheets as necessary):

On behalf of HC Golf Enterprises, Kjolhaug Environmental Services, Inc. (Kjohlhaug) has submitted an incidental wetland determination request for the Royal Golf Club at Lake Elmo. The site is located in Section 25, Township 29 North, Range 21 West, City of Lake Elmo, Washington County, Minnesota.

A wetland delineation report was sent out with a Notice of Application on 4/28/16.

Kjohlhaug's 4/28/16 wetland assessment memo and Notice of Application were provided to the TEP on 5/3/16 with a 15 business day comment period

Kjohlhaug's wetland assessment memo requested that wetlands 2, 3, 4, 6, 13, 15, 18, and 19 be determined incidental per MN Rule 8420.0105 Subpart 2.D. and not regulated by the Wetland Conservation Act (WCA).

A site review was conducted on 5/13/16. Present at the site review were: Jed Chesnut with Washington Conservation District, Ben Meyer with the Board of Water and Soil Resources, Paul Hauser with the U.S. Army Corps of Engineers, Karen Wold with Barr Engineering Co. for the VBWD, Melissa Barrett with Kjolhaug for the applicant, and Jim Felten with Tournament Golf LLC for the applicant.

During the site review, the TEP agreed that wetlands 2, 3, 4, 6, 13, 15, 18, and 19 are incidental per MN Rule 8420.0105 Subpart 2.D. and not regulated by the WCA. The TEP also agreed that Wetland 8 is incidental.

Wetland 14 was included in the wetland review summary table, but not requested to be considered incidental in the memo narrative. During the meeting, the TEP concluded that though portions of the Wetland 14 location were historically wetland, it currently has a rock bottom and does not have hydric

soil. Since Wetland 14 is part of the DNR public watercourse, it should be regulated by the DNR and not the WCA. The VBWD approves the incidental wetland determination for Wetlands 2, 3, 4, 6, 8, 13, 15, 18, and 19.

For Replacement Plans using credits from the State Wetland Bank:

Bank Account #	Bank Service Area	County	Credits Approved for Withdrawal (sq. ft. or nearest .01 acre)

Replacement Plan Approval Conditions. In addition to any conditions specified by the LGU, the approval of a Wetland Replacement Plan is conditional upon the following:

☐ **Financial Assurance:** For project-specific replacement that is not in-advance, a financial assurance specified by the LGU must be submitted to the LGU in accordance with MN Rule 8420.0522, Subp. 9 (List amount and type in LGU Findings).

☐ **Deed Recording:** For project-specific replacement, evidence must be provided to the LGU that the BWSR "Declaration of Restrictions and Covenants" and "Consent to Replacement Wetland" forms have been filed with the county recorder's office in which the replacement wetland is located.

☐ **Credit Withdrawal:** For replacement consisting of wetland bank credits, confirmation that BWSR has withdrawn the credits from the state wetland bank as specified in the approved replacement plan.

Wetlands may not be impacted until all applicable conditions have been met!

LGU Authorized Signature:

Signing and mailing of this completed form to the appropriate recipients in accordance with 8420.0255, Subp. 5 provides notice that a decision was made by the LGU under the Wetland Conservation Act as specified above. If additional details on the decision exist, they have been provided to the landowner and are available from the LGU upon request.		
Name David J. Bucheck	Title Valley Branch WD Board President	
Signature	Date 05/26/2016	Phone Number and E-mail 651-770-1730 djbucheck@yahoo.com

THIS DECISION ONLY APPLIES TO THE MINNESOTA WETLAND CONSERVATION ACT. Additional approvals or permits from local, state, and federal agencies may be required. Check with all appropriate authorities before commencing work in or near wetlands.

Applicants proceed at their own risk if work authorized by this decision is started before the time period for appeal (30 days) has expired. If this decision is reversed or revised under appeal, the applicant may be responsible for restoring or replacing all wetland impacts.

This decision is valid for five years from the date of decision unless a longer period is advised by the TEP and specified in this notice of decision.

3. APPEAL OF THIS DECISION

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Check one:

☐ Appeal of an LGU staff decision. Send petition and $_____ fee (if applicable) to:	☒ Appeal of LGU governing body decision. Send petition and $500 filing fee to: Executive Director

	Minnesota Board of Water and Soil Resources 520 Lafayette Road North St. Paul, MN 55155

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☒ BWSR TEP member: **Ben Meyer**
☒ DNR TEP member: **Leslie Parris, Jenifer Sorensen**
☐ DNR Regional Office (if different than DNR TEP member)
☒ WD or WMO (if applicable): **John Hanson**
☒ Applicant (notice only) and Landowner (if different): **Hollis Cavner (HC Golf Enterprises), James Felten (Tournament Golf LLC), Rick Packer (Homestead Partners), Melissa Barrett (Kjolhaug)**
☒ Corps of Engineers Project Manager: **Paul Hauser**
☐ BWSR Wetland Bank Coordinator (wetland bank plan decisions only)

5. MAILING INFORMATION

- For a list of BWSR TEP representatives: www.bwsr.state.mn.us/aboutbwsr/workareas/WCA_areas.pdf
- For a list of DNR TEP representatives: www.bwsr.state.mn.us/wetlands/wca/DNR_TEP_contacts.pdf
- Department of Natural Resources Regional Offices:

NW Region:	NE Region:	Central Region:	Southern Region:
Reg. Env. Assess. Ecol. Div. Ecol. Resources 2115 Birchmont Beach Rd. NE Bemidji, MN 56601	Reg. Env. Assess. Ecol. Div. Ecol. Resources 1201 E. Hwy. 2 Grand Rapids, MN 55744	Reg. Env. Assess. Ecol. Div. Ecol. Resources 1200 Warner Road St. Paul, MN 55106	Reg. Env. Assess. Ecol. Div. Ecol. Resources 261 Hwy. 15 South New Ulm, MN 56073

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US Army Corps of Engineers
St. Paul District, ATTN: OP-R
180 Fifth St. East, Suite 700
St. Paul, MN 55101-1678

- For Wetland Bank Plan applications, also send a copy of the application to:

Minnesota Board of Water and Soil Resources
Wetland Bank Coordinator
520 Lafayette Road North
St. Paul, MN 55155

6. ATTACHMENTS

In addition to the site locator map, list any other attachments:
☒ **Incidental Wetland Summary Table**

Table 1. Summary of Wetland Review - Royal Golf Club at Lake Elmo.

Wetland ID			Year and Observation														
	Historic Topo Maps	SMU/ Hydric	1936	1947	1953	1957	1964	1970	1980	1986	1991-92	1997	2003	2010	2013	2015	Summary
2	Upland	155D/No, 507/No	Upland with home	Upland with home	Upland with home	Upland with home	Upland with home	Upland with home	Upland with home	Upland with home	Upland with road; home removed	Excavated as presently exists	No change	No change	No change	No change	Created wetland. Area appears to have been mined.
3	Closed depression, upland, no water.	507/No	Upland	Upland	Upland	Upland	Upland	Upland	Upland	Excavated, impounded	Excavated, impounded	Excavated, impounded	Excavated, partly inundated	Excavated, partly inundated	Excavated, partly inundated	Excavated, partly inundated	Excavated to hold irrigation water pumped from nearby DNR waters. This activity is no long occurring.
4	Closed depression, upland, no water.	507/No	Upland	Upland	Upland	Upland	Upland	Upland	Upland	Excavated, impounded	Excavated, impounded	Excavated, impounded	Excavated, partly inundated	Excavated, partly inundated	Excavated, partly inundated	Excavated, partly inundated	Excavated to hold irrigation water pumped from nearby DNR waters. This activity is no long occurring.
6	Closed depression, upland, no water.	301B/No	Upland	Upland	Upland	Upland	Upland	Upland	Inundated depression and adjacent new dev.	Excavated, impounded	Excavated, impounded	Excavated, impounded	Excavated, partly inundated	Excavated, partly inundated	Excavated, partly inundated	Excavated, partly inundated	Excavated to hold stormwater/irrigation water.
13	Closed depression, upland, no water.	507/No	Upland	Upland	Upland	Upland	Upland	Upland	Excavated, impounded	Excavated, impounded	Excavated, impounded	Excavated, impounded	Excavated, impounded	Excavated, impounded	Excavated, impounded	Excavated, impounded	Created basin for irrigation pumping purposes.
14	Wet spot seen on photos shown as water	1847/Predominantly Hydric	Swale	Hillslope, wet spot to north.	Hillslope, wet spot to north.	Hillslope, wet spot to north.	Hillslope, wet spot to north.	excavated channel base of slope.	Impoundment	Impoundment	Impoundment	Re-excavated channel as now present.	Re-excavated channel as present today.	Re-excavated channel as present today.	Re-excavated channel as present today.	Re-excavated channel as present today.	Channel excavated south of historic wetland along hillslope to contain water/impound water/ provide rate control downstream.
15	Upland	155C/No	Upland	Upland	Upland	Upland	Course grading nearby	Created pond nearby	Created pond nearby	Upland	Created pond nearby	As is present today	As is present today	As is present today	As is present today	As is present today	Created course hazard.
18	Upland	49B/No	Upland	Upland	Upland	Upland	Upland	Upland	Upland	Excavated, impounded	Vegetated wetland/stormpond	Excavated, impounded	Vegetated wetland/stormpond	Vegetated wetland/stormpond	Vegetated wetland/stormpond	Vegetated wetland/stormpond	Created stormwater pond.
19	Upland	49B/No	Upland	Upland	Upland	Upland	Upland	Upland	Upland	Upland	Drainage connection to WL18 visible	Drainage connection to WL18 visible	Drainage connection to WL18 visible	Drainage connection to WL18 visible	Drainage connection to WL18 visible	Drainage connection to WL18 visible	Created channel from parking area to stormwater pond.

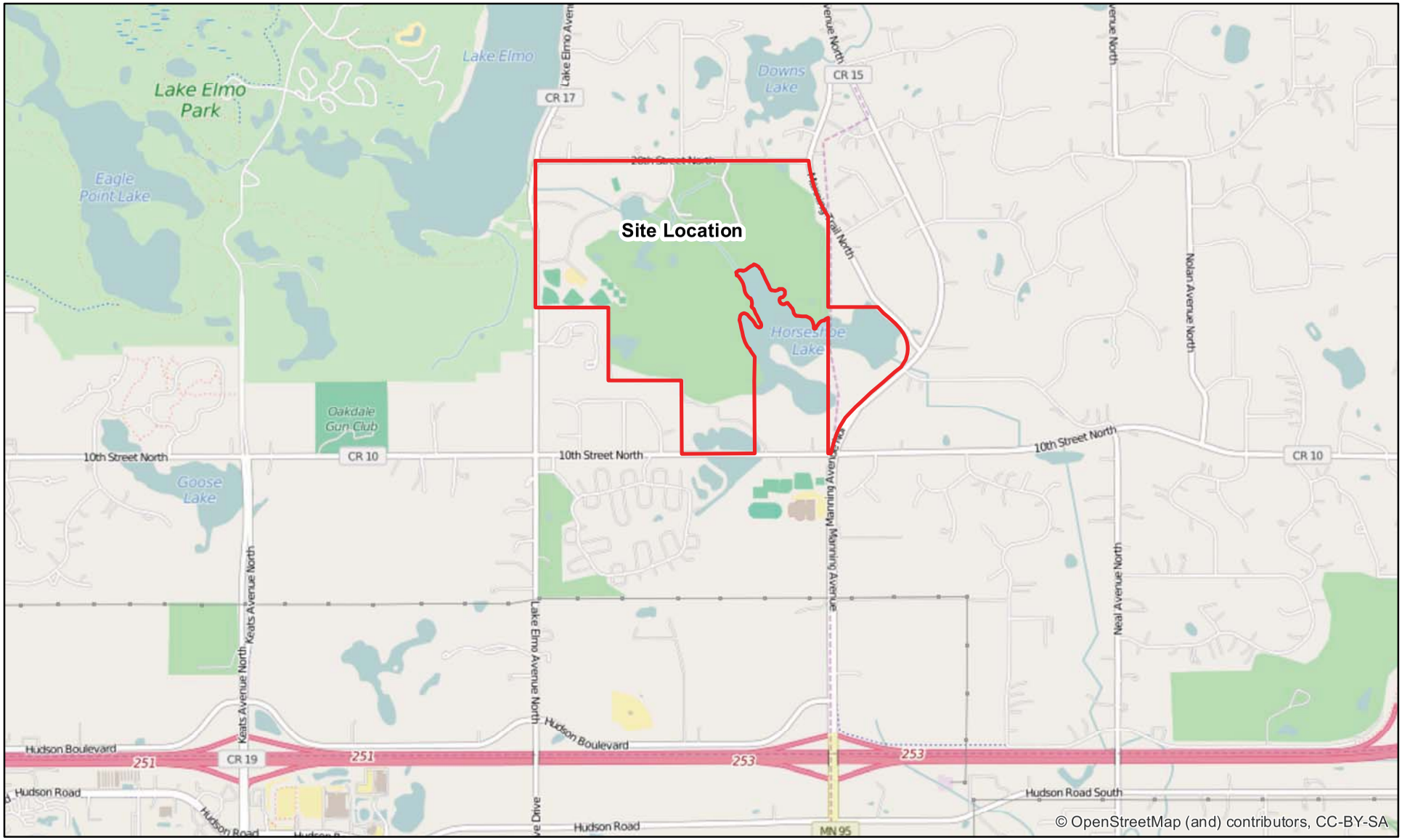

Figure 1 - Site Location

N

0 2,500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: ESRI Streets Basemap

Royal Golf Club at Lake Elmo (KES 2016-014)
Lake Elmo, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Figure 2A - Existing Conditions

N

0 700 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: Minnesota DNR (2013)

Sample Point
DNR Connection Point
Creek
Transect
Lake Edge
Project Boundary
Review Area
Wetland Boundary

Royal Golf Club at Lake Elmo (KES 2016-014)
Lake Elmo, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT, CORPS OF ENGINEERS
180 FIFTH STREET EAST, SUITE 700
ST. PAUL, MN 55101-1678

REPLY TO ATTENTION OF
REGULATORY BRANCH

AUG 23 2016

Regulatory File No. 2016-01340-PRH

HC Golf Enterprises
c/o Hollis Cavner
11074 Radisson Road NE,
Blaine, Minnesota 55449

Dear Mr. Cavner:

This letter is in response to correspondence submitted by Kjolhaug Environmental on your behalf for your 475.2 acre property dated April 25, 2016, requesting Corps of Engineers (Corps) concurrence with the delineation of aquatic resources you completed on the approximately 475.2 acre property of HC Golf Enterprises. The project site is located in Section 25, Township 21 North, Range 29 West, Washington County, Minnesota, as shown on the enclosed figures labeled MVP-2016-01340-PRH Page 1 of 4 through Page 4 of 4.

We have reviewed the *Royal Golf Club at Lake Elmo – Wetland Delineation Report* and determined that the limits of the aquatic resources have been accurately identified in accordance with current agency guidance including the *Corps of Engineers Wetland Delineation Manual* (1987 Manual) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region. This concurrence is only valid for the review area shown on the enclosed figure labeled MVP-2016-01340-PRH Page 2 of 4. The boundaries shown on the enclosed figure accurately reflect the limits of the aquatic resources in the project boundary.

This concurrence may generally be relied upon for five years from the date of this letter. However, we reserve the right to review and revise our concurrence in response to changing site conditions, information that was not considered during our initial review, or off-site activities that could indirectly alter the extent of wetlands and other resources on-site. Our concurrence may be renewed at the end of this period provided you submit a written request and our staff are able to verify that the determination is still valid.

The preliminary jurisdictional determination (JD) for Wetlands 1, 2, 5, 7, 9, 10, 11, 12, 14, 17, 22, and the two tributaries on the enclosed figure labeled MVP-2016-01340-PRH Page 3 of 4, presumes that these aquatic resources identified in the review area are subject to Corps of Engineers' jurisdiction under the Clean Water Act. Since the determination is considered preliminary it is not appealable under our administrative appeal procedures (33 CFR 331). If you prefer an appealable approved jurisdictional determination that verifies the jurisdictional status of the aquatic resources within the project boundary you may request one by contacting the Corps representative identified in the final paragraph of this letter.

If this preliminary JD is acceptable, please sign and date both copies of the Preliminary Jurisdictional Determination Form and return one copy to the letterhead address within 30 days from the date of this letter.

An approved JD has been prepared for Wetlands 3, 4, 6, 8, 13, 15, 16, 18, 19, 20, and 21, as shown on the enclosed figure labeled MVP-2016-01340-PRH Page 4 of 4. These wetlands are isolated and are not waters of the United States subject to Corps of Engineers jurisdiction. Therefore, you are not required to obtain Department of the Army authorization to discharge dredged or fill material within this area. The rationale for this determination is provided in the attached Approved Jurisdictional Determination form.

This determination is only valid for the project boundary shown on the attached figure labeled MVP-2016-01340-PRH Page 4 of 4.

If you object to the approved JD, you may request an administrative appeal under Corps regulations at 33 CFR 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and Request for Appeal (RFA) form. If you request to appeal this determination, you must submit a completed RFA form to the Mississippi Valley Division Office at the address shown on the form.

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR 331.5, and that it has been received by the Division Office within 60 days of the date of the attached NAP.

This approved JD may be relied upon for five years from the date of this letter. However, the Corps reserves the right to review and revise the boundary in response to changing site conditions, information that was not considered during our initial review, or off-site activities that could indirectly alter the extent of wetlands and other resources on-site. This determination may be renewed at the end of the five year period provided you submit a written request and our staff are able to verify that the limits established during the original determination are still accurate.

If you have any questions, please contact Paul Hauser in our St. Paul office at (651) 290-5357 or paul.r.hauser@usace.army.mil. In any correspondence or inquiries, please refer to the Regulatory file number shown above.

Sincerely,

Kristen Hafer

Kristen Hafer
Chief, Southwest Section

cc:

Ben Meyer (BWSR)
Jen Sorensen (MnDNR)
Jay Riggs (CD)
Melissa Barrett (Agent)

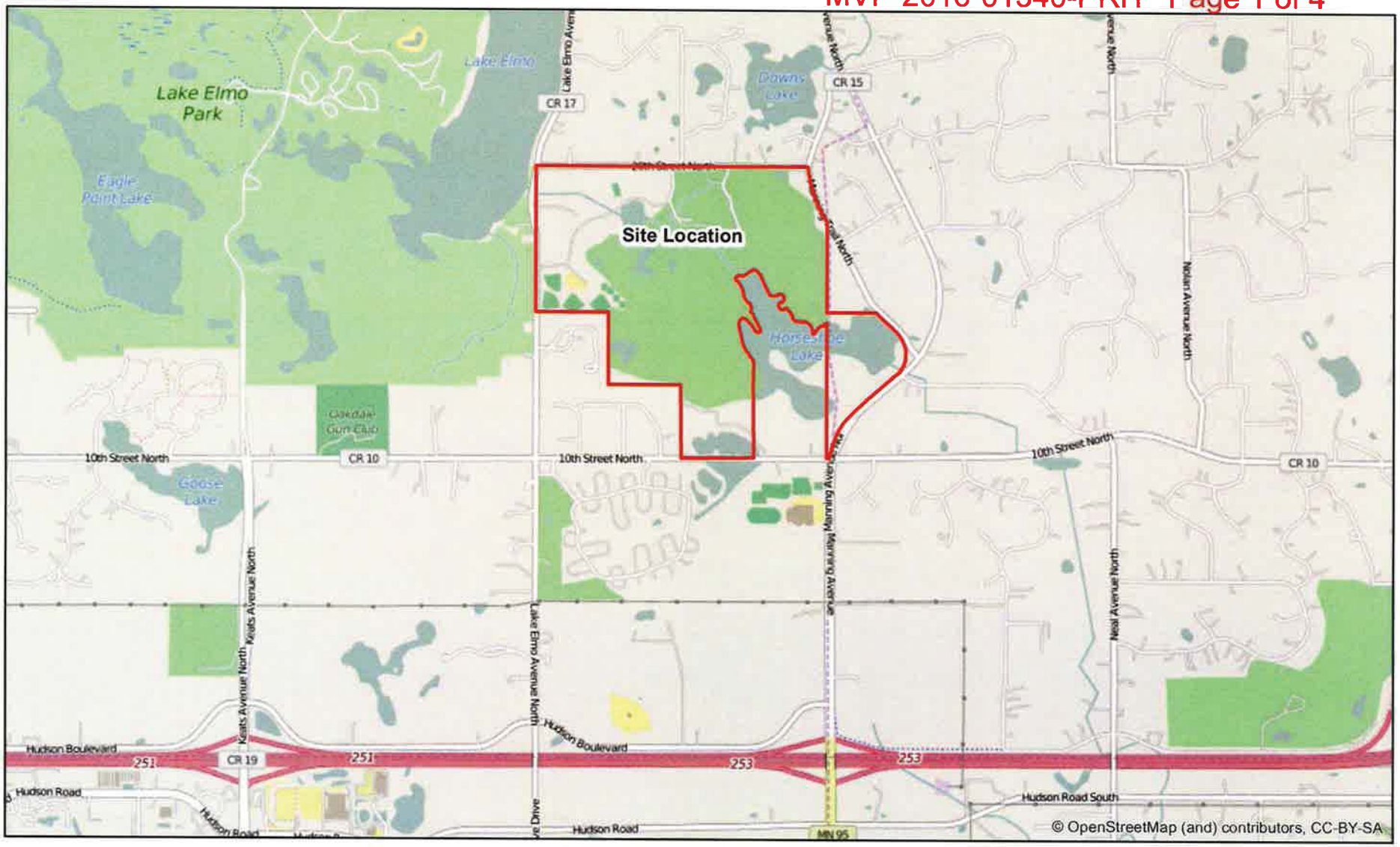

Figure 1 - Site Location

N

0 2,500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: ESRI Streets Basemap

Royal Golf Club at Lake Elmo (KES 2016-014)
Lake Elmo, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

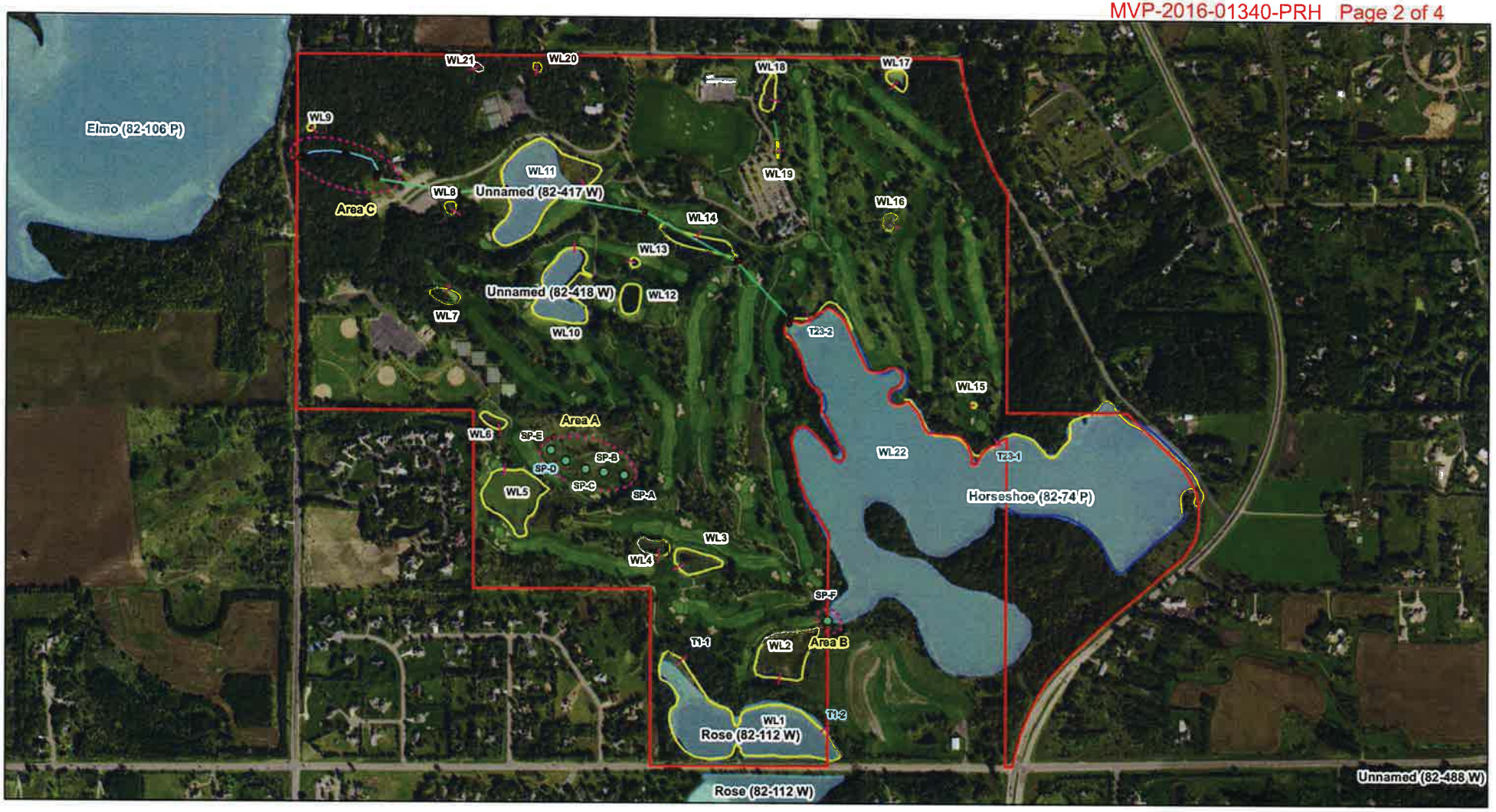

Figure 2A - Existing Conditions

N

0 700 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: Minnesota DNR (2013)

Sample Point
DNR Connection Point
DNR Pipe
Creek
Transect
Project Boundary
Review Area
Wetland Boundary
Lake Edge
Public Waters

Royal Golf Club at Lake Elmo (KES 2016-014)
Lake Elmo, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Figure 2A - Existing Conditions

N

0 700 Feet

Wetlands Considered Jurisdictional

Sample Point

DNR Connection Point

Creek

Transect

Lake Edge

Project Boundary

Review Area

Wetland Boundary

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: Minnesota DNR (2013)

Royal Golf Club at Lake Elmo (KES 2016-014)
Lake Elmo, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Figure 2B - Existing Conditions

N

0 700 Feet

Wetlands Considered Isolated, Non-Jurisdictional

Sample Point

DNR Connection Point

Creek

Transect

Lake Edge

10ft Lidar Contours

Project Boundary

Review Area

Wetland Boundary

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: Minnesota DNR (2013)

Royal Golf Club at Lake Elmo (KES 2016-014)
Lake Elmo, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

This preliminary JD finds that there *"may be"* waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

District Office: St. Paul District | File/ORM #: 2016-01340-PRH | PJD Date: Aug 16, 2016

State: MN | City/County: Lake Elmo/Washington

Nearest Waterbody: Lake Elmo

Location: TRS, LatLong or UTM: Section 25, Township 29 North, Range 21 West

Name/ Address of Person Requesting PJD: HC Golf Enterprises
c/o Hollis Cavner
11074 Radisson Road
Blaine, Minnesota 55449

Identify (Estimate) Amount of Waters in the Review Area:

Non-Wetland Waters: 4275 linear ft | 2 width | 0.20 acres | Stream Flow: Perennial

Wetlands: 3.99 acre(s) | Cowardin Class: Palustrine, emergent

Name of Any Water Bodies on the Site Identified as Section 10 Waters: Tidal: | Non-Tidal:

☑ Office (Desk) Determination
☑ Field Determination: Date of Field Trip: May 13, 2016

SUPPORTING DATA: Data reviewed for preliminary JD (check all that apply - checked items should be included in case file and, where checked and requested, appropriately reference sources below):

- ☑ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: Wetland Delineation Report Contents
- ☑ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - ☐ Office concurs with data sheets/delineation report.
  - ☐ Office does not concur with data sheets/delineation report.
- ☐ Data sheets prepared by the Corps
- ☐ Corps navigable waters' study:
- ☑ U.S. Geological Survey Hydrologic Atlas:
  - ☑ USGS NHD data.
  - ☐ USGS 8 and 12 digit HUC maps.
- ☑ U.S. Geological Survey map(s). Cite quad name:
- ☑ USDA Natural Resources Conservation Service Soil Survey. Citation: Royal Golf Club at Lake Elmo, 2016
- ☑ National wetlands inventory map(s). Cite name: Royal Golf Club at Lake Elmo, NWI 2016
- ☐ State/Local wetland inventory map(s):
- ☐ FEMA/FIRM maps:
- ☐ 100-year Floodplain Elevation is:
- ☐ Photographs: ☑ Aerial (Name & Date): 2015,2013,2010,2003,1997,1991-92,1986,1980,1964
  - ☐ Other (Name & Date):
- ☐ Previous determination(s). File no. and date of response letter:
- ☐ Other information (please specify):

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

Paul Hansen 08/16/2016

Signature and Date of Regulatory Project Manager (REQUIRED)

Signature and Date of Person Requesting Preliminary JD (REQUIRED, unless obtaining the signature is impracticable)

EXPLANATION OF PRELIMINARY AND APPROVED JURISDICTIONAL DETERMINATIONS:

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "preconstruction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters; (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) that the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant's acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable.

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

This preliminary JD finds that there *"may be"* waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

Appendix A - Sites

District Office: St. Paul District | File/ORM #: 2016-01340 | PJD Date: Jul 7, 2016

State: MN | City/County: Lake Elmo / Washington | Person Requestinq PJD: HC Golf Enterprises

Site Number	Latitude	Longitude	Cowardin Class	Est. Amount of Aquatic Resource in Review Area	Class of Aquatic Resource
creek	44.97591	-92.88209	Riverine	835 linear feet	unnamed creek
ditch	44.97406	-92.87495	Riverine	3440linear feet	Piped Ditch
82-74	44.96940	-92.86021	Lacustrine	22 acres	Horseshoe Lake
82-112	44.96447	-92.87049	Lacustrine	11 acres	Rose Lake
82-417	44.97325	-92.87551	Lacustrine	2.86 acres	unnamed lake
82-418	44.97540	-92.87603	Lacustrine	8 acres	unnamed lake

Notes:

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

This preliminary JD finds that there *"may be"* waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

Appendix A - Sites

District Office: St. Paul District | File/ORM #: MVP-2016-01340-PRH | PJD Date: Aug 16, 2016

State: MN | City/County: Lake Elmo / Washington | Person Requestinq PJD: HC Golf Enterprises

Site Number	Latitude	Longitude	Cowardin Class	Est. Amount of Aquatic Resource in Review Area	Class of Aquatic Resource
WL 1	44.96447	-92.87049	Palustrine, emergent	10.81 acres	Type 2/3/5
WL 2	44.96599	-92.86911	Palustrine, scrub-shrub	2.83 acres	Type 3/6
WL 5	44.96904	-92.87687	Lacustrine	3.32 acres	Type 5
WL 7	44.97313	-92.87876	Lacustrine	0.43 acre	Type 5
WL 9	44.97670	-92.88242	Palustrine, emergent	0.06 acre	Type 1
WL 10	44.97325	-92.87551	Lacustrine	3.29 acres	Type 5

Notes:

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

This preliminary JD finds that there *"may be"* waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

Appendix A - Sites

District Office: St. Paul District | File/ORM #: MVP-2016-01340-PRH | PJD Date: Aug 16, 2016

State: MN | City/County: Lake Elmo / Washington | Person Requestinq PJD: HC Golf Enterprises

Site Number	Latitude	Longitude	Cowardin Class	Est. Amount of Aquatic Resource in Review Area	Class of Aquatic Resource
WL 11	44.97540	-92.87603	Palustrine, emergent	7.09 acres	Type 3/5
WL 12	44.97308	-92.87355	Lacustrine	0.65 acre	Type 5
WL 14	44.97427	-92.87170	Lacustrine	1.16 acres	Type 5
WL 17	44.97758	-92.86592	Palustrine, emergent	0.41 acre	Type 2/3
WL 22	44.96940	-92.86021	Lacustrine	22 acres	Type 2/3/5

Notes:

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): AUG 23 2016

B. ST PAUL, MN DISTRICT OFFICE, FILE NAME, AND NUMBER: MVP-2016-01340-PRH

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State: MN County/parish/borough: Washington City: Lake Elmo

Center coordinates of site (lat/long in degree decimal format): Lat. 44.97084° N, Long. -92.8698° W.

Universal Transverse Mercator:

Name of nearest waterbody: Lake Elmo

Name of watershed or Hydrologic Unit Code (HUC): 07030005

☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.

☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☒ Office (Desk) Determination. Date: June 29, 2016

☒ Field Determination. Date(s): May 13, 2016

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There are no "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area.

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There are no"*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area.

1. **Waters of the U.S.:** N/A

2. **Non-regulated waters/wetlands (check if applicable):**[1]

☒ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: **The review area includes twenty-two aquatic resources. This AJD only covers the following aquatic resources: Wetlands 3, 4, 6, 8, 13, 15, 16, 18, 19, 20, and 21 that were identified in the April 25 2016, Royal Golf Club at Lake Elmo - Wetland Delineation Report conducted by Kjolhaug Environmental Services Company, Inc. The wetland boundaries follow a change in topography. The topographical map shows the wetland mostly conforming to a single elevation within contours. Only wetlands 3, 4, 6, and 13 was identified on the updated 2015 DNR NWI maps. It was determined during a site visit on May 13, 2016 that, with the exception of Wetlands 3, 4, 18, and 19, it is unlikely that any of the other wetlands under this AJD share as subsurface or ecological connection. Wetlands 3 and 4 most likely share a subsurface and ecological connection between themselves, however but not to a tributary. There is a culvert linking Wetland 18 and 19, however they also do not share a subsurface or ecological connection with any other aquatic resource**

Wetland 3 was a Type 3 (PEMC) Shallow marsh wetland located in the south-central portion of the property. The center of the wetland was dominated by narrowleaf cattail and green bulrush with a fringe of reed canary grass, smartweed, and willow shrubs. No inundation or saturation was observed within the wetland. Adjacent upland was golf course fairway dominated by manicured Kentucky bluegrass and planted coniferous and deciduous trees. Primary and secondary hydrology indicators were not observed outside the wetland. The wetland boundary corresponded to a topographic rise that coincided with a transition to an upland plant community. The wetland was shown as a PEM1a/PABGx on the NWI map, and was located in an area mapped as predominantly non-hydric soil (Poskin) on the soil survey. A culvert connecting to Wetland 4 was located within the western portion of Wetland 3. Wetland 3 and 4 area separated from each other by a buried pipeline.

[1] Supporting documentation is presented in Section III.F.

Wetland 4 was a Type 3 (PEMC) Shallow marsh wetland located in the south-central portion of the property. The wetland was dominated by cattail with a fringe of willow shrubs. Adjacent upland was golf course fairway dominated by manicured Kentucky bluegrass and quaking aspen and black willow trees. Primary and secondary hydrology indicators were not observed outside the wetland. The wetland boundary corresponded to a topographic rise that coincided with a transition to an upland plant community. The wetland was shown as a PUBF wetland on the NWI map and was located in an area mapped as predominantly non-hydric soil (Poskin) on the soil survey. A culvert connecting to Wetland 3 was located within the western portion of Wetland 4

Wetland 6 was a Type 2 Wetland 6 was a Type 2 (PABF) Fresh wet meadow wetland located in southwestern portion of the property. The wetland was dominated by reed canary grass and giant goldenrod with lesser amounts of green bulrush and willow shrubs. The western portion of the wetland was inundated with approximately 6 inches of standing water. Adjacent upland was golf course fairway dominated by manicured Kentucky bluegrass and quaking aspen and black willow trees. Primary and secondary hydrology indicators were not observed outside the wetland. The wetland boundary corresponded to a topographic rise that coincided with a transition to an upland plant community. The wetland was shown as a PABF wetland on the NWI map and was located in an area mapped as predominantly hydric soil (Lindstrom) on the soil survey. No culverts or drainage features were observed within Wetland 6.

Wetland 8 was a Type 1 (PEMA) Fresh wet meadow wetland located in the western portion of the property. The wetland was dominated by reed canary grass. No inundation was observed within the wetland. Adjacent upland was woodland dominated by red oak and quaking aspen trees with an understory of gooseberry, honeysuckle and common buckthorn shrubs. Primary and secondary hydrology indicators were not observed outside the wetland. The wetland boundary corresponded to a topographic rise that coincided with a transition to an upland plant community. The wetland was not shown on the NWI map, and was located in an area mapped as predominantly-hydric soil (Poskin) on the soil survey. No culverts or drainage features were observed within Wetland 8.

Wetland 13 was an excavated Type 5 (PUBFx) Shallow, open water community wetland located in the center of the site. The wetland was inundated with approximately 3 to 4 feet of standing water with a fringe of riprap. Adjacent upland was golf course fairway dominated by manicured Kentucky bluegrass and planted coniferous and deciduous trees. Primary and secondary hydrology indicators were not observed outside the wetland. The wetland boundary corresponded to a sharp rise in topography and was placed 12 inches above the water's edge. The wetland was shown as a PUBFx wetland on the NWI map and was located in an area mapped as predominantly non-hydric soil (Poskin) on the soil survey. No apparent culverts or drainage features were observed within Wetland 13.

Wetland 15 was a Type 1 (PEMA) Seasonally flooded basin wetland located in the southeastern portion of the property. The wetland was dominated by Kentucky bluegrass and mowed reed canary grass and willow seedlings. No inundation or soil saturation was observed within the wetland. Adjacent upland was golf course fairway dominated by manicured Kentucky bluegrass and planted coniferous and deciduous trees. Primary and secondary hydrology indicators were not observed outside the wetland. The wetland boundary corresponded to a rise in topography and presence of FACW vegetation that transitioned to upland vegetation. The wetland was not shown as a wetland on the NWI map and was located in an area mapped as non-hydric (Chetek) on the soil survey. Two inlet drainage pipes were located above the wetland boundary. No culverts or drainage features connect this wetland to any relatively permanent waterways.

Wetland 16 was a Type 1 (PEMA) Fresh wet meadow wetland located in eastern portion of the property. The wetland was completely dominated by reed canary grass with no inundation or soil saturation observed within the wetland boundary. Adjacent upland was golf course fairway dominated by manicured Kentucky bluegrass and planted coniferous and deciduous trees. Primary and secondary hydrology indicators were not observed outside the wetland. The wetland boundary corresponded to a slight topographic rise that coincided with a transition to an upland plant community. The wetland was not shown on the NWI map and was located in an area mapped as predominantly non-hydric soil (Poskin) on the soil survey. No culverts or drainage features were observed within Wetland 16.

Wetland 18 was a Type 3 (PEMC) Shallow marsh wetland located in the northeastern portion of the property. The wetland was dominated by cattail with a fringe of reed canary grass and common

buckthorn and boxelder shrubs. No inundation was observed within the wetland, but the center of the wetland appeared to be saturated at the surface. Adjacent upland was grassy meadow dominated by Kentucky bluegrass and smooth brome and planted coniferous and deciduous trees. Primary and secondary hydrology indicators were not observed outside the wetland. The wetland boundary corresponded to a topographic rise and a transition to an upland plant community. The wetland was shown as a PEM1C wetland on the NWI map and was located in an area mapped as non-hydric soil (Antigo) on the soil survey. A culvert discharging into the wetland was located along the western edge of Wetland 18 draining the adjacent parking lot to the west, while a drainage way flowing north from Wetland 19 discharges into the southern edge of the Wetland 18.

Wetland 19 was a Type 1 (PEMAdf) Seasonally flooded basin/drainageway wetland located in the northeastern portion of the property. The wetland was sparsely vegetated with reed canary grass and giant goldenrod with lesser amounts of narrowleaf cattail and swamp milkweed. The lowest portion of the wetland was inundated with approximately 1 to 2 inches of standing water. Adjacent upland was grassy meadow dominated by Kentucky bluegrass and smooth brome and planted coniferous and deciduous trees. Primary and secondary hydrology indicators were not observed outside the wetland. The wetland boundary corresponded to a topographic rise and transition to an upland plant community. The wetland was not shown as a wetland on the NWI map and was located in an area mapped as non-hydric soil (Antigo) on the soil survey. A culvert was located on the southern edge of Wetland 19 serves as the outlet draining the parking lot to the south. Wetlands 18 and 19 are part of the same basin and have no surface or subsurface connection to any relatively permanent waterway

Wetland 20 was a Type 1 (PEMA) Seasonally flooded basin wetland located in the northwestern portion of the property. The wetland was a depression within a wooded area with no observed dominant vegetation. Adjacent upland was woodland dominated by red oak, white oak and bur oak tree with common buckthorn shrubs. Primary and secondary hydrology indicators were not observed outside the wetland. The wetland boundary corresponded to a topographic rise and the presence of non-hydrophytic vegetation. The wetland was not shown as a wetland on the NWI map and was located in an area mapped as non-hydric (Kingsley) on the soil survey. No apparent culverts or drainage features were observed within Wetland 20.

Wetland 21 was a Type 1 (PEMA) Fresh wet meadow wetland located in southwestern portion of the property. The wetland was a depression within a wooded area with no observed dominant vegetation. The majority of the wetland basin had water stained leaves and deposited sediments from an inlet culvert located to the south east of the wetland. Adjacent upland was woodland dominated by red oak, white oak and bur oak tree with common buckthorn shrubs. Primary and secondary hydrology indicators were not observed outside the wetland. The wetland boundary corresponded to a topographic rise and the presence of non-hydrophytic vegetation. The wetland was not shown on the NWI map and was located in an area mapped as non-hydric soil (Antigo) on the soil survey. A culvert located to the southeast of Wetland 21 draining a nearby parking lot to the south of the wetland

Wetlands 3, 4, 6, 8, 13, 15, 16, 18, 19, 20, and 21, described above, do not support a link to interstate or foreign commerce because they are not known to be used by interstate or foreign travelers for recreation or other purposes; they do not produce fish or shellfish that could be taken and sold in interstate or foreign commerce; and they are not known to be used for industrial purposes for interstate or foreign commerce. The waterbodies have been determined to be non-jurisdictional under the Clean Water Act because the wetlands and stormpond lack connections and/or relationships sufficient to serve as a basis for jurisdiction.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs: N/A

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY): N/A

C. SIGNIFICANT NEXUS DETERMINATION: N/A

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY): N/A

E. **ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):** N/A

F. **NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):**

- ☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
- ☒ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
  - ☒ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
- ☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain:
- ☐ Other (explain, if not covered above):

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):

- ☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
- ☐ Lakes/ponds: acres.
- ☐ Other non-wetland waters: acres. List type of aquatic resource: .
- ☒ Wetlands: Wetland 3 (1.04 acres), Wetland 4 (0.51 acre), Wetland 6 (0.33 acre), Wetland 8 (0.15 acre), Wetland 13 (0.09 acre), Wetland 15 (0.02 acre), Wetland 16 (0.22 acre), Wetland 18 (0.52 acre), Wetland 20 (0.08 acre), Wetland 21 (0.10) acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):

- ☒ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
- ☐ Lakes/ponds: acres.
- ☐ Other non-wetland waters: acres. List type of aquatic resource: .
- ☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. **SUPPORTING DATA. Data reviewed for JD (check all that apply** - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):

- ☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:
- ☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - ☒ Office concurs with data sheets/delineation report.
  - ☐ Office does not concur with data sheets/delineation report.
- ☐ Data sheets prepared by the Corps:
- ☐ Corps navigable waters' study:
- ☐ U.S. Geological Survey Hydrologic Atlas:
  - ☐ USGS NHD data.
  - ☐ USGS 8 and 12 digit HUC maps.
- ☐ U.S. Geological Survey map(s). Cite scale & quad name:
- ☒ USDA Natural Resources Conservation Service Soil Survey. Citation: US Dept. of Agriculture, Web Soil Survey
- ☐ National wetlands inventory map(s). Cite name: MnDNR Updated NWI shapefile. Accessed October 2015
- ☐ State/Local wetland inventory map(s):
- ☐ FEMA/FIRM maps:
- ☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
- ☒ Photographs: ☒ Aerial (Name & Date): FSA 2013
  or ☐ Other (Name & Date):
- ☐ Previous determination(s). File no. and date of response letter:
- ☐ Applicable/supporting case law:
- ☐ Applicable/supporting scientific literature:
- ☒ Other information (please specify):

B. **ADDITIONAL COMMENTS TO SUPPORT JD:** Wetlands 3,4, 6, 8, 13, 15, 16, 18, 20, and 21, described above, do not support a link to interstate or foreign commerce because they are not known to be used by interstate or foreign travelers for recreation or other purposes; they do not produce fish or shellfish that could be taken and sold in interstate or foreign commerce; and they are not known to be used for industrial purposes for interstate or foreign commerce. The waterbodies have been determined to be non-

jurisdictional under the Clean Water Act because the wetlands and stormpond lack connections and/or relationships sufficient to serve as a basis for jurisdiction.

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: HC Golf Enterprises	**File No.:** 2016-01340-PRH	**Date:** AUG 23 2016

Attached is:		See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
	PERMIT DENIAL	C
X	APPROVED JURISDICTIONAL DETERMINATION	D
	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://usace.army.mil/inet/functions/cw/cecwo/reg or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT	
REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)	
ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.	
POINT OF CONTACT FOR QUESTIONS OR INFORMATION:	
If you have questions regarding this decision and/or the appeal process you may contact: U. S. Army Corps of Engineers, Regulatory Branch Attn: Paul Hauser 180 East Fifth Street, Suite 700 St. Paul, Minnesota 55101 Telephone (651) 290-5357	If you only have questions regarding the appeal process you may also contact the Division Engineer through: Mr. Thomas McCabe Administrative Appeals Review Officer Mississippi Valley Division P.O. Box 80 (1400 Walnut Street) Vicksburg, MS 39181-0080 601-634-5820 FAX: 601-634-5816
RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.	

_____ Signature of appellant or agent.	Date:	Telephone number:

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Appendix C

Well Logs

The Royal Golf Club Residential Development EAW

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Minnesota Unique Well Number

233566

County Washington
Quad Lake Elmo
Quad ID 102B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 06/12/1989
Update Date
Received Date 03/10/2014

Well Name	Township	Range	Dir Section	Subsection
3M COMPANY	29	21	W 25	BCDBAB

Elevation 934 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 11455 20TH ST N LAKE ELMO MN 55042

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SANDY CLAY	0	114	BROWN	
LIMESTONE	114	118	GRAY	
SHALE & CLAY	118	144	BRN/GRN	
LIMESTONE	144	153	BROWN	
CLAY & GRAVEL	153	155	BRN/GRN	
SAND & GRAVEL	155	158	GREEN	
LIMESTONE	158	227	BROWN	

Remarks

M.G.S. NO. 1614.
WELL NO. 5.

Well Depth 227 ft. **Depth Completed** 227 ft. **Date Well Completed** 02/15/1979

Drill Method Cable Tool **Drill Fluid**

Use public supply/non-comm.-transient **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint** Welded
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
6 in. To 175 ft.	lbs./ft.	6 in. To 227 ft.
10 in. To 158 ft.	lbs./ft.	

Open Hole From 175 ft. To 227 ft.

Screen? ☐ **Type** **Make**

Static Water Level
65 ft. Top of casing extension Measure 02/15/1979

Pumping Level (below land surface)
68 ft. 1.5 hrs. Pumping at 100 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
Neat Cement	50 Sacks	0 ft.	175 ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP 0 Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Prairie Du Chien
Last Strat Prairie Du Chien Group Depth to Bedrock 158 ft
Located by Minnesota Department of Health
Locate Method GPS SA Off (averaged)
System UTM - Mad83, Zone 15, Meters X 509491 Y 4979908
Unique Number Verification Information from Inpute Date 07/29/2004

Angled Drill Hole

Well Contractor
Keys Well Co. 62012 SAMPSON, C.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well No.

233566

County	Washington
Quad	Lake Elmo
Quad ID	102B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING RECORD

Minnesota Statutes Chapter 1031

Entry Date	06/12/1989
Update	
Received Date	03/10/2014

Well Name	Township	Range	Dir	Section	Subsection	Use	Status	Well Depth	Depth Completed	Date Well Completed	Lic/Reg. No.
3M COMPANY	29	21	W	25	BCDBAB	public supply/non-comm.	A	227 ft.	227 ft.	02/15/1979	62012

Elevation 934 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet) **Aquifer** Prairie Du Chien **Depth to Bedrock** 158 ft **Open Hole** - ft **Static Water Level** 65 ft

Field Located By	Minnesota Department of	**Locate Method**	GPS SA Off (averaged)	**Universal Transverse Mercator (UTM) - NAD83 - Zone 15 -**	
Unique No. Verified	Information from owner	**Input Source**	Minnesota Department of Health	**UTM Easting (X)**	509491
Geological Interpretation	Bruce Bloomgren	**Input Date**	07/29/2004	**UTM Northing (Y)**	497990
Agency (Interpretation)				**Interpretaion Method**	Geologic study 1:24k to 1:100k

Geological Material	Color	Hardness	Depth (ft.) From	Depth (ft.) To	Thickness	Elevation (ft.) From	Elevation (ft.) To	Stratigraphy	Primary Lithology	Secondary	Minor Lithology
SANDY CLAY	BROWN		0	114	114	934	820	clay+sand-brown	Clay	sand	
LIMESTONE	GRAY		114	118	4	820	816	boulder or boulders-	Boulder		
SHALE & CLAY	BRN/GRN		118	144	26	816	790	clay	Clay		
LIMESTONE	BROWN		144	153	9	790	781	boulder or boulders-	Boulder		
CLAY & GRAVEL	BRN/GRN		153	155	2	781	779	pebbly sand/silt/clay	Clay	Gravel	
SAND & GRAVEL	GREEN		155	158	3	779	776	sand +larger-green	sand	Gravel	
LIMESTONE	BROWN		158	227	69	776	707	Prairie Du Chien	Dolomite		

Minnesota Unique Well Number

233565

County Washington
Quad Hudson
Quad ID 102A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 06/12/1989
Update Date
Received Date 03/10/2014

Well Name	Township	Range	Dir Section	Subsection
3-M COMPANY	29	21	W 25	ACABBA

Elevation 898 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 11455 20TH ST N ST PAUL MN 55042

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
COARSE SAND & CLAY	0	50		
FINE SAND, CLAY	50	84		
WEATHERED	84	208	TAN	
FRIABLE JORDAN	208	283	WHITE	
ST. LAWRENCE SHALE	283	305	GRAY	

Remarks

WELL NO. 4.

Well Depth 305 ft. **Depth Completed** 305 ft. **Date Well Completed** 00/00/1964

Drill Method Cable Tool **Drill Fluid**

Use public supply/non-comm.-non-transient **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type **Joint**

Drive Shoe? Yes ☐ No ☐ **Above/Below**

Open Hole From ft. To ft.

Screen? ☐ **Type** **Make**

Static Water Level

Pumping Level (below land surface)

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☒ Not Specified

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed

Manufacturer's name

Model Number HP 0 Volt

Length of drop pipe ft Capacity g.p. Typ

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Prairie Du Chien Group Aquifer indeterminate

Last Strat St.Lawrence Formation Depth to Bedrock 84 ft

Located by Minnesota Department of Health

Locate Method GPS SA Off (averaged)

System UTM - Mad83, Zone 15, Meters X 510265 Y 4980094

Unique Number Verification Information from Inpute Date 01/01/1990

Angled Drill Hole

Well Contractor

Minnesota Geological Survey MGS

Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well No.

233565

County	Washington
Quad	Hudson
Quad ID	102A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING RECORD

Minnesota Statutes Chapter 1031

Entry Date	06/12/1989
Update	
Received Date	03/10/2014

Well Name	Township	Range	Dir	Section	Subsection	Use	Status	Well Depth	Depth Completed	Date Well Completed	Lic/Reg. No.
3-M COMPANY	29	21	W	25	ACABBA	public supply/non-comm.	A	305 ft.	305 ft.	00/00/1964	MGS

Elevation 898 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet) **Aquifer** indeterminate **Depth to Bedrock** 84 ft **Open Hole** - ft **Static Water Level** ft

Field Located By	Minnesota Department of	**Locate Method**	GPS SA Off (averaged)	**Universal Transverse Mercator (UTM) - NAD83 - Zone 15 -**	
Unique No. Verified	Information from owner	**Input Source**	Minnesota Department of Health	**UTM Easting (X)**	510265
Geological Interpretation	Bruce Bloomgren	**Input Date**	01/01/1990	**UTM Northing (Y)**	498009
Agency (Interpretation)				**Interpretaion Method**	Geologic study 1:24k to 1:100k

Geological Material	Color	Hardness	Depth (ft.) From	Depth (ft.) To	Thickness	Elevation (ft.) From	Elevation (ft.) To	Stratigraphy	Primary Lithology	Secondary	Minor Lithology
COARSE SAND & CLAY			0	50	50	898	848	clay+sand	sand	Clay	
FINE SAND, CLAY			50	84	34	848	814	clay+sand	sand	Clay	
WEATHERED SHAKOPEE-	TAN		84	208	124	814	690	Prairie Du Chien	Dolomite		
FRIABLE JORDAN	WHITE		208	283	75	690	615	Jordan Sandstone	sandstone		
ST. LAWRENCE SHALE &	GRAY		283	305	22	615	593	St.Lawrence	siltstone	Dolomite	shale

Minnesota Unique Well Number

208461

County Washington
Quad Hudson
Quad ID 102A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/22/1989
Update Date
Received Date 03/10/2014

Well Name	Township	Range	Dir	Section	Subsection
3M COMPANY,	29	21	W	25	BDAADB

Elevation 884 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 11455 20TH ST N LAKE ELMO MN 55042

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DRIFT	0	103		
LIMEROCK	103	169		
SANDROCK	169	250		
SHALE	250	255		

Remarks

WELL NO. 3.
MI E OF S END OF LAKE ELMO
CONTACT NAME & ADDRESS ON ORIGINAL WELL LOG: 3M CLUB
ST. PAUL, MN.

Well Depth 255 ft. **Depth Completed** 255 ft. **Date Well Completed** 11/22/1963

Drill Method Cable Tool **Drill Fluid**

Use public supply/non-comm.-transient **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below** 0 ft.

Casing Diameter	Weight	Hole Diameter
10 in. To ft.	lbs./ft.	16 in. To 255 ft.
16 in. To ft.	lbs./ft.	

Open Hole From ft. To ft.

Screen? ☐ **Type** **Make**

Static Water Level
18 ft. Land surface Measure 11/15/1963

Pumping Level (below land surface)
157 ft. 8 hrs. Pumping at 800 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☒ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP 0 Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer indeterminate
Last Strat St.Lawrence Formation Depth to Bedrock 103 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 509975 Y 4980024
Unique Number Verification Information from Inpute Date 01/01/1990

Angled Drill Hole

Well Contractor
Mccarthy Well Co. 27022
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well No.

208461

County	Washington
Quad	Hudson
Quad ID	102A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING RECORD

Minnesota Statutes Chapter 1031

Entry Date	08/22/1989
Update	
Received Date	03/10/2014

Well Name	Township	Range	Dir	Section	Subsection	Use	Status	Well Depth	Depth Completed	Date Well Completed	Lic/Reg. No.
3M COMPANY,	29	21	W	25	BDAADB	public supply/non-comm.	A	255 ft.	255 ft.	11/22/1963	27022

Elevation 884 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet) **Aquifer** indeterminate **Depth to Bedrock** 103 ft **Open Hole** - ft **Static Water Level** 18 ft

Field Located By	Minnesota Geological Survey	**Locate Method**	Digitization (Screen) - Map (1:24,000)	**Universal Transverse Mercator (UTM) - NAD83 - Zone 15 -**	
Unique No. Verified	Information from owner	**Input Source**	Minnesota Geological Survey	**UTM Easting (X)**	509975
Geological Interpretation	Bruce Bloomgren	**Input Date**	01/01/1990	**UTM Northing (Y)**	498002
Agency (Interpretation)				**Interpretaion Method**	Geologic study 1:24k to 1:100k

Geological Material	Color	Hardness	Depth (ft.) From	Depth (ft.) To	Thickness	Elevation (ft.) From	Elevation (ft.) To	Stratigraphy	Primary Lithology	Secondary	Minor Lithology
DRIFT			0	103	103	884	781	Quaternary deposit	Drift		
LIMEROCK			103	169	66	781	715	Prairie Du Chien	Dolomite		
SANDROCK			169	250	81	715	634	Jordan Sandstone	sandstone		
SHALE			250	255	5	634	629	St.Lawrence	siltstone	Dolomite	shale

Minnesota Unique Well Number

208459

County Washington
Quad Lake Elmo
Quad ID 102B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/22/1989
Update Date
Received Date 03/10/2014

Well Name	Township	Range	Dir Section	Subsection
3M COMPANY,	29	21	W 25	BBDBDB

Elevation 894 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 11455 20TH ST N LAKE ELMO MN 55042

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DRIFT	0	90		
SHAKOPEE	90	200		
JORDAN	200	270		
ST. LAWRENCE	270	282		

Remarks

WELL NO. 2.
WELLNAME, PROPERTY OWNER & ADDRESS ON ORIGINAL WELL
LAKE ELMO, MN.

Well Depth 282 ft. **Depth Completed** 282 ft. **Date Well Completed** 10/01/1961

Drill Method Cable Tool **Drill Fluid**

Use public supply/non-comm.-transient **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below** 1.5 ft.

Casing Diameter	Weight	Hole Diameter
10 in. To ft.	lbs./ft.	16 in. To 282 ft.
16 in. To ft.	lbs./ft.	

Open Hole From ft. To ft.

Screen? ☐ **Type** **Make**

Static Water Level
23 ft. Land surface Measure 09/01/1961

Pumping Level (below land surface)
116 ft. 25 hrs. Pumping at 350 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☒ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP 0 Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer indeterminate
Last Strat St.Lawrence Formation Depth to Bedrock 90 ft
Located by Minnesota Department of Health
Locate Method GPS SA Off (averaged)
System UTM - Mad83, Zone 15, Meters X 509485 Y 4980256
Unique Number Verification Information from Inpute Date 07/29/2004

Angled Drill Hole

Well Contractor
Mccarthy Well Co. 27022
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well No.

208459

County	Washington
Quad	Lake Elmo
Quad ID	102B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING RECORD

Minnesota Statutes Chapter 1031

Entry Date	08/22/1989
Update	
Received Date	03/10/2014

Well Name	Township	Range	Dir	Section	Subsection	Use	Status	Well Depth	Depth Completed	Date Well Completed	Lic/Reg. No.
3M COMPANY,	29	21	W	25	BBDBDB	public supply/non-comm.	A	282 ft.	282 ft.	10/01/1961	27022

Elevation 894 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet) **Aquifer** indeterminate **Depth to Bedrock** 90 ft **Open Hole** - ft **Static Water Level** 23 ft

Field Located By	Minnesota Department of	**Locate Method**	GPS SA Off (averaged)	**Universal Transverse Mercator (UTM) - NAD83 - Zone 15 -**	
Unique No. Verified	Information from owner	**Input Source**	Minnesota Department of Health	**UTM Easting (X)**	509485
Geological Interpretation	Bruce Bloomgren	**Input Date**	07/29/2004	**UTM Northing (Y)**	498025
Agency (Interpretation)				**Interpretaion Method**	Geologic study 1:24k to 1:100k

Geological Material	Color	Hardness	Depth (ft.) From	Depth (ft.) To	Thickness	Elevation (ft.) From	Elevation (ft.) To	Stratigraphy	Primary Lithology	Secondary	Minor Lithology
DRIFT			0	90	90	894	804	Quaternary deposit	Drift		
SHAKOPEE			90	200	110	804	694	Prairie Du Chien	Dolomite		
JORDAN			200	270	70	694	624	Jordan Sandstone	sandstone		
ST. LAWRENCE			270	282	12	624	612	St.Lawrence	siltstone	Dolomite	shale

Minnesota Unique Well Number

208460

County Washington
Quad Hudson
Quad ID 102A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/22/1989
Update Date
Received Date 03/10/2014

Well Name	Township	Range	Dir Section	Subsection
3M COMPANY,	29	21	W 25	ABCBBD

Elevation 919 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 11455 20TH ST N LAKE ELMO MN 55042

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DRIFT	0	85		
LIMEROCK	85	205		
SANDROCK	205	310		
SHALE	310	320		

Remarks

WELL AT TARTAN PARK. WELL NO.1.
WELLNAME, CONTACT NAME & ADDRESS ON ORIGINAL WELL
LAKE ELMO, MN.

Well Depth 320 ft. **Depth Completed** 320 ft. **Date Well Completed** 10/07/1960

Drill Method Cable Tool **Drill Fluid**

Use public supply/non-comm.-transient **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
10 in. To ft.	lbs./ft.	15. in. To 320 ft.
16 in. To ft.	lbs./ft.	

Open Hole From ft. To ft.

Screen? ☐ **Type** **Make**

Static Water Level
48 ft. Land surface Measure 09/23/1960

Pumping Level (below land surface)
195 ft. 28. hrs. Pumping at 780 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
Well grouted, type unknown		ft.	ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP 0 Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer indeterminate
Last Strat St.Lawrence Formation Depth to Bedrock 85 ft
Located by Minnesota Department of Health
Locate Method GPS SA Off (averaged)
System UTM - Mad83, Zone 15, Meters X 510048 Y 4980284
Unique Number Verification Information from Inpute Date 01/01/1990

Angled Drill Hole

Well Contractor
Mccarthy Well Co. 27022
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well No.

208460

County	Washington
Quad	Hudson
Quad ID	102A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING RECORD

Minnesota Statutes Chapter 1031

Entry Date	08/22/1989
Update	
Received Date	03/10/2014

Well Name	Township	Range	Dir	Section	Subsection	Use	Status	Well Depth	Depth Completed	Date Well Completed	Lic/Reg. No.
3M COMPANY,	29	21	W	25	ABCBBD	public supply/non-comm.	A	320 ft.	320 ft.	10/07/1960	27022

Elevation 919 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet) **Aquifer** indeterminate **Depth to Bedrock** 85 ft **Open Hole** - ft **Static Water Level** 48 ft

Field Located By	Minnesota Department of	**Locate Method**	GPS SA Off (averaged)	**Universal Transverse Mercator (UTM) - NAD83 - Zone 15 -**	
Unique No. Verified	Information from owner	**Input Source**	Minnesota Department of Health	**UTM Easting (X)**	510048
Geological Interpretation	Bruce Bloomgren	**Input Date**	01/01/1990	**UTM Northing (Y)**	498028
Agency (Interpretation)				**Interpretaion Method**	Geologic study 1:24k to 1:100k

Geological Material	Color	Hardness	Depth (ft.) From	Depth (ft.) To	Thickness	Elevation (ft.) From	Elevation (ft.) To	Stratigraphy	Primary Lithology	Secondary	Minor Lithology
DRIFT			0	85	85	919	834	Quaternary deposit	Drift		
LIMEROCK			85	205	120	834	714	Prairie Du Chien	Dolomite		
SANDROCK			205	310	105	714	609	Jordan Sandstone	sandstone		
SHALE			310	320	10	609	599	St.Lawrence	siltstone	Dolomite	shale

Minnesota Unique Well Number

139256

County Washington
Quad Hudson
Quad ID 102A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

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Entry Date 01/09/1990
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
SCHUMAKER,	29	21	W	25	CDDADB

Elevation 905 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 1067 LEEWARD AV N LAKE ELMO MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GRAVEL	0	64	BROWN	MEDIUM
CLAY	64	77	GRAY	MEDIUM
GRAVEL	77	86	BROWN	MEDIUM
LIMEROCK	86	110	YELLOW	HARD

Remarks

Well Depth 110 ft. **Depth Completed** 110 ft. **Date Well Completed** 04/08/1986

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Threaded
Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below** 1 ft.

Casing Diameter **Weight**
4 in. To 90 ft. 11 lbs./ft.

Open Hole From 90 ft. To 110 ft.

Screen? ☐ **Type** **Make**

Static Water Level
25 ft. land surface Measure 04/08/1986

Pumping Level (below land surface)
27 ft. 2 hrs. Pumping at 40 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☒ No ☐ Not Specified

Nearest Known Source of Contamination
75 feet South Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP 0 Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Prairie Du Chien
Last Strat Prairie Du Chien Group Depth to Bedrock 86 ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - Mad83, Zone 15, Meters X 509989 Y 4979032
Unique Number Verification Information from Inpute Date 01/01/1990

Angled Drill Hole

Well Contractor
Zuercher Well Co. 62028
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

177922

County Washington
Quad Lake Elmo
Quad ID 102B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 07/07/1989
Update Date 03/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
TRUDEAU,	29	21	W	24	CCCDAD

Elevation 920 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 11150 20THST. CT N LAKE ELMO MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY & SAND	0	6		
SAND & GRAVEL	6	78		
CLAY & SAND LAYERS	78	85	RED	
SHALE & SAND	85	98	YEL/BRN	
SHAKOPEE LIMESTONE	98	125		

Remarks

SOUTH 0.5 SECTION.

Well Depth 125 ft. **Depth Completed** 125 ft. **Date Well Completed** 10/16/1981

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Threaded

Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below** 1 ft.

Casing Diameter **Weight**

4 in. To 101 ft. lbs./ft.

Open Hole From 101 ft. To 125 ft.

Screen? ☐ **Type** **Make**

Static Water Level

44 ft. land surface Measure 10/16/1981

Pumping Level (below land surface)

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☒ No ☐ Not Specified

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed 10/00/1981

Manufacturer's name MCDONALD

Model Number HP 0.5 Volt 240

Length of drop pipe 73 ft Capacity 10 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Prairie Du Chien Group Aquifer Prairie Du Chien

Last Strat Prairie Du Chien Group Depth to Bedrock 85 ft

Located by Minnesota Geological Survey

Locate Method Digitized - scale 1:24,000 or larger - Irregular section

System UTM - Mad83, Zone 15, Meters X 509414 Y 4980575

Unique Number Verification Information from Inpute Date 07/11/1997

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Johnson Bros. Well	62114	JOHNSON, G.

Minnesota Unique Well Number

241944

County Washington
Quad Hudson
Quad ID 102A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 01/09/1990
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
EMERSON,	29	21	W	25	DDDDBD

Elevation 890 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 10TH ST N LAKE ELMO MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	16	BROWN	SOFT
SAND & GRAVEL	16	32	BROWN	SFT-HRD
SAND	32	100	BROWN	SOFT
SANDROCK-LIMEROCK	100	108	VARIED	SFT-HRD
LIMEROCK	108	112	YELLOW	HARD

Remarks

Well Depth 112 ft. **Depth Completed** 112 ft. **Date Well Completed** 08/09/1972

Drill Method Cable Tool **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Threaded
Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below** 1 ft.

Casing Diameter		Weight		Hole Diameter	
4 in. To	108 ft.	11 lbs./ft.		4 in. To	112 ft.

Open Hole From 108 ft. To 112 ft.

Screen? ☐ **Type** **Make**

Static Water Level
20 ft. land surface Measure 08/09/1972

Pumping Level (below land surface)
20 ft. 2 hrs. Pumping at 15 g.p.m.

Wellhead Completion
Pitless adapter manufacturer WHITEWATER Model SU-4
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☒ No ☐ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 08/10/1972
Manufacturer's name REDA
Model Number 9D9P051 HP 0.5 Volt 230
Length of drop pipe 34 ft Capacity 10 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Prairie Du Chien
Last Strat Prairie Du Chien Group Depth to Bedrock 100 ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - Mad83, Zone 15, Meters X 510764 Y 4978968
Unique Number Verification Information from Inpute Date 01/01/1990

Angled Drill Hole

Well Contractor
Mantyla Well Co. 82084
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

406243

County Washington
Quad Hudson
Quad ID 102A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 01/09/1990
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
SELINSKI, MIKE	29	21	W	25	AADAAA

Elevation 899 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 1875 MANNING AV N LAKE ELMO MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND, GRAVEL,	0	70	VARIED	SFT-HRD
LIMEROCK	70	86	YELLOW	HARD

Remarks

Well Depth 86 ft. **Depth Completed** 86 ft. **Date Well Completed** 11/13/1984

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Welded
Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below** 1 ft.

Casing Diameter **Weight**
4 in. To 77 ft. 10.7 lbs./ft.

Open Hole From 77 ft. To 86 ft.

Screen? ☐ **Type** **Make**

Static Water Level
56 ft. land surface Measure 11/13/1984

Pumping Level (below land surface)
60 ft. 2 hrs. Pumping at 30 g.p.m.

Wellhead Completion
Pitless adapter manufacturer WHITEWATER Model SU-4
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite	0	0 ft.	77 ft.

Nearest Known Source of Contamination
85 feet South Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 02/20/1985
Manufacturer's name STANDARD PUMPS
Model Number 9P9P051 HP 0.5 Volt 230
Length of drop pipe 70 ft Capacity 10 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Prairie Du Chien
Last Strat Prairie Du Chien Group Depth to Bedrock 70 ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - Mad83, Zone 15, Meters X 510804 Y 4980310
Unique Number Verification Address verification Inpute Date 01/01/1990

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Mantyla Well Co.	82084	MANTYLA, E.

Minnesota Unique Well Number

430515

County Washington
Quad Lake Elmo
Quad ID 102B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 06/26/1990
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
TOFT, ROD	29	21	W	25	CDBACA

Elevation 909 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 11350 12TH ST N LAKE ELMO MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GRAVEL	0	88	BROWN	SOFT
LIMEROCK	88	110	BROWN	HARD

Remarks

SOUTH 0.5 SECT.

Well Depth 110 ft. **Depth Completed** 110 ft. **Date Well Completed** 10/07/1987

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Threaded

Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below** 1 ft.

Casing Diameter		Weight		Hole Diameter	
4 in. To 89 ft.		11 lbs./ft.		7 in. To 89 ft.	
				4 in. To 110 ft.	

Open Hole From 89 ft. To 110 ft.

Screen? ☐ **Type** **Make**

Static Water Level

35 ft. land surface Measure 10/07/1987

Pumping Level (below land surface)

80 ft. 2 hrs. Pumping at 20 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☒ No ☐ Not Specified

Nearest Known Source of Contamination

75 feet North Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 10/08/1987

Manufacturer's name TAIT

Model Number HP 0.75 Volt 220

Length of drop pipe 60 ft Capacity 10 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Prairie Du Chien Group Aquifer Prairie Du Chien

Last Strat Prairie Du Chien Group Depth to Bedrock 88 ft

Located by Minnesota Geological Survey

Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)

System UTM - Mad83, Zone 15, Meters X 509779 Y 4979228

Unique Number Verification Information from Inpute Date 01/01/1990

Angled Drill Hole

Well Contractor

Gangl Well Co.	62136	GANGL, W.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

431243

County Washington
Quad Hudson
Quad ID 102A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 06/29/1990
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
SWITALA	29	21	W	24	DDCDDA

Elevation 896 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 11880 20TH ST N LAKE ELMO MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GRAVEL & BOULDERS	0	88	VARIED	SFT-HRD
LIMEROCK	88	95	YELLOW	HARD

Remarks

SOUTH 0.5 SECT.

Well Depth 95 ft. **Depth Completed** 95 ft. **Date Well Completed** 05/14/1987

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Threaded

Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below** 1 ft.

Casing Diameter		Weight		Hole Diameter	
4 in. To 90 ft.		11 lbs./ft.		7 in. To 90 ft.	
				4 in. To 95 ft.	

Open Hole From 90 ft. To 95 ft.

Screen? ☐ **Type** **Make**

Static Water Level

40 ft. land surface Measure 05/14/1987

Pumping Level (below land surface)

45 ft. 2 hrs. Pumping at 30 g.p.m.

Wellhead Completion

Pitless adapter manufacturer WHITEWATER Model SU-4

☐ Casing Protection ☒ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite	0	10 ft.	90 ft.

Nearest Known Source of Contamination

65 feet Southeas Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 05/15/1987

Manufacturer's name TRICO STANDARD

Model Number 9D9P051- HP 0.5 Volt 230

Length of drop pipe 73 ft Capacity 10 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Prairie Du Chien Group Aquifer Prairie Du Chien

Last Strat Prairie Du Chien Group Depth to Bedrock 88 ft

Located by Minnesota Geological Survey

Locate Method Digitized - scale 1:24,000 or larger - Irregular section

System UTM - Mad83, Zone 15, Meters X 510614 Y 4980572

Unique Number Verification Address verification Inpute Date 07/11/1997

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Mantyla Well Co.	82084	SANDERS, G.

Minnesota Unique Well Number

447252

County Washington
Quad Stillwater
Quad ID 118D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 07/30/1991
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
BARNES, TOM &	29	20	W	30	BCBBBC

Elevation 912 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

C/W 1734 OLD MANNING TR N STILLWATER MN 55082

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND & GRAVEL	0	58	VARIED	SFT-HRD
SANDROCK	58	70	YELLOW	SOFT
SANDROCK	70	78	YELLOW	HARD

Remarks

FORMER OWNER JOHN TRINE.
OLD WELL SEALED PER STATE CODE.

Well Depth 78 ft. **Depth Completed** 78 ft. **Date Well Completed** 08/30/1988

Drill Method Non-specified Rotary **Drill Fluid** Foam

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Welded
Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below** 1 ft.

Casing Diameter		Weight		Hole Diameter	
4 in. To 72 ft.		10.7 lbs./ft.		8 in. To 72 ft.	
				4 in. To 78 ft.	

Open Hole From 72 ft. To 78 ft.

Screen? ☐ **Type** **Make**

Static Water Level
43 ft. land surface Measure 08/30/1988

Pumping Level (below land surface)
45 ft. 2 hrs. Pumping at 30 g.p.m.

Wellhead Completion
Pitless adapter manufacturer WHITEWATER Model SU*4
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
neat cement		10 ft.	72 ft.

