Pearson Farm Residential Development

Environmental Assessment Worksheet

Draft, March 10, 2017

Responsible Governmental Unit (RGU)

City of Ramsey
Community Development
7550 Sunwood Drive NW
Ramsey, Minnesota 55303
http://www.cityoframsey.com/

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Memo

To: Minnesota Environmental Quality Board
Environmental Review Distribution List

From: Tim Gladhill, Community Development Director

Date: March X, 2017

Subject: Pearson Farm Residential Development EAW

As the Responsible Governmental Unit (RGU), the City of Lake Ramsey is issuing this Environmental Assessment Worksheet (EAW) for the Pearson Farm 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 March X, 2017. A press release or public notice has been submitted for publication in the Anoka County Union Herald. Public comments on this EAW will be accepted by the City of Ramsey until 4:30pm on _____, 2017.

Environmental Assessment Worksheet (EAW)

Pearson Farm Residential Development

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Environmental Assessment Worksheet (EAW)

Pearson Farm 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: **Pearson Farm Residential Development**

2. Proposer:	Eagle Cove Land Company	**RGU:**	City of Ramsey
Contact person:	Stephen Bona	Contact person:	Tim Gladhill
Title:	Development Manager	Title:	Community Development Dir.
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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: Anoka County, Minnesota
City/Township: City of Ramsey
PLS Location (¼, ¼, Section, Township, Range): part of SW ¼ of Section 20 and part of NW ¼ of NW ¼ of Section 29, T32N, R25W
Watershed (81 major watershed scale): Mississippi River Twin Cities (20)
GPS Coordinates: 45.244662, -93.488471
Tax Parcel Number(s): 20-32-25-32-0001, 20-32-25-33-0001, 29-32-25-22-0004, 20-32-25-31-0003

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 Pearson Farm Residential Development is proposed on 89.44 acres of land in southwestern Anoka County. The project will include up to 246 detached single-family homes and 98 attached townhome units. Site development will include installation of municipal sewer and water, mass grading, and stormwater features.

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 Pearson Farm Residential Development is proposed on 89.44 acres of land in the southwestern part of the City of Ramsey, Anoka County, Minnesota (**Figure 1**). The project area is dominated by cropland and has a history of agricultural use. The project is located in Sections 20 and 29, T32N, R25W (**Figure 2**). The project area is bordered on the north by Alpine Drive NW; on the east by Puma Street NW; on the south by the Burlington Northern Railroad and U.S. Highway 10/169, and the west by the Links at Northfork Golf Course.

The project will include up to 246 single-family homes and 98 townhome units, installation of municipal sewer and water, mass grading, and stormwater features. The project will convert approximately 85.48 acres of annually-tilled cropland and small areas of trees to streets, homes, lawns, landscaping, and stormwater features (**Figures 3 and 4**). The project will include about 20.60 acres of open space and stormwater features. The project area includes 1.02 acres of wetland distributed among three small basins. The two largest wetlands will be preserved and protected by buffers. The smallest wetland, which covers only 0.04 acre (1,738 square feet), will be eliminated by site grading necessary to create an emergency overflow for the largest wetland on the site.

The site includes sandy soils, 18 feet of topographic relief, and mostly gradual slopes. Graded ditch slopes along the south side of Alpine Drive NW range up to 20% (5:1), but the steepest natural slopes on the site are 12% and they cover only about a third acre. The site will be mass graded to install utilities, streets, residential building pads, and stormwater features. The southern edge of the site will include a raised berm to buffer the townhomes from the Burlington Northern railroad.

Approximately 4.4 acres in the northwest part of the site is located within 1,000 feet of Lake Itasca, which is Minnesota DNR (MN DNR) pubic water 2-110P.

Single-family lots will generally range from 50- to 65-feet wide and from 120 to 230 feet deep. Public streets are expected to be 28 feet wide and located within 60-foot rights-of-ways, except in two locations, where the right-of-way is proposed to narrow to 50 to allow for more open space. Trails will connect to neighborhood open spaces and Puma Street NW. Sidewalks will be constructed on one side of municipal streets. 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 Ramsey fire and police services and by the Anoka-Hennepin School District.

It is anticipated that construction of the development will start in summer 2017 and be phased over 5 to 10 years, depending on market conditions. Construction will generally be phased from the southeast to the northwest based on the extension of municipal water and sewer, which will be extended from the intersection of Puma Street NW and Bunker Lake Blvd NW, at the southeastern edge of the site. 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	89.44
Linear project length	NA
Number and type of residential units	246 (single-family detached)
Number and type of residential units	98 (multi-family attached)
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 Pearson Farm Residential Development is to provide a residential development with a variety of housing types in proximity to transportation corridors and open spaces. 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]
Cropland	85.48	0.00
Tree rows	1.82	0.96
Grassland	0.81	0.94
Wetlands	1.02	0.98
Lawn and landscaping	0.00	62.52
Impervious surface (developed)	0.31	14.54
Stormwater features	0.00	9.50
Totals	89.44	89.44

[1] Existing impervious surface includes part of Puma Street NW.

[2] After development wetland acreage assumes about 0.04 acre (1,738 square feet) of onsite wetlands will be impacted and will not require replacement.

Existing cover types are shown on **Figure 5**. Delineated wetlands are shown on **Figure 6**.

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 Ramsey	EAW Decision	To be applied for
City of Ramsey	Comprehensive Plan Amendment	To be applied for
City of Ramsey	Rezoning	To be applied for
City of Ramsey	Concept Plan Approval	Submitted
City of Ramsey	Plat Approval	To be applied for
City of Ramsey	PUD Approval	To be applied for
City of Ramsey	Grading Permit	To be applied for
City of Ramsey	Building Permit	To be applied for
City of Ramsey	Stormwater Management and Erosion Control Approval	To be applied for
City of Ramsey	Municipal Water Connection Permit	To be applied for
City of Ramsey	Sanitary Sewer Connection Permit	To be applied for
Lower Rum River WMO	WCA Wetland Boundary/Type Determination	Approved
Lower Rum River WMO	WCA De minimis Exemption	To be applied for
Lower Rum River WMO	Watershed Permit	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
Minnesota Pollution Control Agency	NPDES/SDS General Permit	To be applied for
Minnesota Pollution Control Agency	Sanitary Sewer Extension Approval	To be applied for
U. S. Army Corps of Engineers	Wetland Delineation Concurrence / Jurisdictional Determination	Submitted
U. S. Army Corps of Engineers	Confirmation of RGP-003-MN Coverage	To be applied for

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 has been in agricultural use since at least the 1930s. Crops grown on the site during 2016 include corn, soybeans, wheat and sorghum. Itasca Park, which is owned by the City of Ramsey, is located north of the project area, covers about 61 acres, and adjoins the southeast shore of Lake Itasca. Other surrounding land uses include residential to the northeast, agricultural cropland and one isolated residence to the east; the Burlington Northern Railroad, U.S. Highway 10/169, cropland, and commercial development to the south; and the Links at Northfork golf course and open grassland to the west (**Figure 7**).

Farmland ratings for soils mapped in the project area are listed in **Table 4** under **Item 10b** of this EAW. Of the five soil map units present in the project area, none are considered prime farmland, prime farmland if drained, or farmland of statewide importance.

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 Ramsey 2030 Comprehensive Plan shows the planned land use of the site as Low Density Residential (LDR, average of 4 lots/net acre), Medium Density Residential (MDR, average of 7 units/acre), High Density Residential (HDR, average of 15 units/acre), and Commercial. The City of Ramsey Master Park and Trail Plan shows 2030 Park System Plan shows proposed trails running east-west through northern and southern parts of the site. Mapping prepared by the Minnesota DNR shows Metro Conservation Corridors and Regionally Significant Ecological Areas (RSEA) in the vicinity of the project. These general planning areas for conservation and ecological management area centered on Itasca Lake and the Mississippi River.

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 Ramsey Zoning Map mirrors the City of Ramsey 2030 Comprehensive Plan for the project area. It shows the project area zoned for R-1 (Low-Density Residential [MUSA]), R-2 (Medium-Density Residential), R-3 (High-Density Residential), and B-2 (Business District). The Mississippi River Corridor Critical Area, which is overseen by the Minnesota DNR, and the Mississippi National River & Recreation Area, which is overseen by the National Park Service, is located southwest of the project area, across U.S. Highway 10/169. The project area does not fall in or near a wild and scenic river or an agricultural preserve. Shoreland overlay districts and floodplains are discussed below.

Shorelands

The shoreland overlay district of Lake Itasca (DNR public water 2-110P) extends over approximately 193,605 square feet (4.4 acres) in the northwestern part of the site (**Figure 8**). Lake Itasca has a Natural Environment shoreland classification and is located 600 to 1,000 feet north of the site. Lake Itasca is a shallow lake that covers about 130 acres. It has an Ordinary High Water (OHW) level of 871.4 feet (NGVD 29 Datum).

Development in shorelands is regulated under the City of Ramsey Shoreland Management Overlay District Ordinance (Section 117-221 to 117-229) and Minnesota Rules Part 6120. 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.

Shoreland is defined as land located within 1,000 feet from the OHW of a lake. However, the definition in the City of Ramsey City code and at MN Rules 6120.2500, Subp. 15 states that the "limits of shorelands may be reduced whenever the waters involved are bounded by topographic divides which extend landward from the waters for lesser distances and when approved by the [DNR] commissioner."

The shoreland on the project area is eligible to be reduced because Alpine Drive NW functions as a drainage divide. The project area will not drain north or affect Lake Itasca. The project area drains east through a culvert under Puma Street NW. Although a culvert exists under Alpine Drive NW at the north end of the site, the control elevation in the culvert is 870.4 feet. This control elevation is higher than the elevation of nearby delineated wetland boundaries and 0.7 feet higher than the wetland's 1% frequency flood elevation, which is 869.7 feet. Given these elevations, the proposed development is not predicted to affect Lake Itasca.

Floodplains

Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Map Number 27003C0280E, dated December 16, 2015, shows an unnumbered Zone A 1% frequency floodplain of Lake Itasca located north of site and north of Alpine Drive NW (**Figure 8**). Flood Zone A includes special flood hazard areas subject to inundation by the 1% annual chance of flood. The Lake Itasca floodplain is outside the project area. The floodplain of the Mississippi River is located about 1,350 feet southwest of the project area, and at an elevation about 15 feet lower than the project area.

An analysis of Lake Itasca water levels under existing and future land uses was conducted for a previous development. That analysis showed that Lake Itasca does not outlet during 100-year snowmelt and rainfall events, but modeled water levels came close to reaching the outlet on the south side of the lake, so the City of Ramsey proposed to install an outlet for the lake. The City assumed that any outlet elevation would be above the OHW of 871.4 feet and the approximate 100-year flood elevation of 871.0 feet.