Nearest Known Source of Contamination
60 feet Northeas Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 09/01/1988
Manufacturer's name TRICO
Model Number 9D9P051- HP 0.5 Volt 230
Length of drop pipe 62 ft Capacity 10 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock St.Peter Sandstone Aquifer St.Peter-Prairie
Last Strat St.Peter-Prairie Du Chien Depth to Bedrock 58 ft
Located by Washington Cty.
Locate Method Digitization (Screen) - Map (1:12,000)
System UTM - Mad83, Zone 15, Meters X 510844 Y 4980076
Unique Number Verification Address with parcel Inpute Date 01/13/2004

Angled Drill Hole

Well Contractor

Mantyla Well Co.	82084	COLE, M.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

447264

County Washington
Quad Hudson
Quad ID 102A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 07/29/1991
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ERICKSON,	29	21	W	24	DCCDCD

Elevation 922 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

C/W 11588 20TH ST N LAKE ELMO MN 55042

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND & GRAVEL	0	82	BROWN	SFT-HRD
LIMEROCK	82	102	YELLOW	HARD

Remarks

Well Depth 102 ft. **Depth Completed** 102 ft. **Date Well Completed** 10/12/1988

Drill Method Non-specified Rotary **Drill Fluid** Foam

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Other
Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below** 1 ft.

Casing Diameter		Weight		Hole Diameter	
4 in. To 91 ft.	11 lbs./ft.			6 in. To 91 ft.	
				4 in. To 102 ft.	

Open Hole From 91 ft. To 102 ft.

Screen? ☐ **Type** **Make**

Static Water Level
52 ft. land surface Measure 10/12/1988

Pumping Level (below land surface)
58 ft. 2 hrs. Pumping at 30 g.p.m.

Wellhead Completion
Pitless adapter manufacturer WHITEWATER Model SU4
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
cuttings		0 ft.	91 ft.

Nearest Known Source of Contamination
80 feet North Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 10/13/1988
Manufacturer's name TRICO
Model Number 9D9P051- HP 0.5 Volt 230
Length of drop pipe 72 ft Capacity 10 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Prairie Du Chien
Last Strat Prairie Du Chien Group Depth to Bedrock 82 ft
Located by Washington Cty.
Locate Method Digitization (Screen) - Map (1:12,000)
System UTM - Mad83, Zone 15, Meters X 510151 Y 4980539
Unique Number Verification Address with parcel Inpute Date 12/12/2003

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Mantyla Well Co.	82084	COLE, M.

Minnesota Unique Well Number

571958

County Washington
Quad Lake Elmo
Quad ID 102B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 01/31/1997
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
SCHWARTZ,	29	21	W	26	ADAAAB

Elevation 931.82 **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

C/W 1756 LAKE ELMO AV MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	70	BROWN	HARD
SAND & GRAVEL	70	97	BROWN	HARD
CLAY & GRAVEL	97	121	RED	HARD
LIMEROCK	121	135	TAN	HARD

Remarks

Well Depth 135 ft. **Depth Completed** 135 ft. **Date Well Completed** 09/11/1995

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Welded
Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
4 in. To 121 ft.	lbs./ft.	8 in. To 35 ft.
		6 in. To 121 ft.
		4 in. To 135 ft.

Open Hole From 121 ft. To 135 ft.

Screen? ☐ **Type** **Make**

Static Water Level
50 ft. land surface Measure 09/08/1995

Pumping Level (below land surface)
60 ft. 1 hrs. Pumping at 50 g.p.m.

Wellhead Completion
Pitless adapter manufacturer SNAPPY Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
bentonite	3	Sacks	6 ft.	35 ft.

Nearest Known Source of Contamination
55 feet East Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 09/11/1995
Manufacturer's name MYERS
Model Number HP 0.5 Volt 230
Length of drop pipe 84 ft Capacity 12 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Prairie Du Chien
Last Strat Prairie Du Chien Group Depth to Bedrock 121 ft
Located by Washington Cty.
Locate Method Digitization (Screen) - Map (1:12,000)
System UTM - Mad83, Zone 15, Meters X 509170 Y 4980114
Unique Number Verification Address with parcel Inpute Date 02/19/2004

Angled Drill Hole

Well Contractor

Schroepfer Well Co.	62119	SCHROEPFER, T
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

597115

County Washington
Quad Lake Elmo
Quad ID 102B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 09/30/1998
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
DEWITT HOMES	29	21	W	25	CBDADC

Elevation 912 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

Well 11364 14TH ST LAKE ELMO MN

Contact 4463 WHITE BEAR PK WHITE BEAR LAKE MN 55110

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
TOPSOIL	0	2		
CLAY	2	10		
SAND & GRAVEL	10	40		
CLAY	40	61		
SAND & GRAVEL	61	74		
LIMEROCK	74	120		

Remarks

Well Depth 120 ft. **Depth Completed** 120 ft. **Date Well Completed** 02/23/1998

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint** Threaded

Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below**

Casing Diameter		Weight		Hole Diameter	
4 in. To	74 ft.	11 lbs./ft.		8 in. To	30 ft.
				6.5 in. To	74 ft.

Open Hole From 74 ft. To 120 ft.

Screen? ☐ **Type** **Make**

Static Water Level
30 ft. land surface Measure 02/23/1998

Pumping Level (below land surface)
60 ft. 1 hrs. Pumping at 30 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
bentonite	2	Sacks	0 ft.	30 ft.
cuttings			30 ft.	74 ft.

Nearest Known Source of Contamination
70 feet East Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name RED JACKET
Model Number 150SEW1 HP 1.5 Volt 230
Length of drop pipe ft Capacity 20 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Prairie Du Chien
Last Strat Prairie Du Chien Group Depth to Bedrock 74 ft
Located by Washington Cty.
Locate Method Digitization (Screen) - Map (1:12,000)
System UTM - Mad83, Zone 15, Meters X 509574 Y 4979435
Unique Number Verification Address with parcel Inpute Date 02/19/2004

Angled Drill Hole

Well Contractor

Mccullough & Sons	82054	COX, B.
Licensee Business	Lic. or Reg. No.	Name of Driller

Appendix D

Environmental Contamination Correspondence and Studies

The Royal Golf Club Residential Development EAW

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MINNESOTA DEPARTMENT OF AGRICULTURE

August 15, 2016

Phone No.: (651) 201-6681
E-mail: greg.hanson@state.mn.us
Document No.: GCH-101122700

Hollis Cavner
HC Golf Course Development, LLC
11074 Radison Road
Blaine, Minnesota 55449

SUBJECT: REVISED PHASE II INVESTIGATION REPORT & RESPONSE ACTION PLAN

RE: SITE NAME: TARTAN PARK, LAKE ELMO
MDA PROJECT NO: GCH101068002

Dear Mr. Cavner:

The Minnesota Department of Agriculture (MDA) has completed review of the revised Phase II Report & Response Action Plan (Report) as submitted on your behalf by Carlson McCain on July 22, 2016. MDA approves the Report with incorporation of the following comments.

- For future reports regarding this project, provide the PID detector size and specific result when reporting performance. Additionally, the relative detection ranges should be included.

- The Red Green 7-1' (RDGR71) and White Green 4-1' (WHGR41) had 0.644 and 0.557 mg/kg heptachlor epoxide, respectively, that exceeded the Tier 2 Recreational Soil Reference Value (SRV) of 0.5 mg/kg. Therefore, please analyze the 1-2' depth soil samples for heptachlor epoxide, or have these worst case samples analyzed. The results should be included in the final report.

- It is noted that heptachlor epoxide does not have a Soil Leaching Value (SLV). Therefore, use SLVs of 0.1 and 1.0 mg/kg for heptachlor epoxide to evaluate whether there may be a leaching risk to underlying groundwater. Please run the HELP model for these two samples using heptachlor epoxide SLVs.

- Identify where the TCLP (Toxicity Characteristic Leaching Procedure) samples were collected and discuss how they likely became the most highly contaminated. Perform TCLP on RDGR71 and WHGR41 samples for heptachlor epoxide and include the results in the final report.

- Submit copies of well abandonment/sealing logs.

- Provide supporting HELP model documentation and results for final *Regulated Soil Management Area (RSMA)*. The final report should also include discussion on how RSMA performance will be monitored over time.

In accordance with the Americans with Disabilities Act, this information is available in alternative forms of communication upon request by calling 651/201-6000. TTY users can call the Minnesota Relay Service at 711 or 1-800-627-3529. The MDA is an equal opportunity employer and provider.

- For Appendix C, include the additional worksheet for the requested heptachlor epoxide analyses.

- For Appendix E, Layer 2 is reported to represent the 12 inch clay cap, where Layer 3 has been assigned the lower hydraulic conductivity. Please correct numbers and rerun the HELP model, if appropriate and include an introductory narrative in a rewritten Appendix E.

MDA noted that pages ii through iv are dated May 18th, 2016.

The above information should be included in the final report for this project. Alternatively, you may choose to submit the well abandonment/sealing log information as it is gathered and include the remaining information in the final report.

If you have any questions about this project, please contact me at (651) 201-6681 or MDA technical staff person, Jim Seaberg at (651) 201-6139.

Sincerely,

Greg Hanson

Greg Hanson, Project Manager
Incident Response Unit
Pesticide & Fertilizer Management Division

cc: James Felten, Tournament Golf, LLC
Barb Ryan, Carlson McCain

MINNESOTA DEPARTMENT OF AGRICULTURE

May 11, 2016

Phone No.: (651) 201-6681
Fax No.: (651) 201-6117
E-mail: greg.hanson@state.mn.us
Document No.: GCH-101116912

Hollis Cavner
HC Golf Course Development, LLC
11074 Radison Road
Blaine, Minnesota 55449

SUBJECT: PHASE II INVESTIGATION WORK PLAN

RE: SITE NAME: TARTAN PARK, LAKE ELMO
MDA PROJECT NO: GCH101068002

Dear Mr. Cavner:

The Minnesota Department of Agriculture (MDA) has completed review of the Phase II Investigation Work Plan as submitted on your behalf by Carlson McCain. MDA hereby approves the report with incorporation of the following comments.

Some additional investigation will be necessary prior to implementation of the pending Response Action Plan. Those areas include:

Former Maintenance Building Area – Based on discussion with your consultant and Jim Felten, only one of the four proposed samples was collected at the location of the down gradient storm drain (FMBED) to the southwest. Please sample and analyze soil from around the drain to the east (Figure 4.2, due east of sample location FMBSEP at edge of paved surface.) It appears runoff from the parking area east of the building runs off the area at this drain point.

From Table 1

- Fairway sample *WHFWC691* should be collected and submitted for MDA List 1 & 2 analysis.
- Include RCRA Metals (Metals), Total Kjeldahl Nitrogen (TKN) and nitrate-nitrogen (NO_3-N) analyses for *Red Course Tee box* sample *RDTBC151.*
- Include Metals,TKN and NO_3-N analyses for the *Chipping, Driving, Practice Greens Composite (CHDRPRC1)* sample.
- *Surface Debris* samples *SDA1* and *SDA2* need not be collected for analysis as they are not located on the property.

In accordance with the Americans with Disabilities Act, this information is available in alternative forms of communication upon request by calling 651/201-6000. TTY users can call the Minnesota Relay Service at 711 or 1-800-627-3529. The MDA is an equal opportunity employer and provider.

Site Irrigation Wells – There are five irrigation/production wells within the bounds of Tartan Park. The disposition of these wells has yet to be discussed and they have not been considered in any groundwater discussion to date. Four of five of the wells do not have construction information available. MDA staff requests sampling well #1 (Minnesota Unique Well Number (UWN) 208460) which is located at the former maintenance building and well #4 (UWN 233565), located at the club house. Analyze these samples for MDA List 1 and 2 Pesticides, RCRA metals, Nitrate-Nitrogen (NO_3-N) and Total Kjeldahl Nitrogen (TKN).

The remaining comments to the Phase II Investigation Work Plan can be addressed in the pending Response Action Implementation Plan (RAP)

- List all Figures by number and name in the index.
- Number all pages for reference.
- Include a sample naming key with the Table footnotes and perhaps as a separate appendix.

2.1 Soil Characterization

2.2.1 Soil

Please include in the RAP a description of how composite samples were organized in groups of Holes 1 through 5 and Holes 6 through 9. In addition to the aforementioned naming conventions, composites would be named as such: BLGRC151. This designation would correspond to Blue Course, composite samples of putting Greens 1 through 5 at 0 – 1 foot below ground surface (bgs) depth intervals.

2.2.2 Groundwater Sampling

Please include in the RAP a discussion of on-site water and water well conditions that covers past, current and future use/disposition.

2.2.3 Soil Vapor Sampling

Please include in the RAP the previously mentioned trench and sump configuration in the chemical mixing area that discharges to the septic tank and drain field.

Tables –

Include in the RAP a description of the sample naming conventions as described in *2.2 Sampling* along with the footnotes.

Figures –

Include in the RAP titles that refer to the location the figure represents, e.g., Figure 4.1 – White Greens 6 & 9, White Tee-Boxes 1 & 7, Blue Green 9, Blue Tee-Box 1; Chipping Green 1 and Practice Green 1.

Please provide a figure that would include all former golf course boundaries and labels found on Figure 2 overlain on the proposed housing locations depicted on unlabeled Figure 3 (The New Figure 3 provides this).

Please label Figure 3.

If you have any questions about this project, please contact me at (651) 201-6681 or MDA technical staff person, Jim Seaberg at (651) 201-6139.

Sincerely,

Greg Hanson

Greg Hanson, Project Manager
Incident Response Unit
Pesticide & Fertilizer Management Division

cc:
James Felten, Tournament Golf, LLC
Barb Ryan, Carlson McCain

Phase II Investigation Report and Response Action Plan

Former Tartan Park Golf Course
11455 20th Street North
Lake Elmo, Minnesota 55042

Project #6036-01

Prepared for:

HC Golf Course Development, LLC
11074 Radisson Road
Blaine, Minnesota 55449

May 18, 2016

Carlson McCain

3890 Pheasant Ridge Drive,
Suite 100
Blaine, MN 55449
Tel 763-489-7900
Fax 763-489-7959

ENVIRONMENTAL • ENGINEERING • LAND SURVEYING

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Figure No.	Hole No.	Red: Tee Box	Red: Fairway	Red: Green	White: Tee Box	White: Fairway	White: Green	Blue: Tee Box	Blue: Fairway	Blue: Green	Other Areas	
	1	5.1	5.1 5.11 5.12	5.12	5.1	5.2	5.2	5.1	5.1 5.9	5.9	Practice Green	5.1
	2	5.11 5.12	5.11	5.11	5.2	5.2 5.3	5.3	5.8	5.7 5.8	5.7	Chipping Green	5.1 5.1
	3	5.1	5.1 5.13	5.14	5.3	5.3	5.3	5.7 5.15	5.7 5.15	5.7 5.15		
	4	5.14	5.14	5.14	5.5	5.5	5.5	5.7	5.6 5.7	5.6	Nursery Green	5.12
	5	5.14	5.1 5.13 5.14	5.1	5.5	5.5	5.5	5.6	5.6	5.6		
	6	5.1	5.11	5.11 5.12	5.3	5.4	5.15.4	5.5	5.6	5.6	FMB	5.2
	7	5.11 5.12	5.1	5.1	5.1 5.4 5.9	5.4 5.5	5.4 5.5	5.6	5.6 5.7	5.7		
	8	5.1	5.1 5.13 5.14	5.14	5.5	5.6 5.8 5.9	5.6 5.8	5.7	5.8	5.8	Soil	5.15
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1.0 EXECUTIVE SUMMARY

On behalf of HC Golf Course Development, LLC (HC Golf Course Development), Carlson McCain, Inc. (Carlson McCain) has prepared this Phase II Investigation Report and Response Action Plan (RAP) for the Former Tartan Park Golf Course (Tartan Park), located at 11455 20th Street North in Lake Elmo, Washington County, Minnesota (the "Property"). The Former Tartan Park has historically operated a 27-hole golf course with other recreational features including 12 tennis courts, four softball fields, an archery range, a club house and a ski hill.

Plans for the Property include a complete redevelopment that will result in future residential land use in the western portion and northeast corner and a redesigned 18-hole golf course that is expected to open in the spring of 2017. In order to help facilitate the investigation and cleanup process, HC Golf Course Development has entered the Property into the Minnesota Department of Agriculture (MDA) Voluntary Investigation and Cleanup (VIC) Program. This document presents results of a recently completed Phase II Investigation and our approach to implementing a RAP to redevelop the Property.

Phase I ESA Summary

Phase I Environmental Site Assessments (ESAs) have been completed by both Carlson McCain, dated August 16, 2011, and Arcadis, dated May 28, 2015.

The Phase I ESAs identified several areas or activities that were either considered to be Recognized Environmental Conditions (RECs), as that term is defined by ASTM 1527-13, or while not meeting the definition of a REC, represented areas of potential environmental concern. The following is a summary of environmental concerns identified in the Phase I ESA, which were addressed as part of this Phase II Investigation:

- A septic system connected to the former maintenance building;
- Flammable liquids waste trap in the former maintenance building;
- Storage and handling of herbicides and pesticides in the area of the former maintenance building,
- Possible on-site disposal area in the southeastern portion of the Property (later identified as actually being located on neighboring property);
- Historical use of herbicides and pesticides on course tee boxes, fairways and greens;

Phase II Investigation Summary

The Phase II field investigation focused on areas identified in the Phase I ESAs that were proposed for redevelopment and included the collection of soil and groundwater samples for field screening and laboratory analysis from 303 direct push soil borings and 225 manually advanced, soil borings. The samples were collected to determine if soil at the Property meets MPCA and MDA land use screening

criteria and if groundwater samples meet Minnesota Department of Health (MDH) drinking water standards.

Soil and groundwater sample analysis included: diesel range organics (DRO), gasoline range organics (GRO), volatile organic compounds (VOCs), Resource Conservation and Recovery Act (RCRA) metals, polynuclear aromatic hydrocarbons (PAHs), Minnesota Department of Agriculture (MDA) Pesticide Lists 1 (neutrals) and 2 (acids), Total Kjeldahl Nitrogen, nitrates and/or polychlorinated biphenyls (PCBs), as appropriate. Soil vapor was collected via one soil vapor point advanced in the area of a former maintenance building. The proposed sampling efforts referenced in the Carlson McCain March 24, 2016 Work Plan were adjusted based on observations by the laboratory project manager while analyzing samples for MDA List 1 and List 2. The laboratory project manager reported interference in some of the samples that appeared to be associated with organochlorine pesticides. Based on these observations, available samples, within holding times, were also analyzed for organochlorine pesticides.

Soil analytical results were compared to the following screening criteria:

- MPCA Tier 1 Residential Soil Reference Values (SRVs);
- MPCA Tier 2 Recreational SRVs;
- MPCA Tier 1 and calculated Tier 2 Soil Leaching Values (SLVs);
- Best Management Practice for the Off-Site Reuse of Unregulated Fill; and,
- MDA Incident Response Unit Soil Cleanup Goals.

Groundwater analytical results were compared to Health Risk Limits (HRLs) or Health Based Values (HBVs) established by the Minnesota Department of Health (MDH).

Based on laboratory results of analyzed soil samples, arsenic, mercury and selenium (RCRA metals) were the only analytes that exceeded their respective screening limits on the greens, fairways and tee boxes. Results of the field investigation and subsequent analysis identified the following contaminants:

- The average concentrations of arsenic in the upper one foot of soil in the greens, tee boxes and fairways was 1.9 milligrams per kilogram (mg/kg), 2.53 mg/kg and 3.14 mg/kg, respectively. Arsenic has a Residential SRV of 9 mg/kg and a Recreational SRV of 11 mg/kg.
- The average concentrations of mercury in the upper one foot of soil in the greens, tee boxes and fairways (excluding Fairway 3 on the White Course) was 5.91 mg/kg, 0.46 mg/kg and 0.007 mg/kg, respectively. Mercury has a Residential SRV of 0.5 mg/kg and a Recreational SRV of 1.2 mg/kg.
- Heptachlor epoxide exceeded its Recreational SRV of 0.5 mg/kg in two of the 21 samples submitted for this analysis from the proposed recreational area (golf course area). Reported concentrations were 0.557 mg/kg (White Green 4) and 0.664 mg/kg (Red Green 7). Heptachlor epoxide was not detected in two samples collected from the proposed residential area.

Soil samples collected from the former maintenance area building detected concentrations of arsenic, barium, chromium, lead and mercury, but none were above their respective screening limits and all fell within ranges that are generally accepted as naturally occurring. Groundwater samples collected from borings advanced near the former maintenance building did not detect any contaminants.

One soil vapor sample collected from the former maintenance building area encountered various VOCs. Results which were compared to MPCA Intrusion Screening Values (ISVs). Out of nine analytes detected above laboratory reporting limits, only 1,3-butadiene exceeded its screening criteria. Sampling procedures and analytical results are discussed more in depth later in this report. This portion of the Property has no plans for redevelopment with structures.

Based on results of the investigation, soil from 26 greens, two tee boxes and one fairway require remediation to meet current and proposed land use criteria for direct contact. In addition, grass clippings and soil aeration cores stored on the southern portion of the Property will also be managed as part of this project.

It is expected that approximately 7,500 cubic yards of soil will be excavated and is proposed to be managed on-site in a *Regulated Soil Management Area* that will be constructed on the west end of the driving range. As part of the redevelopment of the Property, it will be necessary to extend the driving range in a westerly direction; these efforts will require removal of an existing bituminous surface and the addition of fill material to regrade the area. The management of excavated soils on-site will serve to reduce the need to dispose of the soil as a solid waste in an off-site landfill while being managed in a manner that is protective of human health, safety and the environment and providing beneficial reuse of soil fill material that will be needed to modify the driving range.

5.0 RESPONSE ACTION PLAN

This RAP outlines the procedures and methods that will be used to implement soil response actions that will be required in order for MDA to issue a No Further Action Letter for the portion of Property proposed for future residential redevelopment and a No Further Action Letter for the redevelopment associated with the golf course greens, tee boxes and fairways. Contingency planning and documentation are also addressed.

5.1 Cleanup Approach and Goals

The RAP approach assumes that 26 greens (including 23 golf greens, one practice green, one chipping green and one nursery green), two tee boxes (the central tee boxes on White 2, and the eastern tee box of White 6) and one fairway (White 3) will be remediated to a depth of one foot bgs. Assuming additional analysis for OCP does not identify contamination above screening criteria, soil from greens Blue 2, Blue 8, White 2 and White 8 will not be remediated as analytical data do not suggest that there are contaminants of concern present in the soil at these locations at concentrations exceeding their applied recreational land use screening criteria.

Proposed Response Actions will include the excavation and on-site management of impacted soils. Cleanup Goals for soil will be based on MPCA SRVs as appropriate for the proposed land use. Tier 1 Residential SRVs will be applied to areas being redeveloped for future residential use and Recreational SRVs will be applied to areas that will remain a golf course. Figure 3 identifies the boundaries of the recreational and future residential areas In addition, Tier 1 SLVs will be used to evaluate the potential for soil leaching to groundwater; in the event that a Tier 1 SLV is exceeded, a site specific Tier 2 SLV will be calculated in an effort to further define the risk for impacts to groundwater. Petroleum impacted soil has not been identified on the Property. If it is encountered during remediation or redevelopment, the MPCA will be notified and the interim cleanup goal will be less than 10 ppm on a PID and in accordance with their guidelines for redevelopment.

Impacted groundwater was not identified and as a result no cleanup or remediation is proposed. However, in the event that future construction and/or redevelopment activities include the need for dewatering, the discharged water will be evaluated and treated if necessary to ensure that it meets requirements for discharge to the sanitary or storm sewer system, as appropriate.

The following sections discuss the tasks that will be required in order to accomplish these goals.

5.2 Additional Pre Response Actions Soil Sampling Efforts

To simplify upcoming remediation efforts and reduce post excavation sampling efforts, it is proposed that additional soil samples will be collected to better define the horizontal extent of impacts and to

evaluate the remediation areas for organochlorine pesticides. Table 11 provides a summary of the proposed additional sampling; Figure 7 provides a summary of proposed sampling locations. In summary, individual composite soil samples will be collected from the following areas and analyzed for organochlorine pesticides:

- Each Green regardless of its associated recreational or residential land use;
- Each Tee box and Fairway that falls within the boundaries of the proposed future residential area; and,
- Composite samples of remaining tee boxes on each course that were not sampled individually and are located in the recreational area.

Since these areas are expected to represent the worst-case potential for contamination of organochlorine pesticides, it is proposed that additional post excavation samples will not be collected for this analysis should results of this and previous sampling efforts indicate that organochlorine pesticides do not exceed Contamination Cleanup Goals. In the event that Contamination Cleanup Goals are exceeded additional samples will be collected following remediation to ensure that all of the impacts have been removed.

Samples will also be collected for analysis of mercury to better define the fringe area in and around the following greens and fairways:

- White Green 5 (approach on east side)
- White Green 7 (approach on east side)
- White Fairway 3 (east side - area between rough and fairway)

Furthermore to evaluate the horizontal extent of impacts perimeter samples will be collected from the following areas, which represent the highest concentrations of mercury found on the Greens:

- Chipping Green (2 perimeter samples – one in fringe)
- Practice Green (2 perimeter samples – one in fringe)
- Red Green 1 (2 perimeter samples – one in fringe)
- Red Green 7 (2 perimeter samples – one in fringe)
- White Green 1 (2 perimeter samples – one in fringe)
- White Green 4 (2 perimeter samples – one in fringe)

In the event that these samples indicate mercury concentrations do not exceed Contamination Cleanup Goals, excavation activities will extend to this sample boundary, these perimeter samples will serve as sidewall samples and additional sidewall samples will not be collected at the time of remediation.

5.3 Soil Response Actions

The MPCA Risk-Based Site Evaluation Manual (Working Draft dated September 1998) defines accessible soil in residential and recreational settings as soil located within four feet of the ground surface. Two SRVs will be applied to the project; the applied SRV will be dependent on the proposed land use. Response Actions for soil in the proposed residential areas will include excavating accessible soils that exceed their residential screening limits to depths of up to four feet bgs and collecting post remediation samples for confirmation that all contamination has been removed. For those areas expected to remain as recreational land use, soil identified during the Phase II Investigation, which exceeds Recreational SRVs will be excavated to a depth of one foot bgs; it is expected that limited post remediation confirmation soil samples will be collected from these areas, as data collected during the Phase II Investigation will be used to document that the vertical extent of impacted soils have been remediated.

All excavated soil is proposed to be managed on-site in a *Regulated Soil Management Area* that will be constructed on the west end of the driving range (Figure 6). As part of the redevelopment of the Property, the driving range will be extended in a westerly direction, which will require removal of an existing bituminous surface and the addition of fill material to regrade the area. The management of excavated soils on-site will serve to reduce the need to dispose of the soil as a solid waste in an off-site landfill while being managed in a manner that is protective of human health, safety and the environment and providing beneficial re-use fill material that will be needed to modify the driving range.

In the event that confirmation sample results exceed their Contamination Cleanup Goals, excavation activities with confirmation soil sampling will continue in one-foot vertical lifts and three-foot horizontal excavations until laboratory analysis indicate that all contaminated soil is removed to appropriate Contamination Cleanup Goals.

Soil contamination in the vicinity of the former maintenance building was not identified during the Phase II Investigation. However, to better assess this area, additional sampling is proposed to be completed during building demolition activities. Additional soil samples will be collected from materials within and surrounding the septic tank, drain field (if present) and adjacent to all floor drains. In addition, as recommended in the May 11, 2016 Phase II Work Plan Approval from the MDA, soil in the vicinity of an exterior drain located east of the former Maintenance Building will also be evaluated and remediated as necessary. Further information regarding this additional sampling is provided in Section 5.3.3

5.3.1 Field Screening

Based on the lack of readily available and affordable field screening equipment for mercury and organochlorine pesticides, field screening will not be conducted during remediation of the course soils except to identify areas with odors or staining. As previously discussed, confirmation samples will be collected for laboratory analysis from remediation areas to document that contaminated soils have been removed. Remedial actions will include the removal of the upper one foot of soil in each of the identified contaminated areas. Following removal of the upper one foot of soil, soil samples will be collected from the base and sidewalls of the excavation at the frequency specified in Table 12 to document that sufficient remedial actions have been taken to meet Contamination Cleanup Goals. In the event that the cleanup goal for any of the contaminants of concern are exceeded, additional soil will be excavated in one-foot lifts until site Contamination Cleanup Goals are met.

Soil samples collected in the vicinity of the former maintenance building and the septic system will be field screened with a PID at a frequency of no less than one sample per 15 cubic yards or 10 lineal feet of soil excavated (whichever is less), using procedures discussed in Section 3.3. Any soil exhibiting odors, staining or elevated PIDs will be segregated with additional samples collected to determine appropriate on-site or off-site handling and disposal.

5.3.2 Groundwater Wells

There are five groundwater wells currently located on the Property that are used for irrigation and drinking water. The wells range in depth from 225 to 320 feet. Four of the five wells are completed in the St. Lawrence formation and likely draw water from the Jordan Sandstone; the fifth well is completed in Prairie Du Chien dolomite, which is the first bedrock that was encountered in all five of the wells. The depth to Prairie Du Chien bedrock ranged from 84 feet bgs to 169 feet bgs (elevations of 814 to 715 msl). Static water levels range from 18 feet bgs to 65 feet bgs (elevations of 866 to 871 msl). Future development plans include connection to municipal water and sewer services and will eventually result in the sealing all but one of the on-site water wells. The only well proposed for continued use will be Well #3, which is currently, and will continue to be, used for irrigation purposes. As the development continues and municipal water becomes available at the Property, the wells will be sealed in accordance with Minnesota Rules and sealing logs will be submitted to the Minnesota Department of Health. Copies of well records are included in Appendix D. Well construction details are summarized on Table 13.

As requested in the May 11, 2016 Phase II Work Plan approval letter from the MDA, groundwater samples will be collected from Well # 1 (Unique No. 208460) located near the club house and Well #4 (Unique No. 233565) located near the former maintenance building. Per the request the water samples will be analyzed for MDA List 1 and 2 Pesticides, RCRA metals, Nitrate-Nitrogen and TKN. In addition, the water will also be analyzed for organochlorine pesticides.

5.3.3 Building Demolition

As part of the redevelopment process and in order to further assess potential contaminated soils and the need for remedial actions, the former maintenance building will require demolition. Oversight during building demolition will provide the best opportunities for identifying contamination in underlying soil. Carlson McCain will be on-site during removal of the concrete slab, the septic tank and below ground drainage system. Additional soil samples will be collected from materials within and surrounding the septic tank, drain field (if present) and adjacent to all floor drains. In addition, as recommended in the May 11, 2016 Phase II Work Plan Approval from the MDA, soil in the vicinity of an exterior drain located east of the former Maintenance Building will also be evaluated. It is expected that soil samples in the area of the exterior drain will be collected near the surface to approximately one-foot below grade and from the approximately depth of the storm drain (approximately 4 to 5 feet bgs) for laboratory analysis to determine if run-off from the parking lot has impacted this area. Sample intervals for all other soil samples will be determined during demolition/removal activities and will focus on stained soil, if present, depths of piping, depths of tanks, etc. Soil samples will be collected for analysis of VOCs, SVOCs, RCRA metals, MDA List 1 and 2 pesticides and organochlorine pesticides. If contamination is identified and results are consistent with those observed elsewhere on the Property, soil exceeding Contamination Cleanup Goals will be excavated and transported to the *Regulated Soil Management Area*. In addition, excavation activities with confirmation sampling will continue until cleanup criteria for recreational land use and Tier 2 SLVs are met.

5.3.3.1 Removal/Abatement of Restricted or Hazardous Materials

Prior to demolition an inspection will be completed to identify asbestos containing building materials as well as other materials that may be considered hazardous or be regulated. Based on the results of the pre-demolition survey, the demolition contractor will be required to address the removal/abatement, handling, transport and disposal of all regulated and/or hazardous materials from the building, prior to the start of demolition activities. All removal/abatement activities will be conducted in compliance with Local, State and/or Federal laws.

5.3.4 Regulated Soil Management Area

As previously discussed, it is proposed that all of the soil identified to date that requires remediation will be managed on-site at a *Regulated Soil Management Area* that will be constructed on the west end of the driving range (Figure 6). As part of the redevelopment of the Property, it will be necessary to extend the driving range in a westerly direction; this effort will require removal of an existing bituminous surface and the addition of fill material to regrade the area. The management of excavated soils on-site will serve to reduce the expense of disposing of the soil as a solid waste in an off-site landfill while being managed in a manner that is protective of human health, safety and the environment and providing beneficial use fill material that will be needed to modify the driving range.

A Regulated Soil Management Cell will be constructed over native soils. The area will be prepared for storing regulated soil by first stripping away the existing top soil and an adequate volume of underlying soil that will be excavated to be used as cover material. Top soil will first be stripped from the Soil Management Area and stored in an on-site stockpile. Following removal of the top soil, adequate soil will be removed from the Soil Management Area to provide additional cover material to make up the required two feet of cover. The regulated soil will then be placed in the prepared area and graded per construction plans. A two foot compacted soil cover, consisting of a minimum of 1.5 feet of native or imported soil and a minimum of 6-inches of top soil, will be placed over the regulated soil. The final cover will be seeded and mulched in accordance with construction plans.

The "Hydrologic Evaluation of Landfill Performance" (HELP) model developed by the U.S. Army Corps of Engineers on behalf of the U.S. Environmental Protection Agency was used in conjunction with MPCA Petroleum Remediation Guidance and models for developing site specific screening limits for the soil leaching to groundwater pathway (June 2013). The HELP program is a quasi-two-dimensional hydrologic model for conducting water balance analysis of landfills, cover systems, and other solid waste containment facilities. The model accepts weather, soil, and design data, and uses solution techniques that account for the effects of surface storage, snowmelt, runoff, infiltration, evapotranspiration, vegetative growth, soil moisture storage, lateral subsurface drainage, leachate recirculation, unsaturated vertical drainage, and leakage through soil, geomembrane or composite liners. The model facilitates rapid estimation of the amounts of runoff, evapotranspiration, drainage, leachate collection, and liner leakage that may be expected to result from the operation of a wide variety of landfill design.

The HELP model was used to estimate the efficiency of the final cover system at Tartan Park for the proposed Regulated Soil Management Area. Efficiency is defined as the percentage of the precipitation that runs off, evapotranspires, or drains laterally. Ouputs from the Help Model were used as input values for the MPCA Site Adjusted SLV Worksheet. Supporting documentation is provided in Appendix E.

Based on results of the modeling programs and using a worst-case scenio with regard to soil thickness (6.67'), the Regulated Soil Management Area could handle 27.5 mg/kg of mercury, which is significantly less than the average concentration of 13.5 mg/kg mercury that has been identified to date for soil requiring remediation, and will still sufficiently protect groundwater from mercury contamination via leaching. The only other contaminant of concern was heptachlor epoxide, which does not have a developed soil leaching value.

Direct contact in the Regulated Soil Management Area would be limited to golf course maintenance personnel who would be managing the grounds. The area will be protected from the general public as it will remain private property; in addition, patrons of the golf course would not have access to this area. Furthermore, a chain link fence will surround the north, west and south sides of the Regulated Soil Management Area. These features, along with the two foot soil cap, used in the design should adequately

protect the public and workers from direct contact with the soil. Details of the Regulated Soil Management Area are provided on Figure 6. Supporting documentation is included in Appendix E.

5.3.4.1 Deed Notification

An affidavit describing the location, contents and construction of the *Regulated Soil Management Area* and any residual contamination in excess of Contamination Cleanup Goals remaining at the Site will be filed in the office of the County Recorder or Registrar of Titles, whichever is appropriate, in and for Washington County. The description will disclose areas of the Property that are contaminated. A copy of the proposed affidavit language will be submitted to MDA staff for review and approval prior to filing. The MDA will be provided a copy of the affidavit as recorded within 30 days after the affidavit is officially recorded.

5.3.5 Excavation and Hauling

Excavation activities will be conducted using a hydraulic excavator (backhoe) and/or front end loader. Impacted soil will be directly loaded into trucks and transported to the on-site Regulated Soil Management Area. An environmental professional will be on-site to supervise, direct and document field activities.

Additional requirements for excavation and hauling are as follows:

- The contractor will be responsible for controlling fugitive dust and minimizing noise, odors, and off-site tracking to the extent possible.
- To avoid tracking of contaminated soil, excessive impacted soil will be removed from all trucks prior to leaving the remediation area. All trucks used to transport impacted soil will require decontamination prior to leaving the Property, in order to minimize the tracking of contaminants off-site. In addition, prior to demobilization from the Property, all on-site equipment used for excavation will be decontaminated.
- The contractor will be responsible for taking the appropriate measures to ensure the excavations are appropriately secured at the end of work each day.
- Work is anticipated to be completed in modified Level D personal protective equipment. A site health and safety plan (HASP) will be prepared, which the contractor's on-site personnel will be required to read and sign (copies will be provided prior to mobilization). However, the contractor is ultimately responsible for maintaining safe operation of it personnel and equipment.
- All personnel working on-site will have appropriate Occupational Safety and Health Act (OSHA) training or only be allowed to work under the supervision of a Competent Person, as defined by OSHA. The contractor will be required to provide all supporting health and safety documentation for its on-site personnel, prior to mobilization.

5.3.6 Confirmatory Sampling

To ensure that cleanup goals have been met, confirmation samples will be collected from the base and sidewalls of the excavations as discussed below. Proposed post excavation sample locations are depicted on Figures that are included in Appendix F.

Residential Area

All post excavation confirmation samples will be collected as composite samples comprised of five individual samples. The actual number of base and sidewall soil samples collected will be based on the square footage of the remediated area and will generally follow MPCA Risk Based Site Characterization and Sampling Guidance (Internal Review Draft 1997). The sampling strategy will be biased and will focus on areas of suspect contamination such as areas with visual staining or other preferential pathways for migration such as fractures in clays, and at soil type interfaces.

The number of bottom samples required to document that all contaminated soils have been removed is summarized on Table 12 and follows MPCA Sampling Guidance. Table 12 also identifies the proposed list of analytes that will be requested from each excavated area.

Four sidewall samples will be collected from each of the excavated areas with one of the sidewall samples focused on the approach to the green (when applicable). The remaining three sidewall samples will be equally spaced around the perimeter of the excavation area.

Recreational Area

Since adequate analytical data has been obtained from the base of the greens and tee boxes to characterize contamination, confirmation sampling from the base of excavations in the recreational area will be limited to one soil sample from each excavated area for organochlorine pesticides. In the event that confirmation bottom samples indicate that cleanup goals have not been met, a field decision may be made to further segregate the bottom to pinpoint exact areas that are failing Contamination Cleanup Goals.

Two sidewall samples will be collected from each excavated area; one of the samples will be focused on the approach to the green and the second sample will focus on the remaining perimeter of the green. Should confirmation sidewall samples collected outside of the approach indicate that cleanup goals have not been met, a field decision may be made to further segregate portions of the sidewalls to pinpoint exact areas that are failing Contamination Cleanup Goals.

Soil and Grass Clipping Piles

Site inspections and interviews with on-site personnel identified an area on the southern portion of the Property where grass clippings and soil aeration cores are typically stored. There were five piles identified; the locations and perimeters of each pile has been surveyed. The pile locations are shown on Figure 5.15. Soil from these piles will be transported to the Soil Management Area and confirmation samples will be collected in accordance with MPCA guidance documents for square footages of excavations, as discussed in Section 0. Based on the small size of the piles, it is expected that one to two bottom samples and two perimeter/sidewall soil samples will collected following removal of the piles. Analysis will include RCRA metals, OCP, MDA List 1 and List 2 Pesticides, TKN and nitrates.

Follow-up Excavations

If analytical results indicate that contaminated soil remains in the sidewalls or at the base of the excavations, an additional one-foot of soil will be removed from the base of the failing area and three horizontal feet of soil will be removed along any remaining impacted sidewalls. Additional samples will be collected for analysis (that will be limited to those failing Contamination Cleanup Goals) to document complete removal of all impacted soil. This process will be completed until all soil exceeding Contamination Cleanup Goals has been adequately removed. Based on previous sampling data, the excavated depth of soil removal is not expected to exceed the accessible depth of four feet in any area on the Property and is generally expected to be confined to the upper one foot of soil.

5.3.7 Backfill

The Property will be undergoing extensive re-grading in preparation for redevelopment with an improved golf course and future residential areas with roadways, drainage ways and utilities. Thus, it is not expected that the excavations will be backfilled using fill from an off-site source. If off-site fill is imported for the construction project, the soil will be tested at a frequency recommended in MPCA's Risk Based Site Characterization and Sampling Guidance (1998) to ensure that it meets Contamination Cleanup Goals.

5.4 Groundwater Response Actions

There are currently no plans that involve groundwater extraction or dewatering. If future development activities involve dewatering, it will be necessary to ensure that discharge water meets criteria for sanitary or sewer disposal, as appropriate.

5.5 Health and Safety

All personnel working on-site will have appropriate OSHA training or will only be permitted to perform work under the direction of a Competent Person. A copy of all supporting health and safety

documentation will be provided to HC Golf Course Development prior to the start of work. All work is anticipated to be completed in modified Level D PPE. A site specific health and safety plan (HASP) will be prepared, which all on-site personnel will be required to read and sign prior to the start of work. However, contractors will ultimately be responsible for maintaining safe operation of their personnel and equipment.

5.6 Contingency Planning

5.6.1 Unknown Conditions

It is possible that other environmental issues will be identified during excavation activities. While completing Response Actions, on-site personnel will note the occurrence of any of the following:

- Strong odors, staining, or other indicators of impacted soil;
- Unknown industrial wastes;
- Free phase product of any kind; and/or
- Unexpected buried objects such as dry wells, drums, tanks etc.

If an unknown condition is encountered during remediation or redevelopment activities, work will immediately cease and workers will temporarily vacate the immediate area. The Carlson McCain Project Manager and an HC Golf Course Development representative will be contacted and will make a preliminary inspection to assess the situation. Depending on the results of the inspection and assessment, the MPCA or MDA may be contacted. In the event the situation is not deemed an emergency, the MDA and/or MPCA project managers will be contacted in order to reach a determination on how best to proceed.

If the situation is determined to be an emergency, the State of Minnesota Duty Officer will be notified and will in turn notify the MPCA's Emergency Response staff. In an emergency situation, work will not resume and workers will not return to the immediate location where the hazardous substance was encountered, until a determination is made on how to proceed.

5.6.2 Petroleum Contamination

The following corrective actions will be implemented in areas where petroleum contamination is identified:

- The MPCA will immediately be notified of the contamination and plans for soil handling will discussed;
- Petroleum contaminated soils at or greater than 200 ppm (PID), will be excavated and properly managed at an MPCA approved off-site disposal facility;

- Petroleum contaminated soils less than 200 ppm (PID) may be thin spread on-site, at a maximum thickness of 4-inches, beneath paved surfaces;
- Petroleum contaminated soils less than 100 ppm may be used to construct on-site landscape berms. However, soils will be mixed at a 50/50 ratio with clean soils and covered with at least two feet of unregulated fill and vegetative cover;
- Petroleum contaminated soils at or greater than 10 ppm (PID) encountered during the installation of underground utilities will be removed and properly managed. If contamination remains at or above 10 ppm or if soil gas exceeds its intrusive screening value (ISV) at the base or sidewalls of a utility trench, a vapor barrier will be installed in the utility trench.
- A sub-slab vapor barrier will be installed in the event that petroleum impacted soil with PIDs greater than 10 ppm are identified within or adjacent to the footprint of any proposed building. In the event that PID readings exceed 50 ppm or the concentrations of VOCs in soil vapor exceed 10 times their ISV within or adjacent to the footprint of any proposed building, a venting system will be installed in addition to the vapor barrier. If a vapor barrier is required, specifications will be submitted for review in an addendum to the RAP.

5.7 Soil Vapor Response Actions

There have been no data collected to indicate that soil vapor responses are necessary; therefore, they will not be implemented as part of this project.

5.8 Documentation

A RAP Implementation Report documenting all work related to soil Response Actions will be prepared after all work is complete. This report will include all documentation from field work including (but not limited to) methods and procedures, sample locations, dimensions of excavated areas, analytical results, *Regulated Soil Management Area* construction details, and approximate volumes or quantities of materials being managed on-site. As previously discussed, an Affidavit describing the location, contents and construction of the Regulated Soil Management are will be prepared and filed with Washington County.

5.9 Schedule

It is anticipated that the implementation of soil Response Actions will begin in late May to early June and will be completed within a period of approximately four weeks. After receipt of analytical results, a RAP Implementation Report will be prepared and submitted to the MDA. Assuming that clean-up goals have been met, it is expected that the MDA will issue No Further Action for the residential areas as well as the remediated greens, tee boxes, fairways and maintenance building located in the footprint of the redesigned course.

6.0 CONCLUSIONS

A Phase II Investigation was completed at the former Tartan Park Golf Course to evaluate RECs that were identified in an August 16, 2011 Phase I ESA that was completed by Carlson McCain and a May 28, 2015 Phase I ESA completed by Arcadis. The Phase I and Phase II were completed in support of proposed redevelopment that will include modifications to the existing golf course and the future additional of residential areas. The following is a summary of field efforts and analytical results and proposed response actions:

- Over 500 direct push soil borings were advanced across the site to evaluate the use of pesticides and herbicides on the course and activities in and surrounding the former maintenance building. Over 190 soil samples, 2 groundwater and one soil vapor samples were collected for laboratory analysis;
- Encountered soil generally consisted of topsoil, layers of sandy fill (for construction of greens) and was underlain by sandy silt and/or sandy clay till;
- The depth to groundwater in the area of the former maintenance building was between 19.7 and 22.8 feet bgs. On-site water wells report static groundwater at depths of 18 to 65 feet bgs (866 to 871 msl);
- The most significant and prevalent contamination encountered was mercury, which was likely used in historic herbicide applications. Based on the data collected as part of this investigation, the mercury contamination appears confined to 26 greens, two tee boxes and one fairway. Analysis also identified organochlorine pesticides, most notably heptachlor epoxide, that will be further evaluated and appropriately remediated during the upcoming additional sampling and remediation efforts;
- Pesticides identified on MDH List 1 or 2 were not detected in any of the 30 plus samples submitted for analysis;
- Additional sampling is proposed to better define the horizontal extent of impacts in specific areas with elevated mercury concentration and to further evaluate the use of and need for post excavation sampling for organochlorine pesticides;
- Features located at the former maintenance building (septic, drains, etc., will be further evaluated and sampled at the time of building demolition). Remediation needs will be re-evaluated upon receipt of additional analytical data;
- Remediation will focus on 26 greens, two tee boxes and one fairway and is expected to result in the removal of approximately 7,500 cubic yards of soil that exceeds Contamination Cleanup Goals applied to the area specific property use;

- Excavated soils will be stored on-site in a Regulated Soil Management Area that will be incorporated into the landscape of the golf course and result in the beneficial reuse of these soils to extend the driving range; and,
- A Deed Restriction will be placed on a portion of the Driving Range to identify the *Regulated Soil Management Area* and any other areas where Contamination Cleanup Goals were not met.

7.0 REFERENCES

Phase I Environmental Site Assessment dated August 16, 2011 prepared by Carlson McCain, Inc.

Phase I Environmental Site Assessment dated May 28, 2015 prepared by Arcadis

Minnesota Pollution Control Agency Risk-Based Guidance for the Soil - Human Health Pathway – updated June 2009.

Minnesota Pollution Control Agency Risk Based Guidance for Evaluating the Soil Leaching Pathway – dated June 2013.

Minnesota Pollution Control Agency - Drinking Water Criteria Spreadsheet, dated October 2009.

MPCA Petroleum Remediation Program Guidance Documents.

MPCA Best Management Practices for the Off-Site Beneficial Re Use of Unregulated Fill, dated 2012.

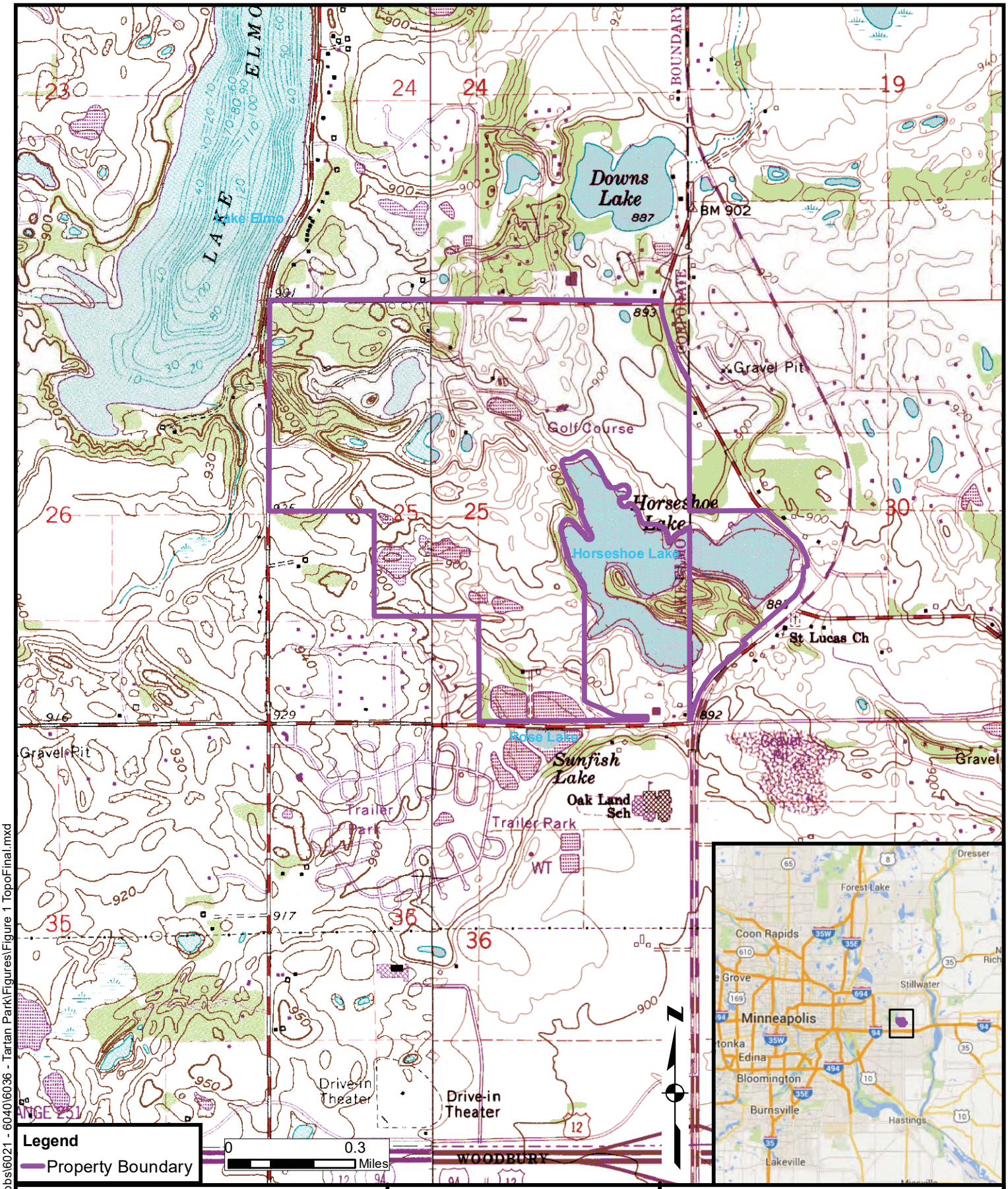
Minnesota Department of Health, County Well Index.

8.0 CERTIFICATION

Carlson McCain has prepared this Phase II Investigation Report and Response Action Plan for the exclusive use of HC Golf Course Development, for specific application to the former Tartan Park Golf Course located at 11455 20th Street North in Lake Elmo, Washington County, Minnesota. The services performed by Carlson McCain for this Project have been conducted in a manner consistent with the level of skill and care ordinarily exercised by other members of the profession currently practicing in this area. No other warranty, expressed or implied, is made.

Name and Title:	Signature:	Date Signed:
Jon Braegelmann – Staff Geologist		May 18, 2016
Barbara Ryan, P.G. – Project Manager		May 18, 2016
Wade Carlson, P.G. - Principal		May 18, 2016

Company Mailing Address:	Carlson McCain, Inc.
	3890 Pheasant Ridge Dr. NE, Suite 100
	Blaine, Minnesota 55449
Phone:	(763) 489-7904
Fax:	(763) 489-7959



F:\jobs\6021 - 6040\6036 - Tartan Park\Figures\Figure 1 TopoFinal.mxd

May 2016

Carlson McCain
ENVIRONMENTAL · ENGINEERING · SURVEYING

Former Tartan Park
Washington County, MN

Figure 1
Site Location
USGS Topographic Map

F:\jobs\6021 - 6040\6036 - Tartan Park\Figures\Figure 2. Current Site Development.mxd

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ENVIRONMENTAL · ENGINEERING · SURVEYING

1:7,276

0 0.1 Miles

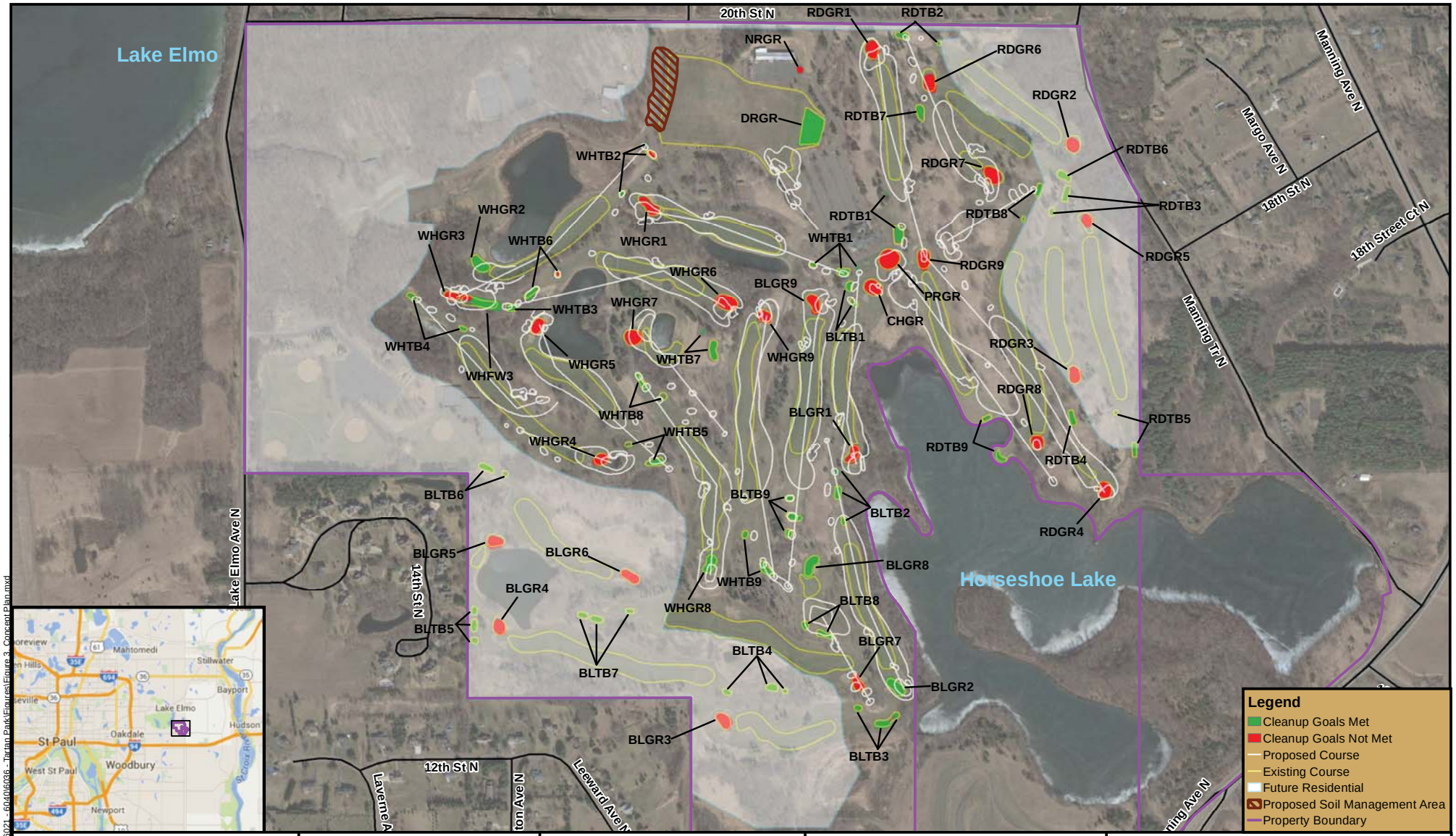
Basemap: Google Maps

N

Phase II Investigation and Response Action Plan

Former Tartan Park Washington County, MN

Figure 2 Current Site Layout



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1:6,340

0 0.1 Miles

Basemap: Google Maps

Phase II Investigation and Response Action Plan

Former Tartan Park Washington County, MN

Figure 3
Preliminary Layout Plan for Proposed Site Development

F:\Jobs\6021 - 6040\6036 - Tartan Park\Figures\Figure 3. Concept Plan.mxd

F:\jobs\6021 - 6040\6036 - Tartan Park\Figures\Figure 4. Sample Location Map.mxd

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ENVIRONMENTAL · ENGINEERING · SURVEYING

1:6,340

0 0.1 Miles

Basemap: Google Maps

N

Phase II Investigation and Response Action Plan

Former Tartan Park Washington County, MN

Figure 4
Phase II Investigation Sample Locations and Soil Exceedances

F:\Jobs\6021 - 6040\6036 - Tartan Park\Figures\Figure 5. Sample Locations\Figure 5.0.mxd

Carlson McCain
ENVIRONMENTAL · ENGINEERING · SURVEYING

1:6,340

0 0.1 0.2 Miles

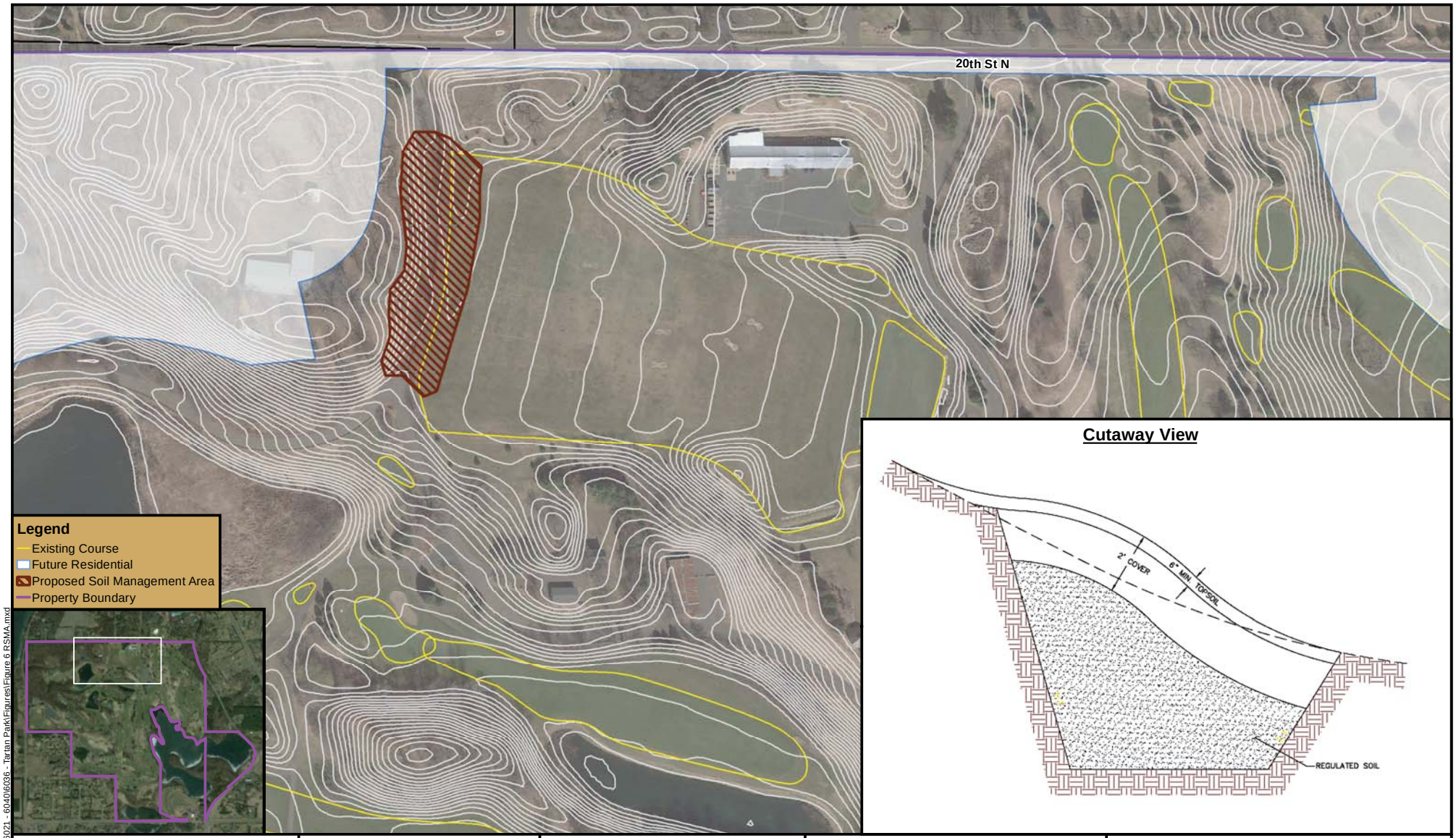
Basemap: Google Maps

N

Phase II Investigation and Response Action Plan

Former Tartan Park Washington County, MN

Figure 5.0 Sample Location Index



F:\jobs\6021 - 6040\6036 - Tartan Park\Figures\Figure 6 RSMA.mxd

Carlson McCain
ENVIRONMENTAL · ENGINEERING · SURVEYING

1:2,000

0 200 Feet

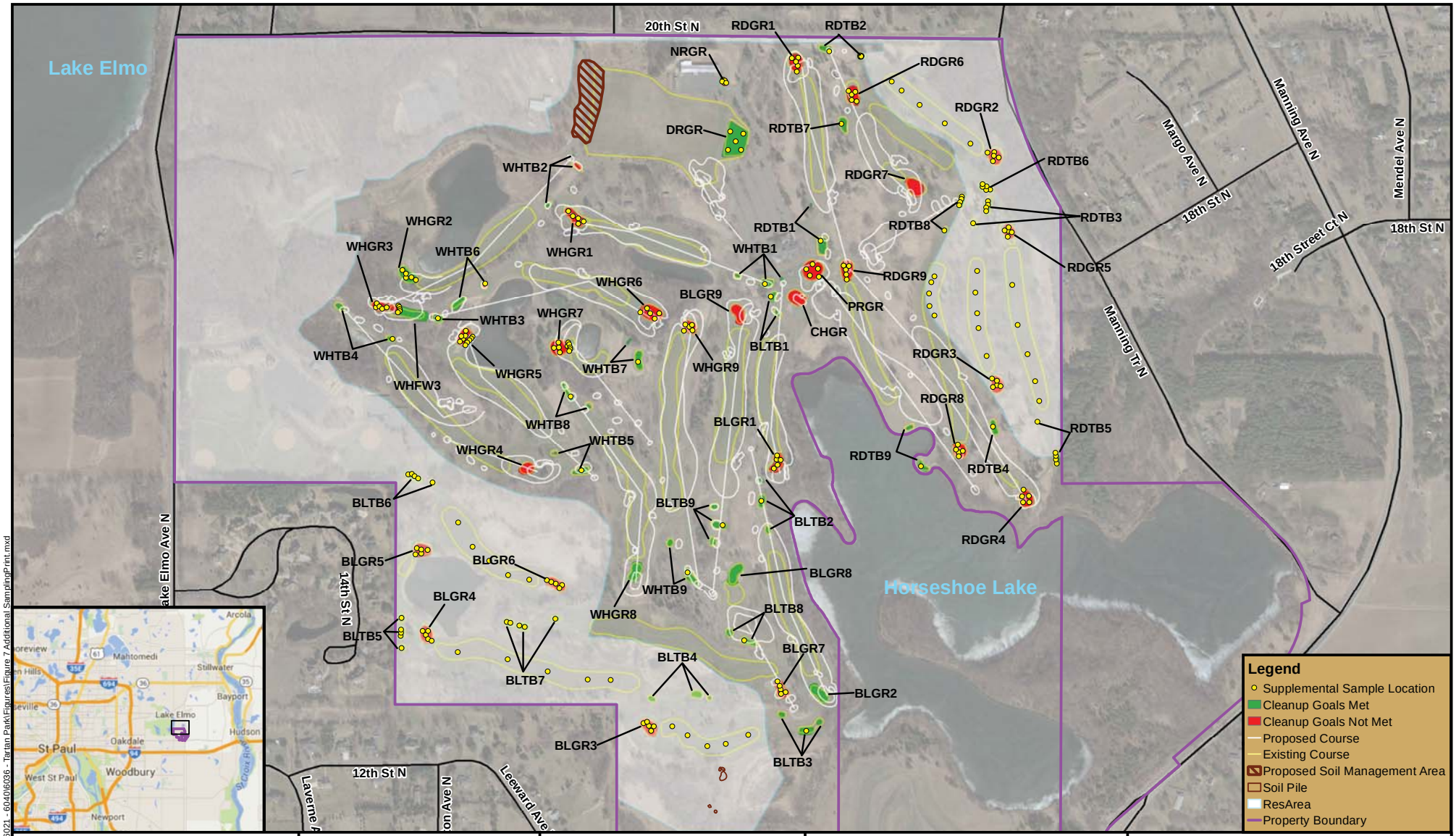
Basemap: Google Maps

N

Limited Phase II Investigation

Former Tartan Park
Washington County, MN

Figure 6
Regulated Soil Management Area Details



F:\jobs\6021 - 6040\6036 - Tartan Park\Figures\Figure 7 Additional SamplingPrint.mxd

Carlson McCain
ENVIRONMENTAL · ENGINEERING · SURVEYING

1:6,400
0 0.1 Miles
Basemap: Google Maps

Phase II Investigation and Response Action Plan

Former Tartan Park
Washington County, MN

Figure 7
Proposed Additional Soil Sample Locations
Pre-RAP Implementation

Imagine the result

3M Company

ASTM Phase I Environmental Site Assessment Report

3M Tartan Park
11455 20th Street North
Lake Elmo, Minnesota 55042

May 2015

ARCADIS

Trika Nelson, Site Auditor
ARCADIS U.S.

David A. Bice, Certified Project Manager 2
ARCADIS U.S.

ASTM Phase I Environmental Site Assessment Report

3M Tartan Park
11455 20th Street North
Lake Elmo, Minnesota 55042

Prepared for:
3M Company

Prepared by:
ARCADIS U.S., Inc.
430 First Avenue North
Suite 720
Minneapolis
Minnesota 55401
Tel 612 339 9434
Fax 612 336 4538

Our Ref.:

Date:
May 28, 2015

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ARCADIS

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Executive Summary

ARCADIS was retained by the 3M Company (3M) to conduct a Phase I Environmental Site Assessment of the 3M Tartan Park Facility located at 11455 20th Street N, Lake Elmo, Minnesota (Site).

This assessment has been prepared in accordance with American Society for Testing and Materials (ASTM) Standard Practice E1527-13 (ASTM E1527-13) to the extent practical for the Site, subject to the scope and limitations of ASTM E1527-13 and the assessment methodology as described herein.

The Site reconnaissance and interviews were conducted on March 16, 2015 by Ms. Trika Nelson of ARCADIS and accompanied by Mr. Jeff Fredeen, 3M Facilities Maintenance Administrator, and Mr. Craig Hanson, 3M Operations Manager. The Site was developed on agricultural fields in 1959 and is primarily used as a 27-hole golf course, conference facility and park, with picnic shelters, archery range, tennis courts, softball fields, and vehicle parking. The entire Site area covers a surface of approximately 482 acres and includes three main buildings: Clubhouse and conference center (23,150 square feet); maintenance shop (10,800 square feet); and the administrative building (3,300 square feet).

The findings identified by ARCADIS are summarized below and discussed in greater detail in the body of the report.

Recognized Environmental Conditions

This assessment identified only one recognized environmental condition (REC) in connection with the Site. The main sump (300 gallons) located in the repair area of the maintenance building is connected to a trench that runs the length of the building to capture any spills or leaks from repair of golf carts or other equipment. Mr. Jeff Fredeen noted that the sump is pumped out approximately once a year.

The sump was sealed in early 2014 and a letter was issued from the United States Environmental Protection Agency stating that the “disposal well was closed” and that “the closure is sufficient to prevent movement of harmful contaminants into any underground sources of drinking water”. Historically, before sealing, the sump drained to the septic tank. It is unknown if any impacts around the trench were identified prior to sealing.

Controlled RECs

No controlled (CRECs) were identified during the Site reconnaissance and the preliminary records review.

Historical RECs

This assessment identified two historical RECs (HRECs) in connection with the Site. The Minnesota Pollution Control Agency (MPCA) website notes that five previous underground storage tanks (USTs) existed at the Site and were removed in 1989 and 1991. Two previous leak numbers (4524 and 9052) are identified for the Site. Site closure was issued for both UST leaks in October 1992 (4524) and October 1997 (9052). These areas are HRECs due to known impacts to soils.

Data Gaps

The following data gaps were identified:

- Unknown size of small sump in chemical storage closet in maintenance building.
- It is unknown if the tank on the diesel generator is double walled.
- No tank closure report for the removal of the five previous USTs. MPCA letter dated October 23, 1997 states that the file is closed but “does not necessarily mean that all petroleum contamination has been removed” and “the MPCA reserves the right to reopen this file”.
- No information on inventory control associated with USTs and potential for transfer piping to leak.
- No information concerning the transformers and the presence of polychlorinated biphenyls. Based on communications with Mr. Jeff Fredeen, the transformers are likely from the 1990s and do not contain polychlorinated biphenyls; however, no documentation was provided.
- Limited information for on-Site well water quality and construction details.
- Limited information on historic use of herbicides, pesticides and fertilizers and possible impacts to Site soils and groundwater.

Table 3
Groundwater Analytical Results
3M Company
Tartan Park
Lake Elmo, Minnesota

ARCADIS Design & Consultancy for natural and built assets

Location ID: Date Collected: Sample Type:	MDH HRL (ng/L)	Units	Well No. 1 12/30/15 PRI	Well No. 3 12/30/15 PRI	Well No. 4 12/30/15 PRI	123015-1 12/30/15 DUP
Perfluorobutyrate (PFBA)	7,000	ng/L	12.0	39.7	109	41.7
Perfluoro-n-pentanoic acid (PFPeA)	- -	ng/L	<1.16	<1.52	<1.04	1.13
Perfluorohexanoic acid (PFHxA)	- -	ng/L	<1.13	<1.22	<1.04	1.19
Perfluoroheptanoic acid (PFHpA)	- -	ng/L	<1.13	<1.22	<1.04	<1.06
Perfluorooctanoic acid (PFOA)	300	ng/L	<1.13	2.53	1.53	2.63
Perfluorononanoic acid (PFNA)	- -	ng/L	<1.13	<1.22	<1.04	<1.06
Perfluorodecanoic acid (PFDA)	- -	ng/L	<1.13	<1.22	<1.04	<1.06
Perfluoroundecanoic acid (PFUnA)	- -	ng/L	<1.13	<1.22	<1.04	<1.06
Perfluorododecanoic acid (PFDoA)	- -	ng/L	<1.13	<1.22	<1.04	<1.06
Perfluorobutanesulfonic acid (PFBS)	7,000	ng/L	<2.27	<2.44	<2.09	<2.11
Perfluorohexanesulfonic acid (PFHxS)	- -	ng/L	<2.27	<2.44	<2.09	<2.11
Perfluoroctanesulfonic acid (PFOS)	300	ng/L	<2.27	3.44	5.15	3.75
Perfluoroctansulfonamide (PFOSA)	- -	ng/L	<1.13	<1.22	<1.04	<1.06

Acronyms and Abbreviations:

Maximum contaminant levels (MCLs) are not available for the above compounds.

< = compound was not detected; reporting limit is displayed

- - = not available

DUP = Duplicate

HRL = Health Risk Limits

MDH = Minnesota Department of Health

ng/L = nanograms per liter

PRI = primary

7. Findings, Opinions, and Conclusions

ARCADIS has performed a Phase I ESA in general accordance with the ASTM E 1527-013 *Standard Practice for Site Assessments: Phase I Environmental Site Assessment Process*. Exceptions to, or deviations from, this practice are described in Section 1.7 of this report.

The findings identified by ARCADIS are summarized below and discussed in greater detail in the body of the report.

7.1 RECs

This assessment identified only one REC in connection with the Site. The main sump (300 gallons) located in the repair area of the maintenance building is connected to a trench that runs the length of the building to capture any spills or leaks from repair of golf carts or other equipment. Mr. Jeff Fredeen noted that the sump is pumped out approximately once a year.

The sump was sealed in early 2014 and a letter was issued from U.S. EPA stating that the “disposal well was closed” and that “the closure is sufficient to prevent movement of harmful contaminants into any underground sources of drinking water”. Historically, before sealing, the sump drained to the septic tank. It is unknown if any impacts around the trench were identified prior to sealing.

7.2 CRECs

No CRECs were identified during the Site reconnaissance and the preliminary records review.

7.3 HRECs

This assessment identified two HRECs in connection with the Site. The MPCA website notes that five previous USTs existed at the Site and were removed in 1989 and 1991. Two previous leak numbers (4524 and 9052) are identified for the Site. Site closure was issued for both UST leaks in October 1992 (4524) and October 1997 (9052). These areas are HRECs due to known impacts to soils.