The proposed project will not affect the floodplain of Lake Itasca or the floodplain of the Mississippi River. The project will avoid floodplain impacts and comply with Lower Rum River Watershed Management Organization (LRRWMO) Stormwater Standards that require lowest floor elevations to be at least 3 feet above the highest anticipated groundwater table and 2 feet above the 100-year flood elevation, or 1 foot above the emergency overflow, whichever is greater.

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 project is compatible with surrounding land uses, which include parkland, grassland, golf course, cropland, and residential. The City of Ramsey 2030 Comprehensive Plan guides the project area for Low Density Residential (LDR, average of 4 lots/net acre), Medium Density Residential (MDR, average of 7 units/acre), High Density Residential (HDR, average of 15 units/acre), and Commercial. The project area is currently zoned R-1 (Low-Density Residential [MUSA]), R-2 (Medium-Density Residential), R-3 (High-Density Residential), and B-2 (Business District). Although the proposed residential development is only partially compatible with the existing Comprehensive Plan and 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 site for LDR-Low Density Residential, which is intended for an average density of 4 units/acre. The proposed project has a gross density of 3.27 to 3.85 units/acre and a net density of 3.31 to 3.89 units/acre. The project area will be rezoned from a mix of uses to PUD-Planned Unit Development. The proposed project is compatible with the proposed land use, zoning, and surrounding land uses. 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 Anoka County, Minnesota (University of Minnesota Geological Survey 2011 and Minnesota DNR 2016) indicates the surficial geology of the area is characterized by terrace sand and gravelly sand that is located above the floodplain. The bedrock geology of the site falls in the Tunnel City Group and is dominantly quartz sandstone.

The estimated depth to bedrock in the project area, based on the Geologic Atlas, generally ranges between 100 and 250 feet. As indicated under **Item 11.a.ii**, the depth to bedrock in three nearby domestic wells ranged between 107 and 116 feet, and the depth to static groundwater in five nearby wells ranged between 28 to 41 feet.

Sinkholes and karst lands are not known to occur in western Anoka County where the project is located. Minnesota Karst Lands and Sinkhole Mapping prepared by Calvin Alexander and others (2006) does not shows karst lands or sinkholes in or near the project area.

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 five soil mapping units that consist of mostly loamy sands (**Table 4, Figure 9**).

Table 4. Soil Classifications

Symbol	Soil Name	% of Area	% Hydric	Hydric Category	Farmland Category
D20A	Isan-Isan, frequently ponded, complex, 0-2% slopes	8.1	95	Predominantly hydric	Not prime farmland
D67A	Hubbard loamy sand, Mississippi River Valley, 0-2% slopes	55.1	1	Predominantly non-hydric	Not prime farmland
D67B	Hubbard loamy sand, Mississippi River Valley, 2-6% slopes	5.7	3	Predominantly non-hydric	Not prime farmland
D67C	Hubbard loamy sand, Mississippi River Valley, 6-12% slopes	13.4	0	Non-hydric	Not prime farmland
Dp	Duelm loamy sand, 0-2% slopes	17.7	7	Predominantly non-hydric	Not prime farmland

These soils have varying levels of limitations for dwelling units and local streets due to factors such as depth to saturated zone, frost action, ponding, and slope. 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 slightly to moderately susceptible to the sheet and rill erosion by water, as indicated by slopes and K factors that range between 0.0 and 0.50.

Grading operations for residential development construction are expected to affect about 87 acres and involve movement of about 475,000 cubic yards of soil to construct streets, residential building pads, and stormwater features. Grading is expected to avoid disturbance of wetlands and trees that will be preserved, which cover about two acres within the project area.

Elevations in the project area range from 887 feet above mean sea level at the highest point in the northeast part of the project to 868 feet at the lowest onsite wetland. Review of two-foot contour mapping indicates the site has less than an acre of slopes that equal or exceed 12% and the site does not include any bluffs. Soils mapping does not classify any parts of site as having slopes of 12% or more (**Table 4, Figure 9**).

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 three wetlands that were delineated by Kjolhaug Environmental Services on October 6, 2016 (**Figure 6, Table 5)**. Of the three wetlands, only Wetland 1 corresponds to a wetland location shown on National Wetlands Inventory (NWI) mapping (**Figure 10**). All three wetlands correspond to locations of predominantly hydric Isan soils (**Figure 9, Table 4**). 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 Lower Rum River Watershed Management Organization (LRRWMO) and wetland boundary approval from the U.S. Army Corps of Engineers (USACE) is pending. The LRRWMO is the local government unit administering the Minnesota Wetland Conservation Action (WCA). **Appendix A** includes the LRRWMO notice of decision approving the wetland boundary and type determinations. The site does not include any MN DNR public waters, public waters wetlands, or public watercourses.

Table 5. Wetlands on the Pearson Farm Residential Development site

Map ID	Acres Onsite	Classification			Dominant Vegetation
		Circ. 39	Cowardin	Eggers and Reed	
1	0.34	1	PEMAf	Seasonally flooded basin	Soybeans, reed canary grass
2	0.64	1	PEMAf	Seasonally flooded basin	Stunted corn, green bulrush
3	0.04	1	PEMAf	Seasonally flooded basin	Stunted corn
Total	1.02				

Impaired waters listed by the Minnesota Pollution Control Agency (MPCA) and located within 1 mile of the site include the Mississippi River (07010206-567), which is impaired for mercury and PCBs in fish tissue between the Crow River and the northwestern limits of the City of Anoka.