7.4 Data Gaps

The following data gaps were identified:

- Unknown size of small sump in chemical storage closet in maintenance building.
- It is unknown if the tank on the diesel generator is double walled.
- No tank closure report for the removal of the five previous USTs. MPCA letter dated October 23, 1997 states that the file is closed but “does not necessarily mean that all petroleum contamination has been removed” and “the MPCA reserves the right to reopen this file”.
- No information on inventory control associated with USTs and potential for transfer piping to leak.
- No information concerning the transformers and the presence of PCBs. Based on communications with Mr. Jeff Fredeen, the transformers are likely from the 1990s and do not contain PCBs; however, no documentation was provided.
- Limited information for on-Site well water quality and construction details.
- Limited information on historic use of herbicides, pesticides and fertilizers and possible impacts to Site soils and groundwater.

8. Qualifications of Environmental Professionals

The work was completed by personnel who meet the definition of "environmental professional" as defined in ASTM E-1527-13. The work was conducted under the supervision and review of Trika Nelson, Lead Site Auditor, ARCADIS. Ms. Nelson's resume is attached in **Appendix H**.

9. References

ASTM. 2013. Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, Designation E 1527-13.

Environmental Data Resources, Inc. (EDR). 2014

Certified Sanborn® Map Report, EDR® Inquiry No. 4235914.3; March 17, 2015

EDR Aerial Photo Decade Package, EDR® Inquiry No. 4235914.12; March 17, 2015

EDR City Directory Abstract, EDR® Inquiry No. 4235914.5; March 17, 2015

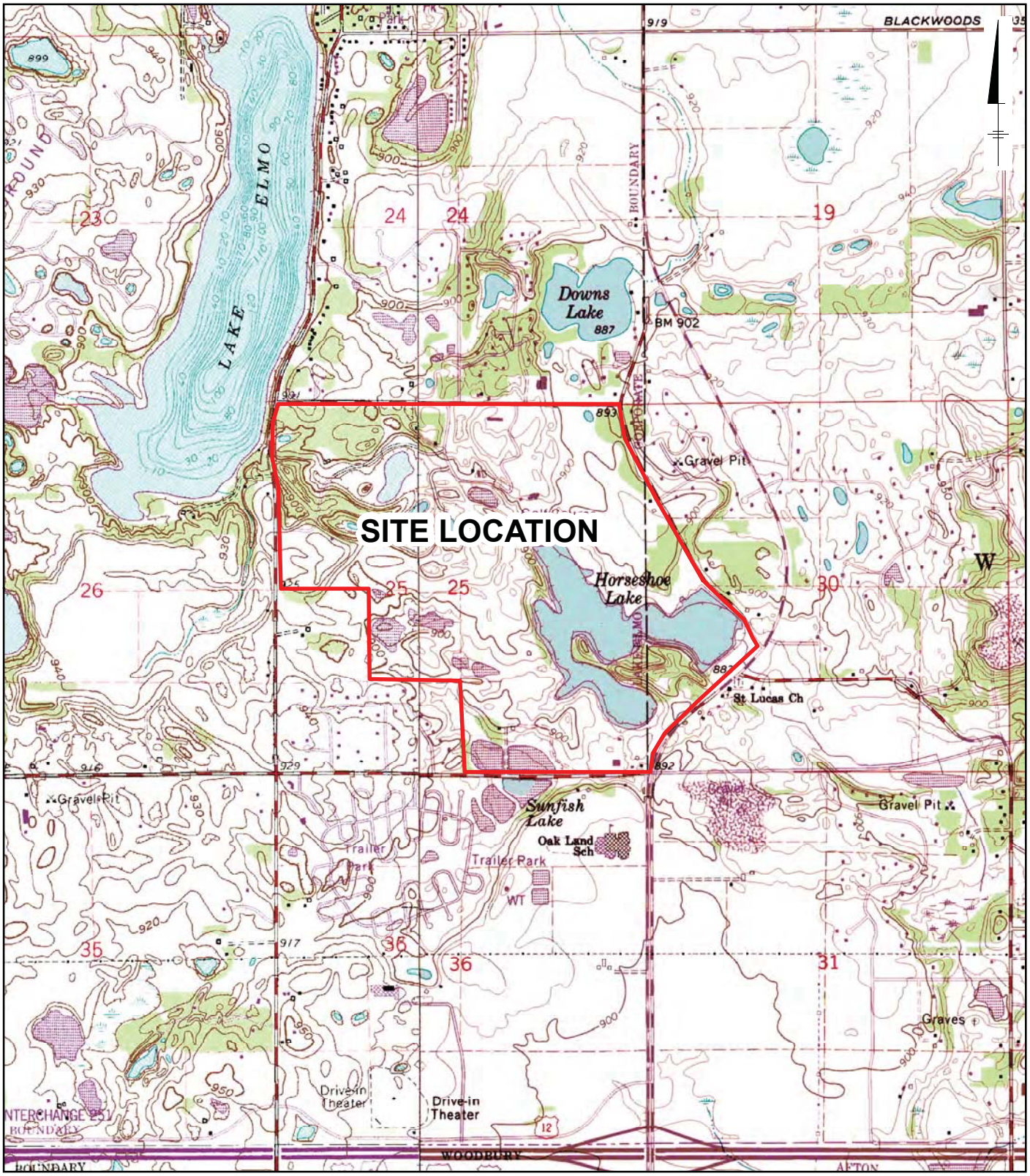
EDR Historical Topographic Map Report, EDR® Inquiry No. 4235914.4; March 17, 2015

EDR Radius Map Report, EDR® Inquiry No. 4235914.2s; March 17, 2015

Minnesota Geological Survey MGS, 1990, Bedrock Topography and Depth to Bedrock, Patterson, C.J., Mossler J.H., and Bloomgren B.A., County Atlas Series Atlas C-5, plate 4 of 7, 1990.

Minnesota Geological Survey MGS, 1990, Hydrogeology, Kanivetsky R. and Cleland J.M., County Atlas Series Atlas C-5, plate 5 of 7, 1990.

Minnesota Geological Survey MGS, 1990, Bedrock Geology, Mossler J.H. and Bloomgren B.A., County Atlas Series Atlas C-5, plate 2 of 7, 1990.



0 1,000 2,000 Feet

GRAPHIC SCALE

NOTES:

USGS 1:24K QUADRANGLES:
LAKE ELMO & HUDSON

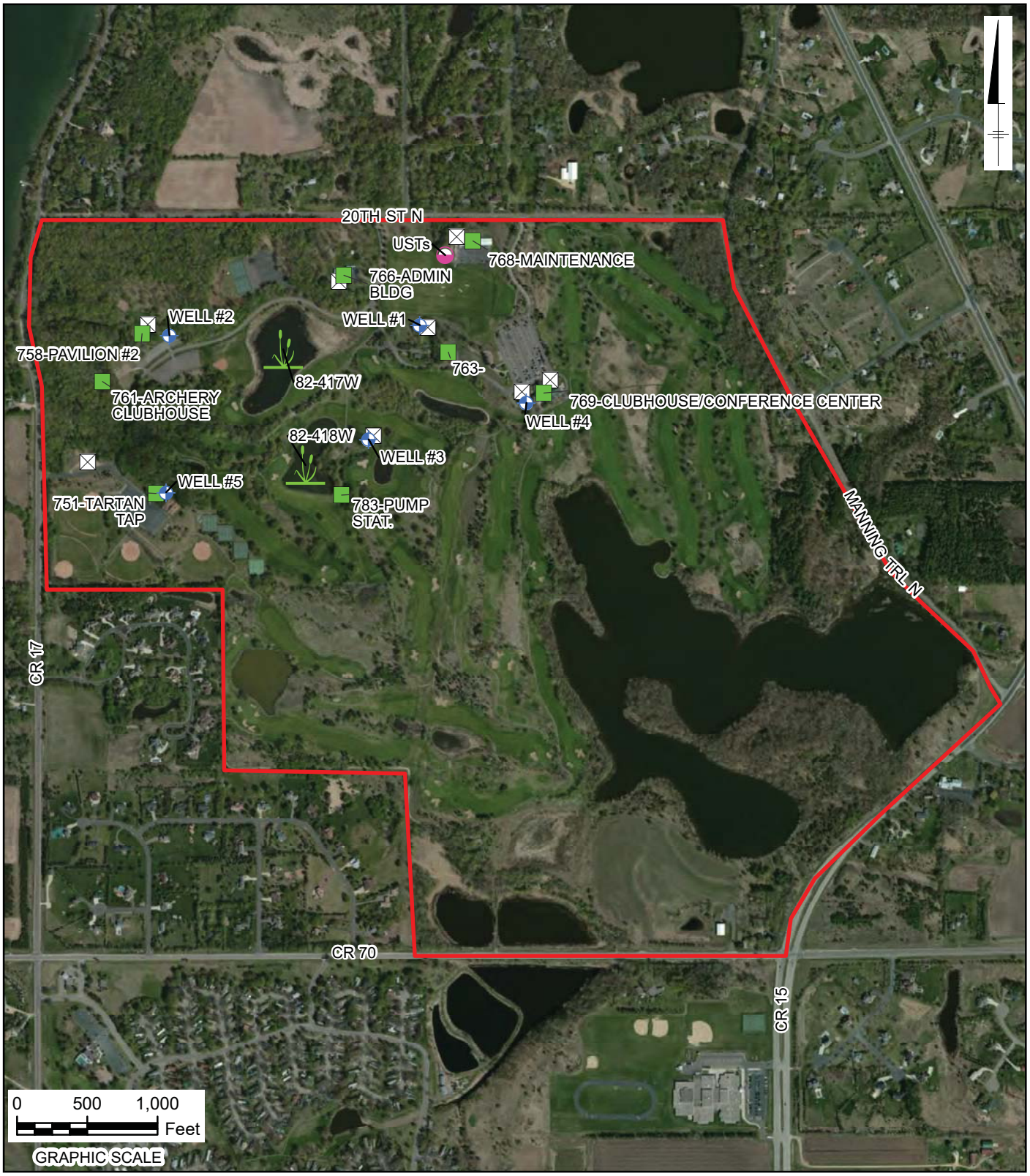
3M
TARTAN PARK
LAKE ELMO, MINNESOTA

SITE LOCATION

ARCADIS

FIGURE
1

CITY: MPLS DIV/GROUP: IM/DV DB: MG LD: PS
ROCKFORD, MN
Document Path: Z:\GISPROJECTS_ENV\3M\3M_Tartan_Park_Lake_Elmo\MXD\Site_Location_20150324.mxd



LEGEND:

- WELL
- BUILDING
- TRANSFORMER
- USTs
- MNDNR PERMITTED WETLAND
- APPROXIMATE SITE LOCATION

NOTES:

AERIAL IMAGE SOURCE: ESRI, DIGITALGLOBE, GEOEYE, I-CUBED, USDA, USGS, AEX, GETMAPPING, AEROGRID, IGN, IGP, SWISSTOPO, AND THE GIS USER COMMUNITY

3M
TARTAN PARK
LAKE ELMO, MINNESOTA

SITE LAYOUT

ARCADIS

FIGURE
1

CITY: MPLS DIV/GROUP: IM/DV DB: MG LD: PS
ROCKFORD, MN
Document Path: Z:\GISPROJECTS_ENV\3M\3M_Tartan_Park_Lake_Elmo\MXD\Site_Layout_20150324.mxd

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Appendix E

Minnesota DNR Natural Heritage Information System Report

The Royal Golf Club Residential Development EAW

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Minnesota Department of Natural Resources
Division of Ecological and Water Resources, Box 25
500 Lafayette Road
St. Paul, Minnesota 55155-4025
Phone: (651) 259-5091 E-mail: samantha.bump@state.mn.us

September 19, 2016 **Correspondence # ERDB 20170079**

Mr. Andrew Krinkle
Kjolhaug Environmental Services Company
26105 Wild Rose Lane
Shorewood, MN 55331

RE: Natural Heritage Review of the proposed The Royal Golf Club Rehabilitation & Development, T29N R21/20W Sections 25/30; Washington County

Dear Mr. Krinkle,

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:

- 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. Blanding's turtles use wetlands as well as upland areas up to and over a mile distant from wetlands. Uplands are used for nesting, basking, periods of dormancy, and traveling between wetlands. Because of the tendency to travel long distances over land, Blanding's turtles regularly travel across roads and are therefore susceptible to collisions with vehicles. Any added mortality can be detrimental to populations of Blanding's turtles, as these turtles have a low reproduction rate that depends upon a high survival rate to maintain population levels. Other factors believed to contribute to the decline of this species include wetland drainage and degradation, and the development of upland habitat.

  This project has the potential to impact this rare turtle through direct fatalities or habitat disturbance/destruction due to dewatering, excavation, fill, or other construction activities associated with the project. Actions to avoid or minimize disturbance to this state-protected turtle may include, but are not limited to, the following recommendations:

  - Avoid Type 2 & 3 wetlands,
  - To avoid any incidental takings, avoid filling or dewatering wetlands during the winter,
  - Implement stringent sediment and erosion control methods,
  - Use wildlife-friendly erosion control methods (see enclosed fact sheet),
  - Monitor for turtles during construction and report any sightings to the DNR,

- Please refer to the first list of recommendations in the enclosed Blanding's Turtle Fact Sheet. If greater protection for turtles is desired, the second list of recommendations can be implemented as well. The fact sheet contains specific recommendations regarding roads, utilities, and landscaping that will pertain to this project.
- For recommendations pertaining to road construction, please refer to Curb Design and Small Animals, Preventing Entanglement, and Reducing Wildlife Vehicle Collisions in Chapter One of the Minnesota Department of Transportation's Best Practices Manual (http://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/gp_2004_0001_manual.html).
- For further assistance regarding the Blanding's turtle, please contact the DNR Regional Nongame Specialist Erica Hoaglund at 651-259-5772 or Erica.Hoaglund@state.mn.us.

The attached flyer should be given to all contractors working in the area. If Blanding's turtles are encountered on 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.

- Pugnose shiners (*Notropis anogenus*), a state-listed threatened fish species, and least darters (*Etheostoma microperca*), a state-listed fish species of special concern, have been documented in Lake Elmo and if habitat conditions are adequate may occur in Horseshoe Lake as well. These species prefer clear, low velocity lakes and streams and are associated with dense, submerged vegetation. Both species are vulnerable to the removal of aquatic vegetation from lakes, increases in eutrophication from nutrient enrichment, and increases in water turbidity or siltation that can be caused from pollution, pesticides, and runoff. Actions to minimize impacts include, but are not limited to, the following recommendations:

  - minimize the use of pesticides and fertilizers,
  - maintain or restore lakeshore vegetation,
  - avoid removal of native aquatic vegetation,
  - require stringent erosion and sediment control practices during construction, and
  - incorporate erosion and sediment control practices into any stormwater management plan.

  Even if these rare fish species are not present within the project boundary, there are other natural resource - related issues associated with lakeshore developments. These issues include increased nutrients, pollutants, erosion, and sedimentation resulting in decreased water quality and decreased habitat quality for fish and wildlife. Maintaining native vegetation along lakeshores is one way to reduce these negative impacts. The combination of upland, lakeshore, and aquatic plants creates a buffer zone that provides numerous ecological benefits. Lakeshore and upland plants help stabilize banks and protect the shoreline from erosion by absorbing the forces of wind, waves, and boat traffic. They also filter pollutants that would otherwise drain from the watershed into the lake, thereby protecting water quality. Most noticeably, lakeshore and upland plants provide a variety of vital habitat components for fish and wildlife including food, protection from weather and predators, denning sites and nursery areas for young, perching and sunning sites for birds and turtles, and flyways and travel corridors. Aquatic plants produce oxygen, purify lake water by stabilizing bottom sediments and reducing nutrient cycling, and provide underwater cover for fish. As such, if a buffer zone of native vegetation is present within

the project boundary, I recommend that it be maintained and enhanced. If not, I recommend that one be established.

For additional information on aquatic plants and lakeshore management, please refer to the links at the end of this letter. The DNR book *Lakescaping for Wildlife and Water Quality* also covers a wide array of topics associated with managing lakeshore property and includes techniques to prevent shoreline erosion and to restore wildlife habitat, wildflowers, and water quality. Another reference is *Restore Your Shore*, an online interactive multimedia program that guides users through the process of protecting a natural shoreline or restoring a degraded shore with a natural buffer zone.

- The northern long-eared bat (*Myotis septentrionalis*), federally listed as threatened and state-listed as special concern, can be found throughout Minnesota. During the winter this species hibernates in caves and mines, and during the active season (approximately April-October) it roosts underneath bark, in cavities, or in crevices of both live and dead trees. Pup rearing is during June and July. Activities that may impact this species include, but are not limited to, wind farm operation, any disturbance to hibernacula, and destruction/degradation of habitat (including tree removal).

  The U.S. Fish and Wildlife Service (USFWS) has published a final 4(d) rule that identifies prohibited take. To determine whether you need to contact the USFWS, please refer to the USFWS Key to the Northern Long-Eared Bat 4(d) Rule (see links below). Please note that the NHIS does not contain any known occurrences of northern long-eared bat roosts or hibernacula within an approximate one-mile radius of the proposed project.

- The Environmental Assessment Worksheet should address whether the proposed project has the potential to adversely affect the above rare features and, if so, it should identify specific measures that will be taken to avoid or minimize disturbance. Sufficient information should be provided so the DNR can determine whether a takings permit will be needed for any of the above protected species.

- Please include a copy of this letter in any state or local license or permit application. **Please note that measures to avoid or minimize disturbance to the above rare features may be included as restrictions or conditions in any required permits or licenses.**

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.**

The enclosed results include an Index Report of records in the Rare Features Database, the main database of the NHIS. To control the release of specific location data, the report is copyrighted and only provides rare features locations to the nearest section. The Index Report may be reprinted, unaltered, in any environmental review document (e.g., EAW or EIS), municipal natural resource plan, or report

compiled by your company for the project listed above. If you wish to reproduce the Index Report for any other purpose, please contact me to request written permission.

For environmental review purposes, the results of this Natural Heritage Review are valid for one year; the results are 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. Rare Features Database: Index Report
Blanding's Turtle Fact Sheet & Flier
Wildlife Friendly Erosion Control

Links: Lakescaping
http://www.dnr.state.mn.us/lakescaping/index.html
Natural Buffers and Lakescaping
http://files.dnr.state.mn.us/publications/waters/shoreline_alterations_lakescaping.pdf
Restore Your Shore
http://www.dnr.state.mn.us/restoreyourshore/index.html

USFWS Key to the Northern Long-Eared Bat 4(d) Rule for Non-Federal Activities
http://www.fws.gov/midwest/endangered/mammals/nleb/KeyFinal4dNLEB.html
USFWS Key to the Northern Long-Eared Bat 4(d) Rule for Federal Actions
http://www.fws.gov/midwest/endangered/mammals/nleb/KeyFinal4dNLEBFedProjects.html
USFWS Northern Long-eared Bat Website
http://www.fws.gov/midwest/endangered/mammals/nleb/index.html
USFWS Northern Long-eared Bat Fact Sheet
http://www.fws.gov/midwest/endangered/mammals/nleb/nlebFactSheet.html

cc: Becky Horton
Leslie Parris
Erica Hoaglund
Jen Sorensen

Printed August 2016
Data valid for one year

Minnesota Natural Heritage Information System
Index Report of records within 1 mile radius of:
ERDB# 20170079 - The Royal Golf Club
T29N R21/20W Sections 25/30
Washington County

Rare Features Database:

Element Name and Occurrence Number	Federal Status	MN Status	Draft Status	SGCN Status	State Rank	Global Rank	Last Obs Date	EO ID #
Vertebrate Animal								
Emydoidea blandingii (Blanding's Turtle) #570 T29N R21W S23; Washington County		THR		SGCN	S2	G4	1991-05-14	12155
Emydoidea blandingii (Blanding's Turtle) #1105 T29N R21W S36; Washington County		THR		SGCN	S2	G4	1991-06-15	38487
Etheostoma microperca (Least Darter) #203 T29N R21W S26, T29N R21W S24, T29N R21W S13, T29N R21W S23, T29N R21W S14; Washington County		SPC		SGCN	S3	G5	2014-09-14	37697
Notropis anogenus (Pugnose Shiner) #136 T29N R21W S26, T29N R21W S24, T29N R21W S13, T29N R21W S23, T29N R21W S14; Washington County		THR		SGCN	S2	G3	2014-09-14	37696
Invertebrate Animal								
Marpissa grata (A Jumping Spider) #1 T29N R21W S26, T29N R21W S27; Washington County		Watchlist			S3	GNR	1996-05-29	25079
Pelegrina arizonensis (A Jumping Spider) #4 T29N R21W S26, T29N R21W S27, T29N R21W S23; Washington County		SPC		SGCN	S3	GNR	1996-05-29	25078
Native Plant Community (This may not represent a complete list. Also see MCBS Native Plant Communities at http://deli.dnr.state.mn.us.)								
Lake bed #8 (NPC Code:) T29N R21W S26, T29N R21W S23; Washington County		N/A			SNR	GNR	1988-08-12	8643
Native Plant Community, Undetermined Class #1110 (NPC Code:) T29N R20W S29, T29N R20W S31, T29N R20W S30, T29N R20W S32; Washington County		N/A			SNR	GNR	1971-06-15	9379
Sand Beach (Inland Lake) Type #6 (NPC Code: LKi32a) T29N R21W S24, T29N R21W S23; Washington County		N/A			S1	GNR	1988-08-12	8661

Records Printed = 9

Minnesota's endangered species law (*Minnesota Statutes*, section 84.0895) and associated rules (*Minnesota Rules*, part 6212.1800 to 6212.2300 and 6134) prohibit the taking of threatened or endangered species without a permit. For plants, taking includes digging or destroying. For animals, taking includes pursuing, capturing, or killing.

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Printed August 2016
Data valid for one year

Minnesota Natural Heritage Information System
Index Report of records within 1 mile radius of:
ERDB# 20170079 - The Royal Golf Club
T29N R21/20W Sections 25/30
Washington County

An Explanation of Fields:

Element Name and Occurrence Number: The Element is the name of the rare feature. For plant and animal species records, this field holds the scientific name followed by the common name in parentheses; for all other elements it is solely the element name. Native plant community names correspond to Minnesota's Native Plant Community Classification (Version 2.0). The Occurrence Number, in combination with the Element Name, uniquely identifies each record.

Federal Status: The status of the species under the U.S. Endangered Species Act: LE = endangered; LT = threatened; LE,LT = listed endangered in part of its range, listed threatened in another part of its range; LT,PDL = listed threatened, proposed for delisting; C = candidate for listing. If null or 'No Status,' the species has no federal status.

MN Status: The legal status of the plant or animal species under the Minnesota Endangered Species Law: END = endangered; THR = threatened; SPC = special concern; NON = tracked, but no legal status. Native plant communities, geological features, and colonial waterbird nesting sites do not have any legal status under the Endangered Species Law and are represented by a N/A.

Draft Status: Proposed change to the legal status of the plant or animal species under the Minnesota Endangered Species Law: END = endangered; THR = threatened; SPC = special concern; Watchlist = tracked, but no legal status.

SGCN Status: SGCN = The species is a Species in Greatest Conservation Need as identified in Minnesota's State Wildlife Action Plan (http://www.dnr.state.mn.us/cwcs/index.html). This designation applies to animals only.

State Rank: Rank that best characterizes the relative rarity or endangerment of the taxon or plant community in Minnesota. The ranks do not represent a legal status. They are used by the Minnesota Department of Natural Resources to set priorities for research, inventory and conservation planning. The state ranks are updated as inventory information becomes available. S1 = Critically imperiled in Minnesota because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state. S2 = Imperiled in Minnesota because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state. S3 = Vulnerable in Minnesota either because rare or uncommon, or found in a restricted range, or because of other factors making it vulnerable to extirpation. S4 = Apparently secure in Minnesota, usually widespread. S5 = Demonstrably secure in Minnesota, essentially ineradicable under present conditions. SH = Of historical occurrence in the state, perhaps having not been verified in the past 20 years, but suspected to be still extant. An element would become SH without the 20-year delay if the only known occurrences in the state were destroyed or if it had been extensively and unsuccessfully looked for. SNR = Rank not yet assessed. SU = Unable to rank. SX = Presumed extinct in Minnesota. SNA = Rank not applicable. S#S# = Range Rank: a numeric range rank (e.g., S2S3) is used to indicate the range of uncertainty about the exact status of the element. S#B, S#N = Used only for migratory animals, whereby B refers to the breeding population of the element in Minnesota and N refers to the non-breeding population of the element in Minnesota.

Global Rank: The global (i.e., range-wide) assessment of the relative rarity or imperilment of the species or community. Ranges from G1 (critically imperiled due to extreme rarity on a world-wide basis) to G5 (demonstrably secure, though perhaps rare in parts of its range). Global ranks are determined by NatureServe, an international network of natural heritage programs and conservation data centers.

Last Observed Date: Date that the Element Occurrence was last observed to be extant at the site in format YYY-MM-DD.

EO ID #: Unique identifier for each Element Occurrence record.

Element Occurrence: An area of land and/or water in which an Element (i.e., a rare species or community) is, or was, present, and which has practical conservation value for the Element as evidenced by potential continued (or historical) presence and/or regular recurrence at a given location. Specifications for each species determine whether multiple observations should be considered 1 Element Occurrence or 2, based on minimum separation distance and barriers to movement.

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Environmental Review Fact Sheet Series

Endangered, Threatened, and Special Concern Species of Minnesota

Blanding's Turtle

(*Emydoidea blandingii*)

Minnesota Status:	Threatened	State Rank[1]:	S2
Federal Status:	none	Global Rank[1]:	G4

HABITAT USE

Blanding's turtles need both wetland and upland habitats to complete their life cycle. The types of wetlands used include ponds, marshes, shrub swamps, bogs, and ditches and streams with slow-moving water. In Minnesota, Blanding's turtles are primarily marsh and pond inhabitants. Calm, shallow water bodies (Type 1-3 wetlands) with mud bottoms and abundant aquatic vegetation (e.g., cattails, water lilies) are preferred, and extensive marshes bordering rivers provide excellent habitat. Small temporary wetlands (those that dry up in the late summer or fall) are frequently used in spring and summer -- these fishless pools are amphibian and invertebrate breeding habitat, which provides an important food source for Blanding's turtles. Also, the warmer water of these shallower areas probably aids in the development of eggs within the female turtle. Nesting occurs in open (grassy or brushy) sandy uplands, often some distance from water bodies. Frequently, nesting occurs in traditional nesting grounds on undeveloped land. Blanding's turtles have also been known to nest successfully on residential property (especially in low density housing situations), and to utilize disturbed areas such as farm fields, gardens, under power lines, and road shoulders (especially of dirt roads). Although Blanding's turtles may travel through woodlots during their seasonal movements, shady areas (including forests and lawns with shade trees) are not used for nesting. Wetlands with deeper water are needed in times of drought, and during the winter. Blanding's turtles overwinter in the muddy bottoms of deeper marshes and ponds, or other water bodies where they are protected from freezing.

LIFE HISTORY

Individuals emerge from overwintering and begin basking in late March or early April on warm, sunny days. The increase in body temperature which occurs during basking is necessary for egg development within the female turtle. Nesting in Minnesota typically occurs during June, and females are most active in late afternoon and at dusk. Nesting can occur as much as a mile from wetlands. The nest is dug by the female in an open sandy area and 6-15 eggs are laid. The female turtle returns to the marsh within 24 hours of laying eggs. After a development period of approximately two months, hatchlings leave the nest from mid-August through early-October. Nesting females and hatchlings are often at risk of being killed while crossing roads between wetlands and nesting areas. In addition to movements associated with nesting, all ages and both sexes move between wetlands from April through November. These movements peak in June and July and again in September and October as turtles move to and from overwintering sites. In late autumn (typically November), Blanding′s turtles bury themselves in the substrate (the mud at the bottom) of deeper wetlands to overwinter.

IMPACTS / THREATS / CAUSES OF DECLINE

- loss of wetland habitat through drainage or flooding (converting wetlands into ponds or lakes)
- loss of upland habitat through development or conversion to agriculture
- human disturbance, including collection for the pet trade* and road kills during seasonal movements
- increase in predator populations (skunks, raccoons, etc.) which prey on nests and young

*It is illegal to possess this threatened species.

RECOMMENDATIONS FOR AVOIDING AND MINIMIZING IMPACTS

These recommendations apply to typical construction projects and general land use within Blanding's turtle habitat, and are provided to help local governments, developers, contractors, and homeowners minimize or avoid detrimental impacts to Blanding's turtle populations. **List 1** describes minimum measures which we recommend to prevent harm to Blanding's turtles during construction or other work within Blanding's turtle habitat. **List 2** contains recommendations which offer even greater protection for Blanding's turtles populations; this list should be used *in addition to the first list* in areas which are known to be of state-wide importance to Blanding's turtles (contact the DNR's Natural Heritage and Nongame Research Program if you wish to determine if your project or home is in one of these areas), or in any other area where greater protection for Blanding's turtles is desired.

List 1. Recommendations for all areas inhabited by Blanding's turtles.	**List 2. *Additional* recommendations for areas known to be of state-wide importance to Blanding's turtles.**
GENERAL	
A flyer with an illustration of a Blanding's turtle should be given to all contractors working in the area. Homeowners should also be informed of the presence of Blanding's turtles in the area.	Turtle crossing signs can be installed adjacent to road-crossing areas used by Blanding's turtles to increase public awareness and reduce road kills.
Turtles which are in imminent danger should be moved, by hand, out of harms way. Turtles which are not in imminent danger should be left undisturbed.	Workers in the area should be aware that Blanding's turtles nest in June, generally after 4pm, and should be advised to minimize disturbance if turtles are seen.
If a Blanding's turtle nests in your yard, do not disturb the nest.	If you would like to provide more protection for a Blanding's turtle nest on your property, see "Protecting Blanding's Turtle Nests" on page 3 of this fact sheet.
Silt fencing should be set up to keep turtles out of construction areas. It is critical that silt fencing be removed after the area has been revegetated.	Construction in potential nesting areas should be limited to the period between September 15 and June 1 (this is the time when activity of adults and hatchlings in upland areas is at a minimum).
WETLANDS	
Small, vegetated temporary wetlands (Types 2 & 3) should not be dredged, deepened, filled, or converted to storm water retention basins (these wetlands provide important habitat during spring and summer).	Shallow portions of wetlands should not be disturbed during prime basking time (mid morning to mid- afternoon in May and June). A wide buffer should be left along the shore to minimize human activity near wetlands (basking Blanding's turtles are more easily disturbed than other turtle species).
Wetlands should be protected from pollution; use of fertilizers and pesticides should be avoided, and run-off from lawns and streets should be controlled. Erosion should be prevented to keep sediment from reaching wetlands and lakes.	Wetlands should be protected from road, lawn, and other chemical run-off by a vegetated buffer strip at least 50' wide. This area should be left unmowed and in a natural condition.
ROADS	
Roads should be kept to minimum standards on widths and lanes (this reduces road kills by slowing traffic and reducing the distance turtles need to cross).	Tunnels should be considered in areas with concentrations of turtle crossings (more than 10 turtles per year per 100 meters of road), and in areas of lower density if the level of road use would make a safe crossing impossible for turtles. Contact your DNR Regional Nongame Specialist for further information on wildlife tunnels.
Roads should be ditched, not curbed or below grade. If curbs must be used, 4 inch high curbs at a 3:1 slope are preferred (Blanding's turtles have great difficulty climbing traditional curbs; curbs and below grade roads trap turtles on the road and can cause road kills).	Roads should be ditched, not curbed or below grade.

ROADS cont.	
Culverts between wetland areas, or between wetland areas and nesting areas, should be 36 inches or greater in diameter, and elliptical or flat-bottomed.	Road placement should avoid separating wetlands from adjacent upland nesting sites, or these roads should be fenced to prevent turtles from attempting to cross them (contact your DNR Nongame Specialist for details).
Wetland crossings should be bridged, or include raised roadways with culverts which are 36 in or greater in diameter and flat-bottomed or elliptical (raised roadways discourage turtles from leaving the wetland to bask on roads).	Road placement should avoid bisecting wetlands, or these roads should be fenced to prevent turtles from attempting to cross them (contact your DNR Nongame Specialist for details). This is especially important for roads with more than 2 lanes.
Culverts under roads crossing streams should be oversized (at least twice as wide as the normal width of open water) and flat-bottomed or elliptical.	Roads crossing streams should be bridged.
UTILITIES	
Utility access and maintenance roads should be kept to a minimum (this reduces road-kill potential).	
Because trenches can trap turtles, trenches should be checked for turtles prior to being backfilled and the sites should be returned to original grade.	
LANDSCAPING AND VEGETATION MANAGEMENT	
Terrain should be left with as much natural contour as possible.	As much natural landscape as possible should be preserved (installation of sod or wood chips, paving, and planting of trees within nesting habitat can make that habitat unusable to nesting Blanding's turtles).
Graded areas should be revegetated with native grasses and forbs (some non-natives form dense patches through which it is difficult for turtles to travel).	Open space should include some areas at higher elevations for nesting. These areas should be retained in native vegetation, and should be connected to wetlands by a wide corridor of native vegetation.
Vegetation management in infrequently mowed areas -- such as in ditches, along utility access roads, and under power lines -- should be done mechanically (chemicals should not be used). Work should occur fall through spring (after October 1st and before June 1st).	Ditches and utility access roads should not be mowed or managed through use of chemicals. If vegetation management is required, it should be done mechanically, as infrequently as possible, and fall through spring (mowing can kill turtles present during mowing, and makes it easier for predators to locate turtles crossing roads).

Protecting Blanding's Turtle Nests: Most predation on turtle nests occurs within 48 hours after the eggs are laid. After this time, the scent is gone from the nest and it is more difficult for predators to locate the nest. Nests more than a week old probably do not need additional protection, unless they are in a particularly vulnerable spot, such as a yard where pets may disturb the nest. Turtle nests can be protected from predators and other disturbance by covering them with a piece of wire fencing (such as chicken wire), secured to the ground with stakes or rocks. The piece of fencing should measure at least 2 ft. x 2 ft., and should be of medium sized mesh (openings should be about 2 in. x 2 in.). It is ***very important*** that the fencing be **removed <u>before August 1st</u>** so the young turtles can escape from the nest when they hatch!

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Oldfield, B., and J. J. Moriarty. 1994. Amphibians and Reptiles Native to Minnesota. University of Minnesota Press, Minneapolis, 237 pp.

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CAUTION

BLANDING'S TURTLES

MAY BE ENCOUNTERED
IN THIS AREA

The unique and rare Blanding's turtle has been found in this area. Blanding's turtles are state-listed as Threatened and are protected under Minnesota Statute 84.095, Protection of Threatened and Endangered Species. Please be careful of turtles on roads and in construction sites. For additional information on turtles, or to report a Blanding's turtle sighting, contact the DNR Nongame Specialist nearest you: Bemidji (218-308-2641); Grand Rapids (218-327-4518); New Ulm (507-359-6033); Rochester (507-206-2820); or St. Paul (651-259-5772).

DESCRIPTION: The Blanding's turtle is a medium to large turtle (5 to 10 inches) with a black or dark blue, dome-shaped shell with muted yellow spots and bars. The bottom of the shell is hinged across the front third, enabling the turtle to pull the front edge of the lower shell firmly against the top shell to provide additional protection when threatened. The head, legs, and tail are dark brown or blue-gray with small dots of light brown or yellow. A distinctive field mark is the bright yellow chin and neck.

BLANDING'S TURTLES DO NOT MAKE GOOD PETS
IT IS ILLEGAL TO KEEP THIS THREATENED SPECIES IN CAPTIVITY

SUMMARY OF RECOMMENDATIONS FOR AVOIDING AND MINIMIZING IMPACTS TO BLANDING'S TURTLE POPULATIONS

(see Blanding's Turtle Fact Sheet for full recommendations)

- This flyer should be given to all contractors working in the area. Homeowners should also be informed of the presence of Blanding's turtles in the area.
- Turtles that are in imminent danger should be moved, by hand, out of harm's way. Turtles that are not in imminent danger should be left undisturbed to continue their travel among wetlands and/or nest sites.
- If a Blanding's turtle nests in your yard, do not disturb the nest and do not allow pets near the nest.
- Silt fencing should be set up to keep turtles out of construction areas. It is critical that silt fencing be removed after the area has been revegetated.
- Small, vegetated temporary wetlands should not be dredged, deepened, or filled.
- All wetlands should be protected from pollution; use of fertilizers and pesticides should be avoided, and run-off from lawns and streets should be controlled. Erosion should be prevented to keep sediment from reaching wetlands and lakes.
- Roads should be kept to minimum standards on widths and lanes.
- Roads should be ditched, not curbed or below grade. If curbs must be used, 4" high curbs at a 3:1 slope are preferred.
- Culverts under roads crossing wetland areas, between wetland areas, or between wetland and nesting areas should be at least 36 in. diameter and flat-bottomed or elliptical.
- Culverts under roads crossing streams should be oversized (at least twice as wide as the normal width of open water) and flat-bottomed or elliptical.
- Utility access and maintenance roads should be kept to a minimum.
- Because trenches can trap turtles, trenches should be checked for turtles prior to being backfilled and the sites should be returned to original grade.
- Terrain should be left with as much natural contour as possible.
- Graded areas should be revegetated with native grasses and forbs.
- Vegetation management in infrequently mowed areas -- such as in ditches, along utility access roads, and under power lines -- should be done mechanically (chemicals should not be used). Work should occur fall through spring (after October 1st and before June 1st).

Wildlife Friendly Erosion Control

Wildlife entanglement in, and death from, plastic netting and other man-made plastic materials has been documented in birds (Johnson, 1990; Fuller-Perrine and Tobin, 1993), fish (Johnson, 1990), mammals (Derraik, 2002), and reptiles (Barton and Kinkead, 2005; Kapfer and Paloski, 2011). Yet the use of these materials continues in many cases, without consideration for wildlife impacts. Plastic netting is frequently used for erosion control during construction and landscape projects and can negatively impact terrestrial and aquatic wildlife populations as well as snag in maintenance machinery resulting in costly repairs and delays. However, wildlife friendly erosion control materials do exist, and are sold by several large erosion control material companies. Below are a few key considerations before starting a project.

Know Your Options

- Remember to consult with local natural resource authorities (DNR, USFWS, etc.) before starting a project. They can help you identify sensitive areas and rare species.
- When erosion control is necessary, select products with biodegradable netting (natural fiber, biodegradable polyesters, etc.).
- DO NOT use products that require UV-light to biodegrade (also called, "photodegradable"). These do not biodegrade properly when shaded by vegetation.
- Use netting with rectangular shaped mesh (not square mesh).
- Use netting with flexible (non-welded) mesh.

Woven 100% natural fiber erosion control materials being utilized along a central Minnesota stream. ©MN DNR, Nick Proulx

Fish trapped and killed by welded-plastic square erosion control mesh improperly placed along a small central Minnesota stream. Photo courtesy of Ben Lowe.

Know the Landscape

- It is especially important to use wildlife friendly erosion control around:
  - Areas with threatened or endangered species.
  - Wetlands, rivers, lakes, and other watercourses.
  - Habitat transition zones (prairie – woodland edges, rocky outcrop – woodland edges, steep rocky slopes, etc.).
  - Areas with threatened or endangered species.
- Use erosion mesh wisely, not all areas with disturbed ground necessitate its use. Do not use plastic mesh unless it is specifically required. Other erosion control options exist (open weave textile (OWT), rolled erosion control products (RECPs) with woven natural fiber netting).

Protect Wildlife

- Avoid photodegradable erosion control materials where possible.
- Use only biodegradable materials (typically made from natural fibers), preferably those that will biodegrade under a variety of conditions.
- Wildlife friendly erosion control material costs are often similar to conventional plastic netting.

Plains Gartersnake trapped and killed by welded-plastic square erosion control mesh placed along a newly installed cement culvert in southern Minnesota. ©MN DNR, Carol Hall

A small vole that was strangled and killed by plastic erosion control material with welded and square mesh. Photo taken in southern Minnesota and provided courtesy of Tom Jessen.

Literature Referenced

Barton, C. and K. Kinkead. 2005. Do erosion control and snakes mesh? Soil and Water Conservation Society 60:33A-35A.

Derraik, J.G.B. 2002. The pollution of the marine environment by plastic debris: a aeview. Marine Pollution Bulletin 44:842-852.

Fuller-Perrine, L.D., and M.E. Tobin. 1993. A method for applying and removing bird-exclusion netting in commercial vineyards. Wildlife Society Bulletin 21:47-51.

Johnson, S.W. 1990. Distribution, abundance, and source of entanglement debris and other plastics on Alaskan beaches, 1982-1988. Proceedings of the Second International Conference on Marine Debris 331-348.

Kapfer, J. M., and R. A. Paloski. 2011. On the threat to snakes of mesh deployed for erosion control and wildlife exclusion. Herpetological Conservation and Biology 6:1-9.

Appendix F

State Historic Preservation Office Response

The Royal Golf Club Residential Development EAW

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From: Thomas Cinadr [mailto:thomas.cinadr@mnhs.org]
Sent: Tuesday, July 19, 2016 2:09 PM
To: Andrew Krinke <Andrew@kjolhaugenv.com>
Subject: Re: The Royal Golf Club at Lake Elmo SHPO Request

THIS EMAIL IS NOT A PROJECT CLEARANCE.

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 historic structures were identified in a search of the Minnesota Archaeological Inventory and Historic Structures Inventory for the search area requested. **A report containing the archaeological sites 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.

Properties that are listed in the National Register of Historic Places (NRHP) or have been determined eligible for listing in the NRHP are indicated on the reports you have received. The following codes on the reports you received are:

NR – National Register listed. The properties may be individually listed or may be within the boundaries of a National Register District.

CEF – Certified Eligible to the National Register findings are usually made during the federal review process, these properties have been evaluated as being eligible for listing in the National Register.

SEF – Staff eligible findings to the National Register are properties that have been determined eligible by SHPO staff.
DOE – Determination of Eligibility is made by the National Park Service and typically refers to properties deemed eligible but the owner objects to the listing.

CNEF – Certified Not Eligible to the National Register. SHPO has begun to record properties that have been evaluated as **not eligible** for listing in the National Register. If the box on the form has a check the property has been determined to be **not eligible.**

Properties without **NR, CEF, SEF, DOE, or CNEF** designations in the reports you received may not have been evaluated and therefore no assumption to their eligibility can be made.

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 can be found at http://www.mnhs.org/shpo/survey/inventories.htm
SHPO research hours are 8:30 AM – 4:00 PM Tuesday-Friday.

The Office is closed on Mondays.

Tom Cinadr
Survey and Information Management Coordinator
Minnesota Historic Preservation Office
Minnesota Historical Society
345 Kellogg Blvd. West
St. Paul, MN 55102

651-259-3453

On Tue, Jul 19, 2016 at 1:53 PM, Andrew Krinke <Andrew@kjolhaugenv.com> wrote:

Tom,

We are requesting a historical property information/database search for a 475.20-acre site located in Section 25, T29N, R21W, and Section 30, T29N, R20W, City of Lake Elmo, Washington County, Minnesota. The Lat/Long coordinates of the site are 44.971280, -92.872716.

We are requesting this search because The Royal Golf Club at Lake Elmo is proposed on this property. The project area includes an existing 27-hole golf course, woodlands, wetlands, and water bodies. The project will rehabilitate an 18-hole golf course on about 221.11 acres and convert about 202.55 acres of golf course and woodland to single-family residential development consisting of about 300 single-family lots. Grading for the residential development is expected to disturb about 183.6 acres.

Attached please find a USGS topography site location map and a shapefile to support this request. I would appreciate your prompt attention to this review.

Thank you,

Andrew Krinke
Kjolhaug Environmental Services Company
26105 Wild Rose Lane
Shorewood, MN 55331
Office: 952-401-8757
Cell: 612-704-6743
Andrew@kjolhaugenv.com

Archaeological Site Locations

Site Number DOE	Site Name	Twp.	Range	Sec.	Quarter Sections	Acres	Phase	Site Description	Tradition	Context	Reports	NR	CEF
County: Washington													
21WAo	Horseshoe Lake	29	21	25	SE	0		AS					

Tuesday, July 19, 2016

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Appendix G
Traffic Impact Study

The Royal Golf Club Residential Development EAW

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Spack CONSULTING
THE TRAFFIC STUDY COMPANY

Traffic Impact Study

Tartan Park Redevelopment
Lake Elmo, MN

I hereby certify that this report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

By: _____
Bryant J. Ficek, P.E., P.T.O.E.
License No. 42802

Date: October 12, 2016

Executive Summary

Background:
The existing Tartan Park Golf Course and Conference Center was recently purchased and proposed for redevelopment. The redevelopment includes construction of a new 18-hole golf course, as well as a residential development consisting of three separate zones. The residential and golf course addition is expected to include an 18-hole golf course as well as 293 development lots for single family homes.

The redevelopment site is encompassed by County State-Aid Highway 17 (CSAH 17), also known as Lake Elmo Avenue North, County State-Aid Highway 10 (CSAH 10), Minnesota State-Aid Street 107 (MSAS 107), also known as 20th Street North, Minnesota State-Aid Street 115 (MSAS 115), also known as Manning Trail North, and County State-Aid Highway 15 (CSAH 15), also known as Manning Avenue North.

Results:
The traffic impacts of the proposed development on the study intersections were analyzed under the 2030 build-out conditions. All study intersections are forecast to operate acceptably overall through the 2030 Build scenarios. Although individual movements at one study intersection falls to LOS E or F, mitigating circumstances include:

- Reasonable queuing with low expected volume and no impact to adjacent intersections.
- Represents only one or two hours of the day with off-times expected to have satisfactory operations.

Recommendations:
Based on the conclusion and results of the analysis for this report, the following is recommended:

- Strengthening and expanding the shoulder at intersections along 20th Street N creating right turn treatments for eastbound traffic.
- Set aside sufficient right-of-way to expand to a standard turn lane if and when additional development and future traffic growths occurs.
- Pursue conversations with the City of Lake Elmo to expand the proposed internal pedestrian and bicycle trails to the future external trail system creating a larger more connected sidewalk/trail system as mentioned in the comprehensive plan.
- Bicycle parking near the front door of the club house and parking lots to further improve mobility choices and potentially reduce the number of vehicles generated.

There are no traffic concerns caused by the traffic generated by the Tartan Park Redevelopment.

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1. Introduction

a. Purpose of Study

The existing Tartan Park Golf Course and Conference Center is proposed for redevelopment. The redevelopment plan includes construction of a new 18-hole golf course, as well as a residential development consisting of three separate zones. The residential addition is expected to consist of 293 development lots for single family homes.

The redevelopment site is encompassed by County State-Aid Highway 17 (CSAH 17), also known as Lake Elmo Avenue North, County State-Aid Highway 10 (CSAH 10), Minnesota State-Aid Street 107 (MSAS 107), also known as 20th Street North, Minnesota State-Aid Street 115 (MSAS 115), also known as Manning Trail North, and County State-Aid Highway 15 (CSAH 15), also known as Manning Avenue North.

The purpose of this study is to determine the traffic impacts associated with the build out of the redeveloped Tartan Park golf course and residential parcels.

b. Study Objectives

The objectives of this study are:

i. Document how the study intersections currently operate.
ii. Forecast the amount of traffic expected to be generated by the proposed development.
iii. Determine how the study intersections will operate in the year 2030 without development traffic.
iv. Determine how the study intersections will operate in the year 2030 with the proposed development.
v. Recommend improvements, if needed.

For the purposes of this traffic study, the study intersections are:

i. Lake Elmo Avenue N/20th Street N.
ii. 20th Street N/20th Street Court N.
iii. 20th Street N/East Golf Course Access.
iv. 20th Street N/Manning Trail N.
v. Lake Elmo Avenue N/Park Access.
vi. Manning Trail N/Manning Avenue N.
vii. 20th Street N/Proposed Western Access.
viii. Manning Trail N/Proposed Access.
ix. CSAH 10/Proposed Access

This traffic impact study is based upon a concept development plan dated September 14, 2016. As long as the general characteristics of the proposed development remain approximately the same as documented here, minor changes in the final design are not expected to alter the results or recommendations of this study.

2. Proposed Redevelopment

The redevelopment site is encompassed by Lake Elmo Avenue N, CSAH 10, 20th Street N, Manning Trail N, and Manning Avenue N (see Figure 1 in the Appendix). There are three existing full accesses to the site, including:

- One access on Lake Elmo Avenue N.
- Two accesses on 20th Street N.

The proposed redevelopment is planned to include a new 18-hole golf course and 293 development lots for single family homes. The proposed development uses the existing accesses with the addition of three additional accesses for a total of six access roads. The existing driveway to the golf course parking will remain as will the access to Lake Elmo Avenue N and 20th Street N. An additional full access onto 20th Street N will line up with the 20th Street N/20th Street Court N intersection. Two new accesses will be provided onto Manning Trail N and onto CSAH 10.

There is another potential access onto Manning Trail N for the proposed residential component. This future access will depend upon development of the adjacent property and is not included in this traffic analysis. Figure 2 in the Appendix shows a concept plan for this proposed development, including the potential future access.

It should be noted that the proposed site driveways do not provide access to the entire development as each access only services a portion of the overall site. This results in traffic that does not mix within the site, and depending on where the driver's origin and destination, will determine which access to use.

3. Analysis of Existing Conditions

a. Roadway Network Characteristics

Lake Elmo Avenue N is a two-lane roadway running along Lake Elmo. Lake Elmo Avenue N provides access to CSAH 10 to the south and to County State-Aid Highway 14 (CSAH 14) to the north. The posted speed limit along the corridor is 45 mph.

20th Street N is a two-lane, east west corridor, providing access between Lake Elmo Avenue N and Manning Trail N. The posted speed limit is 45 mph.

Manning Trail N is located to the east of the redevelopment site and provides local access to Manning Avenue N and 20th Street N only. A two-lane undivided road for its length, Manning Trail N has a posted speed limit of 45 mph.

Manning Avenue N is a two-lane roadway and expands to a divided four-lane roadway just north of interstate 94 with turn lanes provided at intersections. Manning Avenue N provides access to CSAH 10 and Interstate 94 to the south and CSAH 14 to the north. The posted speed limit is 50 mph. Manning Avenue N is currently under construction to expand to a four-lane roadway throughout with turn lanes provided at intersections.

All existing Tartan Park site access intersections operate as side-street stop controlled intersections with the traffic exiting the site encountering the stop condition. Figure 3 in the Appendix shows the study intersection's lane configurations. The outbound lanes all provide one exit lane for all movements. However, the eastern access onto 20th Street N does have sufficient width for a left turning vehicle to be adjacent to a right turning vehicle, completing their turns at the same time.

b. Alternative Forms of Transportation

There are currently no sidewalks and/or trails provided on any roadway within the study area.

The closest transit service is available along CSAH 14 in the downtown Lake Elmo area. Service is provided to Saint Paul and Stillwater by Metro Transit through one route operating with eight buses daily.

c. Traffic Volumes

Intersection video was collected at each study intersection under normal weekday conditions in July 2016 when there was clear weather. Using these videos, 48-hour turning movement counts were collected at the study intersections on the two separate days and averaged to create accurate 24-hour

turning movement counts. The peak hour periods were modeled together to portray the worst possible case scenario for the study intersections.

From these counts, the weekday peak hours were found to be:

- Lake Elmo Avenue N/20th Street N: 7:15 to 8:15 AM and 4:30 to 5:30 PM.
- 20th Street N/20th Street Court N: 7:15 to 8:15 AM and 5:00 to 6:00 PM.
- 20th Street N/East Golf Course Access: 7:15 to 8:15 AM and 5:15 to 6:15 PM.
- 20th Street N/Manning Trail N: 7:00 to 8:00 AM and 5:00 to 6:00 PM.
- Lake Elmo Avenue N/Park Access: 7:45 to 8:45 AM and 4:30 to 5:30 PM.
- Manning Trail N/Manning Avenue N: 7:30 to 8:30 AM and 4:30 to 5:30 PM.

It should be noted that the existing golf course was not in operation at the time of this count. The turning movement count data from the counts are contained in fifteen minute intervals in the Appendix. These counts include pedestrian and bicycle counts.

d. Level of Service

An intersection capacity analysis was conducted for the existing intersections per the *Highway Capacity Manual, 2010*. Intersections are assigned a "Level of Service" letter grade for the peak hour of traffic based on the number of lanes at the intersection, traffic volumes, and traffic control. Level of Service A (LOS A) represents light traffic flow (free flow conditions) while LOS F represents heavy traffic flow (over capacity conditions). LOS D at intersections is typically considered acceptable by most government agencies. Individual movements are also assigned LOS grades. At busy intersections, one or more individual movements may operate at LOS F when the overall intersection is operating acceptably. This situation commonly occurs at side-street stop controlled intersections during the peak periods. The pictures on the right represent some of the LOS grades (from a signal controlled intersection in San Jose, CA). These LOS grades represent the overall intersection operation, not individual movements.

Source: City of San Jose, CA

The LOS results for the AM and PM Peak existing study hours are shown in Table 1 and based on the existing traffic control and lane configurations shown in Figure 3 in the Appendix. The existing turning movement volumes from the Appendix were used. The LOS calculations were completed with the VISTRO™ software package, which uses the methodology detailed in the *Highway Capacity Manual*

2010. The full LOS calculations, including grades for individual movements, are provided in the Appendix.

Table 1 – Existing Peak Hour Level of Service (LOS)[1]

Intersection	AM Peak	PM Peak
Lake Elmo Avenue N/20th Street N	A (a)	A (a)
20th Street N/20th Street Court N	A (a)	A (a)
20th Street N/East Golf Course Access	A (a)	A (a)
20th Street N/Manning Trail N	A (a)	A (a)
Lake Elmo Avenue N/Park Access	A (a)	A (a)
Manning Trail N/Manning Avenue N[2]	A (c)	A (d)

[1] The first letter is the Level of Service for the intersection. The second letter (in parentheses) is the Level of Service for the worst operating movement.

[2] Assumes the existing two lanes on Manning Avenue, not the soon to be constructed four-lane section.

As shown in Table 1, all study intersections currently operate acceptably at LOS A or better with all movements at LOS D or better. Existing 95th percentile queue lengths do not extend to any adjacent study intersections or result in excessive queuing. These results matched our observations of operations in the area. In general, traffic operations are good to very good today.

4. Projected Traffic

a. Site Traffic Forecasting

A trip generation analysis was performed for the development site based on the methods and rates published in the *Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition*. The complete development analyzed included an 18-hole golf course with 293 single family home land parcels. Based on this layout, the resulting new traffic associated with the proposed development is expected to be:

- 1,717 vehicles entering and 1,717 vehicles exiting the development per day (total daily trip generation of 3,434 vehicles).
- 55 vehicles entering and 165 vehicles exiting the development in the AM peak hour.
- 212 vehicles entering and 134 vehicles exiting the development during the PM peak hour.

Data collected locally and compiled by Spack Consulting suggests slightly lower trip generation rates for residential land uses. However, to present a more conservative estimate, ITE trip generation rates were used.

The full trip generation tables for each scenario can be seen in the Appendix, which includes sub-dividing the expected traffic between the Golf Course and the Residential component of the proposed development.

A trip distribution pattern was then developed for the generated traffic going to and from the site. This pattern is based on existing traffic counts as well as taking into account site access and access to the regional transportation system. The trip distribution pattern for this study is:

- 33 percent of the generated traffic to/from the north on Lake Elmo Avenue N and Manning Avenue N.
- 40 percent of the generated traffic to/from the south using Lake Elmo Avenue N and Manning Avenue N.
- 12 percent of the generated traffic to/from the east using CSAH 10.
- 15 percent of the generated traffic to/from the west using CSAH 10.

Traffic generated by the site development was assigned to the study roadways per this distribution pattern.

b. Non-site Traffic Forecasting

To account for non-specific development in the area, a background growth rate was determined based on Washington County's *Manning Avenue (CSAH 15) Corridor Management and Safety Improvement Project* and the City of Lake Elmo's 2030 Comprehensive Transportation Plan. Using the existing AADTs for surrounding roadways in the project area (as provided in each study), and comparing them to the expected forecasted 2030 AADTs within the Comprehensive plan, the following growth rates were determined:

- Five percent to through movements on Lake Elmo Avenue N
- Three and a half percent to through movements on 20th Street N
- Three and a half percent to through movements on Manning Avenue N

This background volume was added to the existing traffic to establish the 2030 No Build Scenario volumes. The resultant 2030 No Build peak hour forecasts are shown in the Appendix under the capacity analysis section for each scenario.

c. Total Traffic

Traffic forecasts were developed for the 2030 Build Scenarios by adding the traffic generated by the proposed development to the corresponding No-Build volumes. The resultant 2030 Build peak hour forecasts are shown in the Appendix under the capacity analysis section for each scenario.

5. Analysis of Future Conditions

a. *Level of Service Analysis*

The forecasted turning movement volumes for the 2030 peak hour scenario were used to re-analyze the study intersections for the Tartan Park Redevelopment. As before, the LOS calculations were done in accordance with the 2010 *Highway Capacity Manual* using VISTRO™ software. The No-Build and Build results are based on the existing traffic control and lane configurations at the study intersections with the exception of the Manning Avenue N/Manning Trail N intersection. This intersection and the Manning Avenue N corridor are currently under construction. This study intersection will have a northbound left turn lane and southbound right turn lane soon. This new lane configuration is used in place of the existing layout for the No-Build and Build scenarios.

A future construction project will further expand Manning Avenue N to a four-lane section. However, the funding and schedule for that work is unknown today and is not analyzed in this report.

A summary of the LOS results for the 2030 study hours is shown in Table 2. The complete LOS calculations, which include queue lengths and grades for all individual movements, are included in the Appendix.

Table 2 – 2030 Level of Service (LOS)[1]

Intersection	AM Peak		PM Peak	
	No-Build	Build	No-Build	Build
Lake Elmo Avenue N/20th Street N	A (a)	A (b)	A (b)	A (b)
20th Street N/20th Street Court N	A (a)	A (a)	A (a)	A (b)
20th Street N/East Golf Course Access	A (a)	A (a)	A (a)	A (b)
20th Street N/Manning Trail N	A (a)	A (a)	A (a)	A (b)
Lake Elmo Avenue N/Park Access	A (a)	A (b)	A (b)	A (b)
Manning Trail N/Manning Avenue N	A (e)	A (e)	A (f)	A (f)
20th Street N/Proposed Western Access	N/A	A (a)	N/A	A (a)
Manning Trail N/Proposed Access	N/A	A (a)	N/A	A (a)
CSAH 10/Proposed Site Access	N/A	A (c)	N/A	A (c)

[1] The first letter is the Level of Service for the intersection. The second letter (in parentheses) is the Level of Service for the worst operating movement.

As shown in Table 2, all study intersections are forecast to operate acceptably overall at LOS A or better in the 2030 Build scenarios. The overall operations for the 2030 Build scenarios are expected to be relatively similar to the existing conditions. Vehicle queues at each study intersection are also reasonable and do not extend to other adjacent intersections.

Some individual movements are expected to operate at LOS E or F during peak hours of operation. In particular, the southeast-bound left from Manning Trail N onto Manning Avenue N during the PM peak hour is expected to be less than

ideal in terms of LOS. However, due to the low expected volume completing this movement and a 95th Percentile Queue length of less than one vehicle, it is not a significant concern and is expected at a side-street stop controlled intersection with a higher volume mainline. Other hours of the day will have better operations.

Based upon these results and other consideration, there are no traffic concerns caused by the traffic generated by the Tartan Park Redevelopment on the study intersections. However, after checking the Minnesota Department of Transportation (MnDOT) Access Management Manual and checking the turn treatment warrants, which can be seen in the attached Traffic Memorandum in the Appendix, the addition of right-turn treatments along 20th Street N, in the form of a strengthened shoulder is recommended. A strengthened shoulder is preferred over full turn lanes due to the low volume of right turning traffic expected to use the accesses on 20th Street N. With a maximum peak hour right turn volume of 54 vehicles there is little concern of queuing caused by these vehicles, and a full right turn lane with taper would be unnecessary. In addition, sufficient right-of-way can be set aside to expand to a standard turn lane if and when additional development and future traffic growth occurs.

Two additional intersection, which are outside of our study area, but worth discussing are the intersections of CSAH 10/Lake Elmo Avenue and the northern intersection of Manning Avenue N/Manning Trail N.

Manning Avenue N/Manning Trail N is currently operating as a two-way stop controlled intersection, with traffic traveling along Manning Trail N experiencing the stop. Using turning movement counts collected for the Manning Avenue Corridor Study, the northern intersection of Manning Avenue N/Manning Trail N is currently operating with an overall intersection LOS A with the worst movement at a LOS D in the PM Peak hour. The 2030 No-Build scenario is expected to remain with an overall LOS A with the worst movement at a LOS F, while the 2030 Build scenario slightly worsens from the No-Build scenario but remains an overall LOS A with a worst movement LOS F. These added delays are not solely due to the Tartan Park Development, which is shown between the similar delays and LOS results of the No-Build and Build scenarios, but are also due to the extended 2030 forecast year and the corresponding background growth in vehicle traffic. The results support the findings of the *Manning Avenue (CSAH 15) Corridor Management and Safety Improvement Project*, which mention the need to expand Manning Avenue to a four-lane roadway with turn lanes for operation and safety improvements as well as the addition of right turn lanes for Manning Trail and 24th Street N.

Using the 2030 PM Peak hour volumes, the Traffic Signal Warrant threshold was checked. This threshold, when checked against the PM Peak hour volumes, gives a gauge of the signals need for an updated traffic signal. If the PM Peak hour volumes fall well above the Signal Warrants threshold the signal is more likely to be a candidate for a traffic signal and fulfill the Four-Hour and Eight-Hour

Traffic Warrants, and a full warrant analysis with daily turning movement counts should be checked. However, the Manning Avenue and Manning Trail intersection's PM Peak hour turning movement volumes do not meet these thresholds, which suggest a traffic signal is not warranted at this location.

The CSAH 10/Lake Elmo Avenue intersection currently operates as an all way stop intersection with combined thru/lets and exclusive right turn lanes at all approaches. Currently, each approach is experiencing the following ADTs:

- Eastbound CSAH 10 – 6,600 vehicles per day.
- Westbound CSAH 10 – 4,000 vehicles per day.
- Northbound Lake Elmo Avenue – 3,300 vehicles per day.
- Southbound Lake Elmo Avenue – 4,200 vehicles per day.

With the addition of the proposed development an additional 33 trips eastbound, 22 trips westbound, 16 trips northbound, and 27 trips southbound are expected to be added to the intersection during the PM Peak period. With a combined total of only 98 additional vehicles, minimal impact is expected at the all-way stop intersection at CSAH 10/Lake Elmo Avenue due to the proposed Tartan Park Redevelopment and no additional traffic control mitigation is necessary.

b. Alternate Forms of Transportation

In order to reduce the amount of vehicle traffic, alternative forms of transportation, such as walking, biking and transit, for accessing the site should be encouraged. Having access to other modes of travel is often seen as an amenity and a general benefit to a site. When provided as part of an overall network of trails and/or public transit, the net effect is a reduction in traffic volumes and better overall traffic operations. It should be noted that no reduction in vehicular traffic was applied for the analysis of this report.

For this site, the existing bus and sidewalk/trail network are undeveloped with no bus routes or sidewalks/trails within the project area. The developer has proposed the addition of internal pedestrian and bicycle trails ranging from six feet to twelve feet wide and should work with the city to create plans for extending these trails through the local network when possible. By providing facilities to accommodate connections from outside sidewalk/trail networks, pedestrians and bicyclists would be safer. Safe and convenient travel attracts use of alternative modes of transportation and would reduce the amount of vehicle trips expected at this site.

Convenient and safe bicycle parking should also be provided on site. Ideally, bicycle parking would be provided in close proximity to the front doors of the golf course club house and by each parking lot to promote bicycle transit.

Any existing sidewalks or trails impacted by construction will need to be rebuilt with ADA-compliant tactile dome curb ramps to assist the visually impaired.

6. Conclusions and Recommendations

The traffic impacts of the proposed development on the study intersections were analyzed under the 2030 build-out condition of the proposed 293 single family home lot and 18-hole golf course development. All study intersections are forecast to operate acceptably overall through the 2030 Build scenarios.

Although an individual movement at one study intersection fall to LOS E and F, no major mitigation in intersection control is warranted due to operation at this time due to:

- Reasonable queuing with low expected volume and no impact to adjacent intersections.
- Represents only one or two hours of the day with off-times expected to have satisfactory operations.

However, after checking the MnDOT Access Management Manual and checking the turn treatment warrants, strengthening and expanding the shoulder at intersections along 20th Street N is recommended. Right-of-way should also be set aside to provide for full turn lanes in the future if actual traffic growth and future operations suggest their need. The full 20th Street N Turn Lane Evaluation can be found in the Appendix.

Additional coordination with the City of Lake Elmo should be pursued to help expand the proposed internal pedestrian and bicycle trail infrastructure to the local Lake Elmo network. According to the City of Lake Elmo Comprehensive Transportation plan there will be potential to connect the proposed internal trails to the future external pedestrian and bicycle trail network to help improve overall pedestrian and bicycle mobility through the city as more developments occur.

Bicycle parking is also recommended, and should ideally be located in close proximity to the main entrances of the park and golf course. Improved pedestrian and bicycle facilities will promote mobility choices and potentially reduce the number of vehicles generated.