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. Depth to surficial groundwater may be as little as one foot in the wetlands on the site during the spring. Depth to static groundwater levels based on domestic water wells located near the project area ranges from 28 to 41 feet (**Table 6, Appendix B**). Geotechnical borings completed by Northern Technologies on December 30, 2016, indicate the depth to groundwater ranged from about 4.5 to 18.5 feet below existing grade. This correlates to an approximate elevation range of 858.5 to 874.5 feet. Groundwater was at elevations of 858.5 to 860.5 feet in most of the borings where groundwater was encountered. The project area does not fall within a MDH wellhead protection area. Although a number of groundwater wells are located near the site, review of the Minnesota County Well Index did not identify any wells located onsite.

Table 6. Domestic Water Wells located near the Pearson Farm site

Well No.	Surface Elevation (feet)	Depth (feet)	Cased Depth (feet)	Depth to		Location (Direction from Site)	Aquifer
				Static Water Level (feet)	Bedrock (feet)		
541778	883	66	63	28	--	Southwest	Tunnel City-Wonewoc
227345	883	75	71	30	--	Southwest	Tunnel City-Wonewoc
430232	883	338	294	30	116	East	Tunnel City-Wonewoc
783804	885	155	113	28	107	Northeast	Tunnel City-Wonewoc
227037	886	156	141	41	110	Northeast	Tunnel City-Wonewoc

The project will be served by the City of Ramsey municipal water supply. The City has eight water supply wells that are all located at least one mile east of the project area.

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 that is typical of residential developments. The project will not include industrial wastewater production or onsite wastewater treatment.

Sanitary wastewater production for the project was estimated using methods described in the Sewer Availability Charge (SAC) Procedure Manual (Metropolitan Council 2017). Metropolitan Council has established 274 gallons per day (GPD) as the average daily wastewater production from a typical residential unit. Based on this residential equivalent, the project is expected to generate a maximum of 94,256 gallons of wastewater per day. An 18-inch sanitary sewer line will be extended from Bunker Lake Boulevard and Puma Street to serve the development area. The project will require installation of a sanitary sewer lift station along Puma Street to serve roughly the northern two-thirds of the site. The southern third of the site will be served by a gravity sanitary sewer main that will drain to Puma Street.

Domestic wastewater from the project will be routed through the City of Ramsey 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 Ramsey 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 disposed of in a landfill.

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

Soils in the project area are quite sandy and most precipitation likely infiltrates into the soils, resulting in little surface runoff. Surface runoff from the project area under existing conditions likely contains some sediment pesticides, fertilizers, and other nutrients. Existing runoff drains overland from the project area to local wetlands. Nearly the entire project area drains east through a culvert under Puma Street NW. From the culvert, runoff drains through an intermittent drainageway and wetlands to a point about 1.4 miles downstream from the project area, where the drainageway ends. Runoff appears to infiltrate into the ground at that location. Although the region contains highly permeable soils, some surface runoff may reach the Mississippi River during extreme runoff events.

Post-Construction Site Runoff

Compliance with LRRWMO, City of Ramsey, and NPDES requirements will minimize and mitigate potential adverse effects on receiving waters. Project development will change the land use from agricultural to residential use. This land use change is expected to have mixed effects on runoff water volume and quality. Residential development may reduce concentrations of agricultural chemicals, but may increase the loading of suspended solids 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, and driveways.

Residential project construction will add about 14.5 acres of impervious surface, consisting of streets, homes, and driveways. The increased impervious surface area is expected to increase in urban runoff pollutants and the volume of runoff during significant storm events. However, it is anticipated that stormwater rate and volume controls that comply with City of Ramsey and LRRWMO requirements will limit increases in runoff volume and associated pollutant transport to large storm events that occur infrequently. The creation of stormwater ponds and infiltration basins is expected to mitigate potential adverse effects from the increase in impervious surface.

The project will include approximately 6.5 acres of stormwater ponds and infiltration areas in compliance City of Ramsey and LRRWMO requirements (**Figures 3, 4 and 8**). The proposed design also includes excavation of a deep 3-acre pond. The deep pond will connect to the storm sewer system and discharge to the east under Puma Street NW, but it will not be designed as a stormwater pond and is not required to meet stormwater treatment requirements. However, the deep pond will serve some infiltration functions.

Section 117-392 of the of Ramsey City Code requires permanent stormwater pollution controls, including: (1) infiltrating or retaining the first inch of precipitation over the impervious surface of the site; (2) retaining the post-construction runoff volume onsite for the 95th percentile storm; and (3) no increase in the post-construction rate, volume, and duration of runoff over existing conditions for the

one- and two-year storms. Section 117-394 of the City Code protects natural wetlands from the discharge of stormwater without appropriate treatment for water quality and runoff quantity control. The minimum treatment required for discharge to wetlands is to meet NURP Guidelines, which include a dead storage treatment pond volume at least equal to the runoff from a 2.5 inch storm over the entire contributing area assuming full development, an average pool depth of more than 3, and a maximum depth of 10 feet. LRRWMO Stormwater Standards require stormwater basins designed to store the volume of the 100-year storm; stormwater treatment to NURP standards prior to discharge to a lake, stream, wetland, or offsite; and infiltration of a runoff volume equal to 1 inch from all impervious surfaces onsite.