7. Appendix

A. Figures 1-3

B. Traffic Counts

C. Trip Generation Table

D. 2030 Peak Hour Warrant

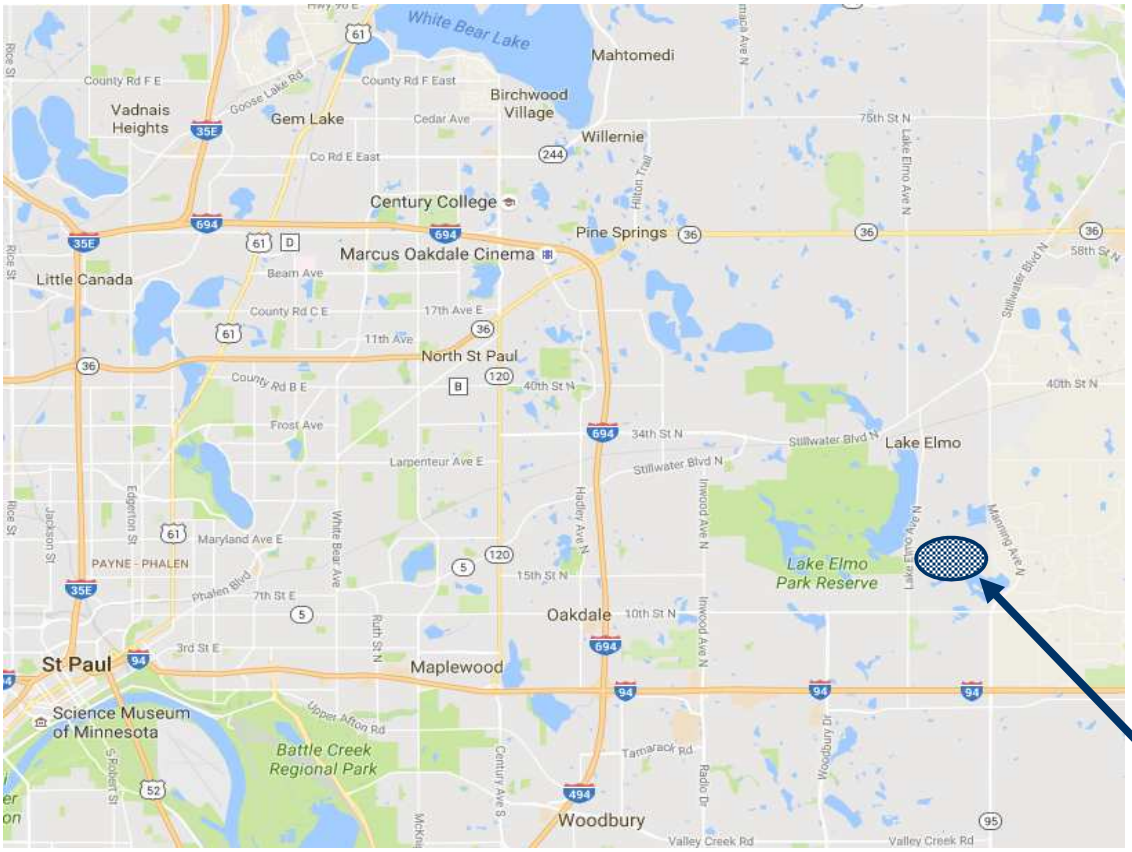
E. Capacity Analysis Backup

- AM Existing
- PM Existing
- AM 2030 No Build
- PM 2030 No Build
- AM 2030 Build
- PM 2030 Build

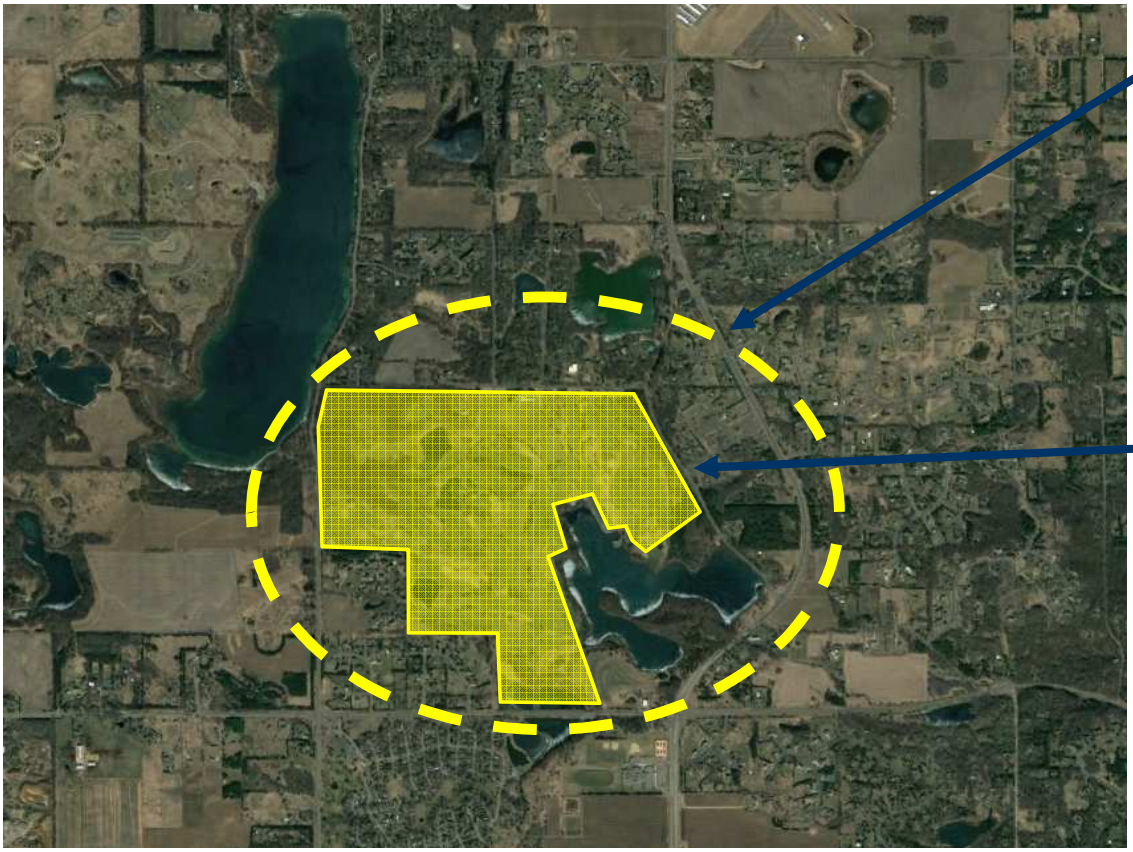
F. 20th Street N Turn Lane Evaluation

Figure 1
Location Maps

North
No Scale



Study Area



Proposed Site

Figure 2
Concept Plan

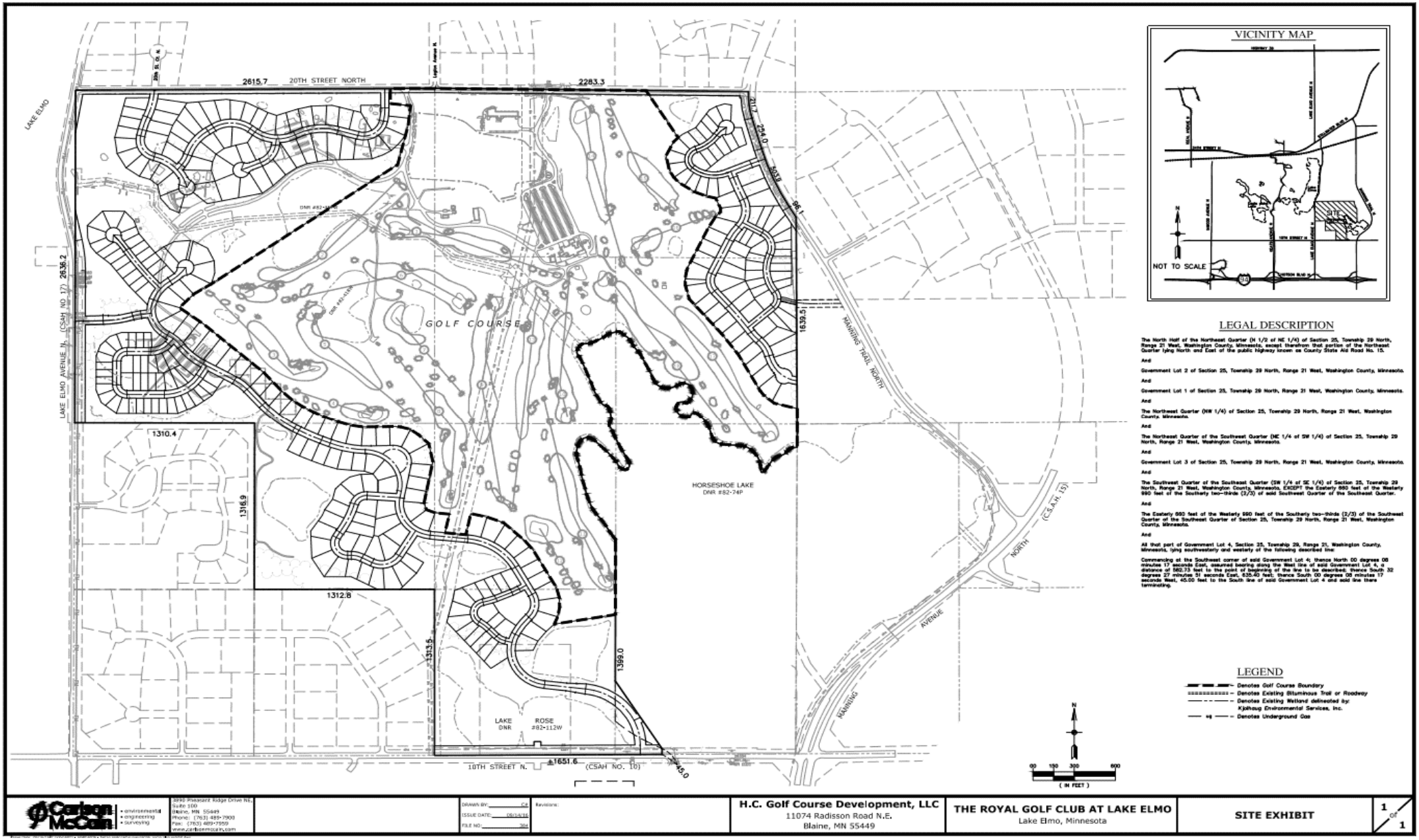
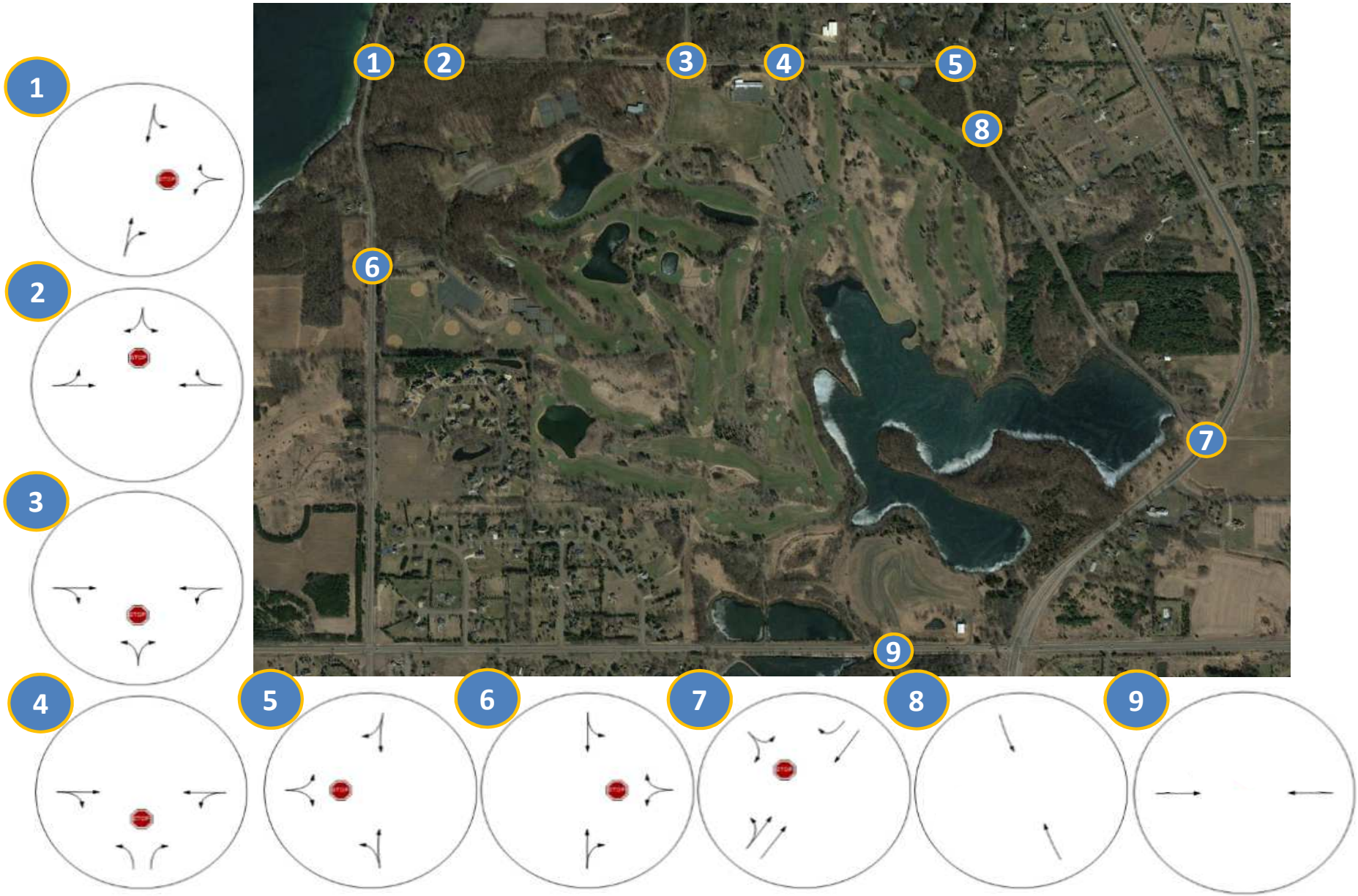


Figure 3
Existing Roadway Configuration



Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 1 - 20th St & Lake Elmo Ave, 7-20-16
Site Code :
Start Date : 7/20/2016
Page No : 1

Groups Printed- Cars + - Trucks

	Lake Elmo Avenue N Southbound						20th Street N Westbound						Lake Elmo Avenue N Northbound						Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
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04:30 AM	0	0	2	0	0	2	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	4
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Start Date : 7/20/2016
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Groups Printed- Cars + - Trucks

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Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
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04:15 PM	0	0	13	0	0	13	0	4	0	0	0	4	0	0	16	3	0	19	0	0	0	0	0	0	36
04:30 PM	0	1	27	0	2	30	0	2	0	0	1	3	0	0	17	5	0	22	0	0	0	0	0	0	55
04:45 PM	0	2	12	0	0	14	0	0	0	1	0	1	1	0	26	6	0	33	0	0	0	0	5	5	53
Total	0	5	69	0	2	76	0	11	0	2	1	14	1	0	85	20	0	106	0	0	0	0	5	5	201
05:00 PM	1	0	12	0	0	13	0	3	0	1	0	4	0	0	10	8	0	18	0	0	0	0	0	0	35
05:15 PM	0	1	15	0	1	17	0	3	0	0	0	3	0	0	13	4	0	17	0	0	0	0	0	0	37
05:30 PM	0	1	15	0	0	16	0	2	0	0	0	2	1	0	22	10	0	33	0	0	0	0	0	0	51
05:45 PM	0	4	14	0	0	18	0	8	0	1	0	9	0	0	13	6	0	19	0	0	0	0	0	0	46
Total	1	6	56	0	1	64	0	16	0	2	0	18	1	0	58	28	0	87	0	0	0	0	0	0	169
06:00 PM	0	1	11	0	0	12	0	6	0	1	0	7	0	0	17	5	0	22	0	0	0	0	0	0	41
06:15 PM	0	0	11	0	0	11	0	6	0	1	0	7	0	0	9	4	0	13	0	0	0	0	0	0	31
06:30 PM	0	2	6	0	0	8	0	1	0	2	0	3	0	0	13	9	0	22	0	0	0	0	0	0	33
06:45 PM	0	1	5	0	0	6	0	2	0	0	0	2	0	0	13	4	0	17	0	0	0	0	0	0	25
Total	0	4	33	0	0	37	0	15	0	4	0	19	0	0	52	22	0	74	0	0	0	0	0	0	130
07:00 PM	0	0	6	0	0	6	0	1	0	2	1	4	0	0	9	2	0	11	0	0	0	0	0	0	21
07:15 PM	0	3	5	0	0	8	0	2	0	0	0	2	0	0	12	3	0	15	0	0	0	0	1	1	26
07:30 PM	0	1	13	0	1	15	0	3	0	0	0	3	0	0	8	4	2	14	0	0	0	0	0	0	32
07:45 PM	0	0	9	0	0	9	0	2	0	1	0	3	0	0	9	3	0	12	0	0	0	0	0	0	24
Total	0	4	33	0	1	38	0	8	0	3	1	12	0	0	38	12	2	52	0	0	0	0	1	1	103
08:00 PM	0	1	8	0	0	9	0	1	0	0	0	1	0	0	14	2	0	16	0	0	0	0	0	0	26
08:15 PM	0	0	6	0	0	6	0	3	0	1	0	4	0	0	7	0	0	7	0	0	0	0	0	0	17
08:30 PM	0	2	4	0	0	6	0	2	0	1	0	3	0	0	9	4	0	13	0	0	0	0	0	0	22
08:45 PM	0	3	7	0	0	10	0	0	0	0	0	0	0	0	11	1	0	12	0	0	0	0	0	0	22
Total	0	6	25	0	0	31	0	6	0	2	0	8	0	0	41	7	0	48	0	0	0	0	0	0	87
09:00 PM	0	0	7	0	0	7	0	3	0	1	0	4	0	0	8	3	0	11	0	0	0	0	0	0	22
09:15 PM	0	0	8	0	0	8	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	11
09:30 PM	0	0	5	0	0	5	0	1	0	0	0	1	0	0	5	1	0	6	0	0	0	0	0	0	12
09:45 PM	0	2	6	0	0	8	0	0	0	2	0	2	0	0	2	1	0	3	0	0	0	0	0	0	13
Total	0	2	26	0	0	28	0	4	0	3	0	7	0	0	18	5	0	23	0	0	0	0	0	0	58
10:00 PM	0	0	2	0	0	2	0	1	0	0	0	1	0	0	4	0	0	4	0	0	0	0	0	0	7
10:15 PM	0	0	8	0	0	8	0	2	0	0	0	2	0	0	2	0	0	2	0	0	0	0	0	0	12
10:30 PM	0	0	4	0	0	4	0	1	0	1	0	2	0	0	3	1	0	4	0	0	0	0	0	0	10
10:45 PM	0	1	3	0	0	4	0	0	0	0	0	0	0	0	1	2	0	3	0	0	0	0	0	0	7
Total	0	1	17	0	0	18	0	4	0	1	0	5	0	0	10	3	0	13	0	0	0	0	0	0	36
11:00 PM	0	0	4	0	0	4	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	7
11:15 PM	0	0	2	0	0	2	0	0	0	0	0	0	0	0	3	1	0	4	0	0	0	0	0	0	6
11:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	2
11:45 PM	0	0	1	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	0	7	0	0	7	0	0	0	1	0	1	0	0	6	3	0	9	0	0	0	0	0	0	17

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 1 - 20th St & Lake Elmo Ave, 7-20-16
Site Code :
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Groups Printed- Cars + - Trucks

	Lake Elmo Avenue N Southbound						20th Street N Westbound						Lake Elmo Avenue N Northbound						Eastbound						
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Grand Total	1	67	681	0	18	767	0	215	0	67	6	288	2	0	690	235	6	933	0	0	0	0	20	20	2008
Apprch %	0.1	8.7	88.8	0	2.3		0	74.7	0	23.3	2.1		0.2	0	74	25.2	0.6		0	0	0	0	100		
Total %	0	3.3	33.9	0	0.9	38.2	0	10.7	0	3.3	0.3	14.3	0.1	0	34.4	11.7	0.3	46.5	0	0	0	0	1	1	
Cars +	1	63	652	0	5	721	0	203	0	61	1	265	2	0	661	219	0	882	0	0	0	0	12	12	1880
% Cars +	100	94	95.7	0	27.8	94	0	94.4	0	91	16.7	92	100	0	95.8	93.2	0	94.5	0	0	0	0	60	60	93.6
Trucks	0	4	29	0	13	46	0	12	0	6	5	23	0	0	29	16	6	51	0	0	0	0	8	8	128
% Trucks	0	6	4.3	0	72.2	6	0	5.6	0	9	83.3	8	0	0	4.2	6.8	100	5.5	0	0	0	0	40	40	6.4

Traffic Data Inc

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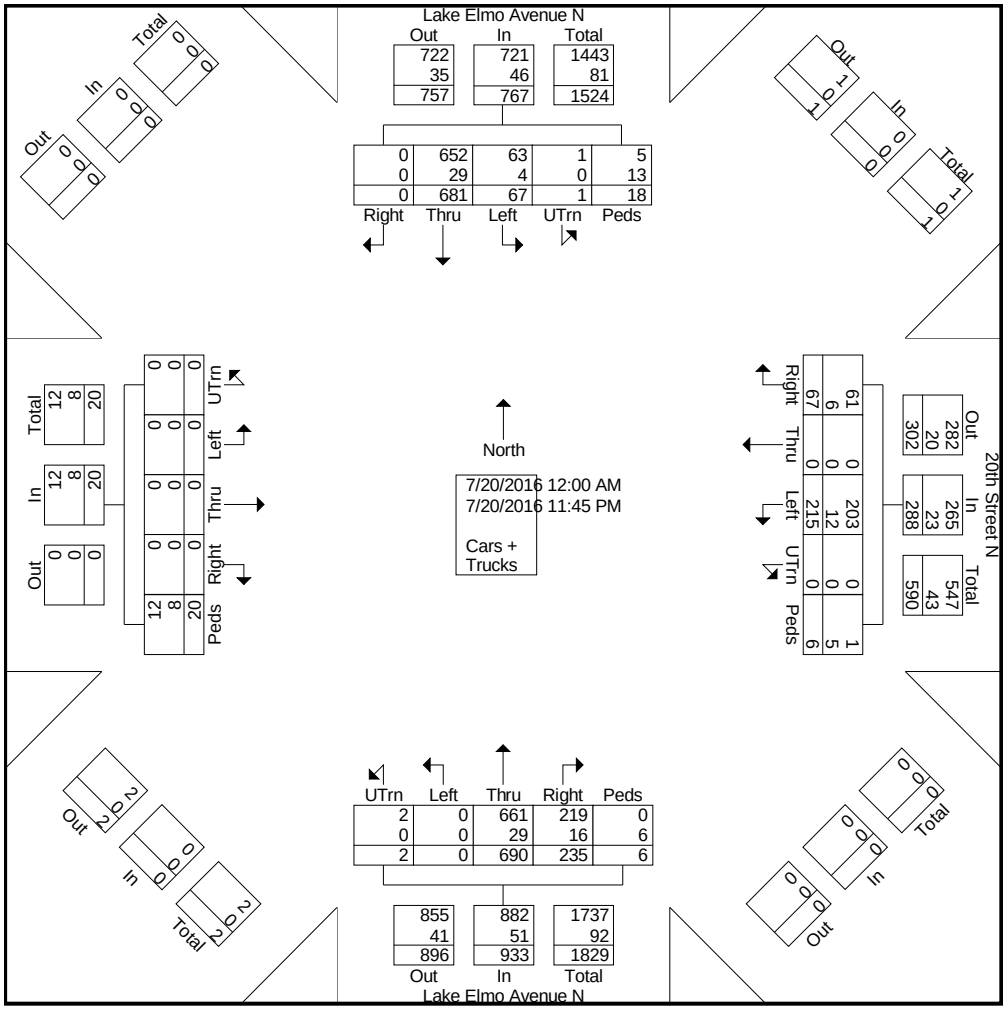

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 1 - 20th St & Lake Elmo Ave, 7-20-16
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	Lake Elmo Avenue N Southbound						20th Street N Westbound						Lake Elmo Avenue N Northbound						Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:15 AM																									
07:15 AM	**0**	1	8	0	1	10	0	12	0	0	0	12	0	0	9	2	0	11	0	0	0	0	0	0	33
07:30 AM	0	0	6	0	0	6	0	7	0	**3**	0	10	0	0	8	4	0	12	0	0	0	0	0	0	28
07:45 AM	0	0	**15**	0	0	**15**	0	6	0	1	0	7	0	0	**14**	**7**	0	**21**	0	0	0	0	0	0	**43**
08:00 AM	0	0	13	0	0	13	0	8	0	1	0	9	0	0	6	7	0	13	0	0	0	0	0	0	35
Total Volume	0	1	42	0	1	44	0	33	0	5	0	38	0	0	37	20	0	57	0	0	0	0	0	0	139
% App. Total	0	2.3	95.5	0	2.3		0	86.8	0	13.2	0		0	0	64.9	35.1	0		0	0	0	0	0		
PHF	.000	.250	.700	.000	.250	.733	.000	.688	.000	.417	.000	.792	.000	.000	.661	.714	.000	.679	.000	.000	.000	.000	.000	.000	.808
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 12:30 PM																									
12:30 PM	0	**4**	**14**	0	0	**18**	0	1	0	2	0	3	0	0	11	2	0	13	0	0	0	0	0	0	34
12:45 PM	0	2	14	0	0	16	0	3	0	2	0	5	0	0	8	3	**1**	12	0	0	0	0	**1**	**1**	34
01:00 PM	0	1	11	0	0	12	0	**6**	0	**3**	0	**9**	0	0	11	**4**	0	**15**	0	0	0	0	1	1	37
01:15 PM	0	3	14	0	0	17	0	3	0	3	0	6	0	0	**13**	2	0	15	0	0	0	0	0	0	**38**
Total Volume	0	10	53	0	0	63	0	13	0	10	0	23	0	0	43	11	1	55	0	0	0	0	2	2	143
% App. Total	0	15.9	84.1	0	0		0	56.5	0	43.5	0		0	0	78.2	20	1.8		0	0	0	0	100		
PHF	.000	.625	.946	.000	.000	.875	.000	.542	.000	.833	.000	.639	.000	.000	.827	.688	.250	.917	.000	.000	.000	.000	.500	.500	.941
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:00 PM																									
04:00 PM	0	**2**	17	0	0	19	0	**5**	0	**1**	0	**6**	0	0	**26**	**6**	0	32	0	0	0	0	0	0	**57**
04:15 PM	0	0	13	0	0	13	0	4	0	0	0	4	0	0	16	3	0	19	0	0	0	0	0	0	36
04:30 PM	0	1	**27**	0	**2**	**30**	0	2	0	0	**1**	3	0	0	17	5	0	22	0	0	0	0	0	0	55
04:45 PM	0	2	12	0	0	14	0	0	0	1	0	1	**1**	0	26	6	0	**33**	0	0	0	0	**5**	**5**	53
Total Volume	0	5	69	0	2	76	0	11	0	2	1	14	1	0	85	20	0	106	0	0	0	0	5	5	201
% App. Total	0	6.6	90.8	0	2.6		0	78.6	0	14.3	7.1		0.9	0	80.2	18.9	0		0	0	0	0	100		
PHF	.000	.625	.639	.000	.250	.633	.000	.550	.000	.500	.250	.583	.250	.000	.817	.833	.000	.803	.000	.000	.000	.000	.250	.250	.882

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 1 - 20th St & Lake Elmo Ave, 7-21-16
Site Code :
Start Date : 7/21/2016
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Groups Printed- Cars + - Trucks

	Lake Elmo Avenue N Southbound						20th Street N Westbound						Lake Elmo Avenue N Northbound						Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
12:00 AM	0	2	1	0	0	3	0	0	0	0	0	0	0	0	1	2	0	3	0	0	0	0	0	0	6
12:15 AM	0	0	1	0	0	1	0	0	0	1	0	1	0	0	0	2	0	2	0	0	0	0	0	0	4
12:30 AM	0	0	2	0	0	2	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	4
12:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1
Total	0	2	4	0	0	6	0	1	0	1	0	2	0	0	1	6	0	7	0	0	0	0	0	0	15
01:00 AM	0	0	4	0	0	4	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	5
01:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	4	0	0	4	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	5
02:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 AM	0	0	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
03:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
04:00 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
04:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:00 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:15 AM	0	1	4	0	0	5	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	6
05:30 AM	0	0	3	0	0	3	0	0	0	0	0	0	0	0	1	2	0	3	0	0	0	0	0	0	6
05:45 AM	0	1	4	0	0	5	0	1	0	0	0	1	0	0	2	0	0	2	0	0	0	0	0	0	8
Total	0	2	12	0	0	14	0	1	0	0	0	1	0	0	3	3	0	6	0	0	0	0	0	0	21
06:00 AM	0	0	3	0	0	3	0	1	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	5
06:15 AM	0	0	5	0	0	5	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	8
06:30 AM	0	0	10	0	0	10	0	3	0	0	0	3	0	0	4	3	0	7	0	0	0	0	0	0	20
06:45 AM	0	3	7	0	0	10	0	6	0	0	0	6	0	0	4	2	0	6	0	0	0	0	0	0	22
Total	0	3	25	0	0	28	0	13	0	0	0	13	0	0	9	5	0	14	0	0	0	0	0	0	55
07:00 AM	0	0	7	0	0	7	0	1	0	0	0	1	0	0	5	3	0	8	0	0	0	0	1	1	17
07:15 AM	0	0	7	0	0	7	0	10	0	0	0	10	0	0	4	4	0	8	0	0	0	0	0	0	25
07:30 AM	0	0	13	0	0	13	0	6	0	2	0	8	0	0	11	2	0	13	0	0	0	0	0	0	34
07:45 AM	0	0	17	0	0	17	0	9	0	1	0	10	0	0	16	3	0	19	0	0	0	0	0	0	46
Total	0	0	44	0	0	44	0	26	0	3	0	29	0	0	36	12	0	48	0	0	0	0	1	1	122

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 1 - 20th St & Lake Elmo Ave, 7-21-16
Site Code :
Start Date : 7/21/2016
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Groups Printed- Cars + - Trucks

	Lake Elmo Avenue N Southbound						20th Street N Westbound						Lake Elmo Avenue N Northbound						Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
08:00 AM	0	0	9	0	0	9	0	6	0	1	0	7	0	0	8	2	0	10	0	0	0	0	0	0	26
08:15 AM	0	0	4	0	0	4	0	5	0	1	0	6	0	0	11	2	0	13	0	0	0	0	1	1	24
08:30 AM	0	1	10	0	0	11	0	4	0	0	0	4	0	0	8	4	0	12	0	0	0	0	0	0	27
08:45 AM	0	2	8	0	0	10	0	0	0	1	0	1	0	0	3	1	0	4	0	0	0	0	0	0	15
Total	0	3	31	0	0	34	0	15	0	3	0	18	0	0	30	9	0	39	0	0	0	0	1	1	92
09:00 AM	0	1	8	0	1	10	0	3	0	2	0	5	0	0	4	3	0	7	0	0	0	0	0	0	22
09:15 AM	0	1	6	0	0	7	0	7	0	3	0	10	0	0	10	3	0	13	0	0	0	0	0	0	30
09:30 AM	0	1	11	0	0	12	0	3	0	1	0	4	0	0	10	4	0	14	0	0	0	0	0	0	30
09:45 AM	0	0	14	0	0	14	0	3	0	0	0	3	0	0	9	2	0	11	0	0	0	0	0	0	28
Total	0	3	39	0	1	43	0	16	0	6	0	22	0	0	33	12	0	45	0	0	0	0	0	0	110
10:00 AM	0	1	7	0	0	8	0	3	0	2	0	5	0	0	4	0	0	4	0	0	0	0	0	0	17
10:15 AM	0	1	7	0	0	8	0	3	0	7	0	10	0	0	13	3	0	16	0	0	0	0	0	0	34
10:30 AM	0	1	5	0	0	6	0	4	0	2	0	6	0	0	8	2	0	10	0	0	0	0	0	0	22
10:45 AM	0	1	12	0	0	13	0	2	0	1	0	3	0	0	5	2	0	7	0	0	0	0	0	0	23
Total	0	4	31	0	0	35	0	12	0	12	0	24	0	0	30	7	0	37	0	0	0	0	0	0	96
11:00 AM	0	1	5	0	0	6	0	3	0	1	0	4	0	0	9	4	0	13	0	0	0	0	0	0	23
11:15 AM	0	2	6	0	0	8	0	2	0	0	0	2	0	0	16	1	0	17	0	0	0	0	0	0	27
11:30 AM	0	0	11	0	0	11	0	4	0	1	0	5	0	0	7	3	0	10	0	0	0	0	0	0	26
11:45 AM	0	0	7	0	0	7	0	6	0	2	0	8	0	0	16	5	0	21	0	0	0	0	0	0	36
Total	0	3	29	0	0	32	0	15	0	4	0	19	0	0	48	13	0	61	0	0	0	0	0	0	112
12:00 PM	0	1	2	0	0	3	0	4	0	1	0	5	0	0	11	5	1	17	0	0	0	0	0	0	25
12:15 PM	0	1	9	0	0	10	0	5	0	3	0	8	0	0	8	4	0	12	0	0	0	0	0	0	30
12:30 PM	0	0	15	0	0	15	0	1	0	0	0	1	0	0	10	3	0	13	0	0	0	0	0	0	29
12:45 PM	0	3	11	0	1	15	0	5	0	1	0	6	0	0	9	5	0	14	0	0	0	0	0	0	35
Total	0	5	37	0	1	43	0	15	0	5	0	20	0	0	38	17	1	56	0	0	0	0	0	0	119
01:00 PM	0	1	13	0	0	14	0	2	0	2	0	4	0	0	12	1	0	13	0	0	0	0	0	0	31
01:15 PM	0	0	8	0	0	8	0	1	0	0	0	1	0	0	13	2	0	15	0	0	0	0	0	0	24
01:30 PM	0	2	13	0	1	16	0	1	0	2	0	3	0	0	9	2	0	11	0	0	0	0	0	0	30
01:45 PM	0	0	11	0	0	11	0	1	0	1	0	2	1	0	16	5	0	22	0	0	0	0	0	0	35
Total	0	3	45	0	1	49	0	5	0	5	0	10	1	0	50	10	0	61	0	0	0	0	0	0	120
02:00 PM	1	0	12	0	0	13	0	6	0	1	0	7	1	0	7	3	0	11	0	0	0	0	0	0	31
02:15 PM	0	2	13	0	0	15	0	2	0	1	0	3	0	0	6	4	0	10	0	0	0	0	0	0	28
02:30 PM	0	0	12	0	0	12	0	7	0	3	0	10	0	0	13	7	0	20	0	0	0	0	0	0	42
02:45 PM	0	0	8	0	0	8	0	4	0	0	0	4	1	0	11	0	1	13	0	0	0	0	0	0	25
Total	1	2	45	0	0	48	0	19	0	5	0	24	2	0	37	14	1	54	0	0	0	0	0	0	126
03:00 PM	0	2	11	0	0	13	0	3	0	1	0	4	0	0	12	5	0	17	0	0	0	0	0	0	34
03:15 PM	0	1	18	0	0	19	0	1	0	1	0	2	0	0	17	3	0	20	0	0	0	0	0	0	41
03:30 PM	0	0	15	0	0	15	0	2	0	1	0	3	0	0	21	4	0	25	0	0	0	0	0	0	43
03:45 PM	0	2	17	0	0	19	0	2	0	4	0	6	0	0	26	0	0	26	0	0	0	0	0	0	51
Total	0	5	61	0	0	66	0	8	0	7	0	15	0	0	76	12	0	88	0	0	0	0	0	0	169

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 1 - 20th St & Lake Elmo Ave, 7-21-16
Site Code :
Start Date : 7/21/2016
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Groups Printed- Cars + - Trucks

	Lake Elmo Avenue N Southbound						20th Street N Westbound						Lake Elmo Avenue N Northbound						Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	3	17	0	0	20	0	4	0	0	0	4	0	0	18	5	0	23	0	0	0	0	0	0	47
04:15 PM	0	3	11	0	0	14	0	7	0	3	0	10	0	0	11	8	0	19	0	0	0	0	0	0	43
04:30 PM	0	1	12	0	0	13	0	1	0	0	0	1	0	0	26	5	0	31	0	0	0	0	0	0	45
04:45 PM	0	1	18	0	0	19	0	3	0	0	0	3	0	0	15	5	0	20	0	0	0	0	0	0	42
Total	0	8	58	0	0	66	0	15	0	3	0	18	0	0	70	23	0	93	0	0	0	0	0	0	177
05:00 PM	0	1	20	0	0	21	0	9	0	0	0	9	0	0	15	8	0	23	0	0	0	0	0	0	53
05:15 PM	0	0	19	0	0	19	0	7	0	1	0	8	0	0	26	11	0	37	0	0	0	0	0	0	64
05:30 PM	0	1	15	0	0	16	0	6	0	0	0	6	0	0	15	3	5	23	0	0	0	0	0	0	45
05:45 PM	0	0	5	0	0	5	0	6	0	0	0	6	0	0	21	3	0	24	0	0	0	0	0	0	35
Total	0	2	59	0	0	61	0	28	0	1	0	29	0	0	77	25	5	107	0	0	0	0	0	0	197
06:00 PM	2	1	13	0	0	16	0	4	0	3	0	7	0	0	19	6	0	25	0	0	0	0	0	0	48
06:15 PM	0	0	13	0	0	13	0	3	0	1	0	4	0	0	12	5	0	17	0	0	0	0	0	0	34
06:30 PM	0	3	11	0	0	14	0	2	0	1	0	3	0	0	10	3	0	13	0	0	0	0	0	0	30
06:45 PM	0	2	15	0	0	17	0	1	0	0	0	1	0	0	6	4	0	10	0	0	0	0	0	0	28
Total	2	6	52	0	0	60	0	10	0	5	0	15	0	0	47	18	0	65	0	0	0	0	0	0	140
07:00 PM	0	2	10	0	0	12	0	1	0	3	0	4	1	0	8	6	0	15	0	0	0	0	0	0	31
07:15 PM	0	5	4	0	1	10	0	1	0	2	0	3	0	0	7	9	0	16	0	0	0	0	0	0	29
07:30 PM	0	1	11	0	0	12	0	6	0	2	0	8	0	0	10	5	0	15	0	0	0	0	0	0	35
07:45 PM	0	2	11	0	0	13	0	2	0	1	0	3	0	0	13	3	0	16	0	0	0	0	0	0	32
Total	0	10	36	0	1	47	0	10	0	8	0	18	1	0	38	23	0	62	0	0	0	0	0	0	127
08:00 PM	0	1	6	0	0	7	1	1	0	0	0	2	0	0	6	2	0	8	0	0	0	0	0	0	17
08:15 PM	0	3	8	0	0	11	0	0	0	1	0	1	0	0	6	5	0	11	0	0	0	0	0	0	23
08:30 PM	0	2	13	0	0	15	0	2	0	0	0	2	0	0	11	1	0	12	0	0	0	0	0	0	29
08:45 PM	0	0	14	0	0	14	0	1	0	0	0	1	0	0	4	2	0	6	0	0	0	0	0	0	21
Total	0	6	41	0	0	47	1	4	0	1	0	6	0	0	27	10	0	37	0	0	0	0	0	0	90
09:00 PM	0	0	8	0	0	8	0	0	0	0	0	0	1	0	10	1	0	12	0	0	0	0	0	0	20
09:15 PM	0	0	7	0	0	7	0	1	0	0	0	1	0	0	3	3	0	6	0	0	0	0	0	0	14
09:30 PM	0	1	6	0	0	7	0	1	0	0	0	1	0	0	5	1	0	6	0	0	0	0	0	0	14
09:45 PM	0	1	4	0	0	5	0	0	0	0	0	0	0	0	3	1	0	4	0	0	0	0	0	0	9
Total	0	2	25	0	0	27	0	2	0	0	0	2	1	0	21	6	0	28	0	0	0	0	0	0	57
10:00 PM	0	0	6	0	0	6	0	5	0	1	0	6	1	0	2	1	0	4	0	0	0	0	0	0	16
10:15 PM	0	1	5	0	0	6	0	1	0	0	0	1	0	0	2	0	0	2	0	0	0	0	0	0	9
10:30 PM	0	1	5	0	0	6	0	0	0	0	0	0	0	0	6	3	0	9	0	0	0	0	0	0	15
10:45 PM	0	0	2	0	0	2	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4
Total	0	2	18	0	0	20	0	6	0	1	0	7	1	0	12	4	0	17	0	0	0	0	0	0	44
11:00 PM	0	0	6	0	0	6	0	0	0	2	0	2	0	0	1	0	0	1	0	0	0	0	0	0	9
11:15 PM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
11:30 PM	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	5
11:45 PM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2
Total	0	0	10	0	0	10	0	0	0	2	0	2	0	0	2	3	0	5	0	0	0	0	0	0	17

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 1 - 20th St & Lake Elmo Ave, 7-21-16
Site Code :
Start Date : 7/21/2016
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Groups Printed- Cars + - Trucks

	Lake Elmo Avenue N Southbound						20th Street N Westbound						Lake Elmo Avenue N Northbound						Eastbound						
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Grand Total	3	71	708	0	4	786	1	222	0	72	0	295	6	0	685	233	7	931	0	0	0	0	2	2	2014
Apprch %	0.4	9	90.1	0	0.5		0.3	75.3	0	24.4	0		0.6	0	73.6	25	0.8		0	0	0	0	100		
Total %	0.1	3.5	35.2	0	0.2	39	0	11	0	3.6	0	14.6	0.3	0	34	11.6	0.3	46.2	0	0	0	0	0.1	0.1	
Cars +	2	64	676	0	2	744	1	207	0	59	0	267	6	0	667	217	0	890	0	0	0	0	0	0	1901
% Cars +	66.7	90.1	95.5	0	50	94.7	100	93.2	0	81.9	0	90.5	100	0	97.4	93.1	0	95.6	0	0	0	0	0	0	94.4
Trucks	1	7	32	0	2	42	0	15	0	13	0	28	0	0	18	16	7	41	0	0	0	0	2	2	113
% Trucks	33.3	9.9	4.5	0	50	5.3	0	6.8	0	18.1	0	9.5	0	0	2.6	6.9	100	4.4	0	0	0	0	100	100	5.6

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 1 - 20th St & Lake Elmo Ave, 7-21-16
Site Code :
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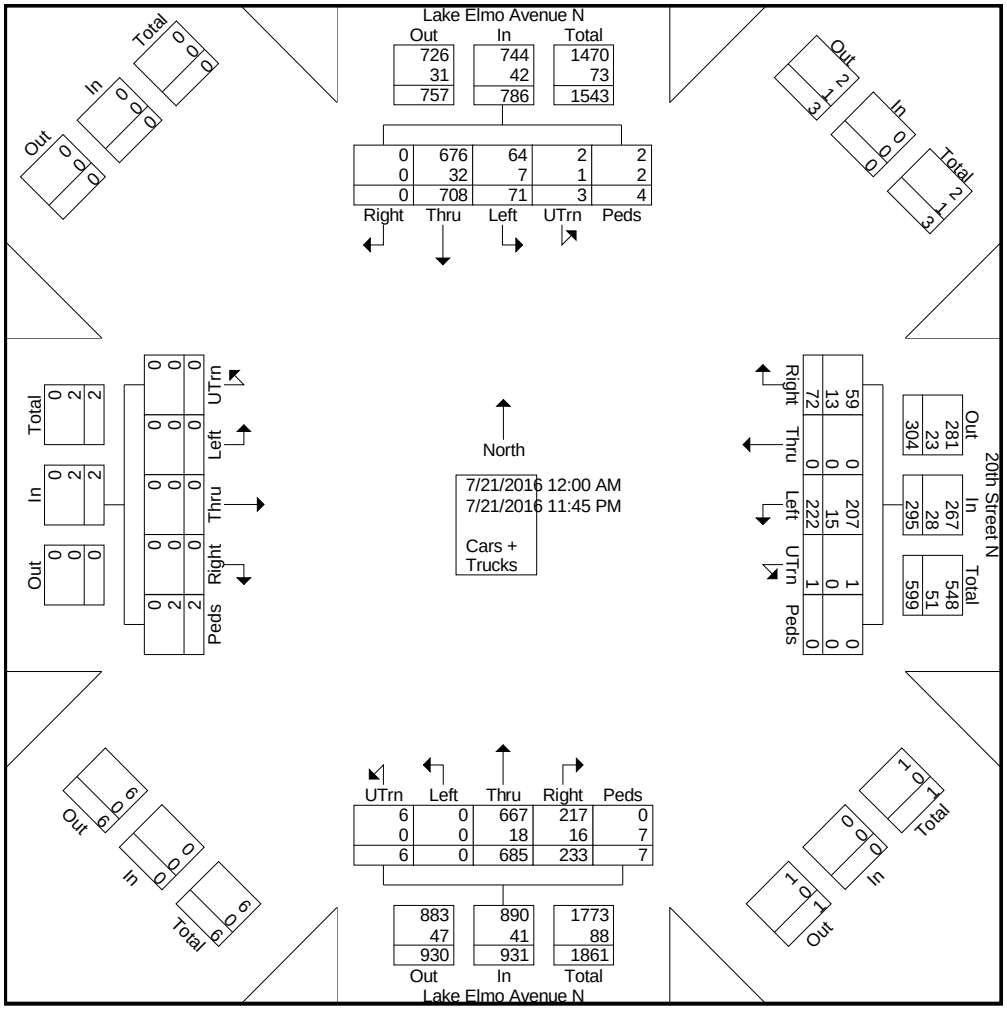

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 1 - 20th St & Lake Elmo Ave, 7-21-16
Site Code :
Start Date : 7/21/2016
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	Lake Elmo Avenue N Southbound						20th Street N Westbound						Lake Elmo Avenue N Northbound						Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:15 AM																									
07:15 AM	**0**	**0**	**7**	**0**	**0**	**7**	**0**	10	0	0	0	10	0	0	4	4	0	8	0	0	0	0	0	0	25
07:30 AM	0	0	13	0	0	13	0	6	0	2	0	8	0	0	11	2	0	13	0	0	0	0	0	0	34
07:45 AM	0	0	**17**	0	0	**17**	0	9	0	1	0	10	0	0	**16**	3	0	**19**	0	0	0	0	0	0	**46**
08:00 AM	0	0	9	0	0	9	0	6	0	1	0	7	0	0	8	2	0	10	0	0	0	0	0	0	26
Total Volume	0	0	46	0	0	46	0	31	0	4	0	35	0	0	39	11	0	50	0	0	0	0	0	0	131
% App. Total	0	0	100	0	0		0	88.6	0	11.4	0		0	0	78	22	0		0	0	0	0	0		
PHF	.000	.000	.676	.000	.000	.676	.000	.775	.000	.500	.000	.875	.000	.000	.609	.688	.000	.658	.000	.000	.000	.000	.000	.000	.712
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 12:15 PM																									
12:15 PM	0	1	9	0	0	10	0	**5**	0	**3**	0	**8**	0	0	8	4	0	12	0	0	0	0	0	0	30
12:30 PM	0	0	**15**	0	0	**15**	0	1	0	0	0	1	0	0	10	3	0	13	0	0	0	0	0	0	29
12:45 PM	0	**3**	11	0	**1**	15	0	5	0	1	0	6	0	0	9	**5**	0	**14**	0	0	0	0	0	0	**35**
01:00 PM	0	1	13	0	0	14	0	2	0	2	0	4	0	0	**12**	1	0	13	0	0	0	0	0	0	31
Total Volume	0	5	48	0	1	54	0	13	0	6	0	19	0	0	39	13	0	52	0	0	0	0	0	0	125
% App. Total	0	9.3	88.9	0	1.9		0	68.4	0	31.6	0		0	0	75	25	0		0	0	0	0	0		
PHF	.000	.417	.800	.000	.250	.900	.000	.650	.000	.500	.000	.594	.000	.000	.813	.650	.000	.929	.000	.000	.000	.000	.000	.000	.893
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:30 PM																									
04:30 PM	0	**1**	12	0	0	13	0	1	0	0	0	1	0	0	**26**	5	0	31	0	0	0	0	0	0	45
04:45 PM	0	1	18	0	0	19	0	3	0	0	0	3	0	0	15	5	0	20	0	0	0	0	0	0	42
05:00 PM	0	1	**20**	0	0	**21**	0	**9**	0	0	0	**9**	0	0	15	8	0	23	0	0	0	0	0	0	53
05:15 PM	0	0	19	0	0	19	0	7	0	**1**	0	8	0	0	26	**11**	0	**37**	0	0	0	0	0	0	**64**
Total Volume	0	3	69	0	0	72	0	20	0	1	0	21	0	0	82	29	0	111	0	0	0	0	0	0	204
% App. Total	0	4.2	95.8	0	0		0	95.2	0	4.8	0		0	0	73.9	26.1	0		0	0	0	0	0		
PHF	.000	.750	.863	.000	.000	.857	.000	.556	.000	.250	.000	.583	.000	.000	.788	.659	.000	.750	.000	.000	.000	.000	.000	.000	.797

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 2 - 20th St & 20th St Court, 7-20-16
Site Code :
Start Date : 7/20/2016
Page No : 1

Groups Printed- Cars + - Trucks

	20th Street Court N Southbound						20th Street N Westbound						Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
04:30 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	2
04:45 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
Total	0	1	0	0	0	1	0	0	2	0	0	2	0	0	0	0	0	0	0	1	1	0	0	2	5
05:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
05:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
05:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	3	0	0	3	4
06:00 AM	0	0	0	0	0	0	0	0	2	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	3
06:15 AM	0	0	0	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2
06:30 AM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	2	0	0	2	6
06:45 AM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	2	0	0	2	9
Total	0	0	0	1	0	1	0	0	13	0	2	15	0	0	0	0	0	0	0	0	4	0	0	4	20
07:00 AM	0	0	0	1	0	1	0	0	9	0	0	9	0	0	0	0	0	0	0	0	3	0	0	3	13
07:15 AM	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	0	0	3	0	0	3	14
07:30 AM	0	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	0	0	4	0	0	4	14
07:45 AM	0	1	0	0	0	1	0	0	7	0	0	7	0	0	0	0	0	0	0	0	6	0	0	6	14
Total	0	1	0	1	0	2	0	0	37	0	0	37	0	0	0	0	0	0	0	0	16	0	0	16	55

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 2 - 20th St & 20th St Court, 7-20-16
Site Code :
Start Date : 7/20/2016
Page No : 2

Groups Printed- Cars + - Trucks

	20th Street Court N Southbound						20th Street N Westbound						Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
08:00 AM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	5	0	0	5	12
08:15 AM	0	0	0	0	0	0	0	0	8	1	0	9	0	0	0	0	0	0	0	0	4	0	0	4	13
08:30 AM	0	0	0	1	0	1	0	0	4	0	0	4	0	0	0	0	0	0	0	0	4	0	0	4	9
08:45 AM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	5	0	0	5	10
Total	0	0	0	1	0	1	0	0	24	1	0	25	0	0	0	0	0	0	0	0	18	0	0	18	44
09:00 AM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	5	0	0	5	10
09:15 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2	0	0	2	3
09:30 AM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	5	0	0	5	9
09:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	4
Total	0	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	0	0	16	0	0	16	26
10:00 AM	0	1	0	0	0	1	0	0	4	0	0	4	0	0	0	0	0	0	0	0	4	0	0	4	9
10:15 AM	0	0	0	0	1	1	0	0	3	0	0	3	0	0	0	0	8	8	0	0	3	0	0	3	15
10:30 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	5	0	0	5	6
10:45 AM	0	1	0	0	0	1	0	0	3	0	0	3	0	0	0	0	0	0	0	0	7	0	0	7	11
Total	0	2	0	0	1	3	0	0	11	0	0	11	0	0	0	0	8	8	0	0	19	0	0	19	41
11:00 AM	0	1	0	0	0	1	0	0	3	0	1	4	0	0	0	0	0	0	0	0	3	0	0	3	8
11:15 AM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	4	0	0	4	8
11:30 AM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	1	1	0	1	7	0	0	8	12
11:45 AM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	7	0	0	7	12
Total	0	1	0	0	0	1	0	0	15	0	1	16	0	0	0	0	1	1	0	1	21	0	0	22	40
12:00 PM	0	0	0	1	0	1	0	0	6	2	0	8	0	0	0	0	0	0	0	0	7	0	0	7	16
12:15 PM	0	0	0	0	0	0	0	0	6	1	0	7	0	0	0	0	0	0	0	0	2	0	0	2	9
12:30 PM	0	0	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	6	0	0	6	8
12:45 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	6	0	0	6	13
Total	0	0	0	2	0	2	0	0	20	3	0	23	0	0	0	0	0	0	0	0	21	0	0	21	46
01:00 PM	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	0	0	6	0	0	6	15
01:15 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	5	0	0	5	8
01:30 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	1	4	0	0	5	7
01:45 PM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	2	0	0	2	7
Total	0	0	0	0	0	0	0	0	19	0	0	19	0	0	0	0	0	0	0	1	17	0	0	18	37
02:00 PM	0	0	0	0	1	1	0	0	2	0	0	2	0	0	0	0	0	0	0	0	4	0	0	4	7
02:15 PM	0	1	0	1	0	2	0	0	2	2	0	4	0	0	0	0	0	0	0	0	2	0	0	2	8
02:30 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	0	3	0	0	3	11
02:45 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	1	3	0	0	4	8
Total	0	1	0	1	1	3	0	0	16	2	0	18	0	0	0	0	0	0	0	1	12	0	0	13	34
03:00 PM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	1	0	0	1	6
03:15 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	8	0	0	8	11
03:30 PM	0	0	0	1	0	1	0	0	6	0	0	6	0	0	0	0	0	0	0	0	5	0	0	5	12
03:45 PM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	6	0	0	6	11
Total	0	0	0	1	0	1	0	0	19	0	0	19	0	0	0	0	0	0	0	0	20	0	0	20	40

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 2 - 20th St & 20th St Court, 7-20-16
Site Code :
Start Date : 7/20/2016
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Groups Printed- Cars + - Trucks

	20th Street Court N Southbound						20th Street N Westbound						Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	1	7	0	0	8	15
04:15 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	3	0	0	3	7
04:30 PM	0	0	0	0	0	0	0	0	3	0	1	4	0	0	0	0	1	1	0	0	5	0	0	5	10
04:45 PM	0	1	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	8	0	0	8	10
Total	0	1	0	0	0	1	0	0	15	0	1	16	0	0	0	0	1	1	0	1	23	0	0	24	42
05:00 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	7	0	0	7	11
05:15 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	6	0	0	6	10
05:30 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	8	0	0	8	10
05:45 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	0	12	0	0	12	20
Total	0	0	0	0	0	0	0	0	18	0	0	18	0	0	0	0	0	0	0	0	33	0	0	33	51
06:00 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	1	0	4	0	0	5	12
06:15 PM	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	5	0	0	5	11
06:30 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	8	0	0	8	12
06:45 PM	0	0	0	0	1	1	0	0	1	1	0	2	0	0	0	0	0	0	0	0	8	0	0	8	11
Total	0	0	0	0	1	1	0	0	18	1	0	19	0	0	0	0	0	0	1	0	25	0	0	26	46
07:00 PM	0	0	0	0	0	0	0	0	2	0	1	3	0	0	0	0	0	0	0	0	2	0	0	2	5
07:15 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	6	0	0	6	10
07:30 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	2	2	0	0	4	0	0	4	9
07:45 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	2	0	0	2	5
Total	0	0	0	0	0	0	0	0	12	0	1	13	0	0	0	0	2	2	0	0	14	0	0	14	29
08:00 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	2	0	0	3	4
08:15 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4
08:30 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	5	0	0	5	8
08:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	4
Total	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	1	11	0	0	12	20
09:00 PM	0	0	0	0	0	0	0	0	4	0	1	5	0	0	0	0	0	0	0	0	2	0	0	2	7
09:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
09:30 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	2
09:45 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2	0	0	2	3
Total	0	0	0	0	0	0	0	0	6	0	1	7	0	0	0	0	1	1	0	1	4	0	0	5	13
10:00 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1	2
10:15 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
10:30 PM	0	1	0	0	0	1	0	0	2	0	0	2	0	0	0	0	0	0	0	0	1	0	0	1	4
10:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
Total	0	1	0	0	0	1	0	0	5	0	0	5	0	0	0	0	0	0	1	0	3	0	0	4	10
11:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
11:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
11:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	2
Total	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	3	0	0	3	4

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 2 - 20th St & 20th St Court, 7-20-16
Site Code :
Start Date : 7/20/2016
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Groups Printed- Cars + - Trucks

	20th Street Court N Southbound						20th Street N Westbound						Northbound						20th Street N Eastbound						
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Grand Total	0	8	0	7	3	18	0	0	270	7	6	283	0	0	0	0	13	13	2	7	284	0	0	293	607
Apprch %	0	44.4	0	38.9	16.7		0	0	95.4	2.5	2.1		0	0	0	0	100		0.7	2.4	96.9	0	0		
Total %	0	1.3	0	1.2	0.5	3	0	0	44.5	1.2	1	46.6	0	0	0	0	2.1	2.1	0.3	1.2	46.8	0	0	48.3	
Cars +	0	8	0	6	3	17	0	0	249	6	1	256	0	0	0	0	0	0	2	7	268	0	0	277	550
% Cars +	0	100	0	85.7	100	94.4	0	0	92.2	85.7	16.7	90.5	0	0	0	0	0	0	100	100	94.4	0	0	94.5	90.6
Trucks	0	0	0	1	0	1	0	0	21	1	5	27	0	0	0	0	13	13	0	0	16	0	0	16	57
% Trucks	0	0	0	14.3	0	5.6	0	0	7.8	14.3	83.3	9.5	0	0	0	0	100	100	0	0	5.6	0	0	5.5	9.4

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 2 - 20th St & 20th St Court, 7-20-16
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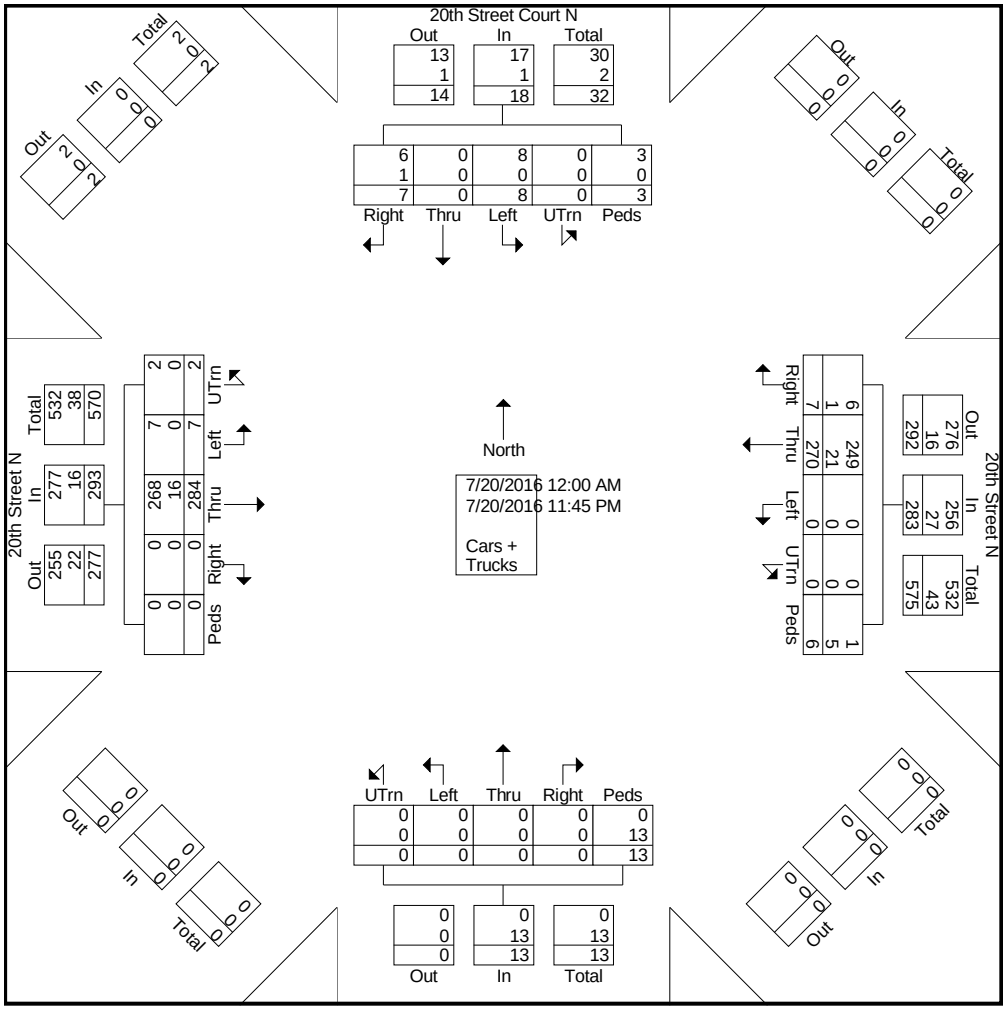

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 2 - 20th St & 20th St Court, 7-20-16
Site Code :
Start Date : 7/20/2016
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	20th Street Court N Southbound						20th Street N Westbound						Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:00 AM																									
07:00 AM	**0**	**0**	**0**	1	0	1	0	0	9	0	0	9	0	0	0	0	0	0	0	0	3	0	0	3	13
07:15 AM	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	0	0	3	0	0	3	**14**
07:30 AM	0	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	0	0	4	0	0	4	14
07:45 AM	0	**1**	0	0	0	1	0	0	7	0	0	7	0	0	0	0	0	0	0	0	**6**	0	0	**6**	14
Total Volume	0	1	0	1	0	2	0	0	37	0	0	37	0	0	0	0	0	0	0	0	16	0	0	16	55
% App. Total	0	50	0	50	0		0	0	100	0	0		0	0	0	0	0		0	0	100	0	0		
PHF	.000	.250	.000	.250	.000	.500	.000	.000	.841	.000	.000	.841	.000	.000	.000	.000	.000	.000	.000	.000	.667	.000	.000	.667	.982
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 11:30 AM																									
11:30 AM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	**1**	**1**	0	**1**	**7**	0	0	**8**	12
11:45 AM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	7	0	0	7	12
12:00 PM	0	0	0	**1**	0	**1**	0	0	**6**	**2**	0	**8**	0	0	0	0	0	0	0	0	7	0	0	7	**16**
12:15 PM	0	0	0	0	0	0	0	0	6	1	0	7	0	0	0	0	0	0	0	0	2	0	0	2	9
Total Volume	0	0	0	1	0	1	0	0	20	3	0	23	0	0	0	0	1	1	0	1	23	0	0	24	49
% App. Total	0	0	0	100	0		0	0	87	13	0		0	0	0	0	100		0	4.2	95.8	0	0		
PHF	.000	.000	.000	.250	.000	.250	.000	.000	.833	.375	.000	.719	.000	.000	.000	.000	.250	.250	.000	.250	.821	.000	.000	.750	.766
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 05:45 PM																									
05:45 PM	0	0	0	0	0	0	0	0	**8**	0	0	**8**	0	0	0	0	0	0	0	0	**12**	0	0	**12**	**20**
06:00 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	**1**	0	4	0	0	5	12
06:15 PM	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	5	0	0	5	11
06:30 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	8	0	0	8	12
Total Volume	0	0	0	0	0	0	0	0	25	0	0	25	0	0	0	0	0	0	1	0	29	0	0	30	55
% App. Total	0	0	0	0	0		0	0	100	0	0		0	0	0	0	0		3.3	0	96.7	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.781	.000	.000	.781	.000	.000	.000	.000	.000	.000	.250	.000	.604	.000	.000	.625	.688

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 2 - 20th St & 20th St Court, 7-21-16
Site Code :
Start Date : 7/21/2016
Page No : 1

Groups Printed- Cars + - Trucks

	20th Street Court N Southbound						20th Street N Westbound						Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	3	3
12:15 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	2
12:30 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
12:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	1	3	0	0	4	6
01:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
03:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
04:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
05:30 AM	0	1	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	1	2	0	0	3	5
05:45 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2	0	0	2	3
Total	0	1	0	0	0	1	0	0	2	0	0	2	0	0	0	0	0	0	0	1	5	0	0	6	9
06:00 AM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
06:15 AM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
06:30 AM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	3	0	0	3	6
06:45 AM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	5	0	0	5	10
Total	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	0	0	8	0	0	8	20
07:00 AM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	3	0	0	3	5
07:15 AM	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	0	0	3	0	0	3	14
07:30 AM	0	1	0	1	0	2	0	0	8	0	0	8	0	0	0	0	0	0	0	0	3	0	0	3	13
07:45 AM	0	1	0	0	0	1	0	0	8	0	0	8	0	0	0	0	0	0	0	0	3	0	0	3	12
Total	0	2	0	1	0	3	0	0	29	0	0	29	0	0	0	0	0	0	0	0	12	0	0	12	44

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 2 - 20th St & 20th St Court, 7-21-16
Site Code :
Start Date : 7/21/2016
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Groups Printed- Cars + - Trucks

	20th Street Court N Southbound						20th Street N Westbound						Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
08:00 AM	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	0	0	2	0	0	2	11
08:15 AM	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	2	0	0	2	8
08:30 AM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	5	0	0	5	9
08:45 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	3	0	0	3	4
Total	0	0	0	0	0	0	0	0	20	0	0	20	0	0	0	0	0	0	0	0	12	0	0	12	32
09:00 AM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	1	1	0	0	4	0	0	4	9
09:15 AM	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	0	0	4	0	0	4	15
09:30 AM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	4	0	0	4	7
09:45 AM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	3	0	0	3	6
Total	0	0	0	0	0	0	0	0	21	0	0	21	0	0	0	0	1	1	0	0	15	0	0	15	37
10:00 AM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	1	0	0	1	6
10:15 AM	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	0	0	4	0	0	4	13
10:30 AM	0	1	0	1	0	2	0	0	5	1	0	6	0	0	0	0	0	0	0	0	2	0	0	2	10
10:45 AM	0	1	0	0	0	1	0	0	2	0	0	2	0	0	0	0	0	0	0	0	4	0	0	4	7
Total	0	2	0	1	0	3	0	0	21	1	0	22	0	0	0	0	0	0	0	0	11	0	0	11	36
11:00 AM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	5	0	0	5	10
11:15 AM	0	0	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	0	0	0	3	0	0	3	6
11:30 AM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	3	0	0	3	7
11:45 AM	0	0	0	1	0	1	1	0	8	0	0	9	0	0	0	0	0	0	0	0	4	0	0	4	14
Total	0	0	0	1	0	1	1	0	19	1	0	21	0	0	0	0	0	0	0	0	15	0	0	15	37
12:00 PM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	6	0	0	6	11
12:15 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	1	1	0	0	4	0	0	4	12
12:30 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	1	3	0	0	4	6
12:45 PM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	8	0	0	8	13
Total	0	0	0	0	0	0	0	0	19	0	0	19	0	0	0	0	1	1	0	1	21	0	0	22	42
01:00 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	2	0	0	2	6
01:15 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	1	0	0	1	3
01:30 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	4	0	0	4	7
01:45 PM	0	1	0	0	0	1	0	0	2	0	0	2	0	0	0	0	0	0	0	0	5	0	0	5	8
Total	0	1	0	0	0	1	0	0	11	0	0	11	0	0	0	0	0	0	0	0	12	0	0	12	24
02:00 PM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	3	0	0	3	8
02:15 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	6	0	0	6	9
02:30 PM	0	1	0	1	0	2	0	0	8	0	0	8	0	0	0	0	0	0	0	1	7	0	0	8	18
02:45 PM	0	0	0	0	0	0	0	0	5	1	0	6	0	0	0	0	0	0	0	1	0	0	0	1	7
Total	0	1	0	1	0	2	0	0	21	1	0	22	0	0	0	0	0	0	0	2	16	0	0	18	42
03:00 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	7	0	0	7	11
03:15 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	4	0	0	4	6
03:30 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	3	0	0	3	6
03:45 PM	0	0	0	1	0	1	0	0	5	1	0	6	0	0	0	0	0	0	0	1	2	0	0	3	10
Total	0	0	0	1	0	1	0	0	14	1	0	15	0	0	0	0	0	0	0	1	16	0	0	17	33

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 2 - 20th St & 20th St Court, 7-21-16
Site Code :
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Groups Printed- Cars + - Trucks

	20th Street Court N Southbound						20th Street N Westbound						Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	6	0	0	6	10
04:15 PM	0	0	0	1	0	1	0	0	7	0	0	7	0	0	0	0	0	0	0	1	10	0	0	11	19
04:30 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	6	0	0	6	9
04:45 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	6	0	0	6	8
Total	0	0	0	1	0	1	0	0	16	0	0	16	0	0	0	0	0	0	0	1	28	0	0	29	46
05:00 PM	0	1	0	0	0	1	0	0	10	0	0	10	0	0	0	0	0	0	0	0	5	0	0	5	16
05:15 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	0	14	0	0	14	22
05:30 PM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	5	5	0	0	4	0	0	4	14
05:45 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	3	0	0	3	10
Total	0	1	0	0	0	1	0	0	30	0	0	30	0	0	0	0	5	5	0	0	26	0	0	26	62
06:00 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	6	0	0	6	13
06:15 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	6	0	0	6	9
06:30 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	5	0	0	5	8
06:45 PM	0	0	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	6	0	0	6	8
Total	0	0	0	1	0	1	0	0	14	0	0	14	0	0	0	0	0	0	0	0	23	0	0	23	38
07:00 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	6	0	0	6	10
07:15 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	1	1	0	0	16	0	0	16	20
07:30 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	0	4	0	0	4	12
07:45 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	7	0	0	7	8
Total	0	0	0	0	0	0	0	0	16	0	0	16	0	0	0	0	1	1	0	0	33	0	0	33	50
08:00 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	4	0	0	4	8
08:15 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	7	0	0	7	8
08:30 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	1	2	0	0	3	5
08:45 PM	0	0	0	0	0	0	1	0	1	0	0	2	0	0	0	0	0	0	0	0	2	0	0	2	4
Total	0	0	0	0	0	0	1	0	8	0	0	9	0	0	0	0	0	0	0	1	15	0	0	16	25
09:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
09:15 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2	0	0	2	3
09:30 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2	0	0	2	3
09:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	3
Total	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	8	0	0	8	10
10:00 PM	0	0	0	0	0	0	0	0	4	1	0	5	0	0	0	0	0	0	0	0	1	0	0	1	6
10:15 PM	0	0	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	3
10:30 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	4	0	0	4	5
10:45 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	1	0	1	0	0	6	2	0	8	0	0	0	0	0	0	0	0	6	0	0	6	15
11:00 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
11:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	2
Total	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	1	0	0	2	3

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 2 - 20th St & 20th St Court, 7-21-16
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Groups Printed- Cars + - Trucks

	20th Street Court N Southbound						20th Street N Westbound						Northbound						20th Street N Eastbound						
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Grand Total	0	8	0	8	0	16	2	0	285	6	0	293	0	0	0	0	8	8	0	9	286	0	0	295	612
Apprch %	0	50	0	50	0		0.7	0	97.3	2	0		0	0	0	0	100		0	3.1	96.9	0	0		
Total %	0	1.3	0	1.3	0	2.6	0.3	0	46.6	1	0	47.9	0	0	0	0	1.3	1.3	0	1.5	46.7	0	0	48.2	
Cars +	0	8	0	7	0	15	2	0	258	6	0	266	0	0	0	0	0	0	0	8	267	0	0	275	556
% Cars +	0	100	0	87.5	0	93.8	100	0	90.5	100	0	90.8	0	0	0	0	0	0	0	88.9	93.4	0	0	93.2	90.8
Trucks	0	0	0	1	0	1	0	0	27	0	0	27	0	0	0	0	8	8	0	1	19	0	0	20	56
% Trucks	0	0	0	12.5	0	6.2	0	0	9.5	0	0	9.2	0	0	0	0	100	100	0	11.1	6.6	0	0	6.8	9.2

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 2 - 20th St & 20th St Court, 7-21-16
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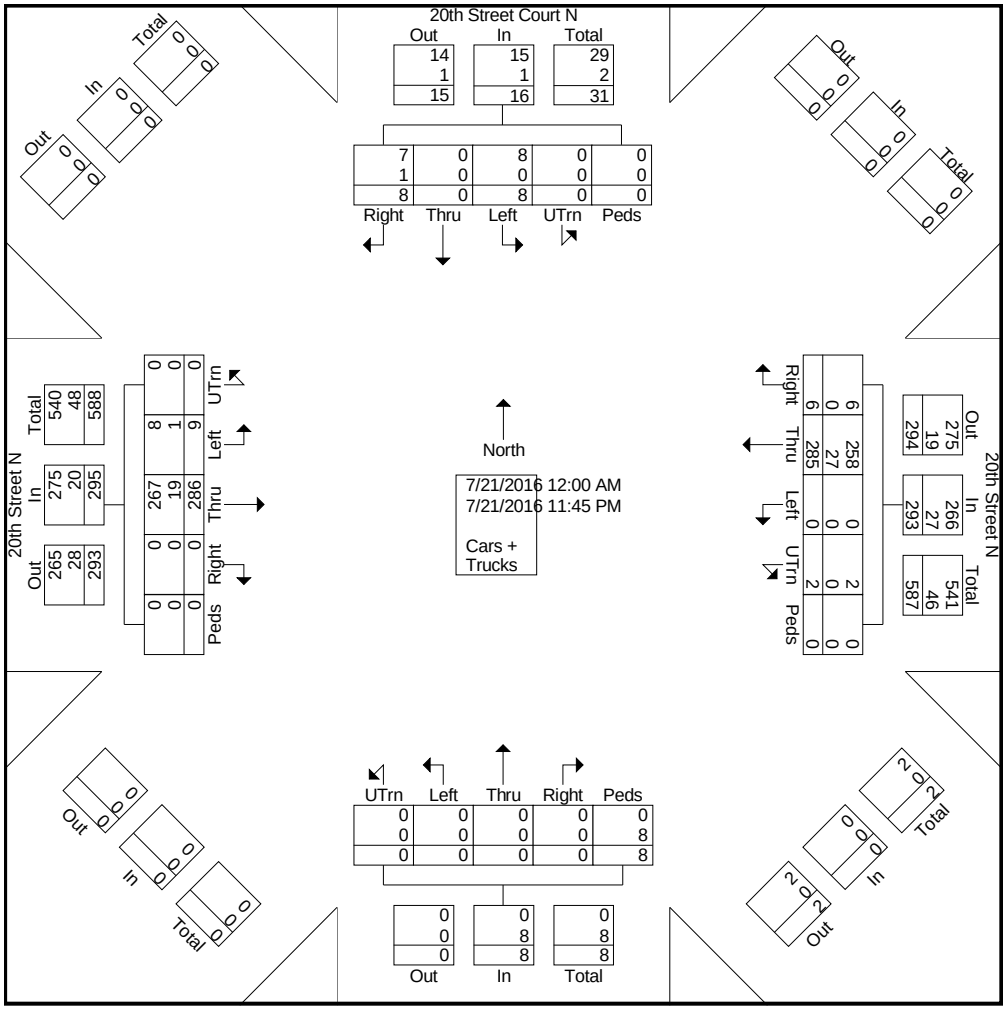

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 2 - 20th St & 20th St Court, 7-21-16
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Start Date : 7/21/2016
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	20th Street Court N Southbound						20th Street N Westbound						Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:15 AM																									
07:15 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**11**	0	0	**11**	0	0	0	0	0	0	0	0	**3**	0	0	**3**	**14**
07:30 AM	0	**1**	0	**1**	0	**2**	0	0	8	0	0	8	0	0	0	0	0	0	0	0	3	0	0	3	13
07:45 AM	0	1	0	0	0	1	0	0	8	0	0	8	0	0	0	0	0	0	0	0	3	0	0	3	12
08:00 AM	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	0	0	2	0	0	2	11
Total Volume	0	2	0	1	0	3	0	0	36	0	0	36	0	0	0	0	0	0	0	0	11	0	0	11	50
% App. Total	0	66.7	0	33.3	0		0	0	100	0	0		0	0	0	0	0		0	0	100	0	0		
PHF	.000	.500	.000	.250	.000	.375	.000	.000	.818	.000	.000	.818	.000	.000	.000	.000	.000	.000	.000	.000	.917	.000	.000	.917	.893
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 11:30 AM																									
11:30 AM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	3	0	0	3	7
11:45 AM	0	0	0	**1**	0	**1**	**1**	0	**8**	0	0	**9**	0	0	0	0	0	0	0	0	4	0	0	4	**14**
12:00 PM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	**6**	0	0	**6**	11
12:15 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	**1**	**1**	0	0	4	0	0	4	12
Total Volume	0	0	0	1	0	1	1	0	24	0	0	25	0	0	0	0	1	1	0	0	17	0	0	17	44
% App. Total	0	0	0	100	0		4	0	96	0	0		0	0	0	0	100		0	0	100	0	0		
PHF	.000	.000	.000	.250	.000	.250	.250	.000	.750	.000	.000	.694	.000	.000	.000	.000	.250	.250	.000	.000	.708	.000	.000	.708	.786
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 05:00 PM																									
05:00 PM	0	**1**	0	0	0	**1**	0	0	**10**	0	0	**10**	0	0	0	0	0	0	0	0	5	0	0	5	16
05:15 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	0	**14**	0	0	**14**	**22**
05:30 PM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	**5**	**5**	0	0	4	0	0	4	14
05:45 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	3	0	0	3	10
Total Volume	0	1	0	0	0	1	0	0	30	0	0	30	0	0	0	0	5	5	0	0	26	0	0	26	62
% App. Total	0	100	0	0	0		0	0	100	0	0		0	0	0	0	100		0	0	100	0	0		
PHF	.000	.250	.000	.000	.000	.250	.000	.000	.750	.000	.000	.750	.000	.000	.000	.000	.250	.250	.000	.000	.464	.000	.000	.464	.705

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 3 - 20th St & East Golf Course, 7-20-16
Site Code :
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Groups Printed- Cars + - Trucks

	Southbound						20th Street N Westbound						East Golf Course Access Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	2
04:45 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	2
Total	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	2	0	0	2	4
05:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 AM	0	0	0	0	0	0	0	2	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
05:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
05:45 AM	0	0	0	0	0	0	0	3	1	0	0	4	0	0	0	0	0	0	0	0	0	1	0	1	5
Total	0	0	0	0	0	0	0	5	2	0	0	7	0	0	0	0	0	0	0	0	0	3	0	3	10
06:00 AM	0	0	0	0	1	1	0	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	3
06:15 AM	0	0	0	0	1	1	0	3	0	0	0	3	0	0	0	0	0	0	0	0	1	0	0	1	5
06:30 AM	0	0	0	0	1	1	0	2	4	0	0	6	0	0	0	0	4	4	0	0	0	1	0	1	12
06:45 AM	0	0	0	0	0	0	0	2	5	0	0	7	0	0	0	0	0	0	0	0	4	3	0	7	14
Total	0	0	0	0	3	3	0	8	10	0	0	18	0	0	0	0	4	4	0	0	5	4	0	9	34
07:00 AM	0	0	0	0	0	0	0	1	7	0	0	8	0	0	0	0	0	0	0	0	2	0	0	2	10
07:15 AM	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	1	0	1	0	0	4	0	0	4	14
07:30 AM	0	0	0	0	1	1	0	1	6	0	0	7	0	0	0	0	0	0	0	0	4	0	0	4	12
07:45 AM	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	0	8	1	0	9	17
Total	0	0	0	0	1	1	0	2	30	0	0	32	0	0	0	1	0	1	0	0	18	1	0	19	53

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 3 - 20th St & East Golf Course, 7-20-16
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Groups Printed- Cars + - Trucks

	Southbound						20th Street N Westbound						East Golf Course Access Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
08:00 AM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	1	1	0	0	7	1	0	8	16
08:15 AM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	2	0	0	2	9
08:30 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	1	0	2	0	0	8	0	0	8	11
08:45 AM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	3	0	0	3	6
Total	0	0	0	0	0	0	0	0	18	0	0	18	0	1	0	1	1	3	0	0	20	1	0	21	42
09:00 AM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	5	0	0	5	8
09:15 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2	0	0	2	3
09:30 AM	0	0	0	0	0	0	0	1	4	0	0	5	0	0	0	0	0	0	0	0	6	0	0	6	11
09:45 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	2	0	2	0	0	3	0	0	3	6
Total	0	0	0	0	0	0	0	1	9	0	0	10	0	0	0	2	0	2	0	0	16	0	0	16	28
10:00 AM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	7	0	0	7	11
10:15 AM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	3	0	0	3	5
10:30 AM	0	0	0	0	0	0	0	2	2	0	0	4	0	0	0	2	0	2	0	0	3	0	0	3	9
10:45 AM	0	0	0	0	0	0	0	2	7	0	0	9	0	0	0	0	0	0	0	0	8	1	0	9	18
Total	0	0	0	0	0	0	0	4	15	0	0	19	0	0	0	2	0	2	0	0	21	1	0	22	43
11:00 AM	0	0	0	0	1	1	0	0	2	0	0	2	0	0	0	0	0	0	0	0	4	0	0	4	7
11:15 AM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	4	1	0	5	7
11:30 AM	0	0	0	0	0	0	0	0	4	0	0	4	0	1	0	0	1	2	0	0	9	0	0	9	15
11:45 AM	0	0	0	0	0	0	0	1	6	0	0	7	0	2	0	0	8	10	0	0	10	0	0	10	27
Total	0	0	0	0	1	1	0	1	14	0	0	15	0	3	0	0	9	12	0	0	27	1	0	28	56
12:00 PM	0	0	0	0	0	0	0	2	4	0	0	6	0	2	0	0	4	6	0	0	6	0	0	6	18
12:15 PM	0	0	0	0	0	0	0	1	3	0	0	4	0	1	0	0	0	1	0	0	4	0	0	4	9
12:30 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	1	0	1	0	0	8	0	0	8	12
12:45 PM	0	0	0	0	0	0	0	2	6	0	0	8	0	1	0	2	0	3	0	0	4	1	0	5	16
Total	0	0	0	0	0	0	0	5	16	0	0	21	0	4	0	3	4	11	0	0	22	1	0	23	55
01:00 PM	0	0	0	0	0	0	0	3	8	0	0	11	0	0	0	0	0	0	0	0	6	0	0	6	17
01:15 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	1	0	2	0	0	5	0	0	5	8
01:30 PM	0	0	0	0	0	0	0	1	5	0	0	6	0	1	0	0	0	1	0	0	5	0	0	5	12
01:45 PM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	1	1	0	0	0	0	0	0	6
Total	0	0	0	0	0	0	0	4	19	0	0	23	0	2	0	1	1	4	0	0	16	0	0	16	43
02:00 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	4	0	0	4	7
02:15 PM	0	0	0	0	0	0	0	0	5	0	0	5	0	3	0	0	0	3	0	0	3	0	0	3	11
02:30 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	2	0	4	0	6	0	0	3	0	0	3	11
02:45 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	1	0	1	0	0	5	0	0	5	10
Total	0	0	0	0	0	0	0	0	14	0	0	14	0	5	0	5	0	10	0	0	15	0	0	15	39
03:00 PM	0	0	0	0	0	0	0	1	5	0	0	6	0	0	0	2	0	2	0	0	1	0	0	1	9
03:15 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	9	1	0	10	12
03:30 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	1	0	1	0	0	4	0	0	4	12
03:45 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	2	0	1	0	3	0	0	9	0	0	9	19
Total	0	0	0	0	0	0	0	1	21	0	0	22	0	2	0	4	0	6	0	0	23	1	0	24	52