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. Impervious surface runoff from storm events will be retained in four stormwater ponds and one or two 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. Treated stormwater runoff from the site will be routed east under Puma Street NW into an existing intermittent drainageway, and eventually into the City's storm sewer system that ultimately reaches the Mississippi River. Proposed discharge flow rates will be equal to or less than the existing flow rates.

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.

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. LRRWMO Wetland Protection Standards require establishment of native vegetation within a 16.5-foot-wide buffer strip around wetland boundaries. Temporary sediment basins will be necessary to comply with the MPCA General Stormwater Permit for Construction Activity and to manage stormwater discharge during construction.

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 Ramsey and the LRRWMO 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 is expected to require dewatering and groundwater appropriation to facilitate installation of sanitary sewer and excavation of a deep 3-acre pond, but the project will not involve installation of new water wells. Project development will require a MN DNR water appropriation permit if dewatering required for installation of utilities exceeds 10,000 gallons/day or 1 million 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 MN DNR General Permit 1997-0005 for temporary water appropriations. Although the extent and duration of construction dewatering that may be necessary is currently unknown, construction dewatering is expected to be unnecessary or 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 water wells.

Well Abandonment

The project area does not include any existing wells, as indicated from review of the site, the project survey, and the Minnesota County Well Index. The project is not expected to involve well abandonment.

Connection to a Public Water Supply

The project will be connected to the City of Ramsey municipal water supply. The City of Ramsey draws its public water supply from the Tunnel City-Wonewoc aquifer. The City currently maintains eight municipal wells that are all located at least one mile east of the project area (**Table 7**). These existing wells have a combined permitted capacity to pump 6,800 million gallons of water per year (MGY).

Table 7. City of Ramsey Municipal Water Appropriation Permits

Permit No.	Well No.	Permitted Volume (MGY)	Max Use 2010-2015 (MGY)
1985-6005	161441	850	141.611
1985-6005	416183	850	5.462
1985-6005	580303	850	164.864
1985-6005	580313	850	194.032
1985-6005	593672	850	79.897
1985-6005	706840	850	138.082
1985-6005	743832	850	118.526
1985-6005	743833	850	117.421
Total		6,800	959.895

During 2010-2015, these wells used a maximum of 960 million gallons per year. Based on past use and permitted capacity, the existing municipal wells have sufficient surplus capacity to serve the proposed project. A 16-inch trunk water main will be extended from Bunker Lake Boulevard and Puma Street to serve the development area. Water flow, pressure, and storage will be adequate to serve the development area. As indicated under **Item 11.a.ii**, the project is not located in or near a wellhead protection area.

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 Lower Rum River Watershed Management Organization (LRRWMO), 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). The project area includes three delineated wetlands that are identified on **Figure 6**.

Physical Effects and Alterations

Construction of an emergency overflow from Wetland 2 is expected to result in physical effects that will eliminate the existing wetland hydrology of Wetland 3. Wetland 3 is a 1,738-square-foot Type 1 seasonally-flooded, farmed wetland that was dominated by stunted corn at the time of the wetland delineation. The proposed 1,738 square feet of wetland impact falls below the 2,500-square-foot de minimis exemption threshold, which applies to wetlands in a 50 to 80 percent area (e.g., Anoka County) under the Minnesota Wetland Conservation Act "except for type 3, 4, 5, or 8 wetland or white cedar and tamarack wetland, outside of the shoreland wetland protection zone and inside the 11-county metropolitan area." (MN Rules 8420.0420, Subp. 8(2)(b). The proposed wetland impact also falls below the 5,000-square-foot wetland sequencing/compensatory mitigation threshold administered by the U.S. Army Corps of Engineers under RGP-003-MN, General Condition 1.

The other wetlands on the site will be avoided. LRRWMO Wetland Protection Standards will require establishment of native vegetation within a 16.5-foot-wide buffer strip around these wetlands.

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.

The proposed project is not expected to affect other surface water features such as lakes, streams, ponds, intermittent channels, or county/judicial ditches. The Mississippi River is located approximately 1,400 feet southwest of the project and will not be affected by the project. The site does not include other surface waters and the proposed project will not affect any MN DNR pubic waters. Although the National Hydrography Dataset shows a flowline running southeast through Wetlands 2 and 3, across the northeastern part of the site, this flowline was not observed in the field during the wetland delineation. Field investigation of this area found that it was dominated by corn with areas of green bulrush and intermittent inundation. The area did not include a drainage channel.

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.

The project area has been used as cropland since at least the 1930s. The site is not known to include environmental hazards and the agricultural land use history suggests a low potential for environmental contamination. The project area is not known to include previous building sites, disposal areas, storage tanks, pipelines, or utility corridors. Carlson McCain completed a Phase I Environmental Site Assessment for the property in November, 2016, and did not identify recognized environmental conditions their assessment.

A review of the MPCA's "What's in My Neighborhood" (WIMN) database identified one Leak Site in close proximity to the proposed project. Leak Site 6487 is located about 400 feet southwest of the project, across the Burlington Northern Railroad and Highway 10/169. The leak involved the release of an unknown quantity of diesel fuel on the David Nathe Farm. The leak was discovered on June 28, 1993, reported to the MPCA on June 30, 1993. The leak site closed by the MPCA on April 24, 1996. Available information suggests the site was properly investigated and that the site does not affect the project area.