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 3 - 20th St & East Golf Course, 7-20-16
Site Code :
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Groups Printed- Cars + - Trucks

	Southbound						20th Street N Westbound						East Golf Course Access Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	7	0	0	7	10
04:15 PM	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	1	0	0	1	7
04:30 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	1	1	0	0	8	0	0	8	12
04:45 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	7	0	0	7	10
Total	0	0	0	0	0	0	0	0	15	0	0	15	0	0	0	0	1	1	0	0	23	0	0	23	39
05:00 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	0	7	1	0	8	16
05:15 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	1	0	1	0	0	5	1	0	6	11
05:30 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	2	0	2	0	0	12	0	0	12	18
05:45 PM	0	0	0	0	0	0	0	1	10	0	0	11	0	0	0	0	0	0	0	0	7	2	0	9	20
Total	0	0	0	0	0	0	0	1	26	0	0	27	0	0	0	3	0	3	0	0	31	4	0	35	65
06:00 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	4	0	4	0	8	0	0	6	0	0	6	22
06:15 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	3	0	0	3	10
06:30 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	6	0	0	6	9
06:45 PM	0	0	0	0	1	1	0	0	3	0	0	3	0	0	0	0	0	0	0	0	5	0	0	5	9
Total	0	0	0	0	1	1	0	0	21	0	0	21	0	4	0	4	0	8	0	0	20	0	0	20	50
07:00 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	2	0	1	1	4	0	0	3	0	0	3	11
07:15 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	1	1	0	0	3	0	0	3	8
07:30 PM	0	0	0	0	1	1	0	0	2	0	0	2	0	0	0	0	1	1	0	0	4	0	0	4	8
07:45 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	2	0	0	2	5
Total	0	0	0	0	1	1	0	0	13	0	0	13	0	2	0	1	3	6	0	0	12	0	0	12	32
08:00 PM	0	0	0	0	1	1	0	0	3	0	0	3	0	0	0	0	0	0	0	0	1	0	0	1	5
08:15 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	3	0	0	3	5
08:30 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	0	3	0	0	4	7
08:45 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	4	0	0	4	7
Total	0	0	0	0	1	1	0	0	11	0	0	11	0	0	0	0	0	0	1	0	11	0	0	12	24
09:00 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	3	0	0	3	7
09:15 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
09:30 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2	0	0	2	3
09:45 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	2	0	0	2	4
Total	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	0	0	7	0	0	7	16
10:00 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
10:15 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
10:30 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	2	0	0	2	4
10:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	3
Total	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	5	0	0	5	10
11:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
11:15 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
11:30 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	1	0	0	1	3
11:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	3	0	0	3	6

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 3 - 20th St & East Golf Course, 7-20-16
Site Code :
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Groups Printed- Cars + - Trucks

	Southbound						20th Street N Westbound						East Golf Course Access Northbound						20th Street N Eastbound						
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Grand Total	0	0	0	0	8	8	0	32	273	0	0	305	0	23	0	27	23	73	1	0	297	17	0	315	701
Apprch %	0	0	0	0	100		0	10.5	89.5	0	0		0	31.5	0	37	31.5		0.3	0	94.3	5.4	0		
Total %	0	0	0	0	1.1	1.1	0	4.6	38.9	0	0	43.5	0	3.3	0	3.9	3.3	10.4	0.1	0	42.4	2.4	0	44.9	
Cars +	0	0	0	0	2	2	0	27	257	0	0	284	0	19	0	23	18	60	1	0	276	14	0	291	637
% Cars +	0	0	0	0	25	25	0	84.4	94.1	0	0	93.1	0	82.6	0	85.2	78.3	82.2	100	0	92.9	82.4	0	92.4	90.9
Trucks	0	0	0	0	6	6	0	5	16	0	0	21	0	4	0	4	5	13	0	0	21	3	0	24	64
% Trucks	0	0	0	0	75	75	0	15.6	5.9	0	0	6.9	0	17.4	0	14.8	21.7	17.8	0	0	7.1	17.6	0	7.6	9.1

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 3 - 20th St & East Golf Course, 7-20-16
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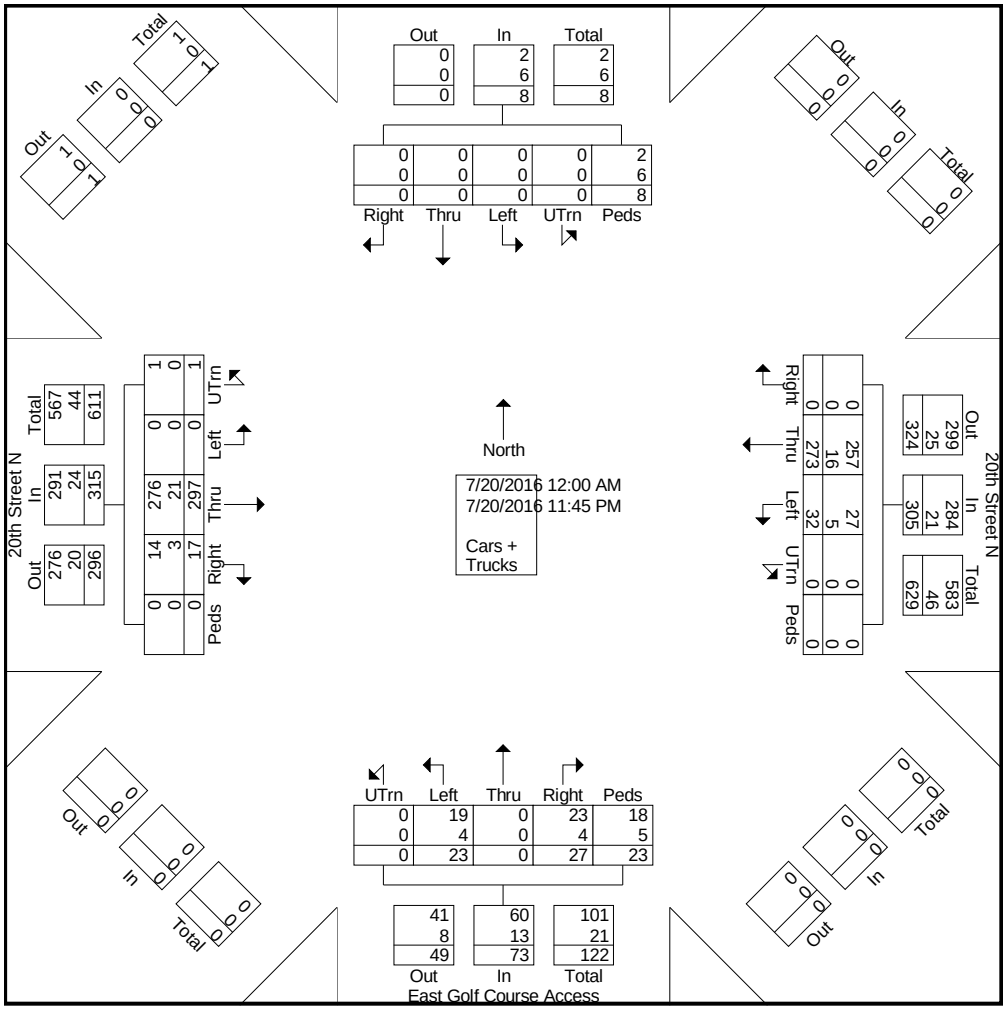

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 3 - 20th St & East Golf Course, 7-20-16
Site Code :
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	Southbound						20th Street N Westbound						East Golf Course Access Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:15 AM																									
07:15 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**9**	0	0	**9**	0	0	0	**1**	0	**1**	0	0	4	0	0	4	14
07:30 AM	0	0	0	0	**1**	**1**	0	**1**	6	0	0	7	0	0	0	0	0	0	0	0	4	0	0	4	12
07:45 AM	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	0	**8**	**1**	0	**9**	**17**
08:00 AM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	**1**	1	0	0	7	1	0	8	16
Total Volume	0	0	0	0	1	1	0	1	30	0	0	31	0	0	0	1	1	2	0	0	23	2	0	25	59
% App. Total	0	0	0	0	100		0	3.2	96.8	0	0		0	0	0	50	50		0	0	92	8	0		
PHF	.000	.000	.000	.000	.250	.250	.000	.250	.833	.000	.000	.861	.000	.000	.000	.250	.250	.500	.000	.000	.719	.500	.000	.694	.868
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 11:30 AM																									
11:30 AM	0	0	0	0	0	0	0	0	4	0	0	4	0	1	0	0	1	2	0	0	9	0	0	9	15
11:45 AM	0	0	0	0	0	0	0	1	**6**	0	0	**7**	0	**2**	0	0	**8**	**10**	0	0	**10**	0	0	**10**	**27**
12:00 PM	0	0	0	0	0	0	0	**2**	4	0	0	6	0	2	0	0	4	6	0	0	6	0	0	6	18
12:15 PM	0	0	0	0	0	0	0	1	3	0	0	4	0	1	0	0	0	1	0	0	4	0	0	4	9
Total Volume	0	0	0	0	0	0	0	4	17	0	0	21	0	6	0	0	13	19	0	0	29	0	0	29	69
% App. Total	0	0	0	0	0		0	19	81	0	0		0	31.6	0	0	68.4		0	0	100	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.500	.708	.000	.000	.750	.000	.750	.000	.000	.406	.475	.000	.000	.725	.000	.000	.725	.639
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 05:15 PM																									
05:15 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	1	0	1	0	0	5	1	0	6	11
05:30 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	2	0	2	0	0	**12**	0	0	**12**	18
05:45 PM	0	0	0	0	0	0	0	**1**	**10**	0	0	**11**	0	0	0	0	0	0	0	0	7	**2**	0	9	20
06:00 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	**4**	0	**4**	0	**8**	0	0	6	0	0	6	**22**
Total Volume	0	0	0	0	0	0	0	1	26	0	0	27	0	4	0	7	0	11	0	0	30	3	0	33	71
% App. Total	0	0	0	0	0		0	3.7	96.3	0	0		0	36.4	0	63.6	0		0	0	90.9	9.1	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.250	.650	.000	.000	.614	.000	.250	.000	.438	.000	.344	.000	.000	.625	.375	.000	.688	.807

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 3 - 20th St & East Golf Course, 7-28-16
Site Code :
Start Date : 7/28/2016
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Groups Printed- Cars + - Trucks

	Southbound						20th Street N Westbound						East Golf Course Access Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	2
12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	1	0	0	1	4
01:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
01:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
02:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
04:45 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	2
Total	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2	0	0	2	3
05:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 AM	0	0	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
05:30 AM	0	0	0	0	0	0	0	3	1	0	0	4	0	0	0	0	0	0	0	0	0	1	0	1	5
05:45 AM	0	0	0	0	0	0	0	4	1	0	0	5	0	0	0	0	0	0	0	0	2	2	0	4	9
Total	0	0	0	0	0	0	0	8	3	0	0	11	0	0	0	0	0	0	0	0	2	3	0	5	16
06:00 AM	0	0	0	0	0	0	0	1	1	0	0	2	0	0	0	1	0	1	0	0	1	0	0	1	4
06:15 AM	0	0	0	0	0	0	0	6	1	0	0	7	0	0	0	0	0	0	0	0	0	1	0	1	8
06:30 AM	0	0	0	0	1	1	0	4	0	0	0	4	0	0	0	0	0	0	0	0	1	2	0	3	8
06:45 AM	0	0	0	0	0	0	1	2	4	0	0	7	0	0	0	1	0	1	0	0	2	0	0	2	10
Total	0	0	0	0	1	1	1	13	6	0	0	20	0	0	0	2	0	2	0	0	4	3	0	7	30
07:00 AM	0	0	0	0	1	1	0	0	4	0	0	4	0	0	0	1	0	1	0	0	2	1	0	3	9
07:15 AM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4
07:30 AM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	1	0	1	0	0	5	0	0	5	13
07:45 AM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	4	0	0	4	7
Total	0	0	0	0	1	1	0	0	18	0	0	18	0	0	0	2	0	2	0	0	11	1	0	12	33

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 3 - 20th St & East Golf Course, 7-28-16
Site Code :
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Groups Printed- Cars + - Trucks

	Southbound						20th Street N Westbound						East Golf Course Access Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
08:00 AM	0	0	0	0	1	1	0	0	2	0	0	2	0	0	0	0	0	0	0	0	2	3	0	5	8
08:15 AM	0	0	0	0	0	0	0	1	3	0	0	4	0	2	0	0	0	2	0	0	2	0	0	2	8
08:30 AM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	6	0	0	6	8
08:45 AM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	1	0	1	0	0	3	0	0	3	7
Total	0	0	0	0	1	1	0	1	10	0	0	11	0	2	0	1	0	3	0	0	13	3	0	16	31
09:00 AM	0	0	0	0	1	1	0	1	3	0	0	4	0	0	0	0	0	0	0	0	4	2	0	6	11
09:15 AM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	2	0	0	2	5
09:30 AM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	5	0	0	5	10
09:45 AM	0	0	0	0	0	0	0	1	4	0	0	5	0	0	0	1	0	1	0	0	5	0	0	5	11
Total	0	0	0	0	1	1	0	2	15	0	0	17	0	0	0	1	0	1	0	0	16	2	0	18	37
10:00 AM	0	0	0	0	0	0	0	1	4	0	0	5	0	2	0	0	0	2	0	0	5	0	0	5	12
10:15 AM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	3	0	0	3	6
10:30 AM	0	0	0	0	0	0	0	1	6	0	0	7	0	0	0	0	0	0	0	0	3	0	0	3	10
10:45 AM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	1	0	1	0	0	7	2	0	9	12
Total	0	0	0	0	0	0	0	2	15	0	0	17	0	2	0	1	0	3	0	0	18	2	0	20	40
11:00 AM	0	0	0	0	0	0	0	0	10	0	0	10	0	2	0	1	0	3	0	0	1	0	0	1	14
11:15 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	4	0	0	4	5
11:30 AM	0	0	0	0	0	0	0	2	5	0	2	9	0	1	0	0	0	1	0	0	4	0	0	4	14
11:45 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	1	0	0	7	0	0	7	9
Total	0	0	0	0	0	0	0	2	17	0	2	21	0	3	0	2	0	5	0	0	16	0	0	16	42
12:00 PM	0	0	0	0	0	0	0	1	4	0	0	5	0	0	0	1	0	1	0	0	8	0	0	8	14
12:15 PM	0	0	0	0	0	0	0	2	6	0	0	8	0	1	0	0	0	1	0	0	6	2	0	8	17
12:30 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	6	0	0	6	10
12:45 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	3	1	0	4	11
Total	0	0	0	0	0	0	0	3	21	0	0	24	0	1	0	1	0	2	0	0	23	3	0	26	52
01:00 PM	0	0	0	0	0	0	0	1	8	0	0	9	0	0	0	0	0	0	0	0	5	0	0	5	14
01:15 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	1	0	1	0	2	0	0	2	0	0	2	7
01:30 PM	0	0	0	0	0	0	0	0	6	0	0	6	0	1	0	0	0	1	0	0	4	0	0	4	11
01:45 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	6	1	1	8	12
Total	0	0	0	0	0	0	0	1	21	0	0	22	0	2	0	1	0	3	0	0	17	1	1	19	44
02:00 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	9	0	0	9	11
02:15 PM	0	0	0	0	0	0	0	1	2	0	0	3	0	1	0	0	0	1	0	0	1	0	0	1	5
02:30 PM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	1	0	1	0	0	1	4	0	5	11
02:45 PM	0	0	0	0	0	0	0	3	4	0	0	7	0	3	0	3	0	6	0	0	8	2	0	10	23
Total	0	0	0	0	0	0	0	4	13	0	0	17	0	4	0	4	0	8	0	0	19	6	0	25	50
03:00 PM	0	0	0	0	0	0	0	1	6	0	0	7	0	1	0	2	0	3	0	0	4	3	0	7	17
03:15 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	3	0	4	0	7	0	0	2	0	0	2	16
03:30 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	2	0	2	0	4	0	0	6	0	0	6	14
03:45 PM	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	0	0	3	0	0	3	15
Total	0	0	0	0	0	0	0	1	29	0	0	30	0	6	0	8	0	14	0	0	15	3	0	18	62

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 3 - 20th St & East Golf Course, 7-28-16
Site Code :
Start Date : 7/28/2016
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Groups Printed- Cars + - Trucks

	Southbound						20th Street N Westbound						East Golf Course Access Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	1	5	0	0	6	0	0	0	0	0	0	0	0	6	0	0	6	12
04:15 PM	0	0	0	0	1	1	0	0	7	0	0	7	0	0	0	5	0	5	0	0	5	1	0	6	19
04:30 PM	0	0	0	0	1	1	0	0	1	0	0	1	0	0	0	2	0	2	0	0	3	0	0	3	7
04:45 PM	0	0	0	0	2	2	0	0	4	0	0	4	0	0	0	1	0	1	0	0	6	0	0	6	13
Total	0	0	0	0	4	4	0	1	17	0	0	18	0	0	0	8	0	8	0	0	20	1	0	21	51
05:00 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	1	0	0	0	1	0	0	8	0	0	8	13
05:15 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	12	0	0	12	16
05:30 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	1	0	1	0	0	9	2	0	11	14
05:45 PM	0	0	0	0	1	1	0	0	7	0	0	7	0	0	0	0	0	0	0	0	11	2	0	13	21
Total	0	0	0	0	1	1	0	0	17	0	0	17	0	1	0	1	0	2	0	0	40	4	0	44	64
06:00 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	4	0	5	0	9	0	0	5	0	0	5	16
06:15 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	1	0	1	0	2	0	0	7	0	0	7	12
06:30 PM	0	0	0	0	1	1	0	0	7	0	0	7	0	0	0	0	0	0	0	0	1	0	0	1	9
06:45 PM	0	0	0	0	1	1	0	0	5	0	0	5	0	0	0	0	0	0	1	0	3	0	0	4	10
Total	0	0	0	0	2	2	0	0	17	0	0	17	0	5	0	6	0	11	1	0	16	0	0	17	47
07:00 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	2	0	0	2	5
07:15 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	1	0	0	0	1	0	0	6	0	0	6	10
07:30 PM	0	0	0	0	0	0	0	0	5	0	0	5	0	1	0	1	0	2	0	0	4	0	0	4	11
07:45 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	3	0	0	3	5
Total	0	0	0	0	0	0	0	0	13	0	0	13	0	2	0	1	0	3	0	0	15	0	0	15	31
08:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	3
08:15 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	7	0	0	7	8
08:30 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	3	0	0	3	10
08:45 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	0	0	13	0	0	13	23
09:00 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	5	0	0	5	6
09:15 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	1	0	0	1	5
09:30 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	1	0	0	1	4
09:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	3
Total	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	0	10	0	0	10	18
10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	1	0	0	1	3
10:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
10:45 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2	0	0	2	3
Total	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	4	0	0	4	7
11:00 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
11:15 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	2
11:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
11:45 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	2
Total	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	3	0	0	3	6

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 3 - 20th St & East Golf Course, 7-28-16
Site Code :
Start Date : 7/28/2016
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Groups Printed- Cars + - Trucks

	Southbound						20th Street N Westbound						East Golf Course Access Northbound						20th Street N Eastbound						
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Grand Total	0	0	0	0	11	11	1	38	261	0	2	302	0	28	0	39	0	67	1	0	278	32	1	312	692
Apprch %	0	0	0	0	100		0.3	12.6	86.4	0	0.7		0	41.8	0	58.2	0		0.3	0	89.1	10.3	0.3		
Total %	0	0	0	0	1.6	1.6	0.1	5.5	37.7	0	0.3	43.6	0	4	0	5.6	0	9.7	0.1	0	40.2	4.6	0.1	45.1	
Cars +	0	0	0	0	4	4	1	36	246	0	2	285	0	23	0	37	0	60	1	0	269	26	1	297	646
% Cars +	0	0	0	0	36.4	36.4	100	94.7	94.3	0	100	94.4	0	82.1	0	94.9	0	89.6	100	0	96.8	81.2	100	95.2	93.4
Trucks	0	0	0	0	7	7	0	2	15	0	0	17	0	5	0	2	0	7	0	0	9	6	0	15	46
% Trucks	0	0	0	0	63.6	63.6	0	5.3	5.7	0	0	5.6	0	17.9	0	5.1	0	10.4	0	0	3.2	18.8	0	4.8	6.6

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 3 - 20th St & East Golf Course, 7-28-16
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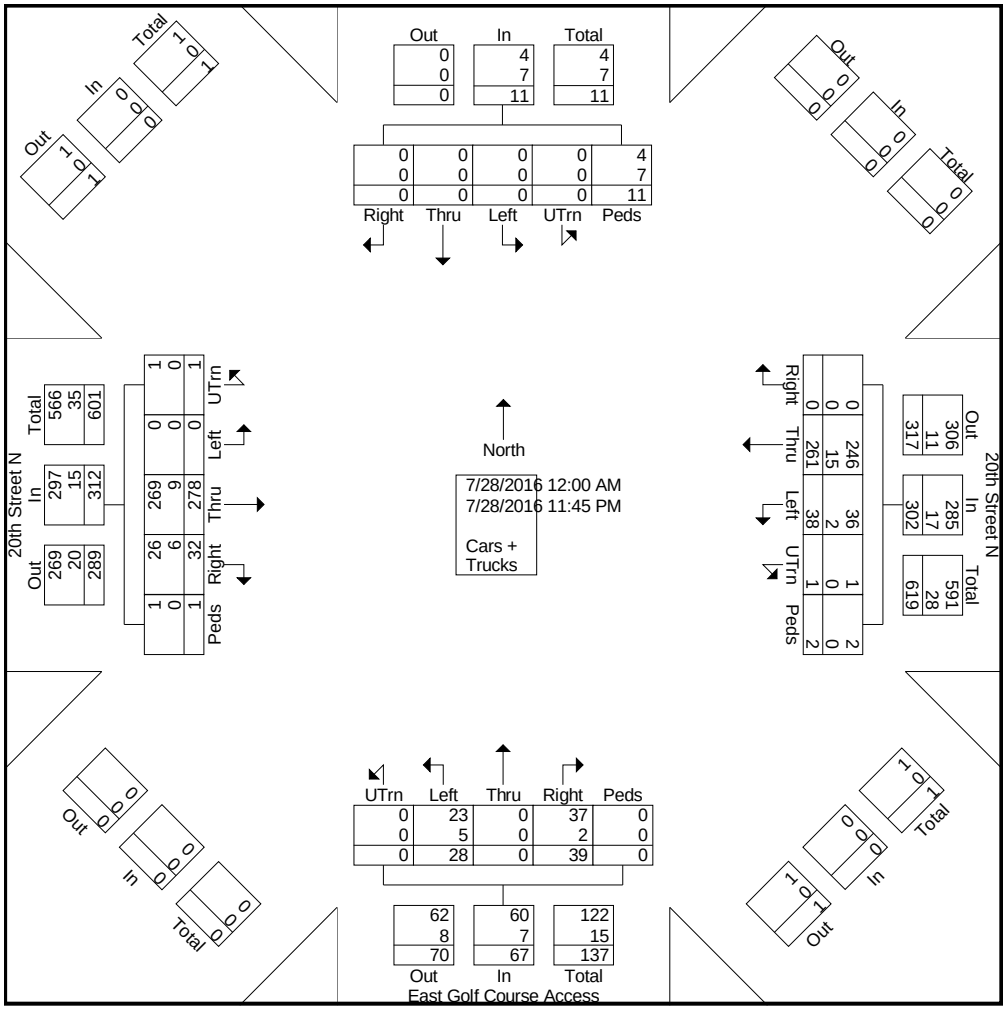

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 3 - 20th St & East Golf Course, 7-28-16
Site Code :
Start Date : 7/28/2016
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	Southbound						20th Street N Westbound						East Golf Course Access Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 09:00 AM																									
09:00 AM	**0**	**0**	**0**	**0**	1	1	0	1	3	0	0	4	0	0	0	0	0	0	0	0	4	2	0	**6**	**11**
09:15 AM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	2	0	0	2	5
09:30 AM	0	0	0	0	0	0	0	0	**5**	0	0	**5**	0	0	0	0	0	0	0	0	**5**	0	0	5	10
09:45 AM	0	0	0	0	0	0	0	1	4	0	0	5	0	0	0	**1**	0	**1**	0	0	5	0	0	5	11
Total Volume	0	0	0	0	1	1	0	2	15	0	0	17	0	0	0	1	0	1	0	0	16	2	0	18	37
% App. Total	0	0	0	0	100		0	11.8	88.2	0	0		0	0	0	100	0		0	0	88.9	11.1	0		
PHF	.000	.000	.000	.000	.250	.250	.000	.500	.750	.000	.000	.850	.000	.000	.000	.250	.000	.250	.000	.000	.800	.250	.000	.750	.841
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 11:30 AM																									
11:30 AM	0	0	0	0	0	0	0	**2**	5	0	**2**	**9**	0	**1**	0	0	0	**1**	0	0	4	0	0	4	14
11:45 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	**1**	0	1	0	0	7	0	0	7	9
12:00 PM	0	0	0	0	0	0	0	1	4	0	0	5	0	0	0	1	0	1	0	0	**8**	0	0	**8**	14
12:15 PM	0	0	0	0	0	0	0	2	**6**	0	0	8	0	1	0	0	0	1	0	0	6	**2**	0	8	**17**
Total Volume	0	0	0	0	0	0	0	5	16	0	2	23	0	2	0	2	0	4	0	0	25	2	0	27	54
% App. Total	0	0	0	0	0		0	21.7	69.6	0	8.7		0	50	0	50	0		0	0	92.6	7.4	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.625	.667	.000	.250	.639	.000	.500	.000	.500	.000	1.00	.000	.000	.781	.250	.000	.844	.794
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 02:45 PM																									
02:45 PM	0	0	0	0	0	0	0	**3**	4	0	0	**7**	0	**3**	0	3	0	6	0	0	**8**	2	0	**10**	**23**
03:00 PM	0	0	0	0	0	0	0	1	6	0	0	7	0	1	0	2	0	3	0	0	4	**3**	0	7	17
03:15 PM	0	0	0	0	0	0	0	0	**7**	0	0	7	0	3	0	**4**	0	**7**	0	0	2	0	0	2	16
03:30 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	2	0	2	0	4	0	0	6	0	0	6	14
Total Volume	0	0	0	0	0	0	0	4	21	0	0	25	0	9	0	11	0	20	0	0	20	5	0	25	70
% App. Total	0	0	0	0	0		0	16	84	0	0		0	45	0	55	0		0	0	80	20	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.333	.750	.000	.000	.893	.000	.750	.000	.688	.000	.714	.000	.000	.625	.417	.000	.625	.761

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 4 - 20th St & Manning Trail, 7-20-16
Site Code :
Start Date : 7/20/2016
Page No : 1

Groups Printed- Cars + - Trucks

	Manning Trail N Southbound						Westbound						Manning Trail N Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
01:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
01:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
02:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1
02:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1
03:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1
04:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 AM	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
04:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	1	3
05:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 AM	0	0	0	2	2	4	0	0	0	0	1	1	0	1	0	0	1	2	0	0	0	0	0	0	7
05:30 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:45 AM	0	0	0	3	0	3	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	4
Total	0	0	1	5	2	8	0	0	0	0	1	1	0	2	0	0	1	3	0	0	0	0	0	0	12
06:00 AM	0	0	2	1	1	4	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	1	6
06:15 AM	0	0	0	3	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	5
06:30 AM	0	0	0	2	0	2	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	4
06:45 AM	0	0	1	7	0	8	0	0	0	0	0	0	0	2	0	0	0	2	0	1	0	1	0	2	12
Total	0	0	3	13	2	18	0	0	0	0	0	0	0	5	0	0	0	5	0	1	0	2	1	4	27
07:00 AM	0	0	0	3	0	3	0	0	0	0	0	0	0	3	0	0	0	3	0	5	0	0	0	5	11
07:15 AM	1	0	3	8	0	12	0	0	0	0	0	0	0	3	0	0	0	3	0	3	0	1	0	4	19
07:30 AM	0	0	0	5	0	5	0	0	0	0	0	0	0	3	0	0	0	3	0	5	0	0	0	5	13
07:45 AM	0	0	0	6	0	6	0	0	0	0	0	0	0	1	0	0	1	2	0	8	0	0	1	9	17
Total	1	0	3	22	0	26	0	0	0	0	0	0	0	10	0	0	1	11	0	21	0	1	1	23	60

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 4 - 20th St & Manning Trail, 7-20-16
Site Code :
Start Date : 7/20/2016
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Groups Printed- Cars + - Trucks

	Manning Trail N Southbound						Westbound						Manning Trail N Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
08:00 AM	0	0	0	7	1	8	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	11
08:15 AM	0	0	0	4	0	4	0	0	0	0	0	0	0	3	0	0	0	3	0	5	0	0	0	5	12
08:30 AM	0	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	1	0	6	8
08:45 AM	0	0	0	2	0	2	0	0	0	0	0	0	0	0	1	0	0	1	0	3	0	1	0	4	7
Total	0	0	1	14	1	16	0	0	0	0	0	0	0	3	1	0	0	4	0	16	0	2	0	18	38
09:00 AM	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	2	0	7	9
09:15 AM	0	0	1	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	3	6
09:30 AM	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	1	0	5	9
09:45 AM	0	0	1	2	0	3	0	0	0	0	0	0	0	0	1	0	0	1	0	4	0	0	0	4	8
Total	0	0	2	10	0	12	0	0	0	0	0	0	0	0	1	0	0	1	1	14	0	4	0	19	32
10:00 AM	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	1	0	8	11
10:15 AM	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	9	13	16
10:30 AM	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	2	0	6	10
10:45 AM	0	0	0	6	0	6	0	0	0	0	0	0	0	2	2	0	0	4	0	7	0	0	0	7	17
Total	0	0	0	16	0	16	0	0	0	0	0	0	0	2	2	0	0	4	0	22	0	3	9	34	54
11:00 AM	0	0	1	1	1	3	0	0	0	0	0	0	0	2	0	0	0	2	0	3	0	2	0	5	10
11:15 AM	0	0	1	2	0	3	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	1	0	2	6
11:30 AM	0	0	1	4	0	5	0	0	0	0	0	0	0	0	1	0	0	1	0	9	0	1	1	11	17
11:45 AM	0	0	1	7	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	1	0	8	16
Total	0	0	4	14	1	19	0	0	0	0	0	0	0	2	2	0	0	4	0	20	0	5	1	26	49
12:00 PM	0	0	0	3	0	3	0	0	0	0	0	0	0	2	1	0	0	3	0	7	0	2	0	9	15
12:15 PM	0	0	1	3	0	4	0	0	0	0	0	0	0	2	0	0	0	2	0	3	0	0	0	3	9
12:30 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	8	10
12:45 PM	0	0	1	7	0	8	0	0	0	0	0	0	0	0	0	0	2	2	0	7	0	0	0	7	17
Total	0	0	2	15	0	17	0	0	0	0	0	0	0	4	1	0	2	7	0	21	0	6	0	27	51
01:00 PM	0	0	0	10	0	10	0	0	0	0	0	0	0	1	0	0	0	1	0	5	0	2	0	7	18
01:15 PM	0	0	0	1	0	1	0	0	0	0	0	0	0	1	1	0	0	2	0	6	0	1	0	7	10
01:30 PM	0	0	1	2	0	3	0	0	0	0	0	0	0	4	0	0	0	4	0	3	0	1	0	4	11
01:45 PM	0	0	2	4	0	6	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	1	8
Total	0	0	3	17	0	20	0	0	0	0	0	0	0	7	1	0	0	8	0	14	0	5	0	19	47
02:00 PM	0	0	1	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	3	6
02:15 PM	0	0	0	5	0	5	0	0	0	0	0	0	0	1	1	0	0	2	0	2	0	1	0	3	10
02:30 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	8	10
02:45 PM	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	5	9
Total	0	0	1	13	0	14	0	0	0	0	0	0	0	1	1	0	0	2	0	12	0	6	1	19	35
03:00 PM	0	0	0	3	0	3	0	0	0	0	0	0	0	2	0	0	0	2	0	3	0	1	0	4	9
03:15 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	1	1	0	0	2	0	7	0	1	0	8	12
03:30 PM	0	0	0	6	0	6	0	0	0	0	0	0	0	1	0	0	0	1	0	6	0	0	0	6	13
03:45 PM	0	0	1	6	0	7	0	0	0	0	0	0	0	0	0	0	1	1	0	7	0	0	0	7	15
Total	0	0	1	17	0	18	0	0	0	0	0	0	0	4	1	0	1	6	0	23	0	2	0	25	49

Traffic Data Inc

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St. Louis Park, MN 55416

File Name : 4 - 20th St & Manning Trail, 7-20-16
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Groups Printed- Cars + - Trucks

	Manning Trail N Southbound						Westbound						Manning Trail N Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	1	0	7	9
04:15 PM	0	0	0	4	0	4	0	0	0	0	0	0	0	1	4	0	0	5	0	1	0	3	0	4	13
04:30 PM	0	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	1	0	7	12
04:45 PM	0	0	1	3	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	1	0	7	11
Total	0	0	1	14	0	15	0	0	0	0	0	0	0	1	4	0	0	5	0	19	0	6	0	25	45
05:00 PM	0	0	0	8	0	8	0	0	0	0	0	0	0	1	1	0	0	2	0	4	0	2	0	6	16
05:15 PM	0	0	2	3	0	5	0	0	0	0	0	0	0	0	1	0	0	1	0	4	0	1	0	5	11
05:30 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	2	1	0	0	3	0	8	0	4	0	12	17
05:45 PM	0	0	1	6	0	7	0	0	0	0	0	0	0	4	1	0	0	5	0	6	0	6	0	12	24
Total	0	0	3	19	0	22	0	0	0	0	0	0	0	7	4	0	0	11	0	22	0	13	0	35	68
06:00 PM	0	0	0	3	0	3	0	0	0	0	0	0	0	3	1	0	2	6	0	6	0	0	0	6	15
06:15 PM	0	0	3	6	0	9	0	0	0	0	0	0	0	1	0	0	0	1	0	3	0	1	0	4	14
06:30 PM	0	0	1	1	0	2	0	0	0	0	0	0	0	2	0	0	0	2	0	2	0	1	0	3	7
06:45 PM	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	1	0	6	9
Total	0	0	4	13	0	17	0	0	0	0	0	0	0	6	1	0	2	9	0	16	0	3	0	19	45
07:00 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	2	1	0	1	4	0	3	0	0	0	3	9
07:15 PM	0	0	0	3	0	3	0	0	0	0	0	0	0	0	1	0	0	1	0	3	0	1	1	5	9
07:30 PM	0	0	0	3	0	3	0	0	0	0	0	0	0	0	1	0	0	1	0	3	0	0	2	5	9
07:45 PM	0	0	3	1	0	4	0	0	0	0	0	0	0	2	2	0	0	4	0	1	0	1	0	2	10
Total	0	0	3	9	0	12	0	0	0	0	0	0	0	4	5	0	1	10	0	10	0	2	3	15	37
08:00 PM	0	0	0	1	1	2	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	1	4
08:15 PM	0	0	1	3	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	5
08:30 PM	0	0	0	3	0	3	0	0	0	0	0	0	0	0	1	0	0	1	0	4	0	1	0	5	9
08:45 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	3	5
Total	0	0	1	9	1	11	0	0	0	0	0	0	0	1	1	0	0	2	0	6	0	4	0	10	23
09:00 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	1	0	0	1	2	0	3	0	1	0	4	8
09:15 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4
09:30 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	1	4
09:45 PM	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	1	3
Total	0	0	0	7	0	7	0	0	0	0	0	0	0	1	3	0	2	6	0	4	0	2	0	6	19
10:00 PM	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
10:15 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
10:30 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	4
10:45 PM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	3	4
Total	0	0	1	5	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	2	0	5	11
11:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	1	2
11:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1
11:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	2
11:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	2
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	4	0	2	0	1	0	3	7

Traffic Data Inc

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St. Louis Park, MN 55416

File Name : 4 - 20th St & Manning Trail, 7-20-16
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Groups Printed- Cars + - Trucks

	Manning Trail N Southbound						Westbound						Manning Trail N Northbound						20th Street N Eastbound						
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Grand Total	1	0	35	233	7	276	0	0	0	0	1	1	0	63	31	0	10	104	1	248	0	69	16	334	715
Apprch %	0.4	0	12.7	84.4	2.5		0	0	0	0	100		0	60.6	29.8	0	9.6		0.3	74.3	0	20.7	4.8		
Total %	0.1	0	4.9	32.6	1	38.6	0	0	0	0	0.1	0.1	0	8.8	4.3	0	1.4	14.5	0.1	34.7	0	9.7	2.2	46.7	
Cars +	1	0	35	219	4	259	0	0	0	0	1	1	0	57	30	0	9	96	1	228	0	65	2	296	652
% Cars +	100	0	100	94	57.1	93.8	0	0	0	0	100	100	0	90.5	96.8	0	90	92.3	100	91.9	0	94.2	12.5	88.6	91.2
Trucks	0	0	0	14	3	17	0	0	0	0	0	0	0	6	1	0	1	8	0	20	0	4	14	38	63
% Trucks	0	0	0	6	42.9	6.2	0	0	0	0	0	0	0	9.5	3.2	0	10	7.7	0	8.1	0	5.8	87.5	11.4	8.8

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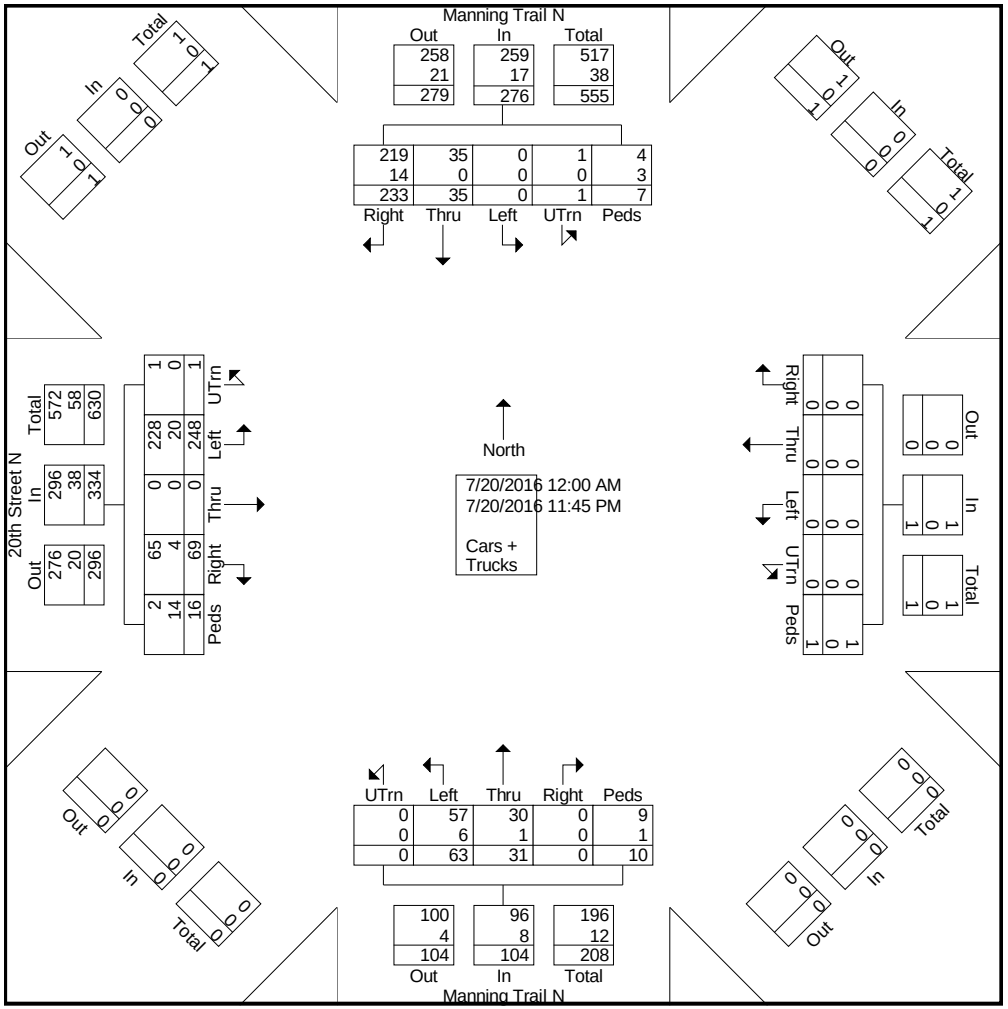

Traffic Data Inc

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St. Louis Park, MN 55416

File Name : 4 - 20th St & Manning Trail, 7-20-16
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	Manning Trail N Southbound						Westbound						Manning Trail N Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:00 AM																									
07:00 AM	**0**	**0**	**0**	**3**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	3	0	0	0	3	0	5	0	0	0	5	11
07:15 AM	1	0	3	**8**	0	**12**	0	0	0	0	0	0	0	3	0	0	0	3	0	3	0	**1**	0	4	**19**
07:30 AM	0	0	0	5	0	5	0	0	0	0	0	0	0	3	0	0	0	3	0	5	0	0	0	5	13
07:45 AM	0	0	0	6	0	6	0	0	0	0	0	0	0	1	0	0	**1**	2	0	**8**	0	0	**1**	**9**	17
Total Volume	1	0	3	22	0	26	0	0	0	0	0	0	0	10	0	0	1	11	0	21	0	1	1	23	60
% App. Total	3.8	0	11.5	84.6	0		0	0	0	0	0		0	90.9	0	0	9.1		0	91.3	0	4.3	4.3		
PHF	.250	.000	.250	.688	.000	.542	.000	.000	.000	.000	.000	.000	.000	.833	.000	.000	.250	.917	.000	.656	.000	.250	.250	.639	.789
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 11:30 AM																									
11:30 AM	0	0	**1**	4	0	5	0	0	0	0	0	0	0	0	**1**	0	0	1	0	**9**	0	1	**1**	**11**	**17**
11:45 AM	0	0	1	**7**	0	**8**	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	1	0	8	16
12:00 PM	0	0	0	3	0	3	0	0	0	0	0	0	0	**2**	1	0	0	**3**	0	7	0	**2**	0	9	15
12:15 PM	0	0	1	3	0	4	0	0	0	0	0	0	0	2	0	0	0	2	0	3	0	0	0	3	9
Total Volume	0	0	3	17	0	20	0	0	0	0	0	0	0	4	2	0	0	6	0	26	0	4	1	31	57
% App. Total	0	0	15	85	0		0	0	0	0	0		0	66.7	33.3	0	0		0	83.9	0	12.9	3.2		
PHF	.000	.000	.750	.607	.000	.625	.000	.000	.000	.000	.000	.000	.000	.500	.500	.000	.000	.500	.000	.722	.000	.500	.250	.705	.838
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 05:30 PM																									
05:30 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	2	**1**	0	0	3	0	**8**	0	4	0	**12**	17
05:45 PM	0	0	1	**6**	0	7	0	0	0	0	0	0	0	**4**	1	0	0	5	0	6	0	**6**	0	12	**24**
06:00 PM	0	0	0	3	0	3	0	0	0	0	0	0	0	3	1	0	**2**	**6**	0	6	0	0	0	6	15
06:15 PM	0	0	**3**	6	0	**9**	0	0	0	0	0	0	0	1	0	0	0	1	0	3	0	1	0	4	14
Total Volume	0	0	4	17	0	21	0	0	0	0	0	0	0	10	3	0	2	15	0	23	0	11	0	34	70
% App. Total	0	0	19	81	0		0	0	0	0	0		0	66.7	20	0	13.3		0	67.6	0	32.4	0		
PHF	.000	.000	.333	.708	.000	.583	.000	.000	.000	.000	.000	.000	.000	.625	.750	.000	.250	.625	.000	.719	.000	.458	.000	.708	.729

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Groups Printed- Cars + - Trucks

	Manning Trail N Southbound						Westbound						Manning Trail N Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
12:00 AM	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	2
Total	0	0	0	1	0	1	0	0	0	0	0	0	0	2	0	0	0	2	0	1	0	0	0	1	4
01:00 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
01:15 AM	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
01:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
02:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1
02:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1
03:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	1	2
03:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	1	2
04:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
05:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 AM	0	0	0	1	0	1	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	3
05:30 AM	0	0	2	3	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
05:45 AM	0	0	0	4	0	4	0	0	0	0	0	0	0	1	0	0	0	1	0	2	0	0	1	3	8
Total	0	0	2	8	0	10	0	0	0	0	0	0	0	3	0	0	0	3	0	2	0	0	1	3	16
06:00 AM	0	0	1	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	5
06:15 AM	0	0	0	5	0	5	0	0	0	0	1	1	0	1	0	0	0	1	0	0	0	0	1	1	8
06:30 AM	0	0	0	1	1	2	0	0	0	0	0	0	0	3	0	0	0	3	0	1	0	0	0	1	6
06:45 AM	0	0	1	3	0	4	0	0	0	0	0	0	0	5	0	0	0	5	0	3	0	1	0	4	13
Total	0	0	2	11	1	14	0	0	0	0	1	1	0	9	0	0	0	9	0	6	0	1	1	8	32
07:00 AM	0	0	3	3	0	6	0	0	0	0	0	0	0	1	0	0	1	2	0	2	0	1	0	3	11
07:15 AM	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
07:30 AM	0	0	0	7	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	1	0	5	12
07:45 AM	0	0	1	4	0	5	0	0	0	0	0	0	0	0	1	0	0	1	0	3	0	2	0	5	11
Total	0	0	4	17	0	21	0	0	0	0	0	0	0	1	1	0	1	3	0	9	0	4	0	13	37

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 4 - 20th St & Manning Trail, 7-28-16
Site Code :
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Groups Printed- Cars + - Trucks

	Manning Trail N Southbound						Westbound						Manning Trail N Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
08:00 AM	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	3	4
08:15 AM	0	0	1	3	0	4	0	0	0	0	0	0	0	1	0	0	0	1	0	2	0	0	1	3	8
08:30 AM	0	0	0	2	0	2	0	0	0	0	0	0	0	0	2	0	0	2	0	5	0	1	1	7	11
08:45 AM	0	0	0	3	0	3	0	0	0	0	0	0	0	0	1	0	0	1	0	2	0	0	0	2	6
Total	0	0	1	9	0	10	0	0	0	0	0	0	0	1	3	0	0	4	0	10	0	2	3	15	29
09:00 AM	0	0	1	4	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	1	5	10
09:15 AM	0	0	2	2	0	4	0	0	0	0	0	0	0	1	0	0	0	1	0	2	0	0	0	2	7
09:30 AM	0	0	0	3	0	3	0	0	0	0	0	0	0	2	0	0	0	2	0	5	0	1	0	6	11
09:45 AM	0	0	0	5	0	5	0	0	0	0	0	0	0	2	1	0	0	3	0	2	0	5	0	7	15
Total	0	0	3	14	0	17	0	0	0	0	0	0	0	5	1	0	0	6	0	12	0	7	1	20	43
10:00 AM	0	0	0	3	0	3	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	4	0	5	9
10:15 AM	0	0	0	2	0	2	0	0	0	0	0	0	0	1	1	0	2	4	0	2	0	1	0	3	9
10:30 AM	0	0	0	4	0	4	0	0	0	0	0	0	0	2	0	0	0	2	0	1	0	0	0	1	7
10:45 AM	0	0	0	3	0	3	0	0	0	0	0	0	0	1	2	0	0	3	0	7	0	2	0	9	15
Total	0	0	0	12	0	12	0	0	0	0	0	0	0	5	3	0	2	10	0	11	0	7	0	18	40
11:00 AM	0	0	0	9	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	11
11:15 AM	0	0	1	3	0	4	0	0	0	0	0	0	0	1	0	0	0	1	0	4	0	0	1	5	10
11:30 AM	0	0	1	3	0	4	0	0	0	0	0	0	0	1	1	0	0	2	0	4	0	0	0	4	10
11:45 AM	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	2	3	0	5	0	3	0	8	12
Total	0	0	2	16	0	18	0	0	0	0	0	0	0	2	2	0	2	6	0	13	0	5	1	19	43
12:00 PM	0	0	1	5	0	6	0	0	0	0	0	0	0	1	2	0	0	3	0	8	0	2	0	10	19
12:15 PM	0	0	3	6	0	9	0	0	0	0	0	0	0	2	1	0	0	3	0	4	0	2	0	6	18
12:30 PM	0	0	0	3	0	3	0	0	0	0	0	0	0	1	0	0	0	1	0	6	0	0	0	6	10
12:45 PM	0	0	0	5	0	5	0	0	0	0	0	0	0	1	1	0	0	2	0	2	0	1	0	3	10
Total	0	0	4	19	0	23	0	0	0	0	0	0	0	5	4	0	0	9	0	20	0	5	0	25	57
01:00 PM	0	0	1	5	0	6	0	0	0	0	0	0	0	3	0	0	0	3	0	5	0	0	0	5	14
01:15 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	1	0	0	0	1	0	3	0	2	0	5	8
01:30 PM	0	0	0	3	0	3	0	0	0	0	0	0	0	3	1	0	0	4	0	3	0	1	0	4	11
01:45 PM	0	0	0	3	0	3	0	0	0	0	0	0	0	1	1	0	0	2	0	4	0	2	0	6	11
Total	0	0	1	13	0	14	0	0	0	0	0	0	0	8	2	0	0	10	0	15	0	5	0	20	44
02:00 PM	0	0	2	2	0	4	0	0	0	0	0	0	0	0	1	0	0	1	0	8	0	1	0	9	14
02:15 PM	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	4
02:30 PM	0	0	0	3	0	3	0	0	0	0	0	0	0	2	0	0	0	2	0	1	0	1	0	2	7
02:45 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	6	0	0	0	6	0	2	0	9	0	11	19
Total	0	0	2	10	0	12	0	0	0	0	0	0	0	8	1	0	0	9	0	12	0	11	0	23	44
03:00 PM	0	0	0	3	0	3	0	0	0	0	0	0	0	4	1	0	0	5	1	5	0	0	0	6	14
03:15 PM	0	0	0	5	0	5	0	0	0	0	0	0	0	1	0	0	0	1	0	6	0	0	0	6	12
03:30 PM	0	0	1	3	0	4	0	0	0	0	0	0	0	2	0	0	0	2	0	4	0	4	0	8	14
03:45 PM	0	0	1	7	0	8	0	0	0	0	0	0	0	4	2	0	0	6	0	3	0	0	0	3	17
Total	0	0	2	18	0	20	0	0	0	0	0	0	0	11	3	0	0	14	1	18	0	4	0	23	57

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 4 - 20th St & Manning Trail, 7-28-16
Site Code :
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Groups Printed- Cars + - Trucks

	Manning Trail N Southbound						Westbound						Manning Trail N Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	0	1	7	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	2	0	6	14
04:15 PM	0	0	0	5	0	5	0	0	0	0	0	0	0	2	0	0	0	2	0	4	0	6	0	10	17
04:30 PM	0	0	1	1	1	3	0	0	0	0	0	0	0	1	1	0	0	2	0	1	0	3	1	5	10
04:45 PM	0	0	1	4	0	5	0	0	0	0	0	0	0	1	1	0	0	2	0	7	0	0	0	7	14
Total	0	0	3	17	1	21	0	0	0	0	0	0	0	4	2	0	0	6	0	16	0	11	1	28	55
05:00 PM	0	0	1	3	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	3	1	8	12
05:15 PM	0	0	2	2	0	4	0	0	0	0	0	0	0	2	1	0	0	3	0	10	0	3	0	13	20
05:30 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	2	0	0	0	2	0	8	0	2	0	10	14
05:45 PM	0	0	1	4	1	6	0	0	0	0	0	0	0	1	2	0	0	3	0	8	0	3	0	11	20
Total	0	0	4	11	1	16	0	0	0	0	0	0	0	5	3	0	0	8	0	30	0	11	1	42	66
06:00 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	1	0	10	12
06:15 PM	0	0	3	3	0	6	0	0	0	0	0	0	0	0	3	0	0	3	0	4	0	3	1	8	17
06:30 PM	0	0	0	5	0	5	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	1	0	1	9
06:45 PM	0	0	1	2	0	3	0	0	0	0	0	0	0	2	0	0	0	2	0	4	0	0	0	4	9
Total	0	0	4	12	0	16	0	0	0	0	0	0	0	5	3	0	0	8	0	17	0	5	1	23	47
07:00 PM	0	0	1	2	0	3	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	2	0	2	6
07:15 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	1	0	0	0	1	0	4	0	1	0	5	8
07:30 PM	0	0	0	4	0	4	0	0	0	0	0	0	0	1	2	0	0	3	0	3	0	3	0	6	13
07:45 PM	0	0	0	1	0	1	0	0	0	0	0	0	0	1	1	0	0	2	0	2	0	1	0	3	6
Total	0	0	1	9	0	10	0	0	0	0	0	0	0	4	3	0	0	7	0	9	0	7	0	16	33
08:00 PM	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	2	0	1	1	4	6
08:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	4	0	7	7
08:30 PM	0	0	0	4	0	4	0	0	0	0	0	0	0	3	0	0	0	3	0	3	0	0	0	3	10
08:45 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	3
Total	0	0	1	6	0	7	0	0	0	0	0	0	0	4	1	0	0	5	0	8	0	5	1	14	26
09:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	4	0	5	0	0	0	5	9
09:15 PM	0	0	0	3	0	3	0	0	0	0	0	0	0	2	0	0	0	2	0	1	0	0	0	1	6
09:30 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
09:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2
Total	0	0	0	5	0	5	0	0	0	0	0	0	0	3	3	0	0	6	0	8	0	0	0	8	19
10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	3
10:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
10:45 PM	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	3
Total	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	7
11:00 PM	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
11:15 PM	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
11:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
11:45 PM	0	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	3
Total	0	0	1	3	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	3	7

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 4 - 20th St & Manning Trail, 7-28-16
Site Code :
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Groups Printed- Cars + - Trucks

	Manning Trail N Southbound						Westbound						Manning Trail N Northbound						20th Street N Eastbound						
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Grand Total	0	0	38	215	3	256	0	0	0	0	1	1	0	86	36	0	5	127	1	224	0	92	11	328	712
Apprch %	0	0	14.8	84	1.2		0	0	0	0	100		0	67.7	28.3	0	3.9		0.3	68.3	0	28	3.4		
Total %	0	0	5.3	30.2	0.4	36	0	0	0	0	0.1	0.1	0	12.1	5.1	0	0.7	17.8	0.1	31.5	0	12.9	1.5	46.1	
Cars +	0	0	34	202	0	236	0	0	0	0	1	1	0	81	29	0	5	115	1	214	0	88	4	307	659
% Cars +	0	0	89.5	94	0	92.2	0	0	0	0	100	100	0	94.2	80.6	0	100	90.6	100	95.5	0	95.7	36.4	93.6	92.6
Trucks	0	0	4	13	3	20	0	0	0	0	0	0	0	5	7	0	0	12	0	10	0	4	7	21	53
% Trucks	0	0	10.5	6	100	7.8	0	0	0	0	0	0	0	5.8	19.4	0	0	9.4	0	4.5	0	4.3	63.6	6.4	7.4

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 4 - 20th St & Manning Trail, 7-28-16
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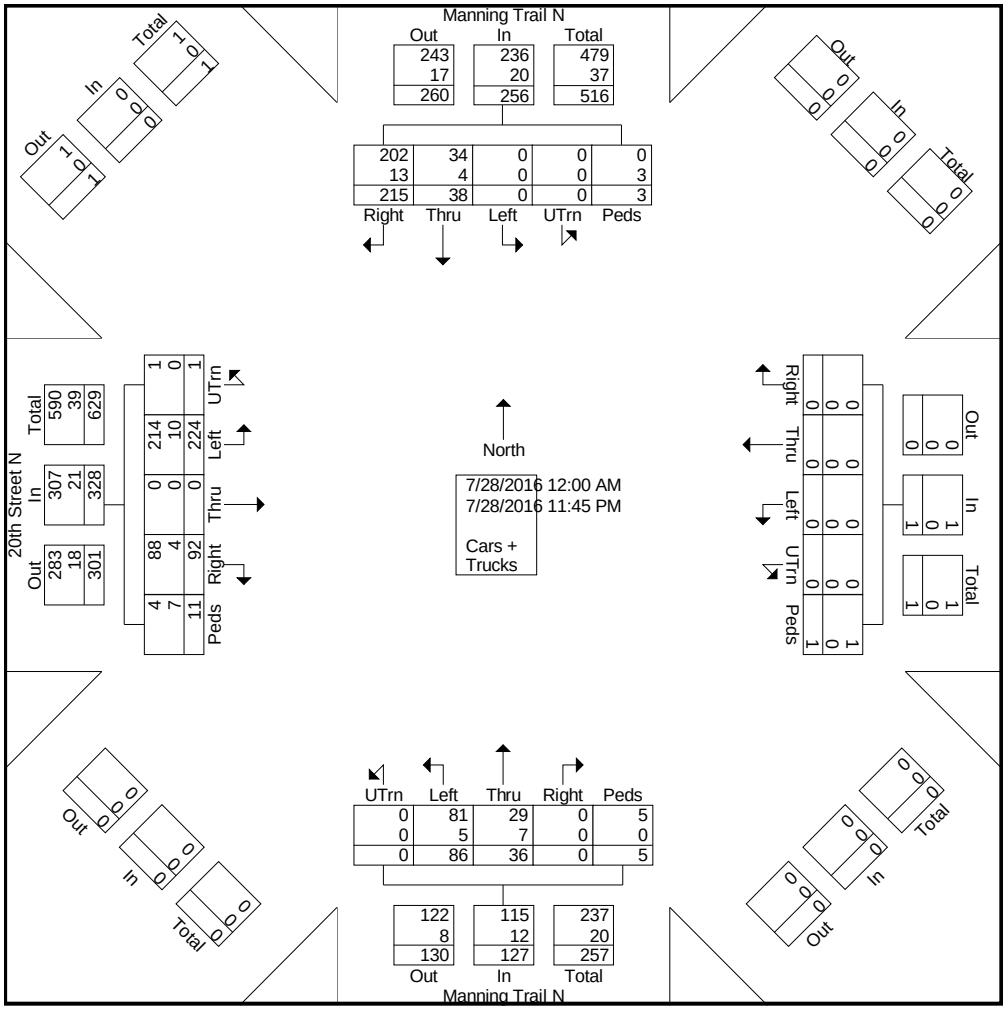

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 4 - 20th St & Manning Trail, 7-28-16
Site Code :
Start Date : 7/28/2016
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	Manning Trail N Southbound						Westbound						Manning Trail N Northbound						20th Street N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 09:00 AM																									
09:00 AM	**0**	**0**	**1**	**4**	**0**	5	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	1	5	10
09:15 AM	0	0	2	2	0	4	0	0	0	0	0	0	0	1	0	0	0	1	0	2	0	0	0	2	7
09:30 AM	0	0	0	3	0	3	0	0	0	0	0	0	0	2	0	0	0	2	0	**5**	0	1	0	6	11
09:45 AM	0	0	0	**5**	0	5	0	0	0	0	0	0	0	2	**1**	0	0	**3**	0	2	0	**5**	0	**7**	**15**
Total Volume	0	0	3	14	0	17	0	0	0	0	0	0	0	5	1	0	0	6	0	12	0	7	1	20	43
% App. Total	0	0	17.6	82.4	0		0	0	0	0	0		0	83.3	16.7	0	0		0	60	0	35	5		
PHF	.000	.000	.375	.700	.000	.850	.000	.000	.000	.000	.000	.000	.000	.625	.250	.000	.000	.500	.000	.600	.000	.350	.250	.714	.717
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 11:30 AM																									
11:30 AM	0	0	1	3	0	4	0	0	0	0	0	0	0	1	1	0	0	2	0	4	0	0	0	4	10
11:45 AM	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	**2**	**3**	0	5	0	**3**	0	8	12
12:00 PM	0	0	1	5	0	6	0	0	0	0	0	0	0	1	**2**	0	0	3	0	**8**	0	2	0	**10**	**19**
12:15 PM	0	0	**3**	**6**	0	**9**	0	0	0	0	0	0	0	**2**	1	0	0	3	0	4	0	2	0	6	18
Total Volume	0	0	5	15	0	20	0	0	0	0	0	0	0	4	5	0	2	11	0	21	0	7	0	28	59
% App. Total	0	0	25	75	0		0	0	0	0	0		0	36.4	45.5	0	18.2		0	75	0	25	0		
PHF	.000	.000	.417	.625	.000	.556	.000	.000	.000	.000	.000	.000	.000	.500	.625	.000	.250	.917	.000	.656	.000	.583	.000	.700	.776
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 05:00 PM																									
05:00 PM	0	0	1	3	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	**3**	**1**	8	12
05:15 PM	0	0	**2**	2	0	4	0	0	0	0	0	0	0	**2**	1	0	0	**3**	0	**10**	0	3	0	**13**	**20**
05:30 PM	0	0	0	2	0	2	0	0	0	0	0	0	0	2	0	0	0	2	0	8	0	2	0	10	14
05:45 PM	0	0	1	**4**	**1**	**6**	0	0	0	0	0	0	0	1	**2**	0	0	3	0	8	0	3	0	11	20
Total Volume	0	0	4	11	1	16	0	0	0	0	0	0	0	5	3	0	0	8	0	30	0	11	1	42	66
% App. Total	0	0	25	68.8	6.2		0	0	0	0	0		0	62.5	37.5	0	0		0	71.4	0	26.2	2.4		
PHF	.000	.000	.500	.688	.250	.667	.000	.000	.000	.000	.000	.000	.000	.625	.375	.000	.000	.667	.000	.750	.000	.917	.250	.808	.825

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 5 - Lake Elmo Ave & Park Access, 7-20-16
Site Code :
Start Date : 7/20/2016
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Groups Printed- Cars + - Trucks

	Lake Elmo Avenue N Southbound						Park Access Westbound						Lake Elmo Avenue N Northbound						Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
12:00 AM	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1
12:30 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
12:45 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	4	0	0	4	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	5
01:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
04:15 AM	0	0	2	0	0	2	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	3
04:30 AM	0	0	3	0	0	3	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	4
04:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	6	0	0	6	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	8
05:00 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	3
05:15 AM	0	0	6	0	0	6	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	7
05:30 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	4
05:45 AM	0	0	2	0	0	2	0	0	0	0	1	1	0	0	1	0	0	1	0	0	0	0	1	1	5
Total	0	0	10	0	0	10	0	0	0	0	1	1	0	0	7	0	0	7	0	0	0	0	1	1	19
06:00 AM	0	0	6	0	0	6	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	1	8
06:15 AM	0	0	10	0	0	10	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	1	12
06:30 AM	0	0	11	0	0	11	0	0	0	0	1	1	0	0	8	0	0	8	0	0	0	0	1	1	21
06:45 AM	0	0	14	0	0	14	0	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	24
Total	0	0	41	0	0	41	0	0	0	0	1	1	0	0	20	0	0	20	0	0	0	0	3	3	65
07:00 AM	0	0	15	0	0	15	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	20
07:15 AM	0	0	20	0	0	20	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	32
07:30 AM	0	1	12	0	0	13	0	0	0	0	6	6	0	0	10	3	0	13	0	0	0	0	0	0	32
07:45 AM	0	0	22	0	0	22	0	1	0	0	0	1	0	0	21	0	0	21	0	0	0	0	0	0	44
Total	0	1	69	0	0	70	0	1	0	0	6	7	0	0	48	3	0	51	0	0	0	0	0	0	128

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 5 - Lake Elmo Ave & Park Access, 7-20-16
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Groups Printed- Cars + - Trucks

	Lake Elmo Avenue N Southbound						Park Access Westbound						Lake Elmo Avenue N Northbound						Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
08:00 AM	0	1	20	0	0	21	0	1	0	0	3	4	0	0	14	3	0	17	0	0	0	0	0	0	42
08:15 AM	0	6	10	0	0	16	0	0	0	0	0	0	0	0	11	12	0	23	0	0	0	0	1	1	40
08:30 AM	0	0	16	0	0	16	0	2	0	0	0	2	0	0	13	7	0	20	0	0	0	0	0	0	38
08:45 AM	0	1	17	0	0	18	0	1	0	0	0	1	0	0	9	3	0	12	0	0	0	0	0	0	31
Total	0	8	63	0	0	71	0	4	0	0	3	7	0	0	47	25	0	72	0	0	0	0	1	1	151
09:00 AM	0	0	12	0	0	12	0	1	0	0	0	1	0	0	5	0	0	5	0	0	0	0	0	0	18
09:15 AM	0	0	10	0	0	10	0	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	20
09:30 AM	0	0	11	0	0	11	0	1	0	0	0	1	0	0	10	1	0	11	0	0	0	0	0	0	23
09:45 AM	0	0	7	0	0	7	0	1	0	0	1	2	0	0	11	0	0	11	0	0	0	0	0	0	20
Total	0	0	40	0	0	40	0	3	0	0	1	4	0	0	36	1	0	37	0	0	0	0	0	0	81
10:00 AM	0	0	12	0	0	12	0	1	0	0	0	1	0	0	6	0	0	6	0	0	0	0	0	0	19
10:15 AM	0	0	10	0	0	10	0	1	0	0	0	1	0	0	13	0	0	13	0	0	0	0	0	0	24
10:30 AM	0	0	9	0	0	9	0	0	0	0	1	1	0	0	12	7	0	19	0	0	0	0	0	0	29
10:45 AM	0	0	14	0	0	14	0	1	0	0	0	1	0	0	14	0	0	14	0	0	0	0	0	0	29
Total	0	0	45	0	0	45	0	3	0	0	1	4	0	0	45	7	0	52	0	0	0	0	0	0	101
11:00 AM	0	1	11	0	0	12	0	3	0	1	0	4	0	0	13	0	0	13	0	0	0	0	0	0	29
11:15 AM	0	0	16	0	0	16	0	1	0	0	0	1	0	0	14	1	0	15	0	0	0	0	0	0	32
11:30 AM	0	0	13	0	0	13	0	2	0	0	0	2	0	0	16	1	0	17	0	0	0	0	1	1	33
11:45 AM	0	0	10	0	0	10	0	1	0	0	0	1	0	0	23	1	0	24	0	0	0	0	0	0	35
Total	0	1	50	0	0	51	0	7	0	1	0	8	0	0	66	3	0	69	0	0	0	0	1	1	129
12:00 PM	0	0	14	0	0	14	0	0	0	0	0	0	0	0	21	1	0	22	0	0	0	0	0	0	36
12:15 PM	0	0	11	0	0	11	0	0	0	0	0	0	0	0	21	0	0	21	0	0	0	0	0	0	32
12:30 PM	0	0	16	0	0	16	0	0	0	0	0	0	0	0	15	1	0	16	0	0	0	0	0	0	32
12:45 PM	0	0	18	0	0	18	1	2	0	0	1	4	0	0	10	0	0	10	0	0	0	0	1	1	33
Total	0	0	59	0	0	59	1	2	0	0	1	4	0	0	67	2	0	69	0	0	0	0	1	1	133
01:00 PM	0	0	17	0	0	17	0	0	0	0	0	0	0	0	14	1	0	15	0	0	0	0	1	1	33
01:15 PM	0	0	18	0	0	18	0	4	0	2	0	6	0	0	13	0	0	13	0	0	0	0	0	0	37
01:30 PM	0	0	12	0	0	12	0	1	0	0	0	1	0	0	14	0	0	14	0	0	0	0	0	0	27
01:45 PM	0	0	10	0	0	10	0	0	0	0	0	0	0	0	15	0	0	15	0	0	0	0	0	0	25
Total	0	0	57	0	0	57	0	5	0	2	0	7	0	0	56	1	0	57	0	0	0	0	1	1	122
02:00 PM	0	0	17	0	0	17	0	1	0	0	0	1	0	0	13	1	0	14	0	0	0	0	0	0	32
02:15 PM	0	0	11	0	0	11	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	17
02:30 PM	0	0	10	0	0	10	0	0	0	0	2	2	0	0	15	12	0	27	0	0	0	0	0	0	39
02:45 PM	0	0	14	0	0	14	0	0	0	0	0	0	0	0	12	2	0	14	0	0	0	0	0	0	28
Total	0	0	52	0	0	52	0	1	0	0	2	3	0	0	46	15	0	61	0	0	0	0	0	0	116
03:00 PM	0	0	13	0	0	13	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	1	1	25
03:15 PM	0	0	10	0	0	10	0	20	0	13	1	34	0	0	18	0	0	18	0	0	0	0	0	0	62
03:30 PM	0	0	26	0	0	26	0	2	0	1	0	3	0	0	19	0	0	19	0	0	0	0	0	0	48
03:45 PM	0	0	14	0	0	14	0	2	0	0	0	2	0	0	21	0	0	21	0	0	0	0	1	1	38
Total	0	0	63	0	0	63	0	24	0	14	1	39	0	0	69	0	0	69	0	0	0	0	2	2	173

Traffic Data Inc

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St. Louis Park, MN 55416

File Name : 5 - Lake Elmo Ave & Park Access, 7-20-16
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Groups Printed- Cars + - Trucks

	Lake Elmo Avenue N Southbound						Park Access Westbound						Lake Elmo Avenue N Northbound						Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	0	22	0	0	22	0	0	0	0	0	0	0	0	30	0	0	30	0	0	0	0	0	0	52
04:15 PM	0	2	16	0	0	18	0	0	0	1	0	1	0	0	18	0	0	18	0	0	0	0	0	0	37
04:30 PM	0	0	27	0	0	27	0	1	0	0	0	1	0	0	20	0	0	20	0	0	0	0	0	0	48
04:45 PM	0	1	12	0	0	13	0	0	0	0	0	0	0	0	32	0	0	32	0	0	0	0	0	0	45
Total	0	3	77	0	0	80	0	1	0	1	0	2	0	0	100	0	0	100	0	0	0	0	0	0	182
05:00 PM	0	0	17	0	0	17	0	0	0	0	0	0	0	0	17	0	0	17	0	0	0	0	0	0	34
05:15 PM	0	0	20	0	0	20	0	0	0	0	0	0	0	0	19	0	0	19	0	0	0	0	0	0	39
05:30 PM	1	0	16	0	0	17	0	0	0	0	0	0	0	0	33	0	0	33	0	0	0	0	0	0	50
05:45 PM	0	0	21	0	0	21	0	0	0	0	0	0	0	0	19	0	0	19	0	0	0	0	0	0	40
Total	1	0	74	0	0	75	0	0	0	0	0	0	0	0	88	0	0	88	0	0	0	0	0	0	163
06:00 PM	1	1	16	0	0	18	0	1	0	0	0	1	0	0	20	0	0	20	0	0	0	0	0	0	39
06:15 PM	0	0	17	0	0	17	0	0	0	0	0	0	0	0	16	0	0	16	0	0	0	0	0	0	33
06:30 PM	0	0	7	0	0	7	0	0	0	0	0	0	0	0	21	0	0	21	0	0	0	0	0	0	28
06:45 PM	0	0	7	0	0	7	0	0	0	0	0	0	0	0	15	0	0	15	0	0	0	0	0	0	22
Total	1	1	47	0	0	49	0	1	0	0	0	1	0	0	72	0	0	72	0	0	0	0	0	0	122
07:00 PM	0	0	7	0	0	7	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	1	1	20
07:15 PM	0	0	7	0	0	7	0	0	0	0	0	0	0	0	15	0	0	15	0	0	0	0	2	2	24
07:30 PM	0	0	15	0	0	15	0	0	0	0	2	2	0	0	11	0	0	11	0	0	0	0	0	0	28
07:45 PM	0	0	11	0	0	11	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	23
Total	0	0	40	0	0	40	0	0	0	0	2	2	0	0	50	0	0	50	0	0	0	0	3	3	95
08:00 PM	0	0	9	0	0	9	0	0	0	0	0	0	0	0	16	0	0	16	0	0	0	0	0	0	25
08:15 PM	0	0	9	0	0	9	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	17
08:30 PM	0	0	8	0	0	8	0	0	0	0	0	0	0	0	13	0	0	13	0	0	0	0	0	0	21
08:45 PM	0	0	6	0	0	6	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	17
Total	0	0	32	0	0	32	0	0	0	0	0	0	0	0	48	0	0	48	0	0	0	0	0	0	80
09:00 PM	0	0	10	0	0	10	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	21
09:15 PM	0	0	8	0	0	8	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	11
09:30 PM	0	0	6	0	0	6	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	11
09:45 PM	0	0	6	0	0	6	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	9
Total	0	0	30	0	0	30	0	0	0	0	0	0	0	0	22	0	0	22	0	0	0	0	0	0	52
10:00 PM	0	0	3	0	0	3	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	6
10:15 PM	0	0	10	0	0	10	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	13
10:30 PM	0	0	5	0	0	5	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	11
10:45 PM	0	0	3	0	0	3	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	7
Total	0	0	21	0	0	21	0	0	0	0	0	0	0	0	16	0	0	16	0	0	0	0	0	0	37
11:00 PM	0	0	4	0	0	4	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	7
11:15 PM	0	0	2	0	0	2	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4
11:30 PM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	3
11:45 PM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2
Total	0	0	8	0	0	8	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	16