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. Most solid waste is expected to include organics, paper, other waste, and plastic (**Table 8**).

Table 8. 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).

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. Brush and tree waste generated by construction will likely be chipped or otherwise recycled rather than burned on site.

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 City of Ramsey residents through their solid waste collector. Participation in the recycling program by future residents of the project area is expected to reduce the volume of solid waste generated by the project.

Solid waste generated in the City of Ramsey that is not recycled or hazardous is delivered to the Elk River Resource Recovery Station. The Elk River Energy Recovery Station convert refuse derived fuel (RDF) from mixed municipal waste into energy. Using waste to generate electricity provides an efficient disposal method for garbage and prevents garbage from going to landfills.

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 proposed in 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.*

Normal construction and household hazardous wastes are anticipated. Toxic or hazardous materials such as fuel for construction equipment and materials used in the construction of homes (paint, adhesives, stains, contaminated rags, acids, bases, herbicides, and pesticides) will likely be used during site preparation and home construction. Spills of these materials is not likely to occur, but a substantial spill could notification of the Minnesota Duty Officer. Contractors and builders will be responsible for proper management and disposal of wastes generated during construction. Homeowners will be responsible for management and disposal of hazardous waste thereafter. Homeowners will be able to dispose of household hazardous waste at the Anoka County Household Hazardous Waste Facility.

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 cultivated cropland, wetlands, woodlands, and grasslands. Vegetative cover types on the project area were mapped based on aerial photography, the wetland delineation, and field reviews (**Figure 5**). The project area is roughly 96% cropland, 2% tree rows, 1% wetland, and 1% grassland. Habitats in the project area are likely used by wildlife adapted to agricultural and suburban environments, such as white-tailed deer, songbirds, small mammals, and amphibians.

The project area falls in the Anoka Sandplain Ecological Subsection of the MN DNR Ecological Classification System and the Anoka Sand Plain and Mississippi Valley Outwash of the Level IV Ecoregion of the U.S. EPA. This area consists of a flat, sandy lake plain and terraces along the Mississippi River. The area includes row crops, small grains, suburban development, wetlands, woodlands.

Most of the project area has limited wildlife habitat value because it is occupied by annually tilled agricultural crops. Cropland consisted of corn, soybeans, and wheat during 2016. Wetlands in the project area were dominated by stunted crops, reed canary grass, and green bulrush (**see Table 5**). Tree rows included elm, aspen, boxelder, pines, and red cedar. Grassy field edges were dominated by smooth brome, and Kentucky bluegrass.

*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 2017____**) 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 MN DNR 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 C**). Kjolhaug Environmental Services also queried a licensed copy of the NHIS database. The NHIS review identified six records of rare species and sensitive natural communities.

Observations of Blanding's turtles (*Emydoidea blandingii*), a state threatened reptile, were recorded in 1989 and 1995 at locations north and east of the project area. One observation occurred on or near the Itasca Park and the other occurred in an area that currently includes a mix of cropland, suburban development, and wetland.

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, but does not include much grassland. 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.

Other rare feature records included three observations of the black sandshell mussel (*Ligumia recta*), and one record of a silver maple floodplain forest. These features were found along the Mississippi River. The black sandshell is a state-listed special concern species. None of the NHIS records represent federally threatened and endangered species.

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 falls within the occupied range of 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. Although the project area includes about 1.8 acres of woodland and is located in the white-nose syndrome zone defined under the Final 4(d) Rule, there are no known incidental, breeding, or hibernacula 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.

Project development is expected to convert about 85.5 acres of cropland and 0.9 acres of trees to residential land uses, including roads, homes, lawns, landscaping, and stormwater ponding. The project may affect the number and type of wildlife species in the area, but changes in wildlife abundance are not expected to be regionally significant. The existing croplands provide wildlife food, but have limited value as wildlife cover. Wildlife species that depend on agricultural cropland will be displaced by the project. The project will likely have short-term negative effects and long-term positive effects on species adapted to suburban habitats. 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. Four of the six rare occurrences identified during the MN DNR NHIS review were associated with the Mississippi River, which is south of the project area and will not be physically affected by the project. These include three occurrences of black sandshell and one record of a silver maple floodplain forest.

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 using erosion control materials constructed of organic fibers rather than plastic.

The project is not considered likely to affect the northern long-eared bat (NLEB) because the project area includes mostly cropland, few trees, which is not considered characteristically suitable NLEB

habitat. The white nose syndrome buffer zone map and the Minnesota NLEB bat occurrence maps available from the USFWS and the MN DNR indicate there are no NLEB maternity roost colonies or hibernacula known to occur within 1 mile of the project area.

Although project construction could be expected to slightly increase the potential for the spread of invasive and weedy species, the project area has been disturbed by agricultural use for decades. 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 1 acre of wetlands, about 1 acre of trees, establishment of native grassland buffers along wetland edges, and creation of approximately 9.5 acres of stormwater features.

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 from the Minnesota State Historic Preservation Office (SHPO) for the project area to assess whether known historic structures or archaeological sites exist in the project vicinity. The SHPO queried the Minnesota Archaeological Inventory and Historic Structures Inventory, and did not identify any archaeological sites or historic structures known to exist in the project vicinity. Correspondence from the SHPO is included in **Appendix D**.

The project site has relatively flat topography and a history of agricultural tillage, which suggests the site has relatively low potential for undiscovered intact archaeological material. Although the potential for project effects on historic and archaeological resources has not been investigated in detail, the initial cultural resource screening did not identify potential for effects on known historic resources.