Traffic Data Inc

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File Name : 5 - Lake Elmo Ave & Park Access, 7-20-16
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Groups Printed- Cars + - Trucks

	Lake Elmo Avenue N Southbound						Park Access Westbound						Lake Elmo Avenue N Northbound						Eastbound						
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Grand Total	2	14	888	0	0	904	1	52	0	18	19	90	0	0	914	57	0	971	0	0	0	0	13	13	1978
Apprch %	0.2	1.5	98.2	0	0		1.1	57.8	0	20	21.1		0	0	94.1	5.9	0		0	0	0	0	100		
Total %	0.1	0.7	44.9	0	0	45.7	0.1	2.6	0	0.9	1	4.6	0	0	46.2	2.9	0	49.1	0	0	0	0	0.7	0.7	
Cars +	2	12	850	0	0	864	1	48	0	17	13	79	0	0	868	52	0	920	0	0	0	0	1	1	1864
% Cars +	100	85.7	95.7	0	0	95.6	100	92.3	0	94.4	68.4	87.8	0	0	95	91.2	0	94.7	0	0	0	0	7.7	7.7	94.2
Trucks	0	2	38	0	0	40	0	4	0	1	6	11	0	0	46	5	0	51	0	0	0	0	12	12	114
% Trucks	0	14.3	4.3	0	0	4.4	0	7.7	0	5.6	31.6	12.2	0	0	5	8.8	0	5.3	0	0	0	0	92.3	92.3	5.8

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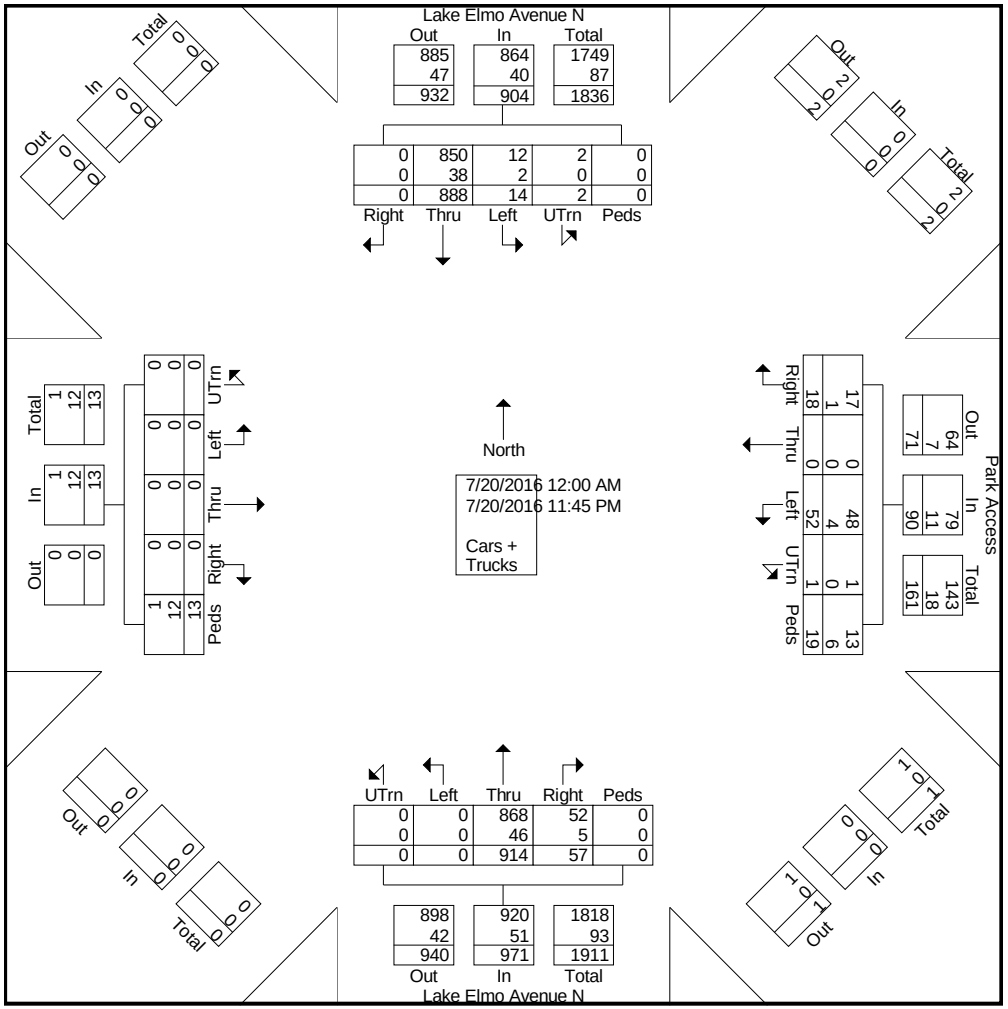

Traffic Data Inc

PO Box 16269
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File Name : 5 - Lake Elmo Ave & Park Access, 7-20-16
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	Lake Elmo Avenue N Southbound						Park Access Westbound						Lake Elmo Avenue N Northbound						Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:45 AM																									
07:45 AM	**0**	**0**	22	0	0	22	0	1	0	0	0	1	0	0	21	0	0	21	0	0	0	0	0	0	44
08:00 AM	0	1	20	0	0	21	0	1	0	0	**3**	**4**	0	0	14	3	0	17	0	0	0	0	0	0	42
08:15 AM	0	**6**	10	0	0	16	0	0	0	0	0	0	0	0	11	**12**	0	**23**	0	0	0	0	**1**	**1**	40
08:30 AM	0	0	16	0	0	16	0	**2**	0	0	0	2	0	0	13	7	0	20	0	0	0	0	0	0	38
Total Volume	0	7	68	0	0	75	0	4	0	0	3	7	0	0	59	22	0	81	0	0	0	0	1	1	164
% App. Total	0	9.3	90.7	0	0		0	57.1	0	0	42.9		0	0	72.8	27.2	0		0	0	0	0	100		
PHF	.000	.292	.773	.000	.000	.852	.000	.500	.000	.000	.250	.438	.000	.000	.702	.458	.000	.880	.000	.000	.000	.000	.250	.250	.932
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 11:15 AM																									
11:15 AM	0	0	**16**	0	0	**16**	0	1	0	0	0	1	0	0	14	**1**	0	15	0	0	0	0	0	0	32
11:30 AM	0	0	13	0	0	13	0	**2**	0	0	0	**2**	0	0	16	1	0	17	0	0	0	0	**1**	**1**	33
11:45 AM	0	0	10	0	0	10	0	1	0	0	0	1	0	0	**23**	1	0	**24**	0	0	0	0	0	0	35
12:00 PM	0	0	14	0	0	14	0	0	0	0	0	0	0	0	21	1	0	22	0	0	0	0	0	0	**36**
Total Volume	0	0	53	0	0	53	0	4	0	0	0	4	0	0	74	4	0	78	0	0	0	0	1	1	136
% App. Total	0	0	100	0	0		0	100	0	0	0		0	0	94.9	5.1	0		0	0	0	0	100		
PHF	.000	.000	.828	.000	.000	.828	.000	.500	.000	.000	.000	.500	.000	.000	.804	1.00	.000	.813	.000	.000	.000	.000	.250	.250	.944
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 03:15 PM																									
03:15 PM	0	0	10	0	0	10	0	**20**	0	**13**	**1**	**34**	0	0	18	0	0	18	0	0	0	0	0	0	**62**
03:30 PM	0	0	**26**	0	0	**26**	0	2	0	1	0	3	0	0	19	0	0	19	0	0	0	0	0	0	48
03:45 PM	0	0	14	0	0	14	0	2	0	0	0	2	0	0	21	0	0	21	0	0	0	0	**1**	**1**	38
04:00 PM	0	0	22	0	0	22	0	0	0	0	0	0	0	0	**30**	0	0	**30**	0	0	0	0	0	0	52
Total Volume	0	0	72	0	0	72	0	24	0	14	1	39	0	0	88	0	0	88	0	0	0	0	1	1	200
% App. Total	0	0	100	0	0		0	61.5	0	35.9	2.6		0	0	100	0	0		0	0	0	0	100		
PHF	.000	.000	.692	.000	.000	.692	.000	.300	.000	.269	.250	.287	.000	.000	.733	.000	.000	.733	.000	.000	.000	.000	.250	.250	.806

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 5 - Lake Elmo Ave & Park Access, 7-21-16
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Groups Printed- Cars + - Trucks

	Lake Elmo Avenue N Southbound						Park Access Westbound						Lake Elmo Avenue N Northbound						Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
12:00 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	4
12:15 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	3
12:30 AM	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
12:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1
Total	0	0	5	0	0	5	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	11
01:00 AM	0	0	4	0	0	4	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	5
01:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	4	0	0	4	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	5
02:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 AM	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
03:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
04:00 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
04:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:00 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2
05:15 AM	0	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
05:30 AM	0	0	3	0	0	3	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	7
05:45 AM	0	0	5	0	0	5	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	6
Total	0	0	13	0	0	13	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	19
06:00 AM	0	0	5	0	0	5	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	9
06:15 AM	0	0	8	0	0	8	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	11
06:30 AM	0	0	13	0	0	13	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	20
06:45 AM	0	0	14	0	0	14	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	20
Total	0	0	40	0	0	40	0	0	0	0	0	0	0	0	20	0	0	20	0	0	0	0	0	0	60
07:00 AM	0	0	9	0	0	9	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	1	1	18
07:15 AM	0	1	15	0	0	16	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	23
07:30 AM	0	0	19	0	0	19	0	0	0	1	0	1	0	0	13	0	0	13	0	0	0	0	0	0	33
07:45 AM	0	0	26	0	0	26	0	0	0	0	0	0	0	0	20	0	0	20	0	0	0	0	0	0	46
Total	0	1	69	0	0	70	0	0	0	1	0	1	0	0	48	0	0	48	0	0	0	0	1	1	120

Traffic Data Inc

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File Name : 5 - Lake Elmo Ave & Park Access, 7-21-16
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Groups Printed- Cars + - Trucks

	Lake Elmo Avenue N Southbound						Park Access Westbound						Lake Elmo Avenue N Northbound						Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
08:00 AM	0	0	15	0	0	15	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	23
08:15 AM	0	0	9	0	0	9	0	0	0	0	0	0	0	0	15	0	0	15	0	0	0	0	1	1	25
08:30 AM	0	0	16	0	0	16	0	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	26
08:45 AM	0	0	8	0	0	8	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	16
Total	0	0	48	0	0	48	0	0	0	0	0	0	0	0	41	0	0	41	0	0	0	0	1	1	90
09:00 AM	0	0	11	0	0	11	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	17
09:15 AM	0	0	13	0	0	13	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	25
09:30 AM	0	0	16	0	0	16	0	0	0	0	0	0	0	0	15	0	0	15	0	0	0	0	0	0	31
09:45 AM	0	0	16	0	0	16	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	25
Total	0	0	56	0	0	56	0	0	0	0	0	0	0	0	42	0	0	42	0	0	0	0	0	0	98
10:00 AM	0	0	10	0	0	10	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	15
10:15 AM	0	0	10	0	0	10	0	0	0	0	0	0	0	0	17	0	0	17	0	0	0	0	0	0	27
10:30 AM	0	0	10	0	0	10	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	18
10:45 AM	0	0	14	0	0	14	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	22
Total	0	0	44	0	0	44	0	0	0	0	0	0	0	0	38	0	0	38	0	0	0	0	0	0	82
11:00 AM	0	0	8	0	0	8	0	0	0	0	1	1	0	0	14	0	0	14	0	0	0	0	0	0	23
11:15 AM	0	0	8	0	0	8	0	0	0	0	0	0	0	0	17	0	0	17	0	0	0	0	0	0	25
11:30 AM	0	0	15	0	0	15	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	26
11:45 AM	0	0	13	0	0	13	0	0	0	0	0	0	0	0	19	0	0	19	0	0	0	0	0	0	32
Total	0	0	44	0	0	44	0	0	0	0	1	1	0	0	61	0	0	61	0	0	0	0	0	0	106
12:00 PM	0	0	7	0	0	7	0	0	0	0	1	1	0	0	18	0	0	18	0	0	0	0	0	0	26
12:15 PM	0	0	14	0	0	14	0	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	24
12:30 PM	0	0	16	0	0	16	0	0	0	0	0	0	0	0	13	0	0	13	0	0	0	0	1	1	30
12:45 PM	0	0	17	0	0	17	0	0	0	0	0	0	0	0	16	0	0	16	0	0	0	0	0	0	33
Total	0	0	54	0	0	54	0	0	0	0	1	1	0	0	57	0	0	57	0	0	0	0	1	1	113
01:00 PM	0	0	14	0	0	14	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	25
01:15 PM	0	0	10	0	0	10	0	0	0	0	0	0	0	0	17	0	0	17	0	0	0	0	0	0	27
01:30 PM	0	0	15	0	0	15	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	26
01:45 PM	1	0	10	0	0	11	0	0	0	0	0	0	0	0	21	0	0	21	0	0	0	0	0	0	32
Total	1	0	49	0	0	50	0	0	0	0	0	0	0	0	60	0	0	60	0	0	0	0	0	0	110
02:00 PM	0	0	19	0	0	19	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	31
02:15 PM	0	0	15	0	0	15	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	24
02:30 PM	0	0	19	0	0	19	0	0	0	0	0	0	0	0	19	0	0	19	0	0	0	0	0	0	38
02:45 PM	0	0	11	0	0	11	0	0	0	0	0	0	0	0	13	0	0	13	0	0	0	0	0	0	24
Total	0	0	64	0	0	64	0	0	0	0	0	0	0	0	53	0	0	53	0	0	0	0	0	0	117
03:00 PM	0	0	15	0	0	15	0	0	0	0	0	0	0	0	16	0	0	16	0	0	0	0	1	1	32
03:15 PM	0	0	19	0	0	19	0	0	0	0	0	0	0	0	21	0	0	21	0	0	0	0	0	0	40
03:30 PM	0	0	20	0	0	20	0	0	0	0	0	0	0	0	26	0	0	26	0	0	0	0	0	0	46
03:45 PM	0	0	20	0	0	20	0	0	0	0	1	1	0	0	25	0	0	25	0	0	0	0	0	0	46
Total	0	0	74	0	0	74	0	0	0	0	1	1	0	0	88	0	0	88	0	0	0	0	1	1	164

Traffic Data Inc

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File Name : 5 - Lake Elmo Ave & Park Access, 7-21-16
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Groups Printed- Cars + - Trucks

	Lake Elmo Avenue N Southbound						Park Access Westbound						Lake Elmo Avenue N Northbound						Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	0	24	0	0	24	0	0	0	0	0	0	0	0	22	0	0	22	0	0	0	0	0	0	46
04:15 PM	0	0	15	0	0	15	0	0	0	0	0	0	0	0	22	0	0	22	0	0	0	0	0	0	37
04:30 PM	0	0	14	0	0	14	0	0	0	0	0	0	0	0	30	0	0	30	0	0	0	0	0	0	44
04:45 PM	0	0	20	0	0	20	0	0	0	0	0	0	0	0	23	0	0	23	0	0	0	0	0	0	43
Total	0	0	73	0	0	73	0	0	0	0	0	0	0	0	97	0	0	97	0	0	0	0	0	0	170
05:00 PM	0	0	29	0	0	29	0	0	0	0	0	0	0	0	20	0	0	20	0	0	0	0	0	0	49
05:15 PM	0	0	25	0	0	25	0	0	0	0	0	0	0	0	38	0	0	38	0	0	0	0	0	0	63
05:30 PM	0	0	20	0	0	20	0	0	0	0	5	5	0	0	20	0	0	20	0	0	0	0	0	0	45
05:45 PM	0	0	13	0	0	13	0	0	0	0	0	0	0	0	23	0	0	23	0	0	0	0	0	0	36
Total	0	0	87	0	0	87	0	0	0	0	5	5	0	0	101	0	0	101	0	0	0	0	0	0	193
06:00 PM	0	0	17	0	0	17	0	0	0	0	0	0	0	0	25	0	0	25	0	0	0	0	0	0	42
06:15 PM	0	0	16	0	0	16	0	0	0	0	0	0	0	0	18	0	0	18	0	0	0	0	0	0	34
06:30 PM	0	0	13	0	0	13	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	1	1	26
06:45 PM	0	0	16	0	0	16	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	28
Total	0	0	62	0	0	62	0	0	0	0	0	0	0	0	67	0	0	67	0	0	0	0	1	1	130
07:00 PM	0	0	13	0	0	13	0	0	0	0	0	0	0	0	17	0	0	17	0	0	0	0	0	0	30
07:15 PM	0	0	6	0	0	6	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	18
07:30 PM	0	0	17	0	0	17	0	0	0	0	0	0	0	0	16	0	0	16	0	0	0	0	0	0	33
07:45 PM	0	0	13	0	0	13	0	0	0	0	0	0	0	0	15	0	0	15	0	0	0	0	0	0	28
Total	0	0	49	0	0	49	0	0	0	0	0	0	0	0	60	0	0	60	0	0	0	0	0	0	109
08:00 PM	0	0	8	0	0	8	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	17
08:15 PM	0	0	7	0	0	7	0	0	0	0	1	1	0	0	11	0	0	11	0	0	0	0	0	0	19
08:30 PM	0	0	15	0	0	15	0	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	25
08:45 PM	0	0	15	0	0	15	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	21
Total	0	0	45	0	0	45	0	0	0	0	1	1	0	0	36	0	0	36	0	0	0	0	0	0	82
09:00 PM	0	0	9	0	0	9	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	21
09:15 PM	0	0	8	0	0	8	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	15
09:30 PM	0	0	8	0	0	8	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	15
09:45 PM	0	0	4	0	0	4	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	9
Total	0	0	29	0	0	29	0	0	0	0	0	0	0	0	31	0	0	31	0	0	0	0	0	0	60
10:00 PM	0	0	13	0	0	13	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	16
10:15 PM	0	0	6	0	0	6	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	8
10:30 PM	0	0	5	0	0	5	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	13
10:45 PM	0	0	2	0	0	2	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4
Total	0	0	26	0	0	26	0	0	0	0	0	0	0	0	15	0	0	15	0	0	0	0	0	0	41
11:00 PM	0	0	6	0	0	6	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	7
11:15 PM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
11:30 PM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	5
11:45 PM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2
Total	0	0	9	0	0	9	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	15

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 5 - Lake Elmo Ave & Park Access, 7-21-16
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Groups Printed- Cars + - Trucks

	Lake Elmo Avenue N Southbound						Park Access Westbound						Lake Elmo Avenue N Northbound						Eastbound						
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Grand Total	1	1	947	0	0	949	0	0	0	1	9	10	0	0	934	0	0	934	0	0	0	0	5	5	1898
Apprch %	0.1	0.1	99.8	0	0		0	0	0	10	90		0	0	100	0	0		0	0	0	0	100		
Total %	0.1	0.1	49.9	0	0	50	0	0	0	0.1	0.5	0.5	0	0	49.2	0	0	49.2	0	0	0	0	0.3	0.3	
Cars +	1	1	902	0	0	904	0	0	0	1	0	1	0	0	899	0	0	899	0	0	0	0	0	0	1804
% Cars +	100	100	95.2	0	0	95.3	0	0	0	100	0	10	0	0	96.3	0	0	96.3	0	0	0	0	0	0	95
Trucks	0	0	45	0	0	45	0	0	0	0	9	9	0	0	35	0	0	35	0	0	0	0	5	5	94
% Trucks	0	0	4.8	0	0	4.7	0	0	0	0	100	90	0	0	3.7	0	0	3.7	0	0	0	0	100	100	5

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File Name : 5 - Lake Elmo Ave & Park Access, 7-21-16
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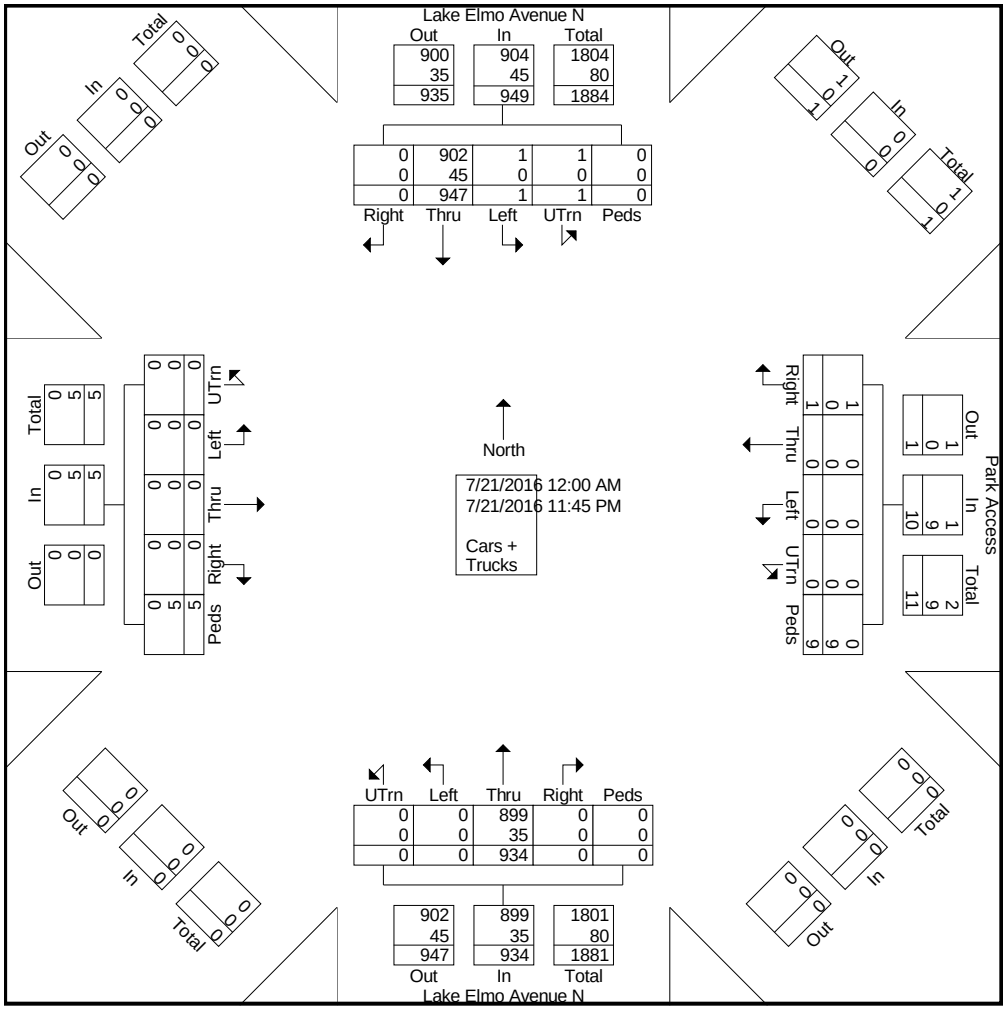

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 5 - Lake Elmo Ave & Park Access, 7-21-16
Site Code :
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	Lake Elmo Avenue N Southbound						Park Access Westbound						Lake Elmo Avenue N Northbound						Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:30 AM																									
07:30 AM	**0**	**0**	**19**	**0**	**0**	**19**	**0**	**0**	**0**	1	0	1	0	0	13	0	0	13	0	0	0	0	0	0	33
07:45 AM	0	0	26	0	0	26	0	0	0	0	0	0	0	0	**20**	0	0	**20**	0	0	0	0	0	0	**46**
08:00 AM	0	0	15	0	0	15	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	23
08:15 AM	0	0	9	0	0	9	0	0	0	0	0	0	0	0	15	0	0	15	0	0	0	0	**1**	**1**	25
Total Volume	0	0	69	0	0	69	0	0	0	1	0	1	0	0	56	0	0	56	0	0	0	0	1	1	127
% App. Total	0	0	100	0	0		0	0	0	100	0		0	0	100	0	0		0	0	0	0	100		
PHF	.000	.000	.663	.000	.000	.663	.000	.000	.000	.250	.000	.250	.000	.000	.700	.000	.000	.700	.000	.000	.000	.000	.250	.250	.690
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 12:30 PM																									
12:30 PM	0	0	16	0	0	16	0	0	0	0	0	0	0	0	13	0	0	13	0	0	0	0	**1**	**1**	30
12:45 PM	0	0	**17**	0	0	**17**	0	0	0	0	0	0	0	0	16	0	0	16	0	0	0	0	0	0	**33**
01:00 PM	0	0	14	0	0	14	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	25
01:15 PM	0	0	10	0	0	10	0	0	0	0	0	0	0	0	**17**	0	0	**17**	0	0	0	0	0	0	27
Total Volume	0	0	57	0	0	57	0	0	0	0	0	0	0	0	57	0	0	57	0	0	0	0	1	1	115
% App. Total	0	0	100	0	0		0	0	0	0	0		0	0	100	0	0		0	0	0	0	100		
PHF	.000	.000	.838	.000	.000	.838	.000	.000	.000	.000	.000	.000	.000	.000	.838	.000	.000	.838	.000	.000	.000	.000	.250	.250	.871
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:45 PM																									
04:45 PM	0	0	20	0	0	20	0	0	0	0	0	0	0	0	23	0	0	23	0	0	0	0	0	0	43
05:00 PM	0	0	**29**	0	0	**29**	0	0	0	0	0	0	0	0	20	0	0	20	0	0	0	0	0	0	49
05:15 PM	0	0	25	0	0	25	0	0	0	0	0	0	0	0	**38**	0	0	**38**	0	0	0	0	0	0	**63**
05:30 PM	0	0	20	0	0	20	0	0	0	0	**5**	**5**	0	0	20	0	0	20	0	0	0	0	0	0	45
Total Volume	0	0	94	0	0	94	0	0	0	0	5	5	0	0	101	0	0	101	0	0	0	0	0	0	200
% App. Total	0	0	100	0	0		0	0	0	0	100		0	0	100	0	0		0	0	0	0	0		
PHF	.000	.000	.810	.000	.000	.810	.000	.000	.000	.000	.250	.250	.000	.000	.664	.000	.000	.664	.000	.000	.000	.000	.000	.000	.794

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 6 - Manning Trail & Manning Ave, 7-20-16
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Groups Printed- Cars + - Trucks

	Manning Avenue N Southbound						Westbound						Manning Avenue N Northbound						Manning Trail N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
12:00 AM	0	0	11	0	0	11	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	19
12:15 AM	0	0	10	0	0	10	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	21
12:30 AM	0	0	9	0	0	9	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	15
12:45 AM	0	0	3	0	0	3	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	11
Total	0	0	33	0	0	33	0	0	0	0	0	0	0	0	33	0	0	33	0	0	0	0	0	0	66
01:00 AM	0	0	3	0	0	3	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	11
01:15 AM	0	0	4	0	0	4	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	11
01:30 AM	0	0	5	0	0	5	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	9
01:45 AM	0	0	3	0	0	3	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	5
Total	0	0	15	0	0	15	0	0	0	0	0	0	0	0	21	0	0	21	0	0	0	0	0	0	36
02:00 AM	0	0	3	0	0	3	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	4
02:15 AM	0	0	3	0	0	3	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	5
02:30 AM	0	0	2	0	0	2	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	9
02:45 AM	0	0	2	0	0	2	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	5
Total	0	0	10	0	0	10	0	0	0	0	0	0	0	0	13	0	0	13	0	0	0	0	0	0	23
03:00 AM	0	0	2	0	0	2	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	7
03:15 AM	0	0	4	0	0	4	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	12
03:30 AM	0	0	3	0	0	3	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	4
03:45 AM	0	0	5	0	0	5	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	6
Total	0	0	14	0	0	14	0	0	0	0	0	0	0	0	15	0	0	15	0	0	0	0	0	0	29
04:00 AM	0	0	3	0	0	3	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	6
04:15 AM	0	0	4	0	0	4	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	7
04:30 AM	0	0	13	0	0	13	0	0	0	0	0	0	0	0	14	0	0	14	0	0	0	0	0	0	27
04:45 AM	0	0	14	0	0	14	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	20
Total	0	0	34	0	0	34	0	0	0	0	0	0	0	0	26	0	0	26	0	0	0	0	0	0	60
05:00 AM	0	0	16	0	0	16	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	24
05:15 AM	0	0	23	0	0	23	0	0	0	0	0	0	0	1	14	0	0	15	0	0	0	0	0	0	38
05:30 AM	0	0	45	0	0	45	0	0	0	0	0	0	0	0	26	0	0	26	0	0	0	1	0	1	72
05:45 AM	0	0	36	0	0	36	0	0	0	0	0	0	0	1	26	0	0	27	0	0	0	0	0	0	63
Total	0	0	120	0	0	120	0	0	0	0	0	0	0	2	74	0	0	76	0	0	0	1	0	1	197
06:00 AM	0	0	65	0	0	65	0	0	0	0	0	0	0	1	48	0	0	49	0	0	0	1	0	1	115
06:15 AM	0	0	55	0	0	55	0	0	0	0	0	0	0	0	94	0	0	94	0	0	0	1	0	1	150
06:30 AM	0	0	81	0	0	81	0	0	0	0	0	0	0	1	95	0	0	96	0	0	0	1	0	1	178
06:45 AM	0	0	94	0	0	94	0	0	0	0	0	0	0	0	77	0	0	77	0	0	0	1	0	1	172
Total	0	0	295	0	0	295	0	0	0	0	0	0	0	2	314	0	0	316	0	0	0	4	0	4	615
07:00 AM	0	0	67	0	0	67	0	0	0	0	0	0	0	3	91	0	0	94	0	1	0	0	0	1	162
07:15 AM	0	0	85	0	0	85	0	0	0	0	0	0	0	1	112	0	0	113	0	0	0	3	0	3	201
07:30 AM	0	0	102	0	0	102	0	0	0	0	0	0	0	2	162	0	0	164	0	1	0	1	0	2	268
07:45 AM	0	0	102	0	0	102	0	0	0	0	0	0	0	0	153	0	0	153	0	0	0	1	0	1	256
Total	0	0	356	0	0	356	0	0	0	0	0	0	0	6	518	0	0	524	0	2	0	5	0	7	887

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 6 - Manning Trail & Manning Ave, 7-20-16
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Groups Printed- Cars + - Trucks

	Manning Avenue N Southbound						Westbound						Manning Avenue N Northbound						Manning Trail N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
08:00 AM	0	0	77	0	0	77	0	0	0	0	0	0	0	1	118	0	0	119	0	0	0	1	0	1	197
08:15 AM	0	0	119	0	0	119	0	0	0	0	0	0	0	3	93	0	0	96	0	0	0	1	0	1	216
08:30 AM	0	0	92	0	0	92	0	0	0	0	0	0	0	0	105	0	0	105	0	0	0	2	0	2	199
08:45 AM	0	0	98	0	0	98	0	0	0	0	0	0	0	0	107	0	0	107	0	0	0	1	0	1	206
Total	0	0	386	0	0	386	0	0	0	0	0	0	0	4	423	0	0	427	0	0	0	5	0	5	818
09:00 AM	0	0	85	0	0	85	0	0	0	0	0	0	0	0	93	0	0	93	0	0	0	0	0	0	178
09:15 AM	0	0	101	0	0	101	0	0	0	0	0	0	0	0	88	0	0	88	0	0	0	3	0	3	192
09:30 AM	0	0	79	0	0	79	0	0	0	0	0	0	0	1	88	0	0	89	0	0	0	1	0	1	169
09:45 AM	0	0	86	0	0	86	0	0	0	0	0	0	1	1	87	0	0	89	0	0	0	2	0	2	177
Total	0	0	351	0	0	351	0	0	0	0	0	0	1	2	356	0	0	359	0	0	0	6	0	6	716
10:00 AM	0	0	93	0	0	93	0	0	0	0	0	0	0	1	86	0	0	87	0	0	0	1	0	1	181
10:15 AM	0	0	84	0	0	84	0	0	0	0	0	0	0	0	86	0	0	86	0	0	0	0	9	9	179
10:30 AM	0	0	84	0	0	84	0	0	0	0	0	0	0	0	91	0	0	91	0	1	0	1	0	2	177
10:45 AM	0	0	92	0	0	92	0	0	0	0	0	0	0	3	94	0	0	97	0	0	0	0	0	0	189
Total	0	0	353	0	0	353	0	0	0	0	0	0	0	4	357	0	0	361	0	1	0	2	9	12	726
11:00 AM	0	0	90	1	0	91	0	0	0	0	0	0	0	0	106	0	0	106	0	0	0	2	2	4	201
11:15 AM	0	0	108	0	0	108	0	0	0	0	0	0	0	1	105	0	0	106	0	0	0	2	0	2	216
11:30 AM	0	0	106	0	0	106	0	0	0	0	0	0	0	0	103	0	0	103	0	0	0	3	0	3	212
11:45 AM	0	0	106	0	0	106	0	0	0	0	0	0	0	0	113	0	0	113	0	0	0	1	0	1	220
Total	0	0	410	1	0	411	0	0	0	0	0	0	0	1	427	0	0	428	0	0	0	8	2	10	849
12:00 PM	0	0	101	2	0	103	0	0	0	0	0	0	0	0	81	0	0	81	0	1	0	1	0	2	186
12:15 PM	0	0	116	0	0	116	0	0	0	0	0	0	0	3	87	0	0	90	0	0	0	2	0	2	208
12:30 PM	0	0	112	0	0	112	0	0	0	0	0	0	0	0	104	0	0	104	0	0	0	4	0	4	220
12:45 PM	0	0	107	0	0	107	0	0	0	0	0	0	0	0	124	0	0	124	0	0	0	0	0	0	231
Total	0	0	436	2	0	438	0	0	0	0	0	0	0	3	396	0	0	399	0	1	0	7	0	8	845
01:00 PM	0	0	114	0	1	115	0	0	0	0	0	0	1	2	110	0	0	113	0	0	0	1	0	1	229
01:15 PM	0	0	91	0	0	91	0	0	0	0	0	0	0	1	117	0	0	118	0	0	0	1	1	2	211
01:30 PM	0	0	91	0	0	91	0	0	0	0	0	0	0	2	88	0	0	90	0	0	0	0	0	0	181
01:45 PM	0	0	94	0	0	94	0	0	0	0	0	0	0	1	125	0	0	126	0	0	0	1	0	1	221
Total	0	0	390	0	1	391	0	0	0	0	0	0	1	6	440	0	0	447	0	0	0	3	1	4	842
02:00 PM	0	0	109	0	0	109	0	0	0	0	0	0	0	1	94	0	1	96	0	0	0	3	2	5	210
02:15 PM	0	0	111	0	0	111	0	0	0	0	0	0	0	1	113	0	0	114	0	0	0	1	0	1	226
02:30 PM	0	0	91	1	0	92	0	0	0	0	0	0	0	0	114	0	0	114	0	0	0	3	0	3	209
02:45 PM	0	0	106	0	0	106	0	0	0	0	0	0	0	0	113	0	0	113	0	0	0	0	0	0	219
Total	0	0	417	1	0	418	0	0	0	0	0	0	0	2	434	0	1	437	0	0	0	7	2	9	864
03:00 PM	0	0	113	0	0	113	0	0	0	0	0	0	0	1	130	0	0	131	0	0	0	1	0	1	245
03:15 PM	0	0	116	0	0	116	0	0	0	0	0	0	0	1	135	0	0	136	0	0	0	0	0	0	252
03:30 PM	0	0	130	1	0	131	0	0	0	0	0	0	0	1	142	0	0	143	0	0	0	0	0	0	274
03:45 PM	0	0	132	0	0	132	0	0	0	0	0	0	0	0	157	0	0	157	0	0	0	0	0	0	289
Total	0	0	491	1	0	492	0	0	0	0	0	0	0	3	564	0	0	567	0	0	0	1	0	1	1060

Traffic Data Inc

PO Box 16269
St. Louis Park, MN 55416

File Name : 6 - Manning Trail & Manning Ave, 7-20-16
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Groups Printed- Cars + - Trucks

	Manning Avenue N Southbound						Westbound						Manning Avenue N Northbound						Manning Trail N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	0	134	0	0	134	0	0	0	0	0	0	0	2	149	0	0	151	0	0	0	0	0	0	285
04:15 PM	0	0	154	0	0	154	0	0	0	0	1	1	0	1	167	0	0	168	0	0	0	1	0	1	324
04:30 PM	0	0	171	0	0	171	0	0	0	0	0	0	0	0	141	0	0	141	0	0	0	1	0	1	313
04:45 PM	0	0	166	0	0	166	0	0	0	0	0	0	0	0	147	0	0	147	0	0	0	2	0	2	315
Total	0	0	625	0	0	625	0	0	0	0	1	1	0	3	604	0	0	607	0	0	0	4	0	4	1237
05:00 PM	0	0	155	0	0	155	0	0	0	0	0	0	0	2	175	0	0	177	0	0	0	2	0	2	334
05:15 PM	0	0	171	0	0	171	0	0	0	0	0	0	0	0	184	0	0	184	0	0	0	1	0	1	356
05:30 PM	0	0	127	0	0	127	0	0	0	0	0	0	0	2	162	0	0	164	1	0	0	2	0	3	294
05:45 PM	0	0	131	1	0	132	0	0	0	0	0	0	0	6	144	0	0	150	0	0	0	4	0	4	286
Total	0	0	584	1	0	585	0	0	0	0	0	0	0	10	665	0	0	675	1	0	0	9	0	10	1270
06:00 PM	0	0	123	0	0	123	0	0	0	0	0	0	0	3	146	0	0	149	0	0	0	0	0	0	272
06:15 PM	0	0	108	0	0	108	0	0	0	0	0	0	0	2	116	0	0	118	0	0	0	3	0	3	229
06:30 PM	0	0	100	0	0	100	0	0	0	0	0	0	1	1	105	0	0	107	0	0	0	2	0	2	209
06:45 PM	0	0	87	0	0	87	0	0	0	0	0	0	0	0	81	0	1	82	0	0	0	1	0	1	170
Total	0	0	418	0	0	418	0	0	0	0	0	0	1	6	448	0	1	456	0	0	0	6	0	6	880
07:00 PM	0	0	91	0	0	91	0	0	0	0	0	0	0	2	77	0	0	79	0	0	0	0	0	0	170
07:15 PM	0	0	75	1	0	76	0	0	0	0	0	0	0	1	73	0	0	74	0	0	0	0	0	0	150
07:30 PM	0	0	57	0	0	57	0	0	0	0	0	0	0	2	80	0	1	83	0	0	0	1	1	2	142
07:45 PM	0	0	62	1	0	63	0	0	0	0	0	0	0	2	86	0	0	88	0	0	0	4	0	4	155
Total	0	0	285	2	0	287	0	0	0	0	0	0	0	7	316	0	1	324	0	0	0	5	1	6	617
08:00 PM	0	0	64	0	0	64	0	0	0	0	0	0	0	1	65	0	0	66	0	0	0	1	1	2	132
08:15 PM	0	0	66	0	0	66	0	0	0	0	0	0	0	0	88	0	0	88	0	0	0	1	0	1	155
08:30 PM	0	0	58	0	0	58	0	0	0	0	0	0	0	1	84	0	0	85	0	0	0	1	0	1	144
08:45 PM	0	0	56	0	0	56	0	0	0	0	0	0	0	0	73	0	0	73	0	0	0	3	0	3	132
Total	0	0	244	0	0	244	0	0	0	0	0	0	0	2	310	0	0	312	0	0	0	6	1	7	563
09:00 PM	0	0	54	0	0	54	0	0	0	0	0	0	0	1	67	0	0	68	0	0	0	0	0	0	122
09:15 PM	0	0	57	0	0	57	0	0	0	0	0	0	0	2	51	0	0	53	0	0	0	0	0	0	110
09:30 PM	0	0	50	0	0	50	0	0	0	0	0	0	0	0	61	0	0	61	0	0	0	1	0	1	112
09:45 PM	0	0	40	0	0	40	0	0	0	0	0	0	0	1	44	0	0	45	0	0	0	0	0	0	85
Total	0	0	201	0	0	201	0	0	0	0	0	0	0	4	223	0	0	227	0	0	0	1	0	1	429
10:00 PM	0	0	32	0	0	32	0	0	0	0	0	0	0	0	38	0	0	38	0	0	0	0	0	0	70
10:15 PM	0	0	46	0	0	46	0	0	0	0	0	0	0	0	49	0	0	49	0	0	0	0	0	0	95
10:30 PM	0	0	25	0	0	25	0	0	0	0	0	0	0	0	33	0	0	33	0	0	0	0	0	0	58
10:45 PM	0	0	32	0	0	32	0	0	0	0	0	0	0	0	28	0	0	28	0	0	0	2	0	2	62
Total	0	0	135	0	0	135	0	0	0	0	0	0	0	0	148	0	0	148	0	0	0	2	0	2	285
11:00 PM	0	0	18	0	0	18	0	0	0	0	0	0	0	0	22	0	0	22	0	0	0	0	0	0	40
11:15 PM	0	0	12	0	0	12	0	0	0	0	0	0	0	0	20	0	0	20	0	0	0	0	0	0	32
11:30 PM	0	0	18	0	0	18	0	0	0	0	0	0	0	3	13	0	0	16	0	0	0	0	0	0	34
11:45 PM	0	0	13	1	0	14	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	1	0	1	24
Total	0	0	61	1	0	62	0	0	0	0	0	0	0	3	64	0	0	67	0	0	0	1	0	1	130

Traffic Data Inc

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File Name : 6 - Manning Trail & Manning Ave, 7-20-16
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Groups Printed- Cars + - Trucks

	Manning Avenue N Southbound						Westbound						Manning Avenue N Northbound						Manning Trail N Eastbound						
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Grand Total	0	0	6664	9	1	6674	0	0	0	0	1	1	3	70	7189	0	3	7265	1	4	0	83	16	104	14044
Apprch %	0	0	99.9	0.1	0		0	0	0	0	100		0	1	99	0	0		1	3.8	0	79.8	15.4		
Total %	0	0	47.5	0.1	0	47.5	0	0	0	0	0	0	0	0.5	51.2	0	0	51.7	0	0	0	0.6	0.1	0.7	
Cars +	0	0	6447	8	1	6456	0	0	0	0	0	0	3	67	6970	0	0	7040	1	4	0	81	1	87	13583
% Cars +	0	0	96.7	88.9	100	96.7	0	0	0	0	0	0	100	95.7	97	0	0	96.9	100	100	0	97.6	6.2	83.7	96.7
Trucks	0	0	217	1	0	218	0	0	0	0	1	1	0	3	219	0	3	225	0	0	0	2	15	17	461
% Trucks	0	0	3.3	11.1	0	3.3	0	0	0	0	100	100	0	4.3	3	0	100	3.1	0	0	0	2.4	93.8	16.3	3.3

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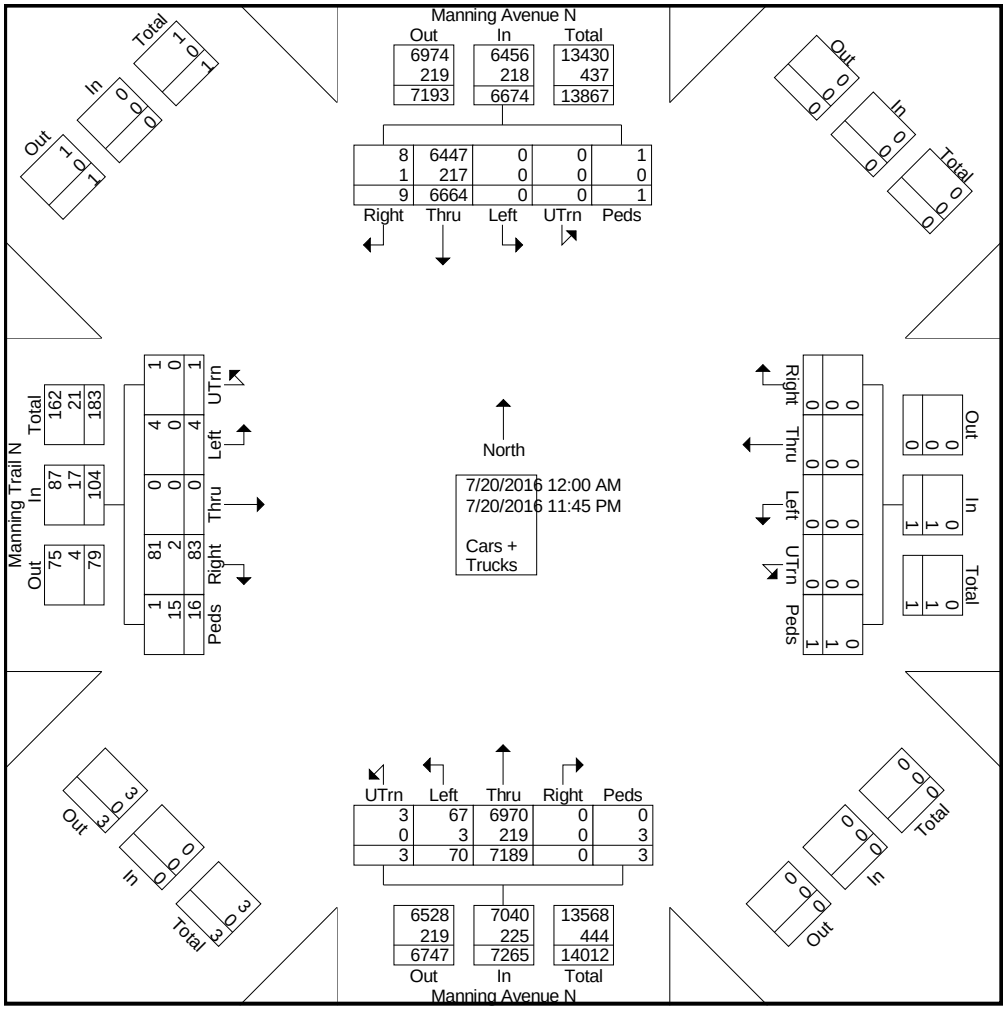

Traffic Data Inc

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File Name : 6 - Manning Trail & Manning Ave, 7-20-16
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	Manning Avenue N Southbound						Westbound						Manning Avenue N Northbound						Manning Trail N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:30 AM																									
07:30 AM	**0**	**0**	**102**	**0**	**0**	**102**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	162	0	0	164	0	1	0	1	0	**2**	**268**
07:45 AM	0	0	102	0	0	102	0	0	0	0	0	0	0	0	153	0	0	153	0	0	0	1	0	1	256
08:00 AM	0	0	77	0	0	77	0	0	0	0	0	0	0	1	118	0	0	119	0	0	0	1	0	1	197
08:15 AM	0	0	**119**	0	0	**119**	0	0	0	0	0	0	0	**3**	93	0	0	96	0	0	0	1	0	1	216
Total Volume	0	0	400	0	0	400	0	0	0	0	0	0	0	6	526	0	0	532	0	1	0	4	0	5	937
% App. Total	0	0	100	0	0		0	0	0	0	0		0	1.1	98.9	0	0		0	20	0	80	0		
PHF	.000	.000	.840	.000	.000	.840	.000	.000	.000	.000	.000	.000	.000	.500	.812	.000	.000	.811	.000	.250	.000	1.00	.000	.625	.874
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 12:30 PM																									
12:30 PM	0	0	112	0	0	112	0	0	0	0	0	0	0	0	104	0	0	104	0	0	0	**4**	0	**4**	220
12:45 PM	0	0	107	0	0	107	0	0	0	0	0	0	0	0	**124**	0	0	**124**	0	0	0	0	0	0	**231**
01:00 PM	0	0	**114**	0	**1**	**115**	0	0	0	0	0	0	**1**	**2**	110	0	0	113	0	0	0	1	0	1	229
01:15 PM	0	0	91	0	0	91	0	0	0	0	0	0	0	1	117	0	0	118	0	0	0	1	**1**	2	211
Total Volume	0	0	424	0	1	425	0	0	0	0	0	0	1	3	455	0	0	459	0	0	0	6	1	7	891
% App. Total	0	0	99.8	0	0.2		0	0	0	0	0		0.2	0.7	99.1	0	0		0	0	0	85.7	14.3		
PHF	.000	.000	.930	.000	.250	.924	.000	.000	.000	.000	.000	.000	.250	.375	.917	.000	.000	.925	.000	.000	.000	.375	.250	.438	.964
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:30 PM																									
04:30 PM	0	0	**171**	0	0	**171**	0	0	0	0	0	0	0	0	141	0	0	141	0	0	0	1	0	1	313
04:45 PM	0	0	166	0	0	166	0	0	0	0	0	0	0	0	147	0	0	147	0	0	0	**2**	0	**2**	315
05:00 PM	0	0	155	0	0	155	0	0	0	0	0	0	0	**2**	175	0	0	177	0	0	0	2	0	2	334
05:15 PM	0	0	171	0	0	171	0	0	0	0	0	0	0	0	**184**	0	0	**184**	0	0	0	1	0	1	**356**
Total Volume	0	0	663	0	0	663	0	0	0	0	0	0	0	2	647	0	0	649	0	0	0	6	0	6	1318
% App. Total	0	0	100	0	0		0	0	0	0	0		0	0.3	99.7	0	0		0	0	0	100	0		
PHF	.000	.000	.969	.000	.000	.969	.000	.000	.000	.000	.000	.000	.000	.250	.879	.000	.000	.882	.000	.000	.000	.750	.000	.750	.926

Traffic Data Inc

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File Name : 6 - Manning Trail & Manning Ave, 7-21-16
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Groups Printed- Cars + - Trucks

	Manning Avenue N Southbound						Westbound						Manning Avenue N Northbound						Manning Trail N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
12:00 AM	0	0	6	0	0	6	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	14
12:15 AM	0	0	8	0	0	8	0	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	18
12:30 AM	0	0	6	0	0	6	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	17
12:45 AM	0	0	6	0	0	6	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	12
Total	0	0	26	0	0	26	0	0	0	0	0	0	0	0	35	0	0	35	0	0	0	0	0	0	61
01:00 AM	0	0	4	0	0	4	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	12
01:15 AM	0	0	4	0	0	4	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	8
01:30 AM	0	0	2	0	0	2	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	6
01:45 AM	0	0	6	0	0	6	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	9
Total	0	0	16	0	0	16	0	0	0	0	0	0	0	0	19	0	0	19	0	0	0	0	0	0	35
02:00 AM	0	0	2	0	0	2	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	5
02:15 AM	0	0	3	0	0	3	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	8
02:30 AM	0	0	2	0	0	2	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	8
02:45 AM	0	0	2	0	0	2	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4
Total	0	0	9	0	0	9	0	0	0	0	0	0	0	0	16	0	0	16	0	0	0	0	0	0	25
03:00 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
03:15 AM	0	0	4	0	0	4	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	6
03:30 AM	0	0	4	0	0	4	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	9
03:45 AM	0	0	4	0	0	4	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	9
Total	0	0	13	0	0	13	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	25
04:00 AM	0	0	4	0	0	4	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	5
04:15 AM	0	0	5	0	0	5	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	1	0	1	11
04:30 AM	0	0	9	0	0	9	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	21
04:45 AM	0	0	14	0	0	14	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	19
Total	0	0	32	0	0	32	0	0	0	0	0	0	0	0	23	0	0	23	0	0	0	1	0	1	56
05:00 AM	0	0	13	0	0	13	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	22
05:15 AM	0	0	32	0	0	32	0	0	0	0	0	0	0	1	10	0	0	11	0	0	0	0	0	0	43
05:30 AM	0	0	36	0	0	36	0	0	0	0	0	0	0	0	26	0	0	26	0	0	0	0	0	0	62
05:45 AM	0	0	50	0	0	50	0	0	0	0	0	0	0	1	41	0	0	42	0	0	0	1	0	1	93
Total	0	0	131	0	0	131	0	0	0	0	0	0	0	2	86	0	0	88	0	0	0	1	0	1	220
06:00 AM	0	0	43	0	0	43	0	0	0	0	0	0	0	1	39	0	0	40	0	0	0	1	0	1	84
06:15 AM	0	0	67	0	0	67	0	0	0	0	0	0	0	1	73	0	0	74	0	0	0	0	0	0	141
06:30 AM	0	0	66	0	0	66	0	0	0	0	0	0	0	1	71	0	0	72	0	0	0	0	0	0	138
06:45 AM	0	0	64	0	0	64	0	0	0	0	0	0	0	2	99	0	0	101	0	0	0	3	0	3	168
Total	0	0	240	0	0	240	0	0	0	0	0	0	0	5	282	0	0	287	0	0	0	4	0	4	531
07:00 AM	0	0	75	0	0	75	0	0	0	0	0	0	0	2	90	0	0	92	0	1	0	4	0	5	172
07:15 AM	0	0	103	0	0	103	0	0	0	0	0	0	0	1	106	0	0	107	0	0	0	3	0	3	213
07:30 AM	0	0	106	0	0	106	0	0	0	0	0	0	0	0	129	0	0	129	0	0	0	2	0	2	237
07:45 AM	0	0	109	1	0	110	0	0	0	0	0	0	0	3	169	0	0	172	0	0	0	1	0	1	283
Total	0	0	393	1	0	394	0	0	0	0	0	0	0	6	494	0	0	500	0	1	0	10	0	11	905

Traffic Data Inc

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File Name : 6 - Manning Trail & Manning Ave, 7-21-16
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Groups Printed- Cars + - Trucks

	Manning Avenue N Southbound						Westbound						Manning Avenue N Northbound						Manning Trail N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
08:00 AM	0	0	104	0	0	104	0	0	0	0	0	0	0	1	123	0	0	124	0	0	0	2	0	2	230
08:15 AM	0	0	97	0	0	97	0	0	0	0	0	0	0	3	100	0	0	103	0	0	0	2	0	2	202
08:30 AM	0	0	91	0	0	91	0	0	0	0	0	0	0	1	93	0	0	94	0	0	0	0	0	0	185
08:45 AM	0	0	90	0	0	90	0	0	0	0	0	0	0	0	107	0	0	107	0	0	0	0	0	0	197
Total	0	0	382	0	0	382	0	0	0	0	0	0	0	5	423	0	0	428	0	0	0	4	0	4	814
09:00 AM	0	0	111	0	0	111	0	0	0	0	0	0	0	0	103	0	0	103	0	0	0	0	0	0	214
09:15 AM	0	0	91	0	0	91	0	0	0	0	0	0	0	0	99	0	0	99	0	0	0	1	0	1	191
09:30 AM	0	0	76	0	0	76	0	0	0	0	0	0	1	0	95	0	0	96	0	0	0	0	0	0	172
09:45 AM	0	0	98	0	0	98	0	0	0	0	0	0	0	0	84	0	0	84	0	0	0	0	0	0	182
Total	0	0	376	0	0	376	0	0	0	0	0	0	1	0	381	0	0	382	0	0	0	1	0	1	759
10:00 AM	0	0	82	0	0	82	0	0	0	0	0	0	0	1	75	0	0	76	0	0	0	1	0	1	159
10:15 AM	0	0	89	0	0	89	0	0	0	0	0	0	0	1	88	0	0	89	0	0	0	4	0	4	182
10:30 AM	0	0	88	0	0	88	0	0	0	0	0	0	0	0	105	0	0	105	0	0	0	2	0	2	195
10:45 AM	0	0	97	1	0	98	0	0	0	0	0	0	0	3	112	0	0	115	0	0	0	1	0	1	214
Total	0	0	356	1	0	357	0	0	0	0	0	0	0	5	380	0	0	385	0	0	0	8	0	8	750
11:00 AM	0	0	83	0	0	83	0	0	0	0	0	0	0	0	94	0	0	94	0	0	0	1	0	1	178
11:15 AM	0	0	108	0	0	108	0	0	0	0	0	0	0	0	82	0	0	82	0	0	0	2	0	2	192
11:30 AM	0	0	106	0	0	106	0	0	0	0	0	0	0	2	96	0	0	98	2	0	0	0	0	2	206
11:45 AM	0	0	86	0	0	86	0	0	0	0	0	0	0	1	108	0	0	109	0	0	0	2	0	2	197
Total	0	0	383	0	0	383	0	0	0	0	0	0	0	3	380	0	0	383	2	0	0	5	0	7	773
12:00 PM	0	0	90	0	0	90	0	0	0	0	0	0	0	2	86	0	0	88	0	0	0	0	0	0	178
12:15 PM	0	0	95	1	0	96	0	0	0	0	0	0	0	0	99	0	0	99	0	1	0	1	0	2	197
12:30 PM	0	0	93	0	0	93	0	0	0	0	1	1	0	0	109	0	0	109	0	0	0	0	0	0	203
12:45 PM	0	0	95	0	0	95	0	0	0	0	0	0	0	0	110	0	0	110	0	0	0	0	0	0	205
Total	0	0	373	1	0	374	0	0	0	0	1	1	0	2	404	0	0	406	0	1	0	1	0	2	783
01:00 PM	0	0	132	0	0	132	0	0	0	0	0	0	0	2	99	0	0	101	0	0	0	1	0	1	234
01:15 PM	0	0	104	0	0	104	0	0	0	0	0	0	0	2	119	0	0	121	0	0	0	1	0	1	226
01:30 PM	0	0	79	0	0	79	0	0	0	0	0	0	0	1	135	0	0	136	0	0	0	2	0	2	217
01:45 PM	0	0	80	0	0	80	0	0	0	0	0	0	0	3	91	0	0	94	0	0	0	2	0	2	176
Total	0	0	395	0	0	395	0	0	0	0	0	0	0	8	444	0	0	452	0	0	0	6	0	6	853
02:00 PM	0	0	105	0	0	105	0	0	0	0	0	0	0	1	145	0	0	146	0	0	0	2	0	2	253
02:15 PM	0	0	90	0	0	90	0	0	0	0	0	0	0	1	114	0	0	115	0	1	0	1	0	2	207
02:30 PM	0	0	99	0	0	99	0	0	0	0	0	0	0	1	103	0	0	104	0	0	0	6	0	6	209
02:45 PM	0	0	126	0	0	126	0	0	0	0	0	0	0	1	99	0	0	100	0	0	0	0	0	0	226
Total	0	0	420	0	0	420	0	0	0	0	0	0	0	4	461	0	0	465	0	1	0	9	0	10	895
03:00 PM	0	0	102	0	0	102	0	0	0	0	0	0	0	2	123	0	0	125	0	0	0	2	0	2	229
03:15 PM	0	0	111	0	0	111	0	0	0	0	0	0	0	0	154	0	0	154	0	0	0	0	0	0	265
03:30 PM	0	0	144	0	0	144	0	0	0	0	0	0	0	0	126	0	0	126	0	0	0	2	0	2	272
03:45 PM	0	0	137	0	0	137	0	0	0	0	0	0	0	1	157	0	0	158	0	0	0	0	0	0	295
Total	0	0	494	0	0	494	0	0	0	0	0	0	0	3	560	0	0	563	0	0	0	4	0	4	1061

Traffic Data Inc

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Groups Printed- Cars + - Trucks

	Manning Avenue N Southbound						Westbound						Manning Avenue N Northbound						Manning Trail N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	0	139	1	0	140	0	0	0	0	0	0	0	1	134	0	0	135	0	0	0	1	0	1	276
04:15 PM	0	0	134	0	0	134	0	0	0	0	0	0	0	2	154	0	0	156	0	0	0	0	0	0	290
04:30 PM	0	0	159	0	0	159	0	0	0	0	0	0	0	1	132	0	0	133	0	0	0	0	0	0	292
04:45 PM	0	0	158	0	0	158	0	0	0	0	0	0	0	2	180	0	0	182	0	0	0	1	0	1	341
Total	0	0	590	1	0	591	0	0	0	0	0	0	0	6	600	0	0	606	0	0	0	2	0	2	1199
05:00 PM	0	0	162	0	0	162	0	0	0	0	0	0	0	0	172	0	0	172	0	0	0	0	0	0	334
05:15 PM	0	0	152	0	0	152	0	0	0	0	0	0	0	2	156	0	0	158	0	0	0	3	0	3	313
05:30 PM	0	0	144	0	0	144	0	0	0	0	0	0	0	0	152	0	0	152	1	0	0	1	0	2	298
05:45 PM	0	0	106	0	0	106	0	0	0	0	0	0	0	1	135	0	0	136	0	0	0	0	0	0	242
Total	0	0	564	0	0	564	0	0	0	0	0	0	0	3	615	0	0	618	1	0	0	4	0	5	1187
06:00 PM	0	0	98	0	0	98	0	0	0	0	0	0	0	5	109	0	0	114	0	0	0	2	0	2	214
06:15 PM	0	0	91	0	0	91	0	0	0	0	0	0	0	4	99	0	0	103	0	0	0	1	0	1	195
06:30 PM	0	0	81	0	0	81	0	0	0	0	0	0	0	0	95	0	0	95	0	0	0	3	0	3	179
06:45 PM	0	0	114	2	0	116	0	0	0	0	0	0	0	0	100	0	0	100	0	0	0	3	0	3	219
Total	0	0	384	2	0	386	0	0	0	0	0	0	0	9	403	0	0	412	0	0	0	9	0	9	807
07:00 PM	0	0	86	0	0	86	0	0	0	0	0	0	0	1	79	0	0	80	0	0	0	1	0	1	167
07:15 PM	0	0	76	0	0	76	0	0	0	0	0	0	0	2	75	0	0	77	0	0	0	7	0	7	160
07:30 PM	0	0	78	0	0	78	0	0	0	0	0	0	0	0	93	0	0	93	0	0	0	0	1	1	172
07:45 PM	0	0	67	0	0	67	0	0	0	0	0	0	0	2	70	0	0	72	0	0	0	2	0	2	141
Total	0	0	307	0	0	307	0	0	0	0	0	0	0	5	317	0	0	322	0	0	0	10	1	11	640
08:00 PM	0	0	55	0	0	55	0	0	0	0	0	0	0	1	84	0	0	85	0	1	0	0	0	1	141
08:15 PM	0	0	69	0	0	69	0	0	0	0	0	0	0	2	60	0	0	62	0	0	0	1	0	1	132
08:30 PM	0	0	51	0	0	51	0	0	0	0	0	0	0	1	54	0	1	56	0	0	0	1	0	1	108
08:45 PM	0	0	45	0	0	45	0	0	0	0	0	0	0	2	50	0	0	52	0	1	0	0	0	1	98
Total	0	0	220	0	0	220	0	0	0	0	0	0	0	6	248	0	1	255	0	2	0	2	0	4	479
09:00 PM	0	0	60	0	0	60	0	0	0	0	0	0	0	0	58	0	0	58	0	0	0	1	0	1	119
09:15 PM	0	0	51	0	0	51	0	0	0	0	0	0	0	2	51	0	0	53	0	0	0	0	0	0	104
09:30 PM	0	0	50	0	0	50	0	0	0	0	0	0	0	0	46	0	0	46	0	0	0	0	0	0	96
09:45 PM	0	0	36	0	0	36	0	0	0	0	0	0	0	2	56	0	0	58	0	0	0	1	0	1	95
Total	0	0	197	0	0	197	0	0	0	0	0	0	0	4	211	0	0	215	0	0	0	2	0	2	414
10:00 PM	0	0	32	0	0	32	0	0	0	0	0	0	0	1	39	0	0	40	0	0	0	1	0	1	73
10:15 PM	0	0	43	0	0	43	0	0	0	0	0	0	0	0	28	0	0	28	0	0	0	0	0	0	71
10:30 PM	0	0	40	0	0	40	0	0	0	0	0	0	0	1	21	0	0	22	0	0	0	0	0	0	62
10:45 PM	0	0	23	0	0	23	0	0	0	0	0	0	0	0	19	0	0	19	0	0	0	3	0	3	45
Total	0	0	138	0	0	138	0	0	0	0	0	0	0	2	107	0	0	109	0	0	0	4	0	4	251
11:00 PM	0	0	16	0	0	16	0	0	0	0	0	0	0	1	35	0	0	36	0	0	0	0	0	0	52
11:15 PM	0	0	10	0	0	10	0	0	0	0	0	0	0	0	22	0	0	22	0	0	0	1	0	1	33
11:30 PM	0	0	18	0	0	18	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	26
11:45 PM	0	0	8	0	0	8	0	0	0	0	0	0	0	1	15	0	0	16	0	0	0	0	0	0	24
Total	0	0	52	0	0	52	0	0	0	0	0	0	0	2	80	0	0	82	0	0	0	1	0	1	135

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Groups Printed- Cars + - Trucks

	Manning Avenue N Southbound						Westbound						Manning Avenue N Northbound						Manning Trail N Eastbound						
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Grand Total	0	0	6491	6	0	6497	0	0	0	0	1	1	1	80	6981	0	1	7063	3	5	0	88	1	97	13658
Apprch %	0	0	99.9	0.1	0		0	0	0	0	100		0	1.1	98.8	0	0		3.1	5.2	0	90.7	1		
Total %	0	0	47.5	0	0	47.6	0	0	0	0	0	0	0	0.6	51.1	0	0	51.7	0	0	0	0.6	0	0.7	
Cars +	0	0	6270	5	0	6275	0	0	0	0	0	0	1	79	6797	0	0	6877	2	5	0	83	0	90	13242
% Cars +	0	0	96.6	83.3	0	96.6	0	0	0	0	0	0	100	98.8	97.4	0	0	97.4	66.7	100	0	94.3	0	92.8	97
Trucks	0	0	221	1	0	222	0	0	0	0	1	1	0	1	184	0	1	186	1	0	0	5	1	7	416
% Trucks	0	0	3.4	16.7	0	3.4	0	0	0	0	100	100	0	1.2	2.6	0	100	2.6	33.3	0	0	5.7	100	7.2	3

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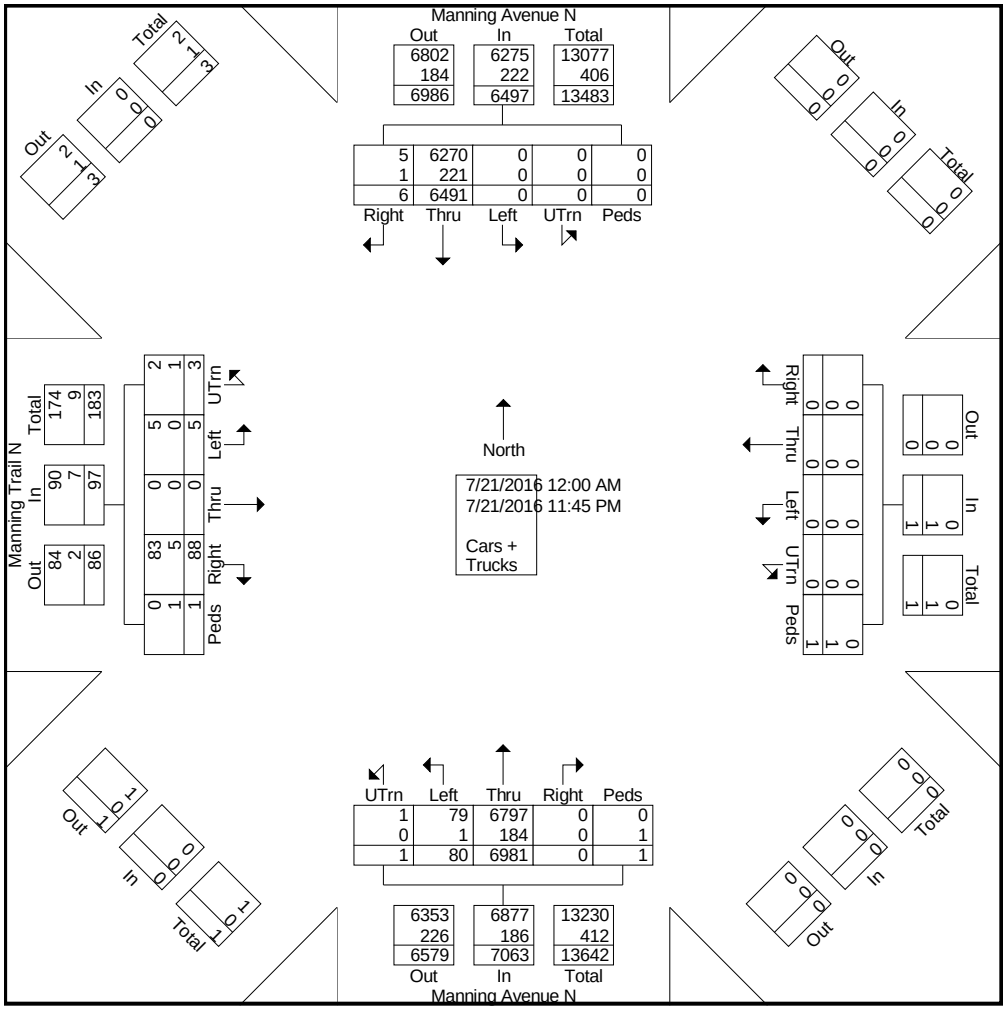

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File Name : 6 - Manning Trail & Manning Ave, 7-21-16
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	Manning Avenue N Southbound						Westbound						Manning Avenue N Northbound						Manning Trail N Eastbound						
Start Time	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 AM to 09:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:15 AM																									
07:15 AM	**0**	**0**	**103**	**0**	**0**	**103**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**106**	**0**	**0**	**107**	**0**	**0**	**0**	3	0	3	213
07:30 AM	0	0	106	0	0	106	0	0	0	0	0	0	0	0	129	0	0	129	0	0	0	2	0	2	237
07:45 AM	0	0	109	1	0	**110**	0	0	0	0	0	0	0	**3**	**169**	0	0	**172**	0	0	0	1	0	1	**283**
08:00 AM	0	0	104	0	0	104	0	0	0	0	0	0	0	1	123	0	0	124	0	0	0	2	0	2	230
Total Volume	0	0	422	1	0	423	0	0	0	0	0	0	0	5	527	0	0	532	0	0	0	8	0	8	963
% App. Total	0	0	99.8	0.2	0		0	0	0	0	0		0	0.9	99.1	0	0		0	0	0	100	0		
PHF	.000	.000	.968	.250	.000	.961	.000	.000	.000	.000	.000	.000	.000	.417	.780	.000	.000	.773	.000	.000	.000	.667	.000	.667	.851
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 12:45 PM																									
12:45 PM	0	0	95	0	0	95	0	0	0	0	0	0	0	0	110	0	0	110	0	0	0	0	0	0	205
01:00 PM	0	0	**132**	0	0	**132**	0	0	0	0	0	0	0	**2**	99	0	0	101	0	0	0	1	0	1	**234**
01:15 PM	0	0	104	0	0	104	0	0	0	0	0	0	0	2	119	0	0	121	0	0	0	1	0	1	226
01:30 PM	0	0	79	0	0	79	0	0	0	0	0	0	0	1	**135**	0	0	**136**	0	0	0	**2**	0	**2**	217
Total Volume	0	0	410	0	0	410	0	0	0	0	0	0	0	5	463	0	0	468	0	0	0	4	0	4	882
% App. Total	0	0	100	0	0		0	0	0	0	0		0	1.1	98.9	0	0		0	0	0	100	0		
PHF	.000	.000	.777	.000	.000	.777	.000	.000	.000	.000	.000	.000	.000	.625	.857	.000	.000	.860	.000	.000	.000	.500	.000	.500	.942
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:45 PM																									
04:45 PM	0	0	158	0	0	158	0	0	0	0	0	0	0	**2**	**180**	0	0	**182**	0	0	0	1	0	1	**341**
05:00 PM	0	0	**162**	0	0	**162**	0	0	0	0	0	0	0	0	172	0	0	172	0	0	0	0	0	0	334
05:15 PM	0	0	152	0	0	152	0	0	0	0	0	0	0	2	156	0	0	158	0	0	0	**3**	0	**3**	313
05:30 PM	0	0	144	0	0	144	0	0	0	0	0	0	0	0	152	0	0	152	**1**	0	0	1	0	2	298
Total Volume	0	0	616	0	0	616	0	0	0	0	0	0	0	4	660	0	0	664	1	0	0	5	0	6	1286
% App. Total	0	0	100	0	0		0	0	0	0	0		0	0.6	99.4	0	0		16.7	0	0	83.3	0		
PHF	.000	.000	.951	.000	.000	.951	.000	.000	.000	.000	.000	.000	.000	.500	.917	.000	.000	.912	.250	.000	.000	.417	.000	.500	.943

Table C1
Expected Trip Generation

AM Peak

LAND USE	ITE CODE #	DEVELOPMENT UNITS	QUANTITY	AM RATE	ENTER PERCENT	EXIT PERCENT	NEW TRIPS	
							ENTER	EXIT
Single-Family Detached Housing	210	Units	293.0	0.75	25%	75%	55	165
Golf Course	430	Holes	18.0	2.06	79%	21%	29	8
Total							**84**	**173**

PM Peak

LAND USE	ITE CODE #	DEVELOPMENT UNITS	QUANTITY	PM RATE	ENTER PERCENT	EXIT PERCENT	NEW TRIPS	
							ENTER	EXIT
Single-Family Detached Housing	210	Units	293.0	1.00	63%	37%	185	108
Golf Course	430	Holes	18.0	2.92	51%	49%	27	26
Total							**212**	**134**

Weekday Total

LAND USE	ITE CODE #	DEVELOPMENT UNITS	QUANTITY	DAILY RATE	ENTER PERCENT	EXIT PERCENT	NEW TRIPS	
							ENTER	EXIT
Single-Family Detached Housing	210	Units	293.0	9.52	50%	50%	1,395	1,395
Golf Course	430	Holes	18.0	35.74	50%	50%	322	322
Total							**1,717**	**1,717**

NOTES:

1. **Units = Number of Future Development Units**
2. **All trip generation rates based on "Trip Generation", Institute of Transportation Engineers, 9th Edition unless otherwise noted.**
3. **A.M. Trip Generation is for the peak hour of adjacent street traffic (one hour between 7 and 9 a.m.).**
4. **P.M. Trip Generation is for the peak hour of adjacent street traffic (one hour between 4 and 6 p.m.).**

SPACK ACADEMY

Traffic Signal Warrant Analysis

Warrants 1 - 3 (Volume Warrants)

Project Name	Tartan Park Redevelopment
Project/File #	406-16-01
Scenario	2030 Build

Intersection Information			
Major Street (N/S Road)	Manning Avenue	Minor Street (E/W Road)	Manning Trail
Analyzed with	2 or more approach lanes	Analyzed with	1 Approach Lane
Total Approach Volume	1941 vehicles	Total Approach Volume	69 vehicles
Total Ped/Bike Volume	0 crossings	Total Ped/Bike Volume	0 crossings
Right turn reduction of	0 percent applied	Right turn reduction of	0 percent applied

Reduction applied to Volume Warrant thresholds due to high speeds on Manning Avenue.

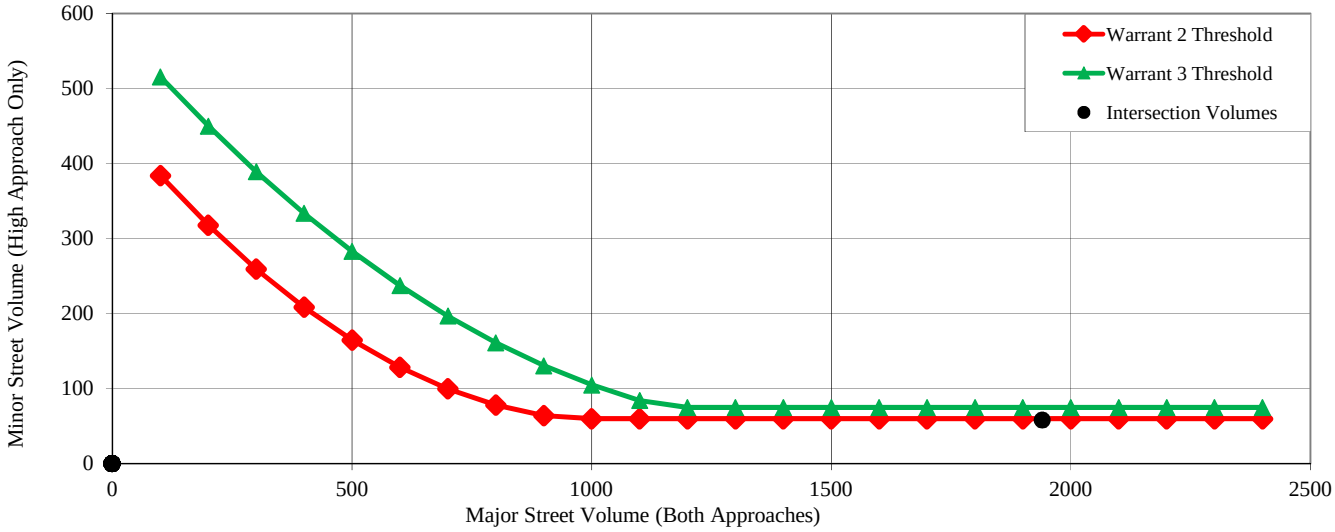
Warrant 1, Eight Hour Vehicular Volume			
	Condition A	**Condition B**	**Condition A+B***
Condition Satisfied?	**Not satisfied**	**Not satisfied**	**Not satisfied**
Required values reached for	0 hours	1 hour	0 (Cond. A) & 1 (Cond. B)
Criteria - Major Street (veh/hr)	420	630	336 (Cond. A) & 504 (Cond. B)
Criteria - Minor Street (veh/hr)	105	53	84 (Cond. A) & 42 (Cond. B)

* Should be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.

Warrant 2, Four Hour Vehicular Volume	
Condition Satisfied?	**Not satisfied**
Required values reached for	0 hours
Criteria	See Figure Below

Warrant 3, Peak Hour Vehicular Volume		
	Condition A	**Condition B**
Condition Satisfied?	**Not Satisfied**	**Not Satisfied**
Required values reached for	2010 total, 58 minor, 4.2 delay	0 hours
Criteria - Total Approach Volume (veh in one hour)	800	See Figure Below
Criteria - Minor Street High Side Volume (veh in one hour)	100	
Criteria - Minor Street High Side Delay (veh-hrs)	4	

Figure 4C-2 (Warrant 2 - 70% Factor) & Figure 4C-4 (Warrant 3 - 70% Factor)



Spack Academy is part of the Spack Enterprise family of companies

Traffic Signal Warrant Analysis

Multi-Way Stop Warrant

Project Name	Tartan Park Redevelopment
Project/File #	406-16-01
Scenario	2030 Build

Intersection Information			
Major Street (N/S Road)	Manning Avenue	Minor Street (E/W Road)	Manning Trail
Analyzed with	2 or more approach lanes	Analyzed with	1 Approach Lane
Total Approach Volume	1941 vehicles	Total Approach Volume	69 vehicles
Total Ped/Bike Volume	0 crossings	Total Ped/Bike Volume	0 crossings
Right turn reduction of	0 percent applied	Right turn reduction of	0 percent applied

Reduction applied to Multi-Way Stop Warrant thresholds due to high speeds on Manning Avenue.

Condition A - Traffic Signal Warrant	
Condition Satisfied?	**Not Examined**
Criteria*	

* Multi-way stop control may be used as an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.

Condition B - Crash Experience	
Condition Satisfied?	**Not Examined**
Required values reached for	4 correctable crashes
Criteria - Crash Experience	

Condition C - Intersection Volume & Delay	
Condition Satisfied?	**Not Examined**
Required values reached for	
Criteria - Major Street (veh/hr)	
Criteria - Minor Street (total vol-veh, ped, & bikes/hr)	
Criteria - Delay (average sec/veh)	

Condition D - Combination Volume, Crash Experience, & Delay	
Condition Satisfied?	**Not Examined**
Required values reached for	
Criteria - Major Street (veh/hr)	
Criteria - Minor Street (total vol-veh, ped, & bikes/hr)	
Criteria - Crash Experience	
Criteria - Delay (average sec/veh)	

Generated with PTV VISTRO
Version 4.00-02

Vistro File: C:\...\Lake Elmo Model.vistro
Report File: C:\Users\Jonah\Desktop\AM PEAK.pdf

Scenario 1: AM PEAK
10/12/2016

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	20th Street and Lake Elmo Avenue N	Two-way stop	HCM 2010	WB Left	0.048	9.4	A
2	20th Street N/20th Street Court N	Two-way stop	HCM 2010	NB Thru	0.000	9.3	A
4	20th Street N/Eastern Access	Two-way stop	HCM 2010	NB Left	0.000	8.7	A
5	20th Street N/Manning Trail N	Two-way stop	HCM 2010	EB Left	0.017	8.7	A
6	Lake Elmo Avenue N/Site Access	Two-way stop	HCM 2010	WB Left	0.004	9.4	A
7	Manning Avenue N/Manning Trail N	Two-way stop	HCM 2010	SEB Left	0.004	20.2	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

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Intersection Level Of Service Report
Intersection 1: 20th Street and Lake Elmo Avenue N

Control Type:	Two-way stop	Delay (sec / veh):	9.4
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.048

Intersection Setup

Name	Lake Elmo Avenue N		Lake Elmo Avenue N		20th Street N	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Lake Elmo Avenue N		Lake Elmo Avenue N		20th Street N	
Base Volume Input [veh/h]	38	16	1	44	32	5
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	38	16	1	44	32	5
Peak Hour Factor	0.7556	0.7556	0.7556	0.7556	0.7556	0.7556
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	13	5	0	15	11	2
Total Analysis Volume [veh/h]	50	21	1	58	42	7
Pedestrian Volume [ped/h]	0		0		0	

Scenario 1: 1: AM PEAK

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.05	0.01
d_M, Delay for Movement [s/veh]	0.00	0.00	7.36	0.00	9.35	8.82
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.12	0.12	0.17	0.17
95th-Percentile Queue Length [ft]	0.00	0.00	3.01	3.01	4.36	4.36
d_A, Approach Delay [s/veh]	0.00		0.12		9.28	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.58					
Intersection LOS	A					

Scenario 1: 1: AM PEAK

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Intersection Level Of Service Report
Intersection 2: 20th Street N/20th Street Court N

Control Type:	Two-way stop	Delay (sec / veh):	9.3
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name				20th Street Court N			20th Street N			20th Street N		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

volumes

Name				20th Street Court N			20th Street N			20th Street N		
Base Volume Input [veh/h]	0	0	0	2	0	1	0	15	0	0	36	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	2	0	1	0	15	0	0	36	0
Peak Hour Factor	0.9286	0.9286	0.9286	0.9286	1.0000	0.9286	0.9286	0.9286	1.0000	1.0000	0.9286	0.9286
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	1	0	0	0	4	0	0	10	0
Total Analysis Volume [veh/h]	0	0	0	2	0	1	0	16	0	0	39	0
Pedestrian Volume [ped/h]	0			0			0			0		

Scenario 1: 1: AM PEAK

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Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	8.83	9.31	8.39	8.83	0.00	8.50	7.29	0.00	0.00	0.00	0.00	0.00
Movement LOS	A	A	A	A		A	A	A			A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.23	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	8.84			8.72			0.00			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	0.45											
Intersection LOS	A											

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Intersection Level Of Service Report
Intersection 4: 20th Street N/Eastern Access

Control Type:	Two-way stop	Delay (sec / veh):	8.7
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Eastern Access		20th Street N		20th Street N	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0	0	0	0
Pocket Length [ft]	100.00	25.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Eastern Access		20th Street N		20th Street N	
Base Volume Input [veh/h]	0	1	17	3	1	23
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1	17	3	1	23
Peak Hour Factor	0.9167	0.9167	0.9167	0.9167	0.9167	0.9167
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	5	1	0	6
Total Analysis Volume [veh/h]	0	1	19	3	1	25
Pedestrian Volume [ped/h]	0		0		0	

Scenario 1: 1: AM PEAK

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	8.74	8.41	0.00	0.00	7.26	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.05	0.05
95th-Percentile Queue Length [ft]	0.00	0.07	0.00	0.00	1.24	1.24
d_A, Approach Delay [s/veh]	8.41		0.00		0.28	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.32					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 5: 20th Street N/Manning Trail N

Control Type:	Two-way stop	Delay (sec / veh):	8.7
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.017

Intersection Setup

Name	Manning Trail N		Manning Trail		20th Street N	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Manning Trail N		Manning Trail		20th Street N	
Base Volume Input [veh/h]	6	1	4	20	15	3
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	6	1	4	20	15	3
Peak Hour Factor	0.9038	0.9038	0.9038	0.9038	0.9038	0.9038
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	0	1	6	4	1
Total Analysis Volume [veh/h]	7	1	4	22	17	3
Pedestrian Volume [ped/h]	0		0		0	

Scenario 1: 1: AM PEAK

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.02	0.00
d_M, Delay for Movement [s/veh]	7.28	0.00	0.00	0.00	8.75	8.46
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.02	0.02	0.00	0.00	0.06	0.06
95th-Percentile Queue Length [ft]	0.38	0.38	0.00	0.00	1.54	1.54
d_A, Approach Delay [s/veh]	6.37		0.00		8.70	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	4.17					
Intersection LOS	A					

Scenario 1: 1: AM PEAK

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Intersection Level Of Service Report
Intersection 6: Lake Elmo Avenue N/Site Access

Control Type:	Two-way stop	Delay (sec / veh):	9.4
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

Intersection Setup

Name	Lake Elmo Avenue		Lake Elmo Avenue N		Site Access	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Lake Elmo Avenue		Lake Elmo Avenue N		Site Access	
Base Volume Input [veh/h]	56	11	4	67	2	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	56	11	4	67	2	0
Peak Hour Factor	0.7750	0.7750	0.7750	0.7750	0.7750	0.7750
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	18	4	1	22	1	0
Total Analysis Volume [veh/h]	72	14	5	86	3	0
Pedestrian Volume [ped/h]	0		0		0	

Scenario 1: 1: AM PEAK

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.39	0.00	9.45	8.68
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.19	0.19	0.01	0.01
95th-Percentile Queue Length [ft]	0.00	0.00	4.80	4.80	0.28	0.28
d_A, Approach Delay [s/veh]	0.00		0.41		9.45	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.36					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 7: Manning Avenue N/Manning Trail N

Control Type:	Two-way stop	Delay (sec / veh):	20.2
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

Intersection Setup

Name	Manning Avenue N				Manning Trail N	
Approach	Northeastbound		Southwestbound		Southeastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00		50.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Manning Avenue N				Manning Trail N	
Base Volume Input [veh/h]	7	524	408	1	1	6
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	524	408	1	1	6
Peak Hour Factor	0.8762	0.8762	0.8762	0.8762	0.8762	0.8762
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	150	116	0	0	2
Total Analysis Volume [veh/h]	8	598	466	1	1	7
Pedestrian Volume [ped/h]	0		0		0	

Scenario 1: 1: AM PEAK

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.00	0.00	0.00	0.01
d_M, Delay for Movement [s/veh]	8.31	0.00	0.00	0.00	20.20	11.15
Movement LOS	A	A	A	A	C	B
95th-Percentile Queue Length [veh]	1.14	0.57	0.00	0.00	0.05	0.05
95th-Percentile Queue Length [ft]	28.39	14.19	0.00	0.00	1.21	1.21
d_A, Approach Delay [s/veh]	0.11		0.00		12.28	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	0.15					
Intersection LOS	C					

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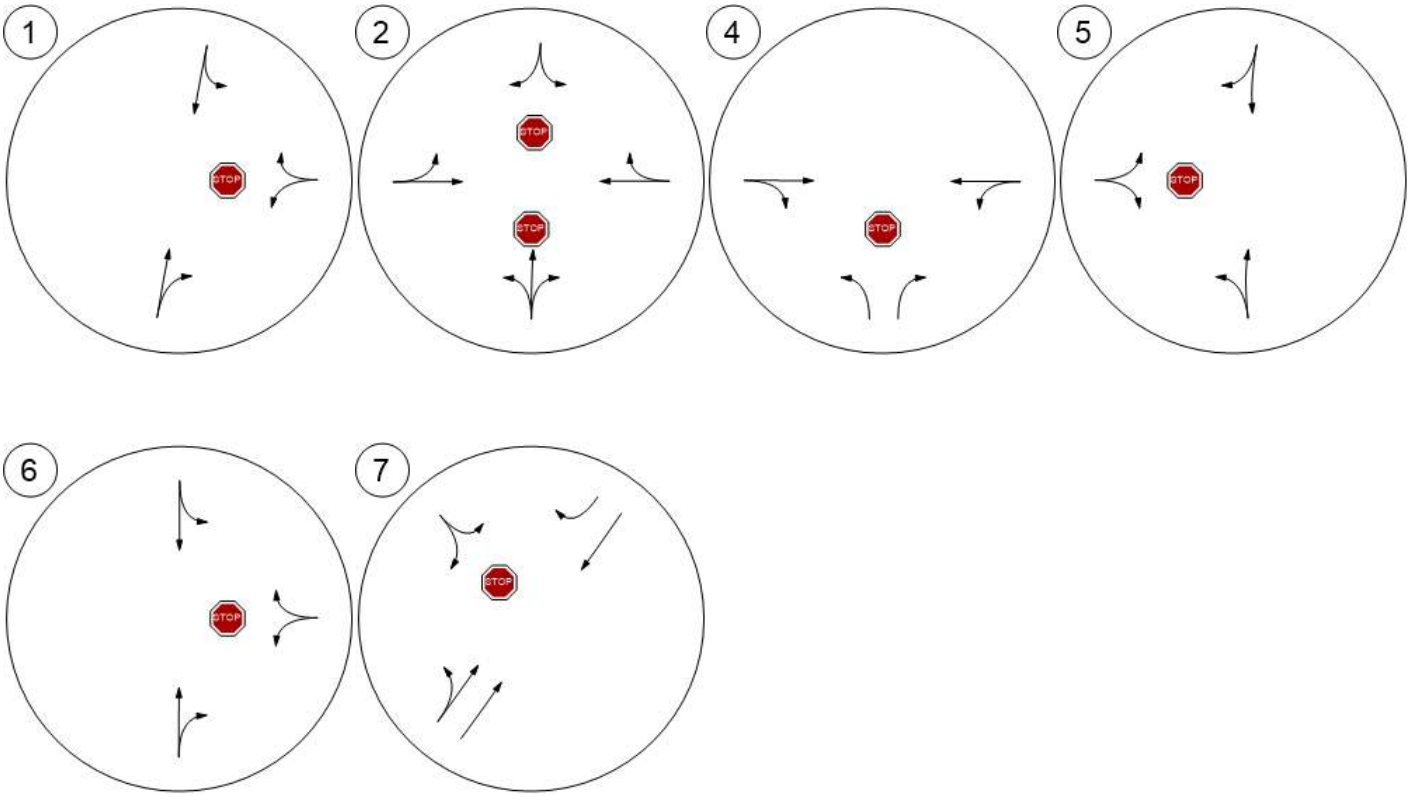
Lane Configuration and Traffic Control



Scenario 1: 1: AM PEAK

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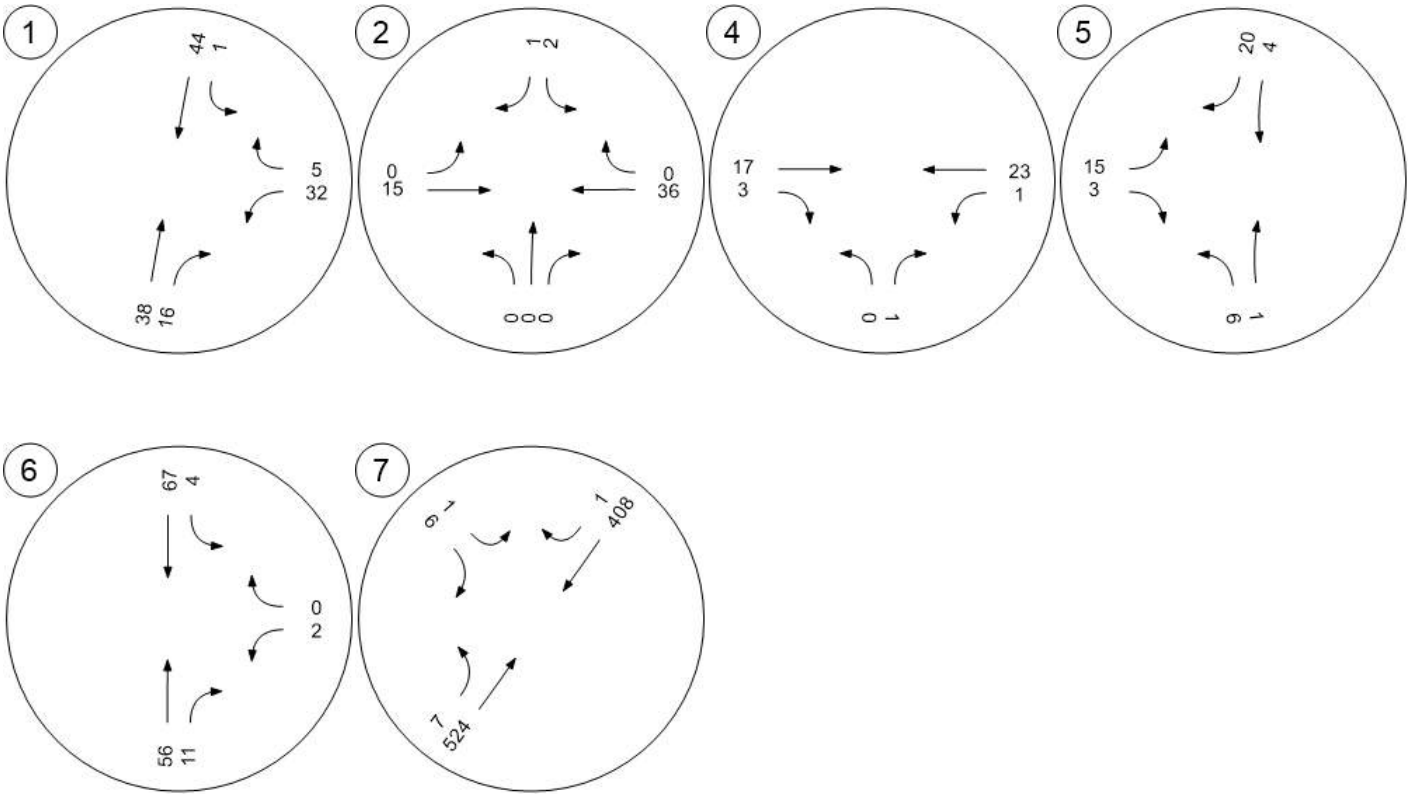
Traffic Volume - Base Volume



Scenario 1: 1: AM PEAK

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Vistro File: C:\...\Lake Elmo Model.vistro
Report File: C:\...\PM PEAK.pdf

Scenario 2: PM PEAK
10/12/2016

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Lake Elmo Avenue N/20th Street N	Two-way stop	HCM 2010	WB Left	0.018	9.5	A
2	20th Street N/20th Street Court N	Two-way stop	HCM 2010	NB Thru	0.000	9.4	A
4	20th Street N/Eastern Access	Two-way stop	HCM 2010	NB Left	0.005	8.9	A
5	20th Street N/Manning Trail N	Two-way stop	HCM 2010	EB Left	0.035	8.9	A
6	Lake Elmo Avenue N/Site Access	Two-way stop	HCM 2010	WB Left	0.001	9.6	A
7	Manning Avenue N/Manning Trail N	Two-way stop	HCM 2010	SEB Left	0.000	26.5	D

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

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Intersection Level Of Service Report
Intersection 1: Lake Elmo Avenue N/20th Street N

Control Type:	Two-way stop	Delay (sec / veh):	9.5
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.018

Intersection Setup

Name	Lake Elmo Avenue N		Lake Elmo Avenue N		20th Street N	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Lake Elmo Avenue N		Lake Elmo Avenue N		20th Street N	
Base Volume Input [veh/h]	74	26	4	68	14	2
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	74	26	4	68	14	2
Peak Hour Factor	0.9375	0.9375	0.9375	0.9375	0.9375	0.9375
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	20	7	1	18	4	1
Total Analysis Volume [veh/h]	79	28	4	73	15	2
Pedestrian Volume [ped/h]	0		0		0	

Scenario 2: 2: PM PEAK

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Version 4.00-02

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.02	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.43	0.00	9.52	8.82
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.16	0.16	0.06	0.06
95th-Percentile Queue Length [ft]	0.00	0.00	4.10	4.10	1.57	1.57
d_A, Approach Delay [s/veh]	0.00		0.39		9.43	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.95					
Intersection LOS	A					

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Version 4.00-02

Intersection Level Of Service Report
Intersection 2: 20th Street N/20th Street Court N

Control Type:	Two-way stop	Delay (sec / veh):	9.4
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name				20th Street Court N			20th Street N			20th Street N		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

volumes

Name				20th Street Court N			20th Street N			20th Street N		
Base Volume Input [veh/h]	0	0	0	1	0	0	0	30	0	0	24	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	1	0	0	0	30	0	0	24	0
Peak Hour Factor	0.8438	0.8438	0.8438	0.8438	1.0000	0.8438	0.8438	0.8438	1.0000	1.0000	0.8438	0.8438
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	0	0	0	9	0	0	7	0
Total Analysis Volume [veh/h]	0	0	0	1	0	0	0	36	0	0	28	0
Pedestrian Volume [ped/h]	0			0			0			0		

Scenario 2: 2: PM PEAK

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Version 4.00-02

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	8.87	9.35	8.47	8.87	0.00	8.44	7.27	0.00	0.00	0.00	0.00	0.00
Movement LOS	A	A	A	A		A	A	A			A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.08	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	8.90			8.87			0.00			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	0.14											
Intersection LOS	A											

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Intersection Level Of Service Report
Intersection 4: 20th Street N/Eastern Access

Control Type:	Two-way stop	Delay (sec / veh):	8.9
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.005

Intersection Setup

Name	Eastern Access		20th Street N		20th Street N	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0	0	0	0
Pocket Length [ft]	100.00	25.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Eastern Access		20th Street N		20th Street N	
Base Volume Input [veh/h]	4	7	34	4	1	21
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	7	34	4	1	21
Peak Hour Factor	0.8563	0.8563	0.8563	0.8563	0.8563	0.8563
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	2	10	1	0	6
Total Analysis Volume [veh/h]	5	8	40	5	1	25
Pedestrian Volume [ped/h]	0		0		0	

Scenario 2: 2: PM PEAK

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	8.87	8.53	0.00	0.00	7.30	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.02	0.02	0.00	0.00	0.05	0.05
95th-Percentile Queue Length [ft]	0.40	0.59	0.00	0.00	1.27	1.27
d_A, Approach Delay [s/veh]	8.66		0.00		0.28	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.43					
Intersection LOS	A					

Scenario 2: 2: PM PEAK

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Intersection Level Of Service Report
Intersection 5: 20th Street N/Manning Trail N

Control Type:	Two-way stop	Delay (sec / veh):	8.9
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.035

Intersection Setup

Name	Manning Trail N		Manning Trail		20th Street N	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Manning Trail N		Manning Trail		20th Street N	
Base Volume Input [veh/h]	6	4	4	15	26	12
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	6	4	4	15	26	12
Peak Hour Factor	0.7674	0.7674	0.7674	0.7674	0.7674	0.7674
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	1	1	5	8	4
Total Analysis Volume [veh/h]	8	5	5	20	34	16
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.00	0.03	0.02
d_M, Delay for Movement [s/veh]	7.28	0.00	0.00	0.00	8.89	8.57
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.02	0.02	0.00	0.00	0.16	0.16
95th-Percentile Queue Length [ft]	0.62	0.62	0.00	0.00	3.94	3.94
d_A, Approach Delay [s/veh]	4.48		0.00		8.79	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	5.66					
Intersection LOS	A					

Scenario 2: 2: PM PEAK

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Intersection Level Of Service Report
Intersection 6: Lake Elmo Avenue N/Site Access

Control Type:	Two-way stop	Delay (sec / veh):	9.6
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.001

Intersection Setup

Name	Lake Elmo Avenue		Lake Elmo Avenue N		Site Access	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Lake Elmo Avenue		Lake Elmo Avenue N		Site Access	
Base Volume Input [veh/h]	100	0	1	82	1	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	100	0	1	82	1	0
Peak Hour Factor	0.8946	0.8946	0.8946	0.8946	0.8946	0.8946
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	28	0	0	23	0	0
Total Analysis Volume [veh/h]	112	0	1	92	1	0
Pedestrian Volume [ped/h]	0		0		0	

Scenario 2: 2: PM PEAK

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Version 4.00-02

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.44	0.00	9.61	8.83
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.20	0.20	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	5.03	5.03	0.10	0.10
d_A, Approach Delay [s/veh]	0.00		0.08		9.61	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.08					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 7: Manning Avenue N/Manning Trail N

Control Type:	Two-way stop	Delay (sec / veh):	26.5
Analysis Method:	HCM 2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Manning Avenue N				Manning Trail N	
Approach	Northeastbound		Southwestbound		Southeastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00		50.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Manning Avenue N				Manning Trail N	
Base Volume Input [veh/h]	4	644	647	0	0	5
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	644	647	0	0	5
Peak Hour Factor	0.9709	0.9709	0.9709	0.9709	0.9709	0.9709
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	166	167	0	0	1
Total Analysis Volume [veh/h]	4	663	666	0	0	5
Pedestrian Volume [ped/h]	0		0		0	

Scenario 2: 2: PM PEAK

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Version 4.00-02

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.01	0.01	0.00	0.00	0.01
d_M, Delay for Movement [s/veh]	8.92	0.00	0.00	0.00	26.55	12.92
Movement LOS	A	A	A	A	D	B
95th-Percentile Queue Length [veh]	1.66	0.83	0.00	0.00	0.03	0.03
95th-Percentile Queue Length [ft]	41.47	20.73	0.00	0.00	0.82	0.82
d_A, Approach Delay [s/veh]	0.05		0.00		12.92	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	0.07					
Intersection LOS	D					

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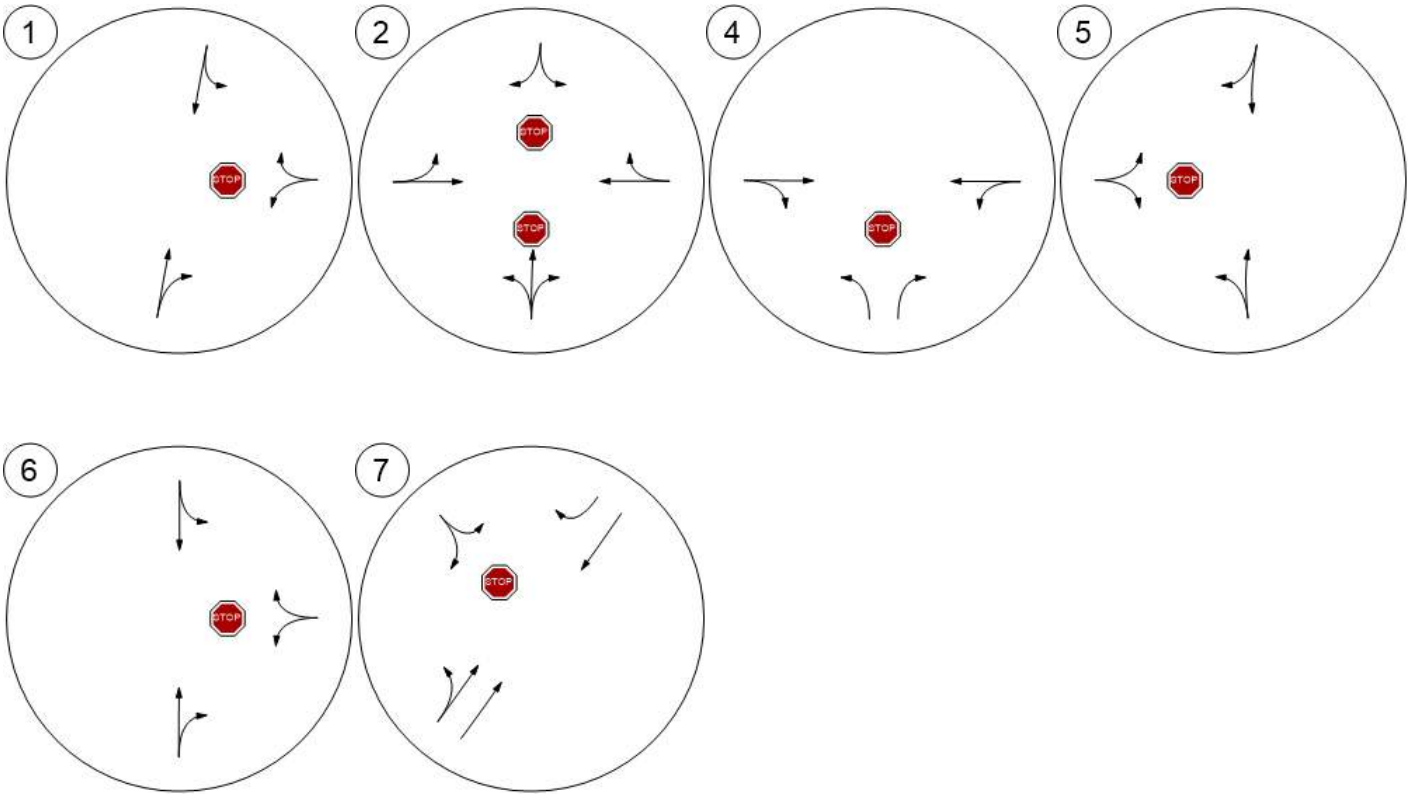
Lane Configuration and Traffic Control



Scenario 2: 2: PM PEAK

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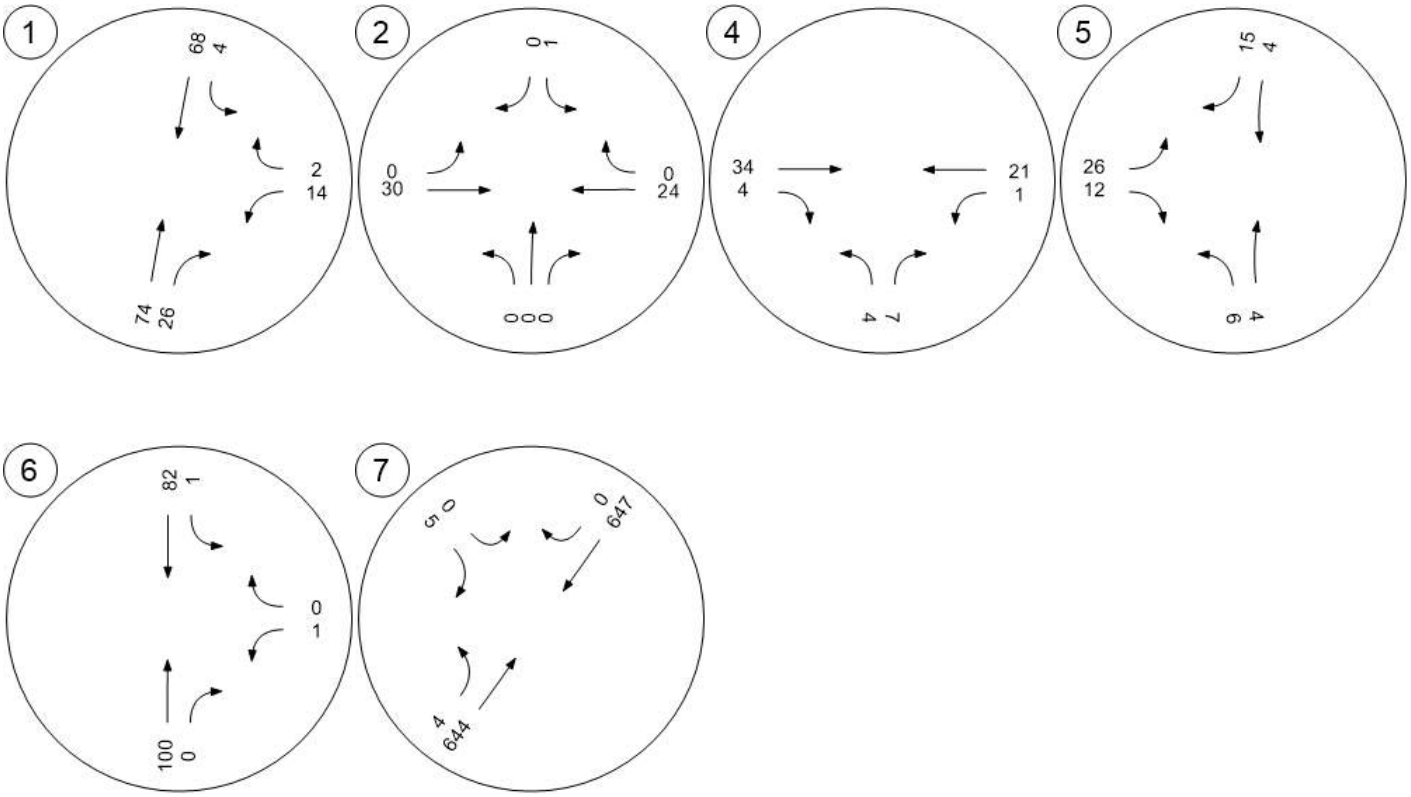
Traffic Volume - Base Volume



Scenario 2: 2: PM PEAK

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Vistro File: C:\...\Lake Elmo Model.vistro
Report File: C:\...\2030 AM NOBUILD.pdf

Scenario 14: 2030 NOBUILD AM PEAK_NEW
10/12/2016

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	20th Street and Lake Elmo Avenue N	Two-way stop	HCM 2010	WB Left	0.081	10.0	A
2	20th Street N/20th Street Court N	Two-way stop	HCM 2010	NB Thru	0.000	9.5	A
4	20th Street N/Eastern Access	Two-way stop	HCM 2010	NB Left	0.000	8.8	A
5	20th Street N/Manning Trail N	Two-way stop	HCM 2010	EB Left	0.025	8.8	A
6	Lake Elmo Avenue N/Site Access	Two-way stop	HCM 2010	WB Left	0.004	10.2	B
7	Manning Avenue N/Manning Trail N	Two-way stop	HCM 2010	SEB Left	0.009	36.5	E

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

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Intersection Level Of Service Report
Intersection 1: 20th Street and Lake Elmo Avenue N

Control Type:	Two-way stop	Delay (sec / veh):	10.0
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.081

Intersection Setup

Name	Lake Elmo Avenue N		Lake Elmo Avenue N		20th Street N	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Lake Elmo Avenue N		Lake Elmo Avenue N		20th Street N	
Base Volume Input [veh/h]	38	16	1	44	32	5
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.70	1.00	1.00	1.70	1.49	1.49
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	65	16	1	75	48	7
Peak Hour Factor	0.7556	0.7556	0.7556	0.7556	0.7556	0.7556
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	5	0	25	16	2
Total Analysis Volume [veh/h]	86	21	1	99	64	9
Pedestrian Volume [ped/h]	0		0		0	

Scenario 14: 14: 2030 NOBUILD AM PEAK_NEW

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.08	0.01
d_M, Delay for Movement [s/veh]	0.00	0.00	7.43	0.00	10.00	9.19
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.22	0.22	0.30	0.30
95th-Percentile Queue Length [ft]	0.00	0.00	5.41	5.41	7.42	7.42
d_A, Approach Delay [s/veh]	0.00		0.07		9.90	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.61					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 2: 20th Street N/20th Street Court N

Control Type:	Two-way stop	Delay (sec / veh):	9.5
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name				20th Street Court N			20th Street N			20th Street N		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

volumes

Name				20th Street Court N			20th Street N			20th Street N		
Base Volume Input [veh/h]	0	0	0	2	0	1	0	15	0	0	36	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.49	1.00	1.00	1.49	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	2	0	1	0	22	0	0	54	0
Peak Hour Factor	0.9286	0.9286	0.9286	0.9286	1.0000	0.9286	0.9286	0.9286	1.0000	1.0000	0.9286	0.9286
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	1	0	0	0	6	0	0	15	0
Total Analysis Volume [veh/h]	0	0	0	2	0	1	0	24	0	0	58	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	8.98	9.45	8.42	8.99	0.00	8.58	7.33	0.00	0.00	0.00	0.00	0.00
Movement LOS	A	A	A	A		A	A	A			A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.24	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	8.95			8.85			0.00			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	0.31											
Intersection LOS	A											

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Intersection Level Of Service Report
Intersection 4: 20th Street N/Eastern Access

Control Type:	Two-way stop	Delay (sec / veh):	8.8
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Eastern Access		20th Street N		20th Street N	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0	0	0	0
Pocket Length [ft]	100.00	25.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Eastern Access		20th Street N		20th Street N	
Base Volume Input [veh/h]	0	1	17	3	1	23
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.49	1.00	1.00	1.49
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	1	25	3	1	34
Peak Hour Factor	0.9167	0.9167	0.9167	0.9167	0.9167	0.9167
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	7	1	0	9
Total Analysis Volume [veh/h]	0	1	27	3	1	37
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	8.84	8.44	0.00	0.00	7.28	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.07	0.07
95th-Percentile Queue Length [ft]	0.00	0.07	0.00	0.00	1.84	1.84
d_A, Approach Delay [s/veh]	8.44		0.00		0.19	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.23					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 5: 20th Street N/Manning Trail N

Control Type:	Two-way stop	Delay (sec / veh):	8.8
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.025

Intersection Setup

Name	Manning Trail N		Manning Trail		20th Street N	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Manning Trail N		Manning Trail		20th Street N	
Base Volume Input [veh/h]	6	1	4	20	15	3
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.49	1.49	1.00	1.49	1.49
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	6	1	6	20	22	4
Peak Hour Factor	0.9038	0.9038	0.9038	0.9038	0.9038	0.9038
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	0	2	6	6	1
Total Analysis Volume [veh/h]	7	1	7	22	24	4
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.02	0.00
d_M, Delay for Movement [s/veh]	7.28	0.00	0.00	0.00	8.79	8.50
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.02	0.02	0.00	0.00	0.09	0.09
95th-Percentile Queue Length [ft]	0.38	0.38	0.00	0.00	2.19	2.19
d_A, Approach Delay [s/veh]	6.37		0.00		8.75	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	4.55					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 6: Lake Elmo Avenue N/Site Access

Control Type:	Two-way stop	Delay (sec / veh):	10.2
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

Intersection Setup

Name	Lake Elmo Avenue		Lake Elmo Avenue N		Site Access	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Lake Elmo Avenue		Lake Elmo Avenue N		Site Access	
Base Volume Input [veh/h]	56	11	4	67	2	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.70	1.00	1.00	1.70	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	95	11	4	114	2	0
Peak Hour Factor	0.7750	0.7750	0.7750	0.7750	0.7750	0.7750
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	31	4	1	37	1	0
Total Analysis Volume [veh/h]	123	14	5	147	3	0
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.50	0.00	10.16	8.94
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.35	0.35	0.01	0.01
95th-Percentile Queue Length [ft]	0.00	0.00	8.78	8.78	0.32	0.32
d_A, Approach Delay [s/veh]	0.00		0.25		10.16	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	0.23					
Intersection LOS	B					

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Intersection Level Of Service Report
Intersection 7: Manning Avenue N/Manning Trail N

Control Type:	Two-way stop	Delay (sec / veh):	36.5
Analysis Method:	HCM 2010	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.009

Intersection Setup

Name	Manning Avenue N				Manning Trail N	
Approach	Northeastbound		Southwestbound		Southeastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00		50.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Manning Avenue N				Manning Trail N	
Base Volume Input [veh/h]	7	524	408	1	1	6
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.49	1.49	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	781	608	1	1	6
Peak Hour Factor	0.8762	0.8762	0.8762	0.8762	0.8762	0.8762
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	223	173	0	0	2
Total Analysis Volume [veh/h]	8	891	694	1	1	7
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.01	0.00	0.01	0.02
d_M, Delay for Movement [s/veh]	9.03	0.00	0.00	0.00	36.45	13.41
Movement LOS	A	A	A	A	E	B
95th-Percentile Queue Length [veh]	0.03	0.00	0.00	0.00	0.08	0.08
95th-Percentile Queue Length [ft]	0.67	0.00	0.00	0.00	1.88	1.88
d_A, Approach Delay [s/veh]	0.08		0.00		16.29	
Approach LOS	A		A		C	
d_I, Intersection Delay [s/veh]	0.13					
Intersection LOS	E					

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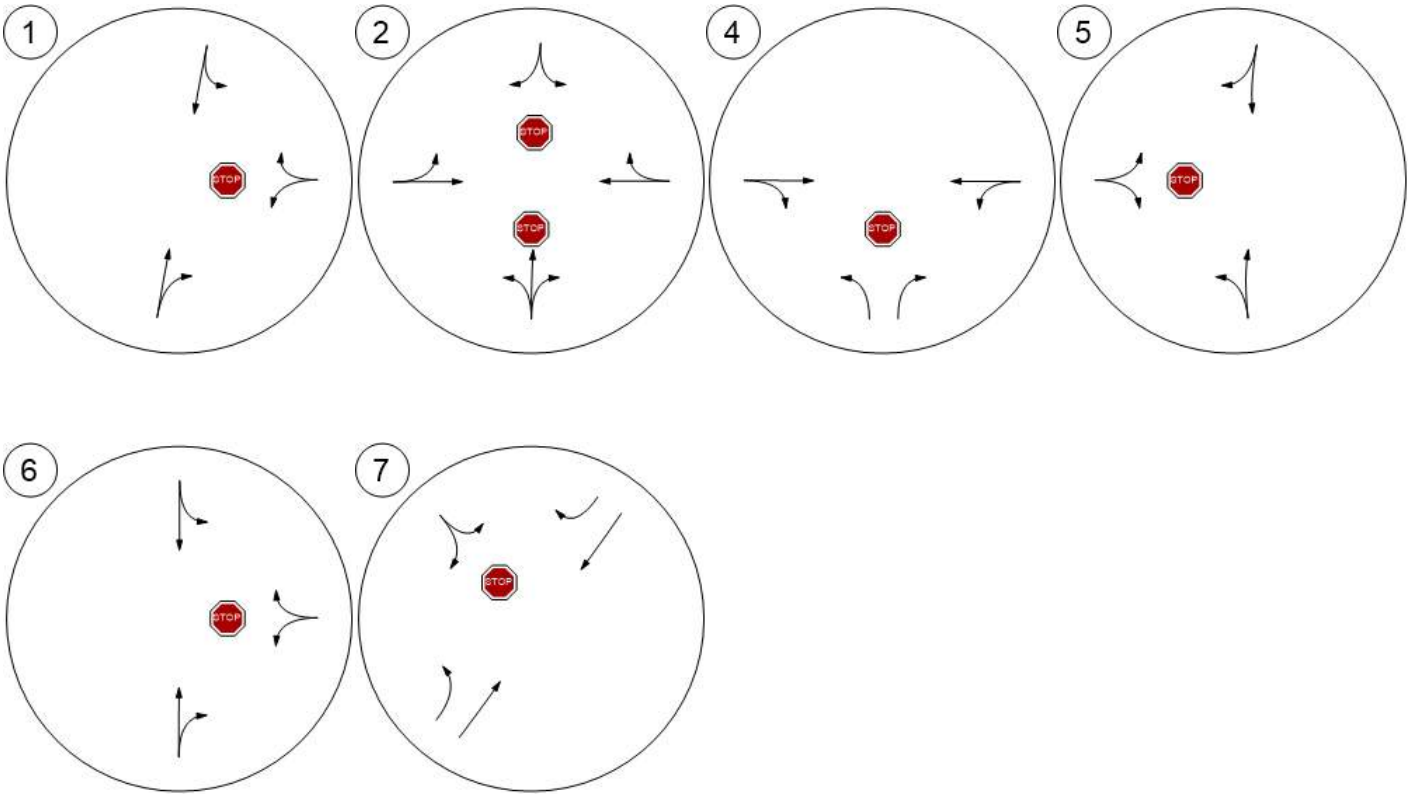
Lane Configuration and Traffic Control



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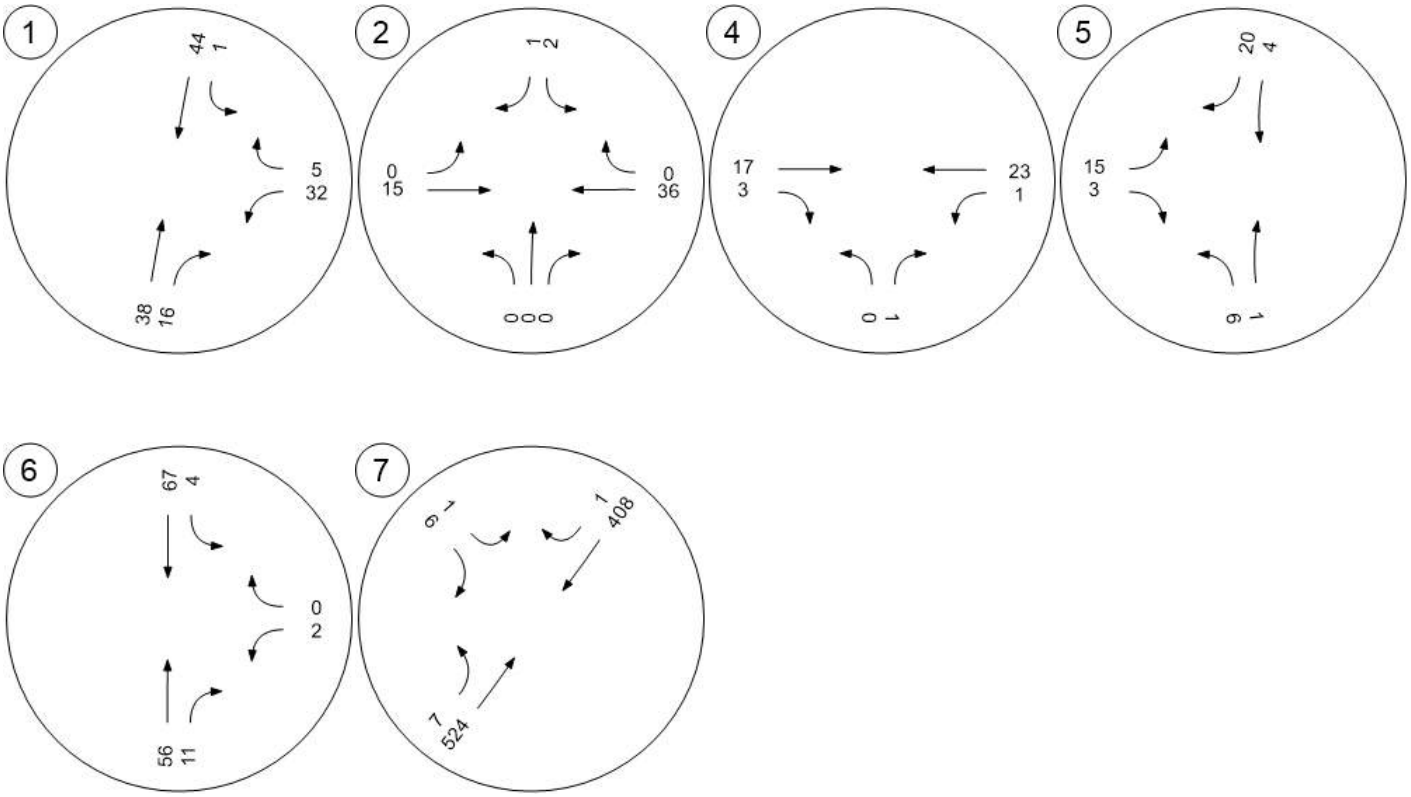
Traffic Volume - Base Volume



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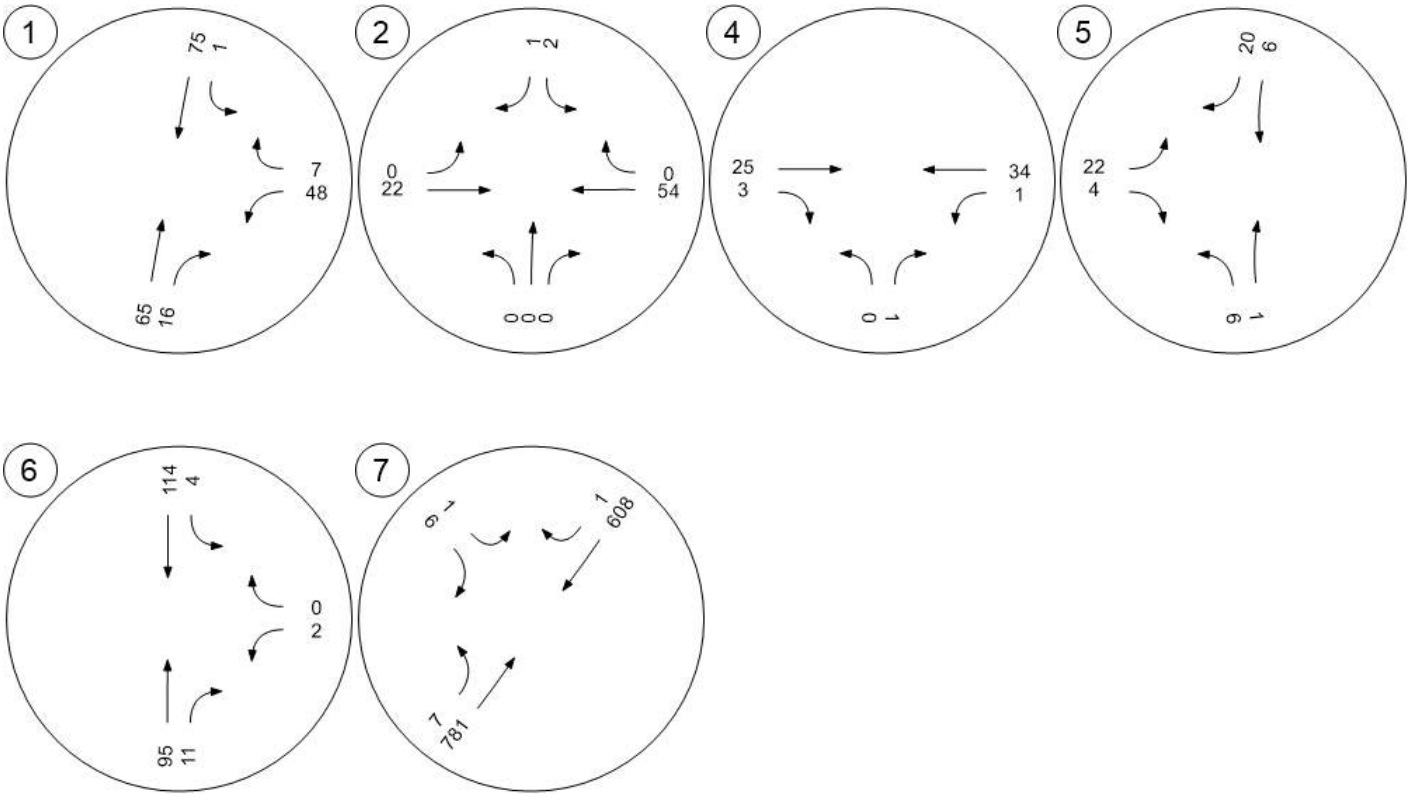
Traffic Volume - Future Total Volume



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Vistro File: C:\...\Lake Elmo Model.vistro
Report File: C:\...\2030 PM NOBUILD.pdf

Scenario 15: 2030 NOBUILD PM PEAK_NEW
10/12/2016

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Lake Elmo Avenue N/20th Street N	Two-way stop	HCM 2010	WB Left	0.031	10.3	B
2	20th Street N/20th Street Court N	Two-way stop	HCM 2010	NB Thru	0.000	9.5	A
4	20th Street N/Eastern Access	Two-way stop	HCM 2010	NB Left	0.006	9.0	A
5	20th Street N/Manning Trail N	Two-way stop	HCM 2010	EB Left	0.053	9.0	A
6	Lake Elmo Avenue N/Site Access	Two-way stop	HCM 2010	WB Left	0.002	10.6	B
7	Manning Avenue N/Manning Trail N	Two-way stop	HCM 2010	SEB Left	0.000	59.4	F

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

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Intersection Level Of Service Report
Intersection 1: Lake Elmo Avenue N/20th Street N

Control Type:	Two-way stop	Delay (sec / veh):	10.3
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.031

Intersection Setup

Name	Lake Elmo Avenue N		Lake Elmo Avenue N		20th Street N	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Lake Elmo Avenue N		Lake Elmo Avenue N		20th Street N	
Base Volume Input [veh/h]	74	26	4	68	14	2
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.70	1.00	1.00	1.70	1.49	1.49
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	126	26	4	116	21	3
Peak Hour Factor	0.9375	0.9375	0.9375	0.9375	0.9375	0.9375
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	7	1	31	6	1
Total Analysis Volume [veh/h]	134	28	4	124	22	3
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.03	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.55	0.00	10.26	9.18
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.30	0.30	0.11	0.11
95th-Percentile Queue Length [ft]	0.00	0.00	7.43	7.43	2.67	2.67
d_A, Approach Delay [s/veh]	0.00		0.24		10.13	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	0.90					
Intersection LOS	B					

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Intersection Level Of Service Report
Intersection 2: 20th Street N/20th Street Court N

Control Type:	Two-way stop	Delay (sec / veh):	9.5
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name				20th Street Court N			20th Street N			20th Street N		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

volumes

Name				20th Street Court N			20th Street N			20th Street N		
Base Volume Input [veh/h]	0	0	0	1	0	0	0	30	0	0	24	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.49	1.00	1.00	1.49	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	1	0	0	0	45	0	0	36	0
Peak Hour Factor	0.8438	0.8438	0.8438	0.8438	1.0000	0.8438	0.8438	0.8438	1.0000	1.0000	0.8438	0.8438
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	0	0	0	13	0	0	11	0
Total Analysis Volume [veh/h]	0	0	0	1	0	0	0	53	0	0	43	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.06	9.53	8.55	9.06	0.00	8.51	7.30	0.00	0.00	0.00	0.00	0.00
Movement LOS	A	A	A	A		A	A	A			A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.08	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.05			9.06			0.00			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	0.09											
Intersection LOS	A											

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Intersection Level Of Service Report
Intersection 4: 20th Street N/Eastern Access

Control Type:	Two-way stop	Delay (sec / veh):	9.0
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.006

Intersection Setup

Name	Eastern Access		20th Street N		20th Street N	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0	0	0	0
Pocket Length [ft]	100.00	25.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Eastern Access		20th Street N		20th Street N	
Base Volume Input [veh/h]	4	7	34	4	1	21
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.49	1.00	1.00	1.49
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	7	51	4	1	31
Peak Hour Factor	0.8563	0.8563	0.8563	0.8563	0.8563	0.8563
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	2	15	1	0	9
Total Analysis Volume [veh/h]	5	8	60	5	1	36
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.03	8.62	0.00	0.00	7.34	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.02	0.02	0.00	0.00	0.07	0.07
95th-Percentile Queue Length [ft]	0.42	0.60	0.00	0.00	1.85	1.85
d_A, Approach Delay [s/veh]	8.78		0.00		0.20	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.06					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 5: 20th Street N/Manning Trail N

Control Type:	Two-way stop	Delay (sec / veh):	9.0
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.053

Intersection Setup

Name	Manning Trail N		Manning Trail		20th Street N	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Manning Trail N		Manning Trail		20th Street N	
Base Volume Input [veh/h]	6	4	4	15	26	12
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.49	1.49	1.00	1.49	1.49
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	6	6	6	15	39	18
Peak Hour Factor	0.7674	0.7674	0.7674	0.7674	0.7674	0.7674
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	2	2	5	13	6
Total Analysis Volume [veh/h]	8	8	8	20	51	23
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.00	0.05	0.02
d_M, Delay for Movement [s/veh]	7.28	0.00	0.00	0.00	9.03	8.69
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.03	0.03	0.00	0.00	0.24	0.24
95th-Percentile Queue Length [ft]	0.76	0.76	0.00	0.00	6.03	6.03
d_A, Approach Delay [s/veh]	3.64		0.00		8.92	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	6.09					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 6: Lake Elmo Avenue N/Site Access

Control Type:	Two-way stop	Delay (sec / veh):	10.6
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.002

Intersection Setup

Name	Lake Elmo Avenue		Lake Elmo Avenue N		Site Access	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Lake Elmo Avenue		Lake Elmo Avenue N		Site Access	
Base Volume Input [veh/h]	100	0	1	82	1	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.70	1.00	1.00	1.70	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	170	0	1	139	1	0
Peak Hour Factor	0.8946	0.8946	0.8946	0.8946	0.8946	0.8946
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	48	0	0	39	0	0
Total Analysis Volume [veh/h]	190	0	1	155	1	0
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.60	0.00	10.55	9.23
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.38	0.38	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	9.51	9.51	0.12	0.12
d_A, Approach Delay [s/veh]	0.00		0.05		10.55	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	0.05					
Intersection LOS	B					

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Intersection Level Of Service Report
Intersection 7: Manning Avenue N/Manning Trail N

Control Type:	Two-way stop	Delay (sec / veh):	59.4
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Manning Avenue N				Manning Trail N	
Approach	Northeastbound		Southwestbound		Southeastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00		50.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Manning Avenue N				Manning Trail N	
Base Volume Input [veh/h]	4	644	647	0	0	5
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.49	1.49	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	960	964	0	0	5
Peak Hour Factor	0.9709	0.9709	0.9709	0.9709	0.9709	0.9709
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	247	248	0	0	1
Total Analysis Volume [veh/h]	4	989	993	0	0	5
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.01	0.00	0.00	0.02
d_M, Delay for Movement [s/veh]	10.20	0.00	0.00	0.00	59.43	17.29
Movement LOS	B	A	A	A	F	C
95th-Percentile Queue Length [veh]	0.02	0.00	0.00	0.00	0.05	0.05
95th-Percentile Queue Length [ft]	0.43	0.00	0.00	0.00	1.28	1.28
d_A, Approach Delay [s/veh]	0.04		0.00		17.29	
Approach LOS	A		A		C	
d_I, Intersection Delay [s/veh]	0.06					
Intersection LOS	F					

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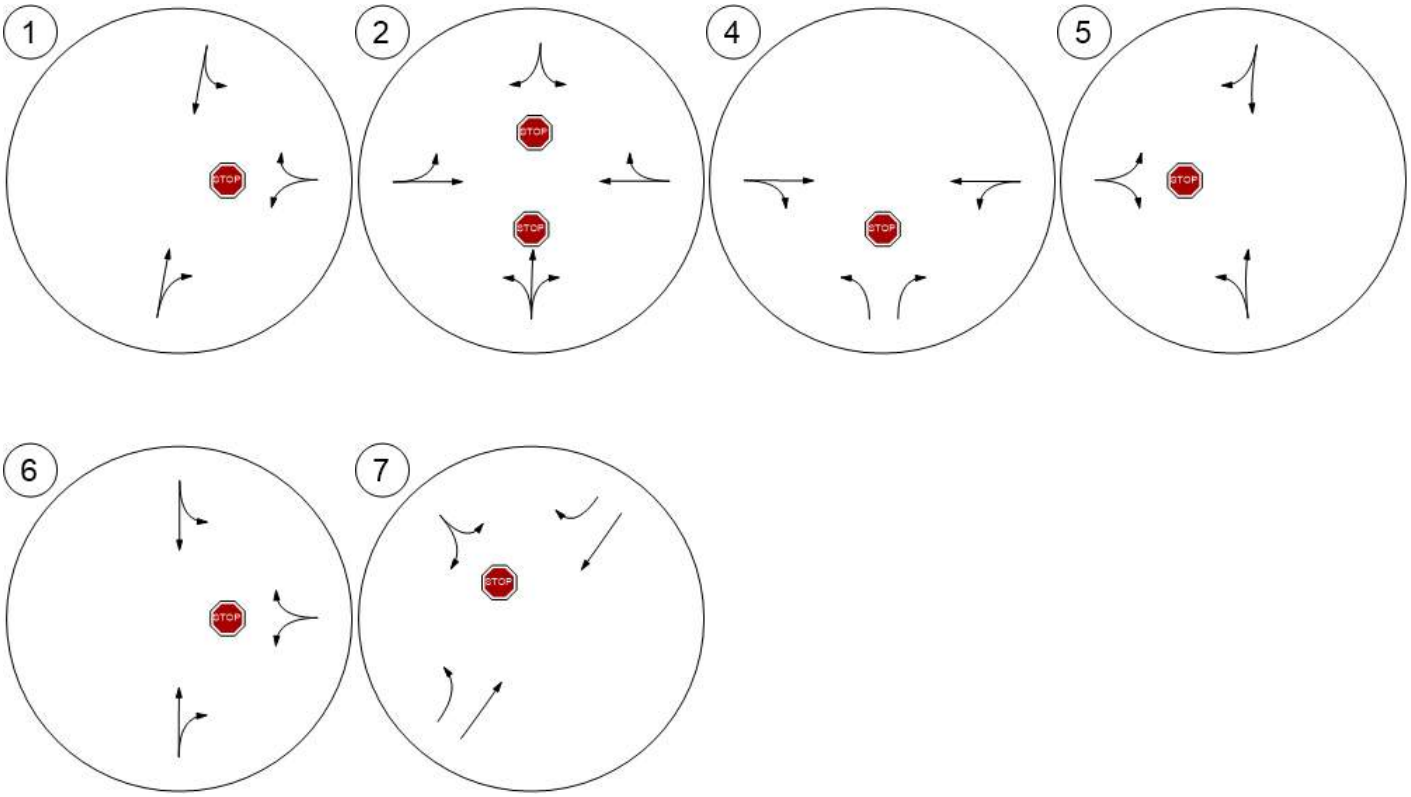
Lane Configuration and Traffic Control



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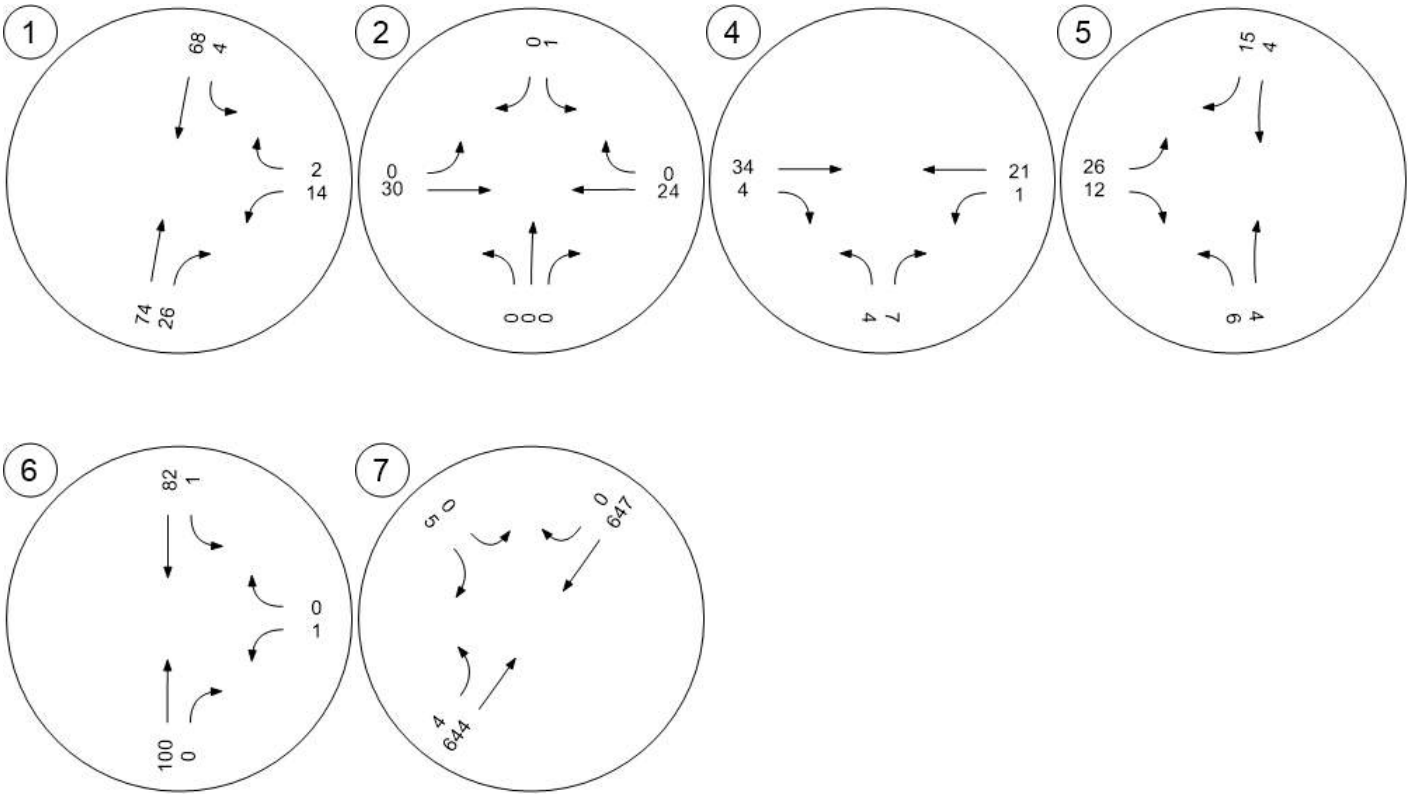
Traffic Volume - Base Volume



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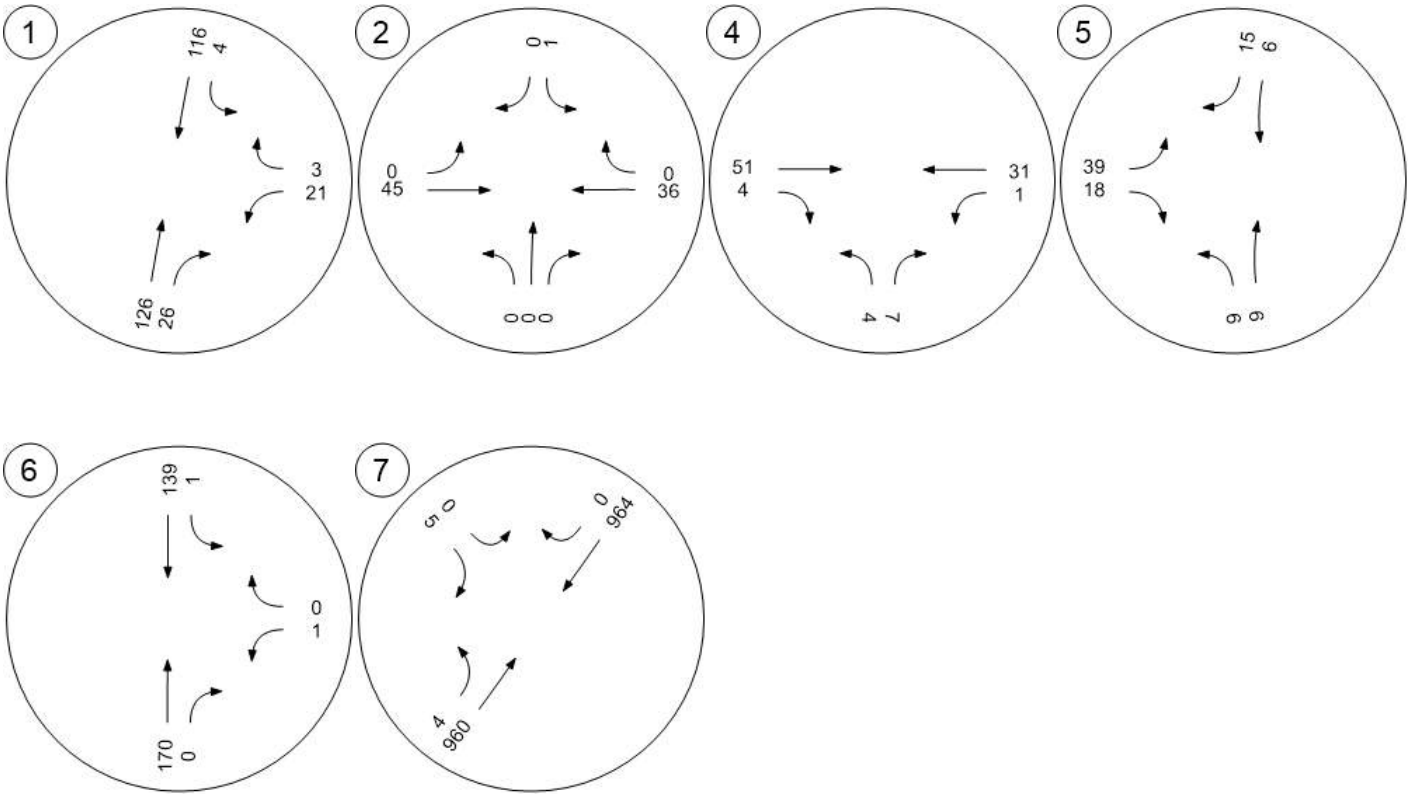
Traffic Volume - Future Total Volume



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Vistro File: C:\...\Lake Elmo Model.vistro
Report File: C:\...\2030 AM BUILD.pdf

Scenario 13: 2030 BUILD AM PEAK_NEW
10/12/2016

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	20th Street and Lake Elmo Avenue N	Two-way stop	HCM 2010	WB Left	0.140	10.7	B
2	20th Street N/20th Street Court N	Two-way stop	HCM 2010	NB Thru	0.000	9.9	A
3	20th Street N/Western Site Access	Two-way stop	HCM 2010	NB Left	0.005	9.1	A
4	20th Street N/Eastern Access	Two-way stop	HCM 2010	NB Left	0.015	9.3	A
5	20th Street N/Manning Trail N	Two-way stop	HCM 2010	EB Left	0.063	9.3	A
6	Lake Elmo Avenue N/Site Access	Two-way stop	HCM 2010	WB Left	0.024	10.9	B
7	Manning Avenue N/Manning Trail N	Two-way stop	HCM 2010	SEB Left	0.010	41.8	E
10	Manning Trail N/Site Access	Two-way stop	HCM 2010	EB Left	0.004	8.8	A
11	10th Street N & Site Access	Two-way stop	HCM 2010	SB Left	0.130	15.5	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

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Intersection Level Of Service Report
Intersection 1: 20th Street and Lake Elmo Avenue N

Control Type:	Two-way stop	Delay (sec / veh):	10.7
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.140

Intersection Setup

Name	Lake Elmo Avenue N		Lake Elmo Avenue N		20th Street N	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Lake Elmo Avenue N		Lake Elmo Avenue N		20th Street N	
Base Volume Input [veh/h]	38	16	1	44	32	5
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.70	1.00	1.00	1.70	1.49	1.49
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	7	23	4	2	31	7
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	72	39	5	77	79	14
Peak Hour Factor	0.7556	0.7556	0.7556	0.7556	0.7556	0.7556
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	24	13	2	25	26	5
Total Analysis Volume [veh/h]	95	52	7	102	105	19
Pedestrian Volume [ped/h]	0		0		0	

Scenario 13: 13: 2030 BUILD AM PEAK_NEW

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.14	0.02
d_M, Delay for Movement [s/veh]	0.00	0.00	7.52	0.00	10.71	9.76
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.25	0.25	0.57	0.57
95th-Percentile Queue Length [ft]	0.00	0.00	6.16	6.16	14.28	14.28
d_A, Approach Delay [s/veh]	0.00		0.48		10.57	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	3.59					
Intersection LOS	B					