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. Substantial effects on visual resources are not anticipated in conjunction with project development. 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.

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 proposed project will generate increased traffic, which will generate a relatively small corresponding increase in carbon monoxide, carbon dioxide and other vehicle-related air emissions. Project development is expected to have a negligible effect on air quality. The project does not include air quality monitoring, modeling, or measures to mitigate effects on air quality.

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 areas northeast and east of the site. 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 areas northeast and east of the site. 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 E**.

Existing and Proposed Parking Spaces

The project area does not include any parking stalls under existing conditions. The proposed 246 single-family lots and 98 multi-family homes 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 246 single-family and 98 multi-family residential units. The residential development is expected to generate a total of 2,912 average daily trips, including 1,456 vehicles entering the site and 1,456 vehicles exiting the site (**Table 9**).

Table 9. Project Trip Generation Estimates

Land Use	ITE Code	No. of Units	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
				In	Out	Total	In	Out	Total
Single-family detached housing	210	246	2,342	46	138	184	155	91	246
Multi-family attached housing	230	98	570	7	36	43	34	17	51
Total		344	2,912	53	174	227	189	108	297

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 4:45 and 5:45PM. 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 297 trips, consisting of 189 entering vehicles and 108 exiting vehicles. The Traffic Impact Study included in **Appendix E** provides a full description and analysis of the peak hour traffic and traffic recommendations.

Availability of Transit and Alternative Transportation

The Ramsey Metro Transit Station is located about 1.5 miles southeast of the project area along the railroad and Highway 10/169. The station includes a park and ride lot and access to the Northstar Commuter Rail Line. The Northstar Line offers service between Big Lake and downtown Minneapolis, stopping at stations in Elk River, Ramsey, Anoka, Coon Rapids and Fridley.

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 E**). The principle findings of the Traffic Impact Study are:

1. All Study intersections 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 analyzed the extended traffic forecast to the year 2040. The extended forecast included traffic generated by the proposed project and background traffic growth. Under this forecast, all intersections continue to operate at an acceptable LOS during peak hours of operation causing minimal effects on adjacent public roadways and intersections.

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. Due to the speed limits along Puma Street and Alpine Drive being lower than 45 MPH, turn lane treatments are not warranted. If the speed limits along Puma Street or Alpine Drive is increased to 45 MPH or higher the Turn-Lane Warrants should be re-evaluated. The City of Ramsey 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 E.**

The project will include internal sidewalks to help facilitate safe pedestrian, bicycle, and traffic mobility within the residential project and the adjoining sidewalk/trail network. An addition of a sidewalk/trail along the southern side Alpine Drive should be considered stretching from the site access to the Puma Street and Alpine Drive intersection. An additional crosswalk should also be considered, connecting pedestrians north to the existing sidewalk/trail along the northern side of Alpine Drive. 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 E**).

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.

It is anticipated that the project area will develop over the next 5 to 10 years, but the actual timing of development could vary depending on the demand for housing and market conditions. Other projects are expected to develop in the City of Ramsey during this time period. These projects and their geographic locations are described under **Item 19.b** below.

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.

The City of Ramsey is reviewing and has recently approved several other development projects that are located 0.15 to 4.4 miles from the Pearson Farm development site (**Table 10**). These projects range from a trailer sales display lot to a 141-lot residential subdivision.

Table 10. Other Projects in the City of Ramsey

Name	Description	Status	Distance/Direction from Pearson Farm
Northfork Alpine Addition	4 rural single-family residential lots	Approved	0.15 mile west/northwest
Pearson Bowers Drive	13 rural single-family residential lots	Under review	0.6 mile south
Brookview Addition	11 rural single-family residential lots	Under review	4.4 miles northeast
Rum River on the Green	2 rural single-family residential lots	Approved	4.1 miles northeast
Sunwood Village	47 unit apartment building	Approved	1.0 mile east-southeast
McDonald's	Restaurant	Approved	0.9 mile east-southeast
COR Three North Commons	13 sewered single-family residential lots	Approved	1 mile east
Woodlands	85 sewered single-family residential lots	Partially approved	1.7 miles northeast
Harvest Estates	44 sewered single-family residential lots	Approved	3.6 miles east
Brookfield Subdivision	141 sewered single-family residential lots	Partially approved	2.9 miles northeast
Vistas North Commons	12 sewered single-family residential lots	Under review	0.9 mile east-southeast
Stonebrook Academy	Early childhood learning	Under review	1.1 mile east-southeast
Aeon Housing	40-60 unit apartment building	Under review	1.4 miles east-southeast
Regency Commons	Self-storage facility	Under review	1.8 miles east
Station	77 townhome units	Approved	1.7 miles east-southeast
Parkview East	121 unit apartment building	Approved	1.7 miles east-southeast
M & G Trailers	Display lot	Approved	1.5 miles east-southeast

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.

Reasonably foreseeable future projects may combine with the proposed project to result in cumulative effects on municipal infrastructure and natural resources. The potential for cumulative effects varies with the type of resource affected and the geographic area of impact.