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Intersection Level Of Service Report
Intersection 2: 20th Street N/20th Street Court N

Control Type:	Two-way stop	Delay (sec / veh):	9.9
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name				20th Street Court N			20th Street N			20th Street N		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

volumes

Name				20th Street Court N			20th Street N			20th Street N		
Base Volume Input [veh/h]	0	0	0	2	0	1	0	15	0	0	36	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.49	1.00	1.00	1.49	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	17	0	3	0	0	0	0	21	6	1	22	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	17	0	3	2	0	1	0	43	6	1	76	0
Peak Hour Factor	0.9286	0.9286	0.9286	0.9286	1.0000	0.9286	0.9286	0.9286	1.0000	1.0000	0.9286	0.9286
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	0	1	1	0	0	0	12	2	0	20	0
Total Analysis Volume [veh/h]	18	0	3	2	0	1	0	46	6	1	82	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.41	9.86	8.64	9.33	0.00	8.70	7.38	0.00	0.00	7.32	0.00	0.00
Movement LOS	A	A	A	A		A	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.08	0.08	0.08	0.01	0.00	0.01	0.00	0.00	0.00	0.17	0.17	0.17
95th-Percentile Queue Length [ft]	1.88	1.88	1.88	0.26	0.00	0.26	0.00	0.00	0.00	4.23	4.23	4.23
d_A, Approach Delay [s/veh]	9.30			9.12			0.00			0.09		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	1.45											
Intersection LOS	A											

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Intersection Level Of Service Report
Intersection 3: 20th Street N/Western Site Access

Control Type:	Two-way stop	Delay (sec / veh):	9.1
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.005

Intersection Setup

Name	Site Access		20th Street N		20th Street N	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Site Access		20th Street N		20th Street N	
Base Volume Input [veh/h]	0	0	17	0	0	23
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.49	1.00	1.00	1.49
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	4	10	23	1	4	19
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	10	48	1	4	53
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	3	12	0	1	13
Total Analysis Volume [veh/h]	4	10	48	1	4	53
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.01	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.12	8.58	0.00	0.00	7.32	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.04	0.04	0.00	0.00	0.11	0.11
95th-Percentile Queue Length [ft]	1.09	1.09	0.00	0.00	2.85	2.85
d_A, Approach Delay [s/veh]	8.74		0.00		0.51	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.26					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 4: 20th Street N/Eastern Access

Control Type:	Two-way stop	Delay (sec / veh):	9.3
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.015

Intersection Setup

Name	Eastern Access		20th Street N		20th Street N	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0	0	0	0
Pocket Length [ft]	100.00	25.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Eastern Access		20th Street N		20th Street N	
Base Volume Input [veh/h]	0	1	17	3	1	23
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.49	1.00	1.00	1.49
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	12	31	29	4	9	11
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	12	32	54	7	10	45
Peak Hour Factor	0.9167	0.9167	0.9167	0.9167	0.9167	0.9167
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	9	15	2	3	12
Total Analysis Volume [veh/h]	13	35	59	8	11	49
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.03	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	9.28	8.72	0.00	0.00	7.36	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.05	0.11	0.00	0.00	0.12	0.12
95th-Percentile Queue Length [ft]	1.16	2.71	0.00	0.00	3.05	3.05
d_A, Approach Delay [s/veh]	8.88		0.00		1.35	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.90					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 5: 20th Street N/Manning Trail N

Control Type:	Two-way stop	Delay (sec / veh):	9.3
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.063

Intersection Setup

Name	Manning Trail N		Manning Trail		20th Street N	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Manning Trail N		Manning Trail		20th Street N	
Base Volume Input [veh/h]	6	1	4	20	15	3
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.49	1.49	1.00	1.49	1.49
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	11	2	7	9	30	30
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	17	3	13	29	52	34
Peak Hour Factor	0.9038	0.9038	0.9038	0.9038	0.9038	0.9038
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	1	4	8	14	9
Total Analysis Volume [veh/h]	19	3	14	32	58	38
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.00	0.06	0.04
d_M, Delay for Movement [s/veh]	7.33	0.00	0.00	0.00	9.32	8.86
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.04	0.04	0.00	0.00	0.33	0.33
95th-Percentile Queue Length [ft]	1.07	1.07	0.00	0.00	8.24	8.24
d_A, Approach Delay [s/veh]	6.33		0.00		9.13	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	6.20					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 6: Lake Elmo Avenue N/Site Access

Control Type:	Two-way stop	Delay (sec / veh):	10.9
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.024

Intersection Setup

Name	Lake Elmo Avenue		Lake Elmo Avenue N		Site Access	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Lake Elmo Avenue		Lake Elmo Avenue N		Site Access	
Base Volume Input [veh/h]	56	11	4	67	2	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.70	1.00	1.00	1.70	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	12	4	6	27	10	18
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	107	15	10	141	12	18
Peak Hour Factor	0.7750	0.7750	0.7750	0.7750	0.7750	0.7750
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	35	5	3	45	4	6
Total Analysis Volume [veh/h]	138	19	13	182	15	23
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.01	0.00	0.02	0.03
d_M, Delay for Movement [s/veh]	0.00	0.00	7.55	0.00	10.90	9.24
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.47	0.47	0.15	0.15
95th-Percentile Queue Length [ft]	0.00	0.00	11.87	11.87	3.87	3.87
d_A, Approach Delay [s/veh]	0.00		0.50		9.90	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.22					
Intersection LOS	B					

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Intersection Level Of Service Report
Intersection 7: Manning Avenue N/Manning Trail N

Control Type:	Two-way stop	Delay (sec / veh):	41.8
Analysis Method:	HCM 2010	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.010

Intersection Setup

Name	Manning Avenue N				Manning Trail N	
Approach	Northeastbound		Southwestbound		Southeastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00		50.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Manning Avenue N				Manning Trail N	
Base Volume Input [veh/h]	7	524	408	1	1	6
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.49	1.49	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	25	11	4	0	0	29
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	32	792	612	1	1	35
Peak Hour Factor	0.8762	0.8762	0.8762	0.8762	0.8762	0.8762
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	226	175	0	0	10
Total Analysis Volume [veh/h]	37	904	698	1	1	40
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.01	0.01	0.00	0.01	0.09
d_M, Delay for Movement [s/veh]	9.18	0.00	0.00	0.00	41.84	14.16
Movement LOS	A	A	A	A	E	B
95th-Percentile Queue Length [veh]	0.13	0.00	0.00	0.00	0.33	0.33
95th-Percentile Queue Length [ft]	3.22	0.00	0.00	0.00	8.34	8.34
d_A, Approach Delay [s/veh]	0.36		0.00		14.84	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	0.56					
Intersection LOS	E					

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Intersection Level Of Service Report
Intersection 10: Manning Trail N/Site Access

Control Type:	Two-way stop	Delay (sec / veh):	8.8
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

Intersection Setup

Name	Manning Trail N		Site Access		Manning Trail N	
Approach	Southbound		Eastbound		Northwestbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00		30.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Manning Trail N		Site Access		Manning Trail N	
Base Volume Input [veh/h]	7	0	0	0	0	13
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.49	1.00	1.00	1.00	1.00	1.49
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	25	12	4	4	16	9
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	35	12	4	4	16	28
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	3	1	1	4	7
Total Analysis Volume [veh/h]	35	12	4	4	16	28
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Stop	Free
Flared Lane		No	
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance		No	
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	8.85	8.50	0.00	0.00
Movement LOS	A		A	A		A
95th-Percentile Queue Length [veh]	0.00	0.00	0.02	0.02	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	0.61	0.61	0.00	0.00
d_A, Approach Delay [s/veh]	0.00		8.67		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.98					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 11: 10th Street N & Site Access

Control Type:	Two-way stop	Delay (sec / veh):	15.5
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.130

Intersection Setup

Name	Site Access		CSAH 10		CSAH 10	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		55.00		55.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

volumes

Name	Site Access		CSAH 10		CSAH 10	
Base Volume Input [veh/h]	0	0	0	250	250	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.70	1.00	1.70	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	52	10	4	13	4	18
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	52	10	4	263	429	18
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	13	3	1	66	107	5
Total Analysis Volume [veh/h]	52	10	4	263	429	18
Pedestrian Volume [ped/h]	0		0		0	

Scenario 13: 13: 2030 BUILD AM PEAK_NEW

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Version 4.00-02

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.13	0.02	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	15.48	12.27	8.25	0.00	0.00	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh]	0.51	0.51	0.94	0.94	0.00	0.00
95th-Percentile Queue Length [ft]	12.73	12.73	23.45	23.45	0.00	0.00
d_A, Approach Delay [s/veh]	14.96		0.12		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.24					
Intersection LOS	C					

Scenario 13: 13: 2030 BUILD AM PEAK_NEW

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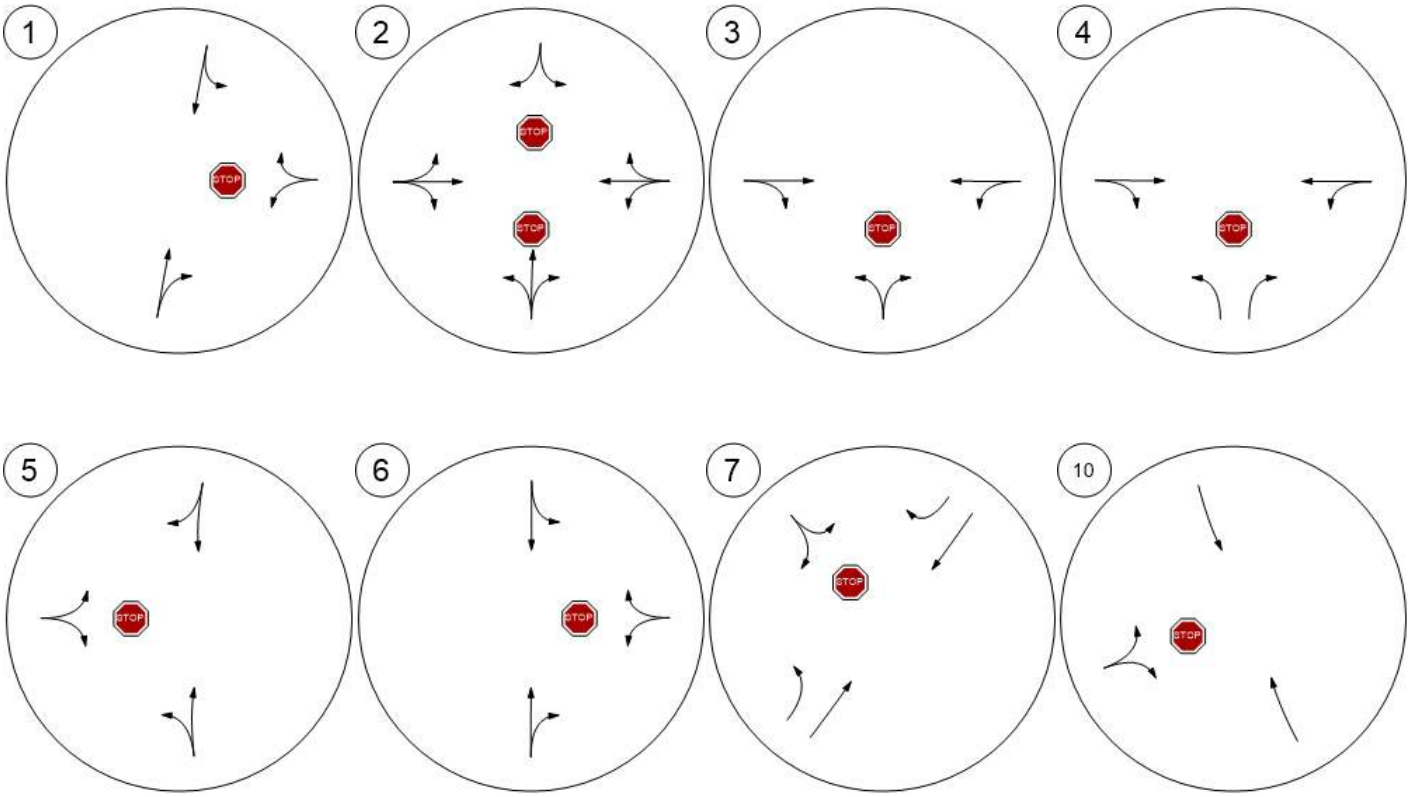
Version 4.00-02

Lane Configuration and Traffic Control



Scenario 13: 13: 2030 BUILD AM PEAK_NEW

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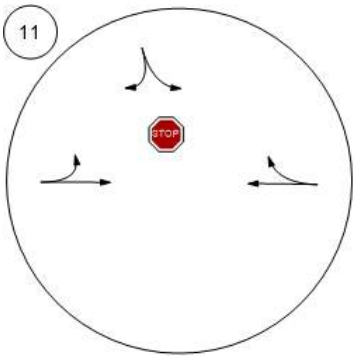
Version 4.00-02

Lane Configuration and Traffic Control



Scenario 13: 13: 2030 BUILD AM PEAK_NEW

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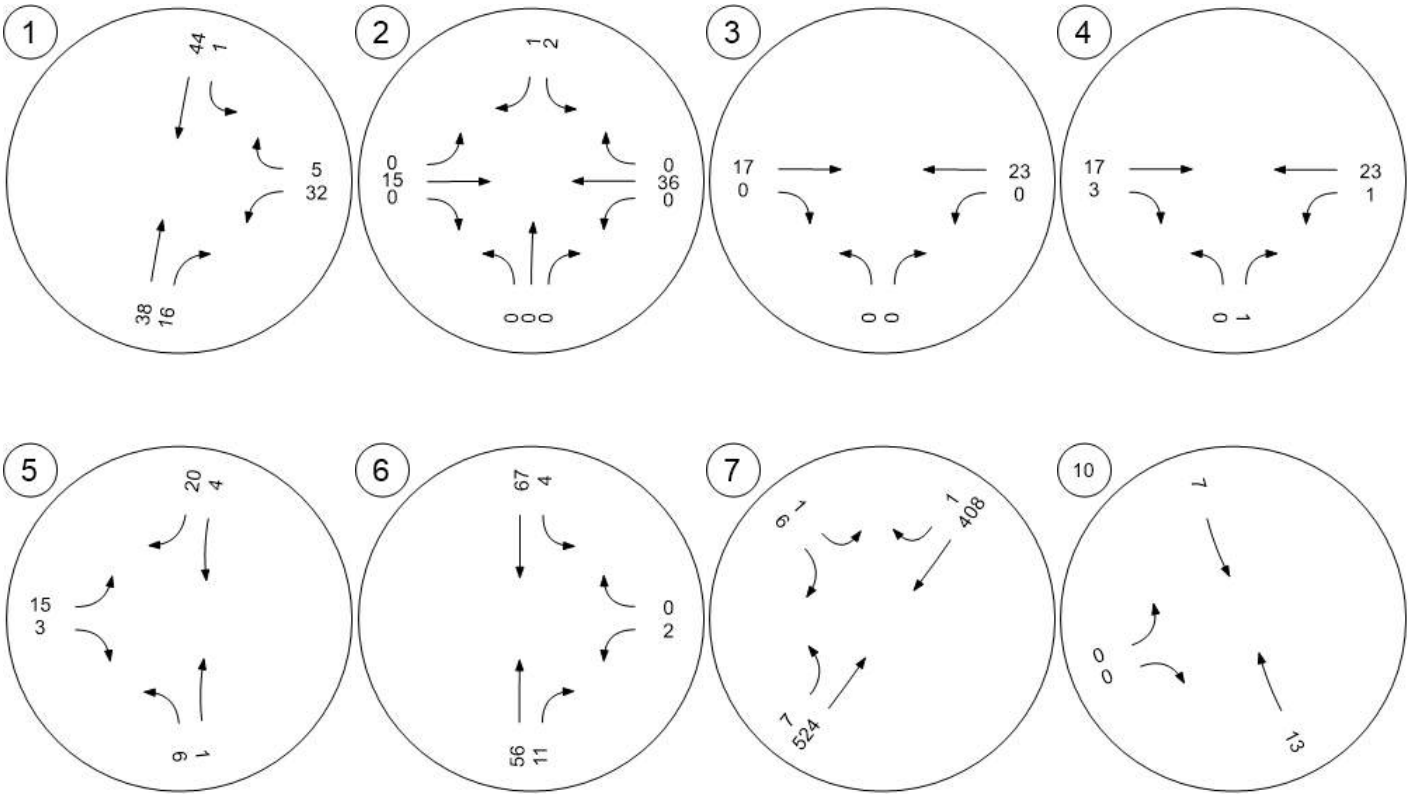
Traffic Volume - Base Volume



Scenario 13: 13: 2030 BUILD AM PEAK_NEW

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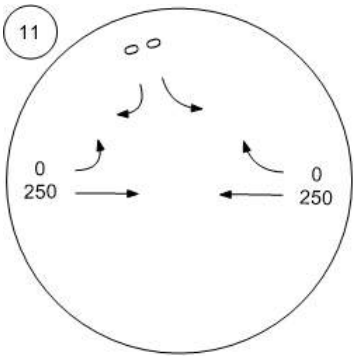
Traffic Volume - Base Volume



Scenario 13: 13: 2030 BUILD AM PEAK_NEW

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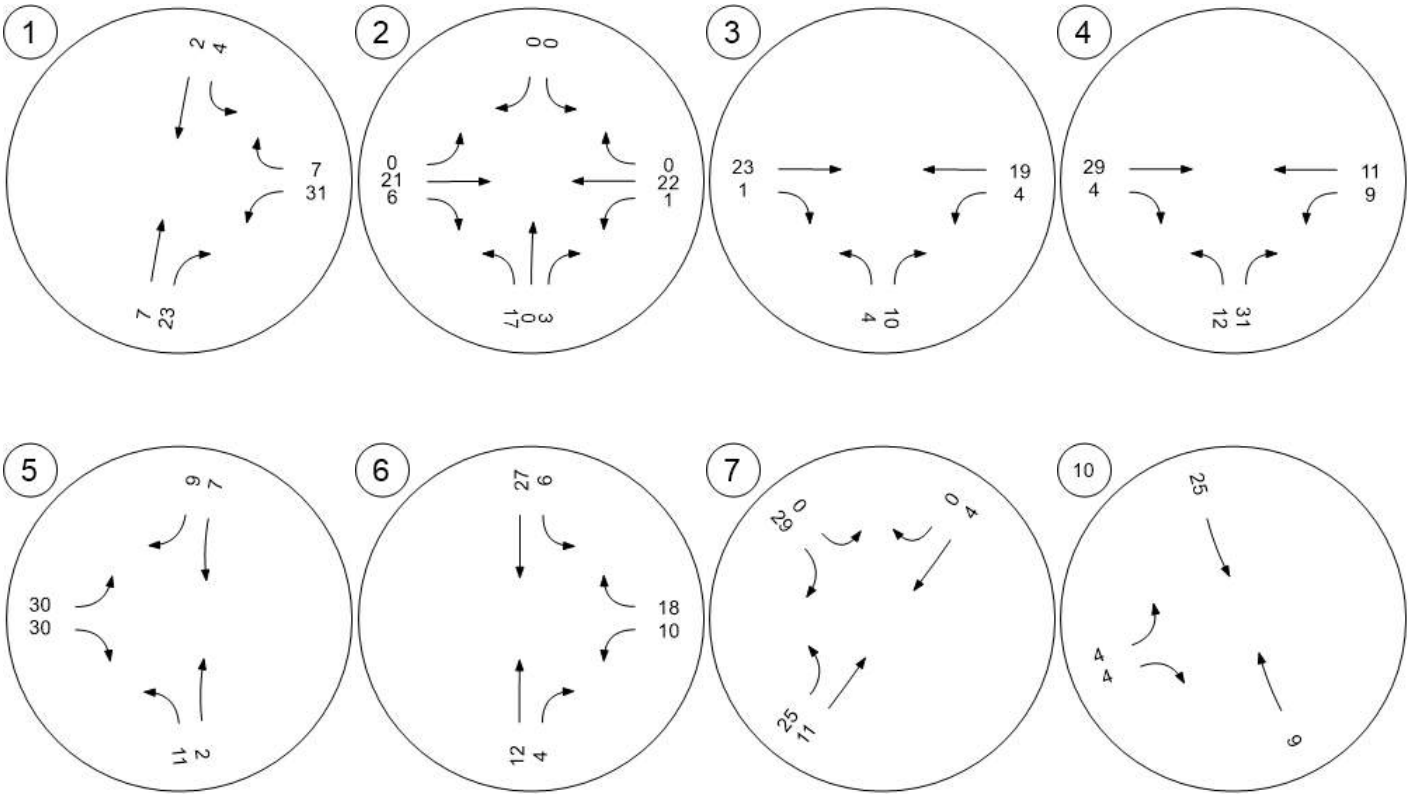
Traffic Volume - Net New Site Trips



Scenario 13: 13: 2030 BUILD AM PEAK_NEW

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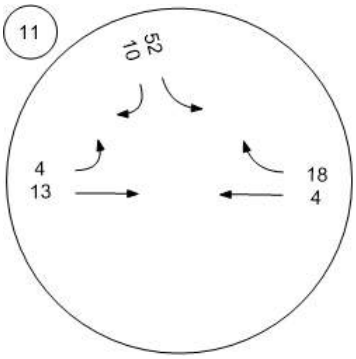
Version 4.00-02

Traffic Volume - Net New Site Trips



Scenario 13: 13: 2030 BUILD AM PEAK_NEW

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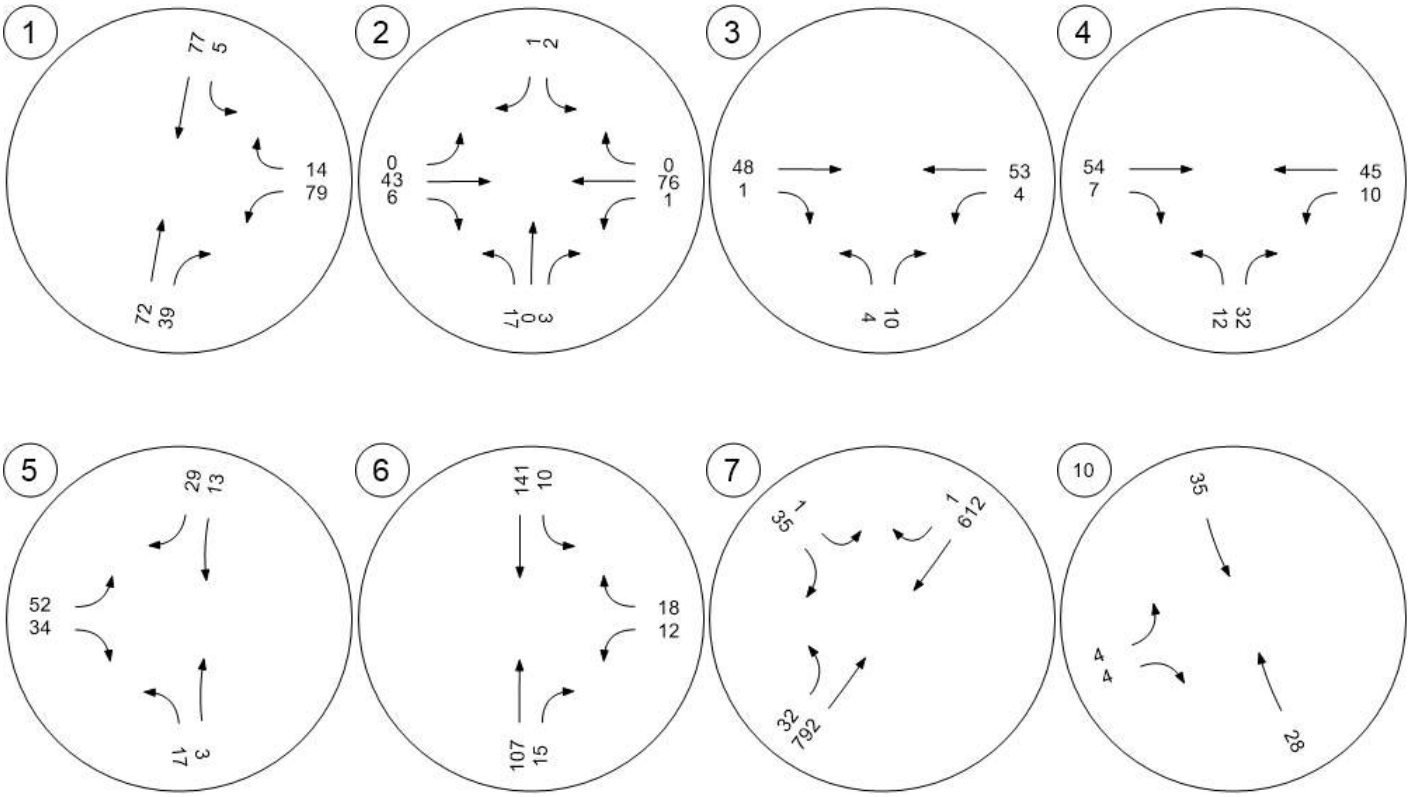
Traffic Volume - Future Total Volume



Scenario 13: 13: 2030 BUILD AM PEAK_NEW

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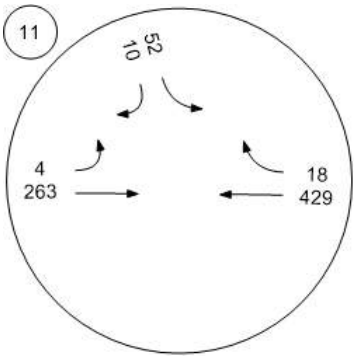
Traffic Volume - Future Total Volume



Scenario 13: 13: 2030 BUILD AM PEAK_NEW

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Vistro File: C:\...\Lake Elmo Model.vistro
Report File: C:\...\2030 PM BUILD.pdf

Scenario 16: 2030 BUILD PM PEAK_NEW
10/12/2016

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	20th Street and Lake Elmo Avenue N	Two-way stop	HCM 2010	WB Left	0.089	11.1	B
2	20th Street N/20th Street Court N	Two-way stop	HCM 2010	NB Thru	0.000	10.2	B
3	20th Street N/Western Site Access	Two-way stop	HCM 2010	NB Left	0.004	9.3	A
4	20th Street N/Eastern Access	Two-way stop	HCM 2010	NB Left	0.020	10.1	B
5	20th Street N/Manning Trail N	Two-way stop	HCM 2010	EB Left	0.098	10.3	B
6	Lake Elmo Avenue N/Site Access	Two-way stop	HCM 2010	WB Left	0.016	11.8	B
7	Manning Avenue N/Manning Trail N	Two-way stop	HCM 2010	SEB Left	0.000	74.6	F
10	Manning Trail N/Site Access	Two-way stop	HCM 2010	EB Left	0.013	9.0	A
11	10th Street N & Site Access	Two-way stop	HCM 2010	SB Left	0.085	15.2	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. for all other control types, they are taken for the whole intersection.

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Version 4.00-02

Intersection Level Of Service Report
Intersection 1: 20th Street and Lake Elmo Avenue N

Control Type:	Two-way stop	Delay (sec / veh):	11.1
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.089

Intersection Setup

Name	Lake Elmo Avenue N		Lake Elmo Avenue N		20th Street N	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Lake Elmo Avenue N		Lake Elmo Avenue N		20th Street N	
Base Volume Input [veh/h]	74	26	4	68	14	2
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.70	1.00	1.00	1.70	1.49	1.49
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	5	41	9	8	33	6
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	131	67	13	124	54	9
Peak Hour Factor	0.9375	0.9375	0.9375	0.9375	0.9375	0.9375
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	35	18	3	33	14	2
Total Analysis Volume [veh/h]	140	71	14	132	58	10
Pedestrian Volume [ped/h]	0		0		0	

Scenario 16: 16: 2030 BUILD PM PEAK_NEW

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.01	0.00	0.09	0.01
d_M, Delay for Movement [s/veh]	0.00	0.00	7.68	0.00	11.11	9.74
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.36	0.36	0.33	0.33
95th-Percentile Queue Length [ft]	0.00	0.00	9.00	9.00	8.34	8.34
d_A, Approach Delay [s/veh]	0.00		0.74		10.91	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	2.00					
Intersection LOS	B					

Scenario 16: 16: 2030 BUILD PM PEAK_NEW

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Intersection Level Of Service Report
Intersection 2: 20th Street N/20th Street Court N

Control Type:	Two-way stop	Delay (sec / veh):	10.2
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name				20th Street Court N			20th Street N			20th Street N		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			45.00			45.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

volumes

Name				20th Street Court N			20th Street N			20th Street N		
Base Volume Input [veh/h]	0	0	0	1	0	0	0	30	0	0	24	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.49	1.00	1.00	1.49	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	11	0	2	0	0	0	0	30	20	4	28	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	11	0	2	1	0	0	0	75	20	4	64	0
Peak Hour Factor	0.8438	0.8438	0.8438	0.8438	1.0000	0.8438	0.8438	0.8438	1.0000	1.0000	0.8438	0.8438
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	1	0	0	0	0	22	5	1	19	0
Total Analysis Volume [veh/h]	13	0	2	1	0	0	0	89	20	4	76	0
Pedestrian Volume [ped/h]	0			0			0			0		

Scenario 16: 16: 2030 BUILD PM PEAK_NEW

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Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.72	10.16	8.85	9.66	0.00	8.66	7.36	0.00	0.00	7.44	0.00	0.00
Movement LOS	A	B	A	A		A	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.06	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.17	0.17
95th-Percentile Queue Length [ft]	1.44	1.44	1.44	0.10	0.00	0.10	0.00	0.00	0.00	4.28	4.28	4.28
d_A, Approach Delay [s/veh]	9.61			9.66			0.00			0.37		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	0.90											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 3: 20th Street N/Western Site Access

Control Type:	Two-way stop	Delay (sec / veh):	9.3
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

Intersection Setup

Name	Site Access		20th Street N		20th Street N	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Site Access		20th Street N		20th Street N	
Base Volume Input [veh/h]	0	0	17	0	0	23
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.49	1.00	1.00	1.49
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	3	7	29	4	12	30
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	7	54	4	12	64
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	2	14	1	3	16
Total Analysis Volume [veh/h]	3	7	54	4	12	64
Pedestrian Volume [ped/h]	0		0		0	

Scenario 16: 16: 2030 BUILD PM PEAK_NEW

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Version 4.00-02

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.01	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	9.32	8.60	0.00	0.00	7.35	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.03	0.03	0.00	0.00	0.15	0.15
95th-Percentile Queue Length [ft]	0.79	0.79	0.00	0.00	3.87	3.87
d_A, Approach Delay [s/veh]	8.82		0.00		1.16	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.22					
Intersection LOS	A					

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Version 4.00-02

Intersection Level Of Service Report
Intersection 4: 20th Street N/Eastern Access

Control Type:	Two-way stop	Delay (sec / veh):	10.1
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.020

Intersection Setup

Name	Eastern Access		20th Street N		20th Street N	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	0	0	0	0
Pocket Length [ft]	100.00	25.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Eastern Access		20th Street N		20th Street N	
Base Volume Input [veh/h]	4	7	34	4	1	21
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.49	1.00	1.00	1.49
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	8	20	21	14	34	34
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	12	27	72	18	35	65
Peak Hour Factor	0.8563	0.8563	0.8563	0.8563	0.8563	0.8563
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	8	21	5	10	19
Total Analysis Volume [veh/h]	14	32	84	21	41	76
Pedestrian Volume [ped/h]	0		0		0	

Scenario 16: 16: 2030 BUILD PM PEAK_NEW

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.03	0.00	0.00	0.03	0.00
d_M, Delay for Movement [s/veh]	10.14	8.87	0.00	0.00	7.49	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.06	0.10	0.00	0.00	0.26	0.26
95th-Percentile Queue Length [ft]	1.50	2.58	0.00	0.00	6.40	6.40
d_A, Approach Delay [s/veh]	9.26		0.00		2.62	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.73					
Intersection LOS	B					

Scenario 16: 16: 2030 BUILD PM PEAK_NEW

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Intersection Level Of Service Report
Intersection 5: 20th Street N/Manning Trail N

Control Type:	Two-way stop	Delay (sec / veh):	10.3
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.098

Intersection Setup

Name	Manning Trail N		Manning Trail		20th Street N	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00		45.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Manning Trail N		Manning Trail		20th Street N	
Base Volume Input [veh/h]	6	4	4	15	26	12
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.49	1.49	1.00	1.49	1.49
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	33	7	7	35	21	21
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	39	13	13	50	60	39
Peak Hour Factor	0.7674	0.7674	0.7674	0.7674	0.7674	0.7674
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	13	4	4	16	20	13
Total Analysis Volume [veh/h]	51	17	17	65	78	51
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.00	0.00	0.00	0.10	0.05
d_M, Delay for Movement [s/veh]	7.46	0.00	0.00	0.00	10.25	9.25
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh]	0.14	0.14	0.00	0.00	0.52	0.52
95th-Percentile Queue Length [ft]	3.52	3.52	0.00	0.00	12.99	12.99
d_A, Approach Delay [s/veh]	5.59		0.00		9.86	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	5.92					
Intersection LOS	B					

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Intersection Level Of Service Report
Intersection 6: Lake Elmo Avenue N/Site Access

Control Type:	Two-way stop	Delay (sec / veh):	11.8
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.016

Intersection Setup

Name	Lake Elmo Avenue		Lake Elmo Avenue N		Site Access	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Lake Elmo Avenue		Lake Elmo Avenue N		Site Access	
Base Volume Input [veh/h]	100	0	1	82	1	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.70	1.00	1.00	1.70	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	34	11	21	20	7	13
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	204	11	22	159	8	13
Peak Hour Factor	0.8946	0.8946	0.8946	0.8946	0.8946	0.8946
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	57	3	6	44	2	4
Total Analysis Volume [veh/h]	228	12	25	178	9	15
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.02	0.00	0.02	0.02
d_M, Delay for Movement [s/veh]	0.00	0.00	7.77	0.00	11.78	9.66
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.54	0.54	0.11	0.11
95th-Percentile Queue Length [ft]	0.00	0.00	13.50	13.50	2.73	2.73
d_A, Approach Delay [s/veh]	0.00		0.96		10.46	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	0.95					
Intersection LOS	B					

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Intersection Level Of Service Report
Intersection 7: Manning Avenue N/Manning Trail N

Control Type:	Two-way stop	Delay (sec / veh):	74.6
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Manning Avenue N				Manning Trail N	
Approach	Northeastbound		Southwestbound		Southeastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00		50.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Manning Avenue N				Manning Trail N	
Base Volume Input [veh/h]	4	644	647	0	0	5
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.49	1.49	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	43	8	13	0	0	30
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	47	968	977	0	0	35
Peak Hour Factor	0.9709	0.9709	0.9709	0.9709	0.9709	0.9709
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	12	249	252	0	0	9
Total Analysis Volume [veh/h]	48	997	1006	0	0	36
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.01	0.01	0.00	0.00	0.12
d_M, Delay for Movement [s/veh]	10.62	0.00	0.00	0.00	74.57	19.02
Movement LOS	B	A	A	A	F	C
95th-Percentile Queue Length [veh]	0.22	0.00	0.00	0.00	0.42	0.42
95th-Percentile Queue Length [ft]	5.60	0.00	0.00	0.00	10.38	10.38
d_A, Approach Delay [s/veh]	0.49		0.00		19.02	
Approach LOS	A		A		C	
d_I, Intersection Delay [s/veh]	0.57					
Intersection LOS	F					

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Intersection Level Of Service Report
Intersection 10: Manning Trail N/Site Access

Control Type:	Two-way stop	Delay (sec / veh):	9.0
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.013

Intersection Setup

Name	Manning Trail N		Site Access		Manning Trail N	
Approach	Southbound		Eastbound		Northwestbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	45.00		30.00		45.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

volumes

Name	Manning Trail N		Site Access		Manning Trail N	
Base Volume Input [veh/h]	7	0	0	0	0	13
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.49	1.00	1.00	1.00	1.00	1.49
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	16	12	12	14	15	28
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	26	12	12	14	15	47
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	3	3	4	4	12
Total Analysis Volume [veh/h]	26	12	12	14	15	47
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Free	Stop	Free
Flared Lane		No	
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance		No	
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.01	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	8.97	8.53	0.00	0.00
Movement LOS	A		A	A		A
95th-Percentile Queue Length [veh]	0.00	0.00	0.08	0.08	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	2.02	2.02	0.00	0.00
d_A, Approach Delay [s/veh]	0.00		8.73		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.29					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 11: 10th Street N & Site Access

Control Type:	Two-way stop	Delay (sec / veh):	15.2
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.085

Intersection Setup

Name	Site Access		CSAH 10		CSAH 10	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		55.00		55.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

volumes

Name	Site Access		CSAH 10		CSAH 10	
Base Volume Input [veh/h]	0	0	0	350	300	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	33	7	11	9	15	58
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	33	7	11	359	315	58
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	8	2	3	90	79	15
Total Analysis Volume [veh/h]	33	7	11	359	315	58
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.01	0.01	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	15.19	11.05	8.07	0.00	0.00	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh]	0.31	0.31	1.34	1.34	0.00	0.00
95th-Percentile Queue Length [ft]	7.84	7.84	33.59	33.59	0.00	0.00
d_A, Approach Delay [s/veh]	14.47		0.24		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.85					
Intersection LOS	C					

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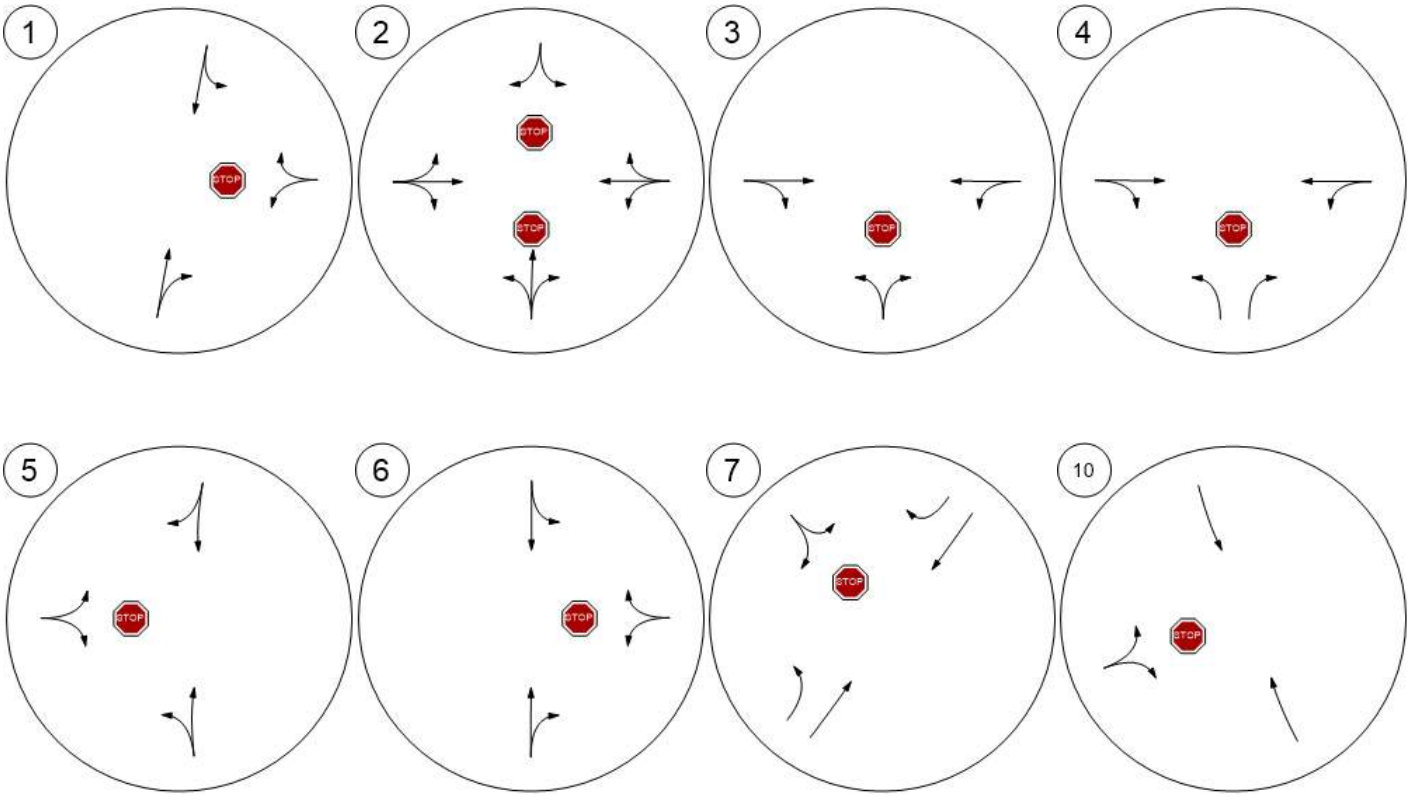
Lane Configuration and Traffic Control



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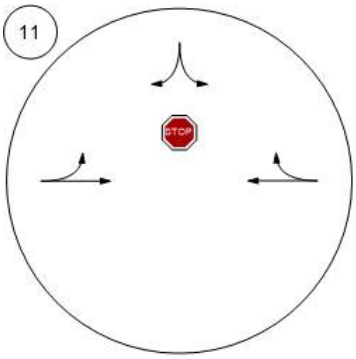
Lane Configuration and Traffic Control



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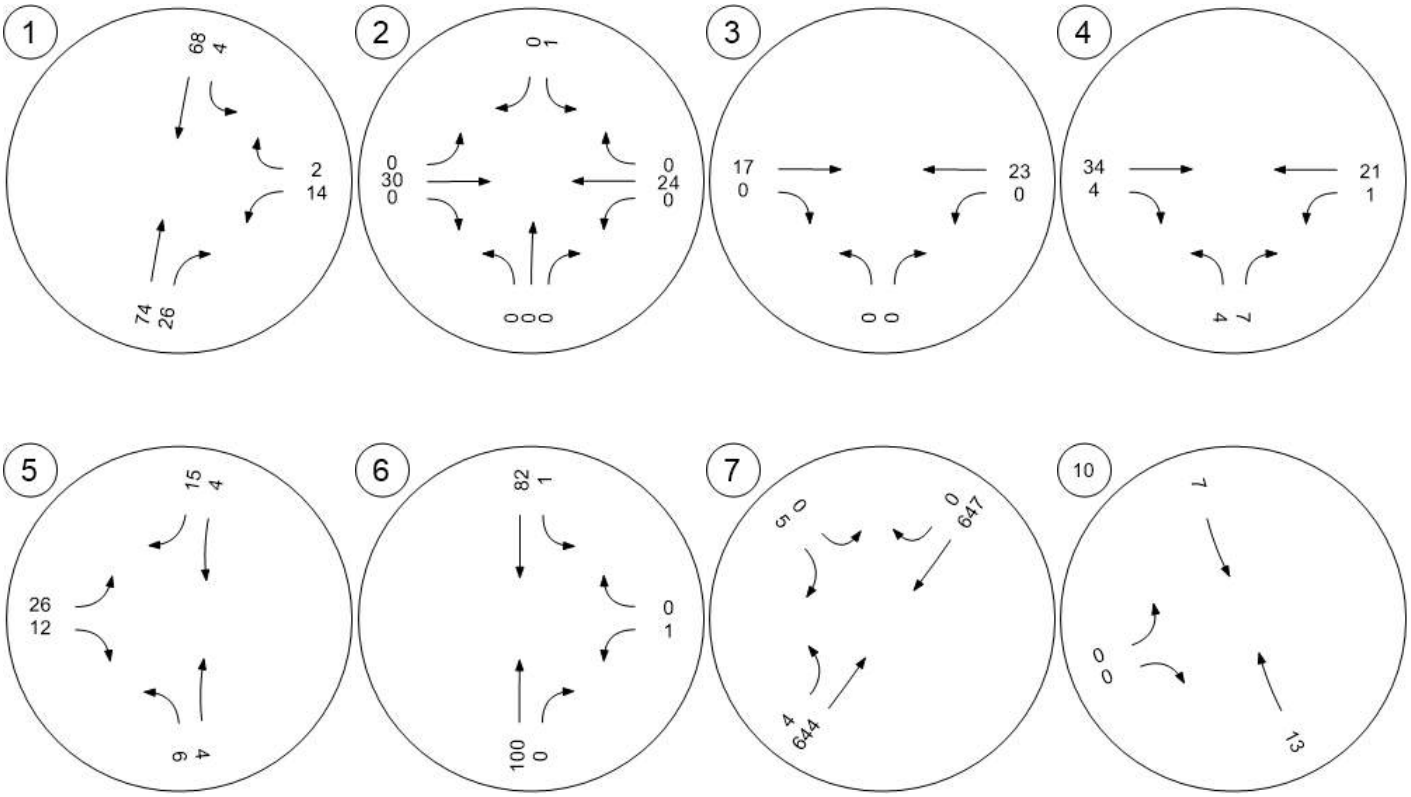
Traffic Volume - Base Volume



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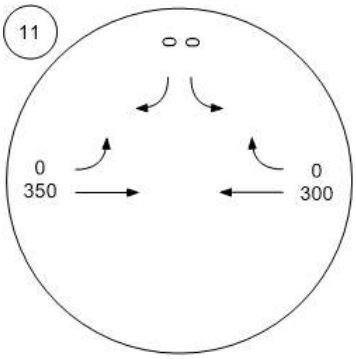
Traffic Volume - Base Volume



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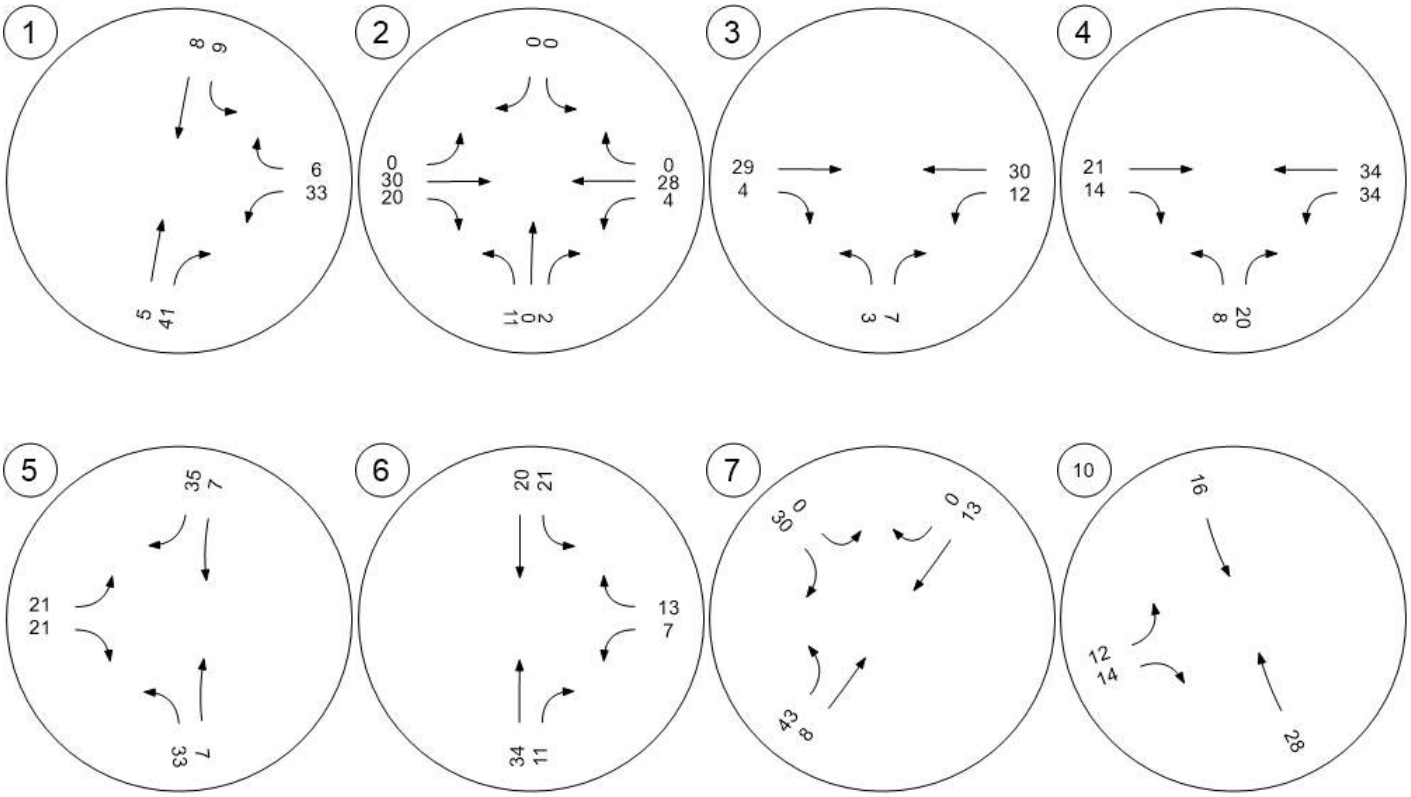
Traffic Volume - Net New Site Trips



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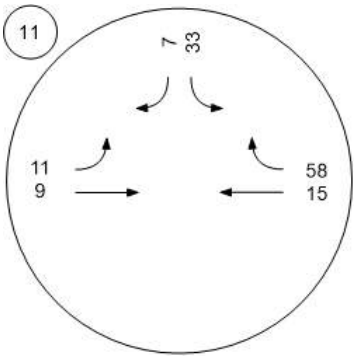
Traffic Volume - Net New Site Trips



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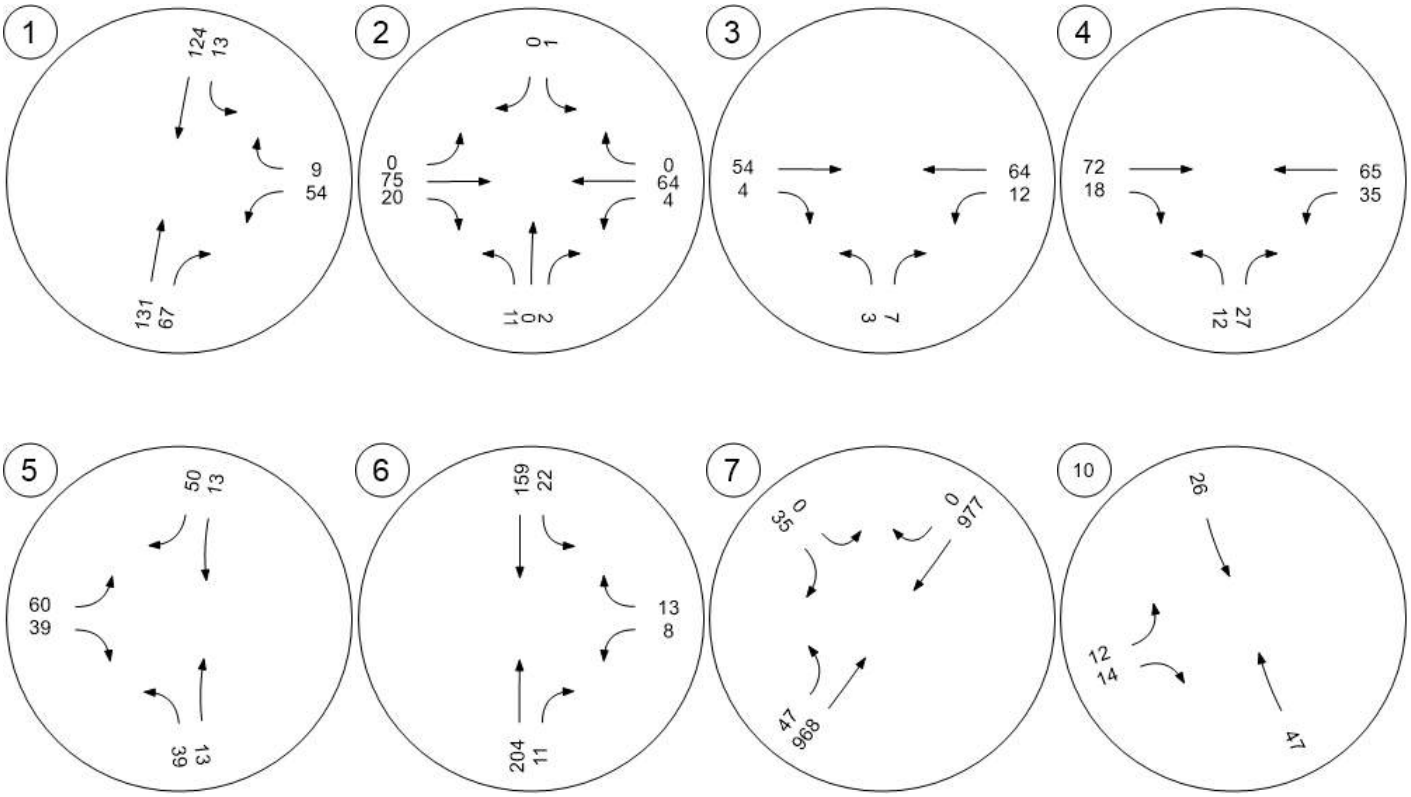
Traffic Volume - Future Total Volume



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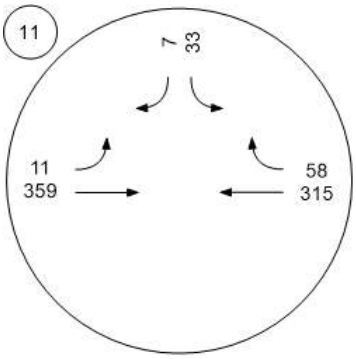
Traffic Volume - Future Total Volume



Scenario 16: 16: 2030 BUILD PM PEAK_NEW

Spack CONSULTING THE TRAFFIC STUDY COMPANY

Technical Memorandum

To: Rick Packer, President Royal Golf Club
From: Bryant Ficek, P.E., P.T.O.E.
Date: October 12, 2016
Re: 20th Street N Turn Lane Evaluation

The Tartan Park Redevelopment is proposing its 293 residential lot and 18-hole golf course. In the City's recent review of the proposed plan, the addition of turn lanes along 20th Street N was suggested due to the size of the proposed development. As noted at a meeting with the City, in lieu of specific analyses, they have previously required turn lanes when a new road will provide access to 25 or more residential homes. The purpose of this memorandum is to examine the traffic along the 20th Street N corridor and determine if left or right turn treatments are warranted and justified.

Conclusions

Based upon the information and analysis presented in this memorandum, the proposed Tartan Park Redevelopment is expected to generate a total of 3,434 vehicle trips per day to and from the residential and golf course components. Based on the trip distribution from the Traffic Impact Study, approximately 41 percent of the development traffic, or 1,402 vehicles, will access the site along 20th Street N throughout a typical weekday. Further sub-dividing this volume amongst the access driveways, a single access intersection on 20th Street N is expected to have a maximum of 845 vehicles per day.

The expected 2030 operations for each site intersections on 20th Street N are very good, with no concerns regarding delays or queuing. None of the criteria for the nine warrants for left turn lane treatments, as developed by the Minnesota Department of Transportation (MnDOT), are met at these study intersections either. For right turn lane treatment, only Warrant 9 is satisfied by the 20th Street N/20th Street Court N, 20th Street N/Proposed Western Access, 20th Street N/Golf Course Access (Eastern Access), and 20th Street N/Manning Trail N (20th Street Mainline) intersections.

Using the analysis presented in this report, full turn lanes are not recommended at these intersections based on:

- No operational concerns at the intersections with all movements and the overall intersection operating at a Level of Service (LOS) A.
- No queuing concerns at the intersections with all single approach lanes to each intersection experiencing a 95th percentile queue length of under one vehicle.
- Warrants one through eight are not satisfied.

The characteristics and volumes along the 20th Street N corridor are all such that safe and satisfactory operations without turn lanes is expected and the addition of full turn lanes would add unnecessary and unused additional capacity. However, we recommend strengthening and expanding the shoulder to create a partial right turn lane on the eastbound approaches as opposed to a standard right turn lane and taper. This will allow right turning traffic to use an area outside of the through lane. Right-of-Way should also be set aside for a standard right turn lane in the future if and when additional development and actual future traffic growth occurs within the area.

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Existing and Future Conditions

The redevelopment site is encompassed by County State-Aid Highway 17 (CSAH 17), also known as Lake Elmo Avenue North, County State-Aid Highway 10 (CSAH 10), Minnesota State-Aid Street 107 (MSAS 107), also known as 20th Street North, Minnesota State-Aid Street 115 (MSAS 115), also known as Manning Trail North, and County State-Aid Highway 15 (CSAH 15), also known as Manning Avenue North.

20th Street N is a two-lane, east west local roadway, providing access between Lake Elmo Avenue N and Manning Trail N. The posted speed limit is 45 mph.

Turning movement counts were collected at the study intersections on the two separate days in July 2016 and averaged to create accurate 24-hour turning movement counts. The Average Daily Traffic (ADT) on 20th Street N based on these counts is approximately 600 vehicles per day. The full turning movement counts, provided in 15-minute increments, are in the appendix of the Traffic Impact Study for this development.

Based on the concept plan, which can also be found in the appendix of the Traffic Impact Study, the development is proposed to provide 293 single-family housing units and an 18-hole golf course. A trip generation analysis was performed based on the methods and rates published in the *Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition*. Using ITE Land Use codes 210 and 430, Single Family Homes, and Golf Course, the proposed site will generate:

- 1,717 vehicles entering and 1,717 exiting the development per day (total of 3434 trips).
- 84 vehicles entering and 173 vehicles exiting during the AM peak hour.
- 212 vehicles entering and 134 vehicles exiting during the PM peak hour.

The trip distribution of the Traffic Impact Study determined that 41 percent of the total site generated traffic would use 20th Street N. Using the highest volume traffic period within the project limits, the PM peak hour, the projected 2030 turning movement counts along the 20th Street N corridor were determined and can be seen in Figure 1 below.

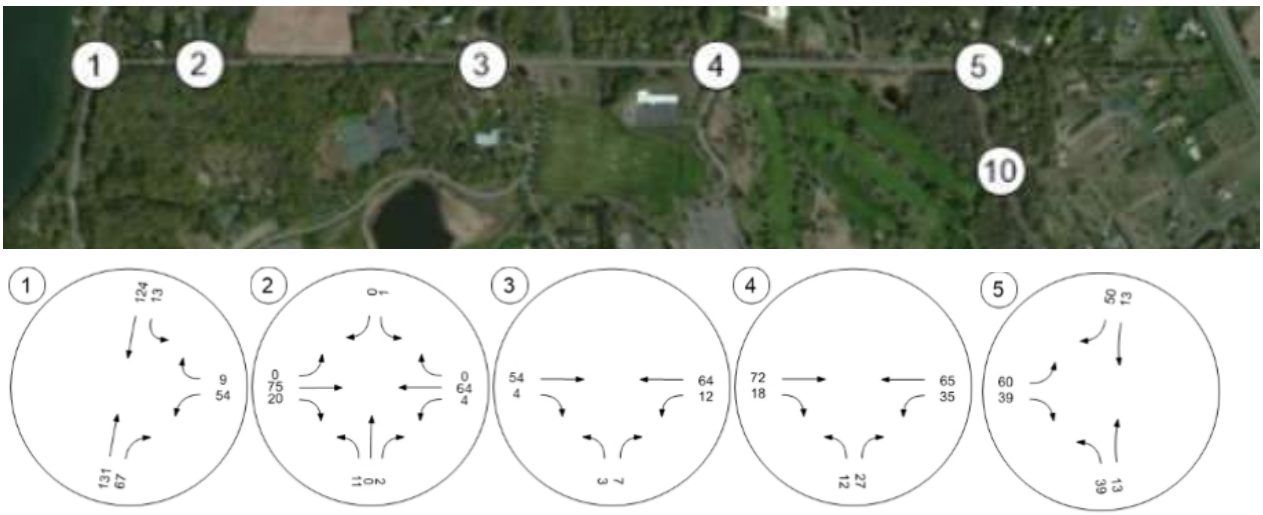

Figure 1: 2030 PM Peak Turning Movement Counts

As shown, all intersections along 20th Street N have expected mainline turning volumes under 40 vehicles over the course of an average day. The highest turning volumes are expected at the redeveloped Golf Course Access (Eastern Access), which exists for the same purpose today and is not provided with turn lanes.

The daily projected 2030 turning movement counts along the 20th Street N corridor were also determined and can be seen in Figure 2 below.

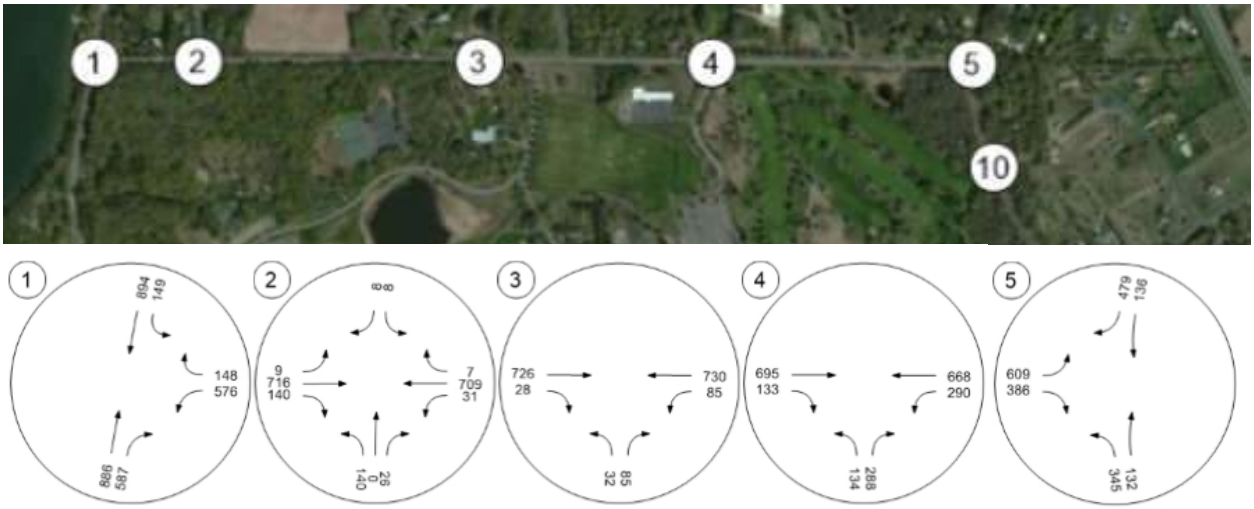

Figure 2: 2030 Daily Turning Movement Counts

Using these daily turning movement projections for the year 2030, the following future ADTs are expected on 20th Street:

- 1,700 vehicles per day between Lake Elmo Avenue N/20th Street N and 20th Street N/20th Street Court N.
- 1,500 vehicles per day between 20th Street N/20th Street Court N and 20th Street N/Proposed Western Access.
- 1,600 vehicles per day between 20th Street N/Proposed Western Access and 20th Street N/Golf Course Access (Eastern Access).
- 1,800 vehicles per day between 20th Street N/Golf Course Access (Eastern Access) and 20th Street N/Manning Trail N.
- 1,400 vehicles per day north of 20th Street N on Manning Trail N.
- 1000 vehicles per day south of 20th Street N on Manning Trail N.

For the new access roads, the projected daily volumes are:

- 337 vehicles per day for the access opposite 20th Street Court N.
- 230 vehicles per day for the proposed Western Access.
- 845 vehicles per day for the Golf Course access (eastern access).

Operations Evaluation

The expected 2030 Build operations were presented in the Traffic Impact Study for this proposed development. As detailed there, Table 1 below summarizes the operational results.

Table 1 – 2030 Build Level of Service (LOS) Results[1]

Intersection	AM Peak Build	PM Peak Build
20th Street N/20th Street Court N	A (a)	A (b)
20th Street N/Proposed Western Access	A (a)	A (a)
20th Street N/Golf Course Access (Eastern Access)	A (a)	A (b)

[1] The first letter is the Level of Service for the intersection. The second letter (in parentheses) is the Level of Service for the worst operating movement.

As shown in Table 1, all study intersections are forecast to operate acceptably overall at LOS A or better in the 2030 Build scenarios. These overall operations for the 2030 Build scenarios are expected to be relatively similar to the existing conditions.

The vehicle stacking at these intersections are expected to be effectively zero. The analysis reports show 95th percentile queues of less than one vehicle for any of the single approach lane. As with the LOS results, this suggest very good operations with little to no delays or waiting for approaching vehicles.

Based on these operational results, turn lanes are not necessary at these intersections.

Turn Treatment Warrant Evaluation

For additional consideration of whether turn lanes are needed for this corridor, the *MnDOT Access Management Manual* was consulted. This document provides guidance for exclusive turn lanes and bypass lanes at public street connections in accordance with the *MnDOT Road Design Manual*. The purpose of this document is to assist with access management for highways, which have different characteristics than 20th Street N. However, if the criteria for turn lanes is not satisfied for a highway, then it can be assumed turn lanes would not be warranted for a local road.

Nine warrants are presented that account for site conditions and expected traffic to evaluate the need for turn lanes. Each warrant is examined separately below and the MnDOT guide's text is attached to this memorandum for reference.

Warrant 1 – Passing Lane/Climbing Lane

20th Street N does not have a passing or climbing lane at any of the project intersections that would necessitate additional turning treatment.

Warrant 2 – Limited Sight Distance/Terrain

The sight distance was evaluated on-site at each existing and proposed access. All turning movements appear to have sufficient sight distance, with no noticeable obstructions or sight issues.

Warrant 3 – Railroad Crossings

The proposed site intersections do not have a railroad crossing in the vicinity that would require turn lanes.

Warrant 4 – Signalized Intersections

The proposed site intersections will be controlled by stop signs on the side streets, not a traffic signal. Therefore, turn lane treatments are not necessary due to the type of intersection control.

Warrant 5 – Heavy-Vehicle Traffic

The existing counts indicate the truck traffic along 20th Street N is below 15 vehicles per hour for all hours of the day. Additional truck traffic related to the proposed development is expected to be low and related to moving trucks, garbage trucks, and delivery trucks for the golf course. The relatively low truck traffic associated with these land uses does not warrant turn lanes.

Warrant 6 – School Entrances

The proposed connection is not a school entrance that would necessitate turn lanes.

Warrant 7 – Crash History

No correctable crashes have occurred at any of the project intersections along 20th Street N within the last five years that would necessitate turn lane treatments.

Warrant 8 – Corridor Crash Experience

No correctable crashes have occurred along 20th Street N corridor within the last five years, according to recorded crash data provided by MnDOT. The corridor does not have a crash experience that would necessitate a system-wide treatment with turn lanes.

Warrant 9 – Vehicular Volume

The table below provides the relevant volume criteria from Figure 3.40 of the MnDOT guide that, if satisfied, would warrant left turn treatment:

2-Lane Highway AADT	Cross Street or Driveway ADT	Turn Lane Requirement
1,500 to 2,999	> 1,500	Left-turn lane warranted

The relevant criteria from Figure 3.41 of the MnDOT guide is provided in the following table that, if satisfied, would warrant right turn treatment:

2-Lane Highway AADT	Cross Street or Driveway ADT	Turn Lane Requirement
>1,500	> 100	Right-turn lane warranted

The roadway volume and cross street volume for each study intersection are presented in Table 2:

Table 2 – Turn Lane Warrant 9 Evaluation

Intersection	Left Turn Lane		Right Turn Lane	
	Street ADT	Access ADT	Street ADT	Access ADT
20th Street N/20th Street Court N	1,500	337	1,700	337
20th Street N/Proposed Western Access	1,600	230	1,500	230
20th Street N/Golf Course Access (Eastern Access)	1,900	845	1,600	845
20th Street N/Manning Trail N (20th Street Mainline)	1,800	1,400	1,800	1,000
Manning Trail N/20th Street N (Manning Trail Mainline)	1,000	1,800	1,400	1,800
Criteria	**1,500 – 2,999**	**> 1,500**	**> 1,500**	**> 100**

Using the 3.5% annual growth rate from the *Manning Avenue (CSAH 15) Corridor Management and Safety Improvement Project*, and projecting the volumes to the year 2030, the left turn volume warrant is not met by any intersection. However, the right turn warrant volumes were met by 20th Street N/20th Street Court N, 20th Street N/Proposed Western Access, 20th Street N/Golf Course Access (Eastern Access), and 20th Street N/Manning Trail N (20th Street Mainline). With these results we recommend:

- Strengthening and expanding the shoulder at intersections along 20th Street N for eastbound vehicles, as shown in Figure 3 below. Due to the low volume of vehicles making right-turning movements into the development an expanded and strengthened shoulder will allow the turning vehicles to shift out of the through lane and make a safe right turning movement without blocking through moving vehicles. In addition, sufficient right-of-way can be set aside to expand to a standard turn lane if and when additional development and future traffic growth occurs.

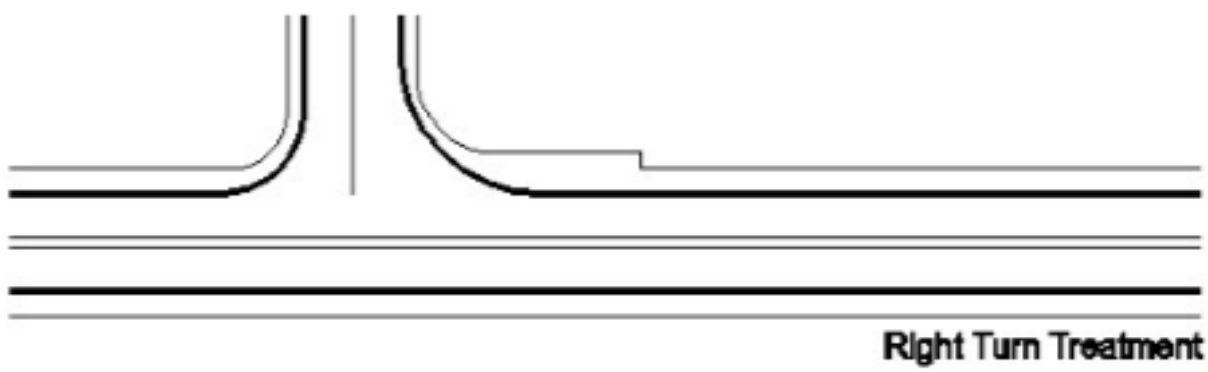

Figure 3: Strengthened Right Turn Lane Treatment.

MnDOT Access Management Manual

Chapter 3
Guidelines for Public Street and Driveway Connections
(http://www.dot.state.mn.us/accessmanagement/docs/pdf/manualchapters/chapter3.pdf)

3.4.9 Turn Lanes

Turn-Lane Warrants for Undivided Highways

The Turn-Lane Warrants for Undivided Highways are shown below. These warrants apply to both left-turn lanes and right-turn lanes.

- Warrant 1: Passing Lane/Climbing Lane – At high-volume driveways (> 100 trips per day) and all public street connections located on highway segments where passing lanes or climbing lanes are present in the approach direction.
- Warrant 2: Limited Sight Distance/Terrain – At all driveways and public street connections with inadequate stopping sight distance or located on short vertical curves or steep grades. Designers may consider alternative options, such as access relocation, vegetation removal, and spot grading as alternatives to building turn lanes.
- Warrant 3: Railroad Crossings – At high-volume driveways (> 100 trips per day) and all public street connections where a railroad is parallel to the highway and where the potential exists for vehicles delayed by a train to back up into the through-lanes of the highway, creating both safety and operational problems. At these locations, the queuing of traffic caused by train movements should be considered. If the cross street between the railroad and the highway does not provide adequate storage, then a turn lane or turn-lane treatment should be considered on the highway to provide the additional storage needed.
- Warrant 4: Signalized Intersections – At all signalized public street connections and driveways.
- Warrant 5: Heavy-Vehicle Traffic – At all driveways and public street connections on high-speed highways (posted speed ≥ 45 mph) where the heavy-vehicle turning volume is 15 or more vehicles per hour for at least eight hours a day for four months or more per year. Examples of this include gravel operations, large grain elevators, or large distribution centers.
- Warrant 6: School Entrances – At public and private school driveways on high-speed highways (posted speed ≥ 45 mph) used by school traffic.
- Warrant 7: Crash History – At high-volume driveways (>100 trips per day) and all public street connections that demonstrate a history of crashes of the type suitable to correction by a turn lane or turn-lane treatment (typically three or more correctable crashes in one year), or where adequate trial of other remedies has failed to reduce the crash frequency.
- Warrant 8: Corridor Crash Experience – On highway corridors that demonstrate a history of similar crash types suitable to correction by providing corridor-wide consistency in turn-lane use.
- Warrant 9: Vehicular Volume Warrant – At high-volume driveways (>100 trips per day) and all public street connections on high-speed highways (posted speed ≥ 45 mph) that satisfy the criteria in Figures 3.40 and 3.41 below.

Figure 3.40: Warrant 9 for Left-Turn Lanes

2-Lane Highway AADT	4-Lane Highway AADT	Cross Street or Driveway ADT	Turn Lane Requirement
1500 to 2999	3000 to 5999	> 1500	Left-turn lane warranted
3000 to 3999	6000 to 7999	> 1200	Left-turn lane warranted
4000 to 4999	8000 to 9999	> 1000	Left-turn lane warranted
5000 to 6499	10,000 to 12,999	> 800	Left-turn lane warranted
≥ 6500 AADT	≥ 13,000 AADT	101 to 400 > 400	Left-turn lane or bypass lane Left-turn lane warranted

Highway AADT one year after opening
Posted speed 45 mph or greater

Figure 3.41: Warrant 9 for Right-Turn Lanes

2-Lane Highway AADT	4-Lane Highway AADT	Cross Street or Driveway ADT	Turn Lane Requirement
≥ 1500 AADT	≥ 3000 AADT	> 100	Right-turn lane warranted

Highway AADT one year after opening
Posted speed 45 mph or greater