Potential cumulative effects on public infrastructure relate to municipal water supply systems, sanitary sewer conveyance and treatment systems, stormwater management systems, and traffic and transportation systems. The City of Ramsey has planned for continued growth and expanded infrastructure system capacity to address these effects and serve anticipated future projects. The City of Ramsey will consider the timing and staging of other development proposals within the context of

the Comprehensive Plan and related growth management tools at the time that such proposals are brought forward. Over time, much of Ramsey may develop into a combination of residential, commercial, and public uses. Consequently, cumulative effects on public infrastructure are not expected to be significant.

Potential cumulative effects of anticipated future projects on natural resources depend largely on the type, density, and location of future developments. Potential effects on natural resources such as wetlands and wildlife habitat typically vary with project location and the extent of habitat diversity. Effects of the project on wetlands, vegetation communities, and wildlife resources may combine with effects of nearby or nearly concurrent projects in a manner that results in local and subtle cumulative effects. Cumulative effects of suburban development on natural resources can include the loss of agricultural land and the loss and fragmentation of wildlife habitat. Surface water runoff from the project area will infiltrate into the soil and some treated runoff may discharge to the Mississippi River. However, the highly-regulated nature of stormwater runoff and the ubiquitous implementation of BMPs 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 Ramsey, the Lower Rum River Watershed Management Organization, and other government agencies provide the impetus for certain mitigation measures discussed in this EAW. These mitigation measures will help ensure the minimization of cumulative effects on the environment and the capacity for municipal services.

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 _____ Date _____

Title _____

Figures 1 – 10

Pearson Farm Residential Development EAW

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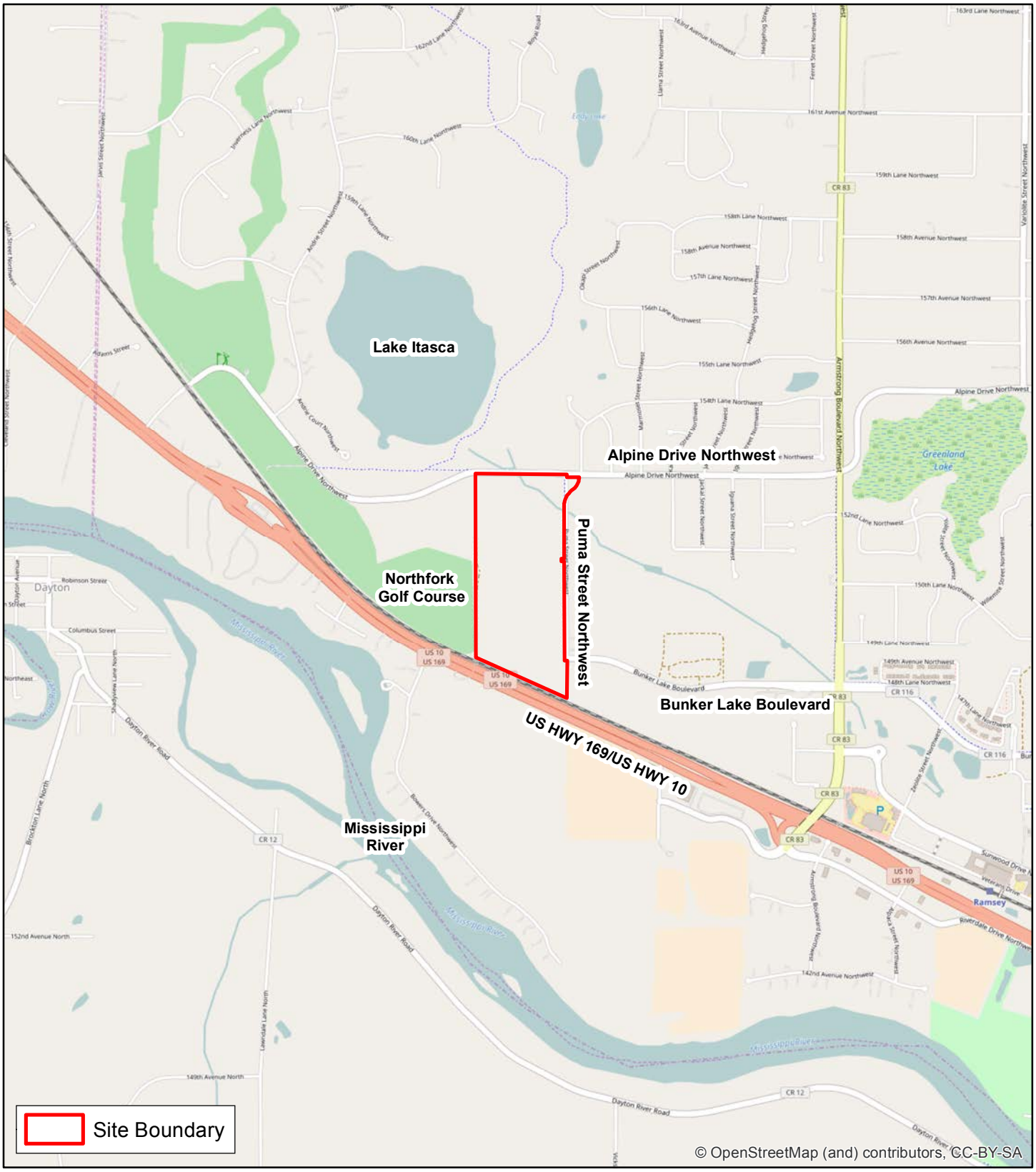

Figure 1 - Site Location

N

0 2,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: ESRI Streets Basemap

Pearson Farm Residential Development (KES 2017-004)
Ramsey, Minnesota

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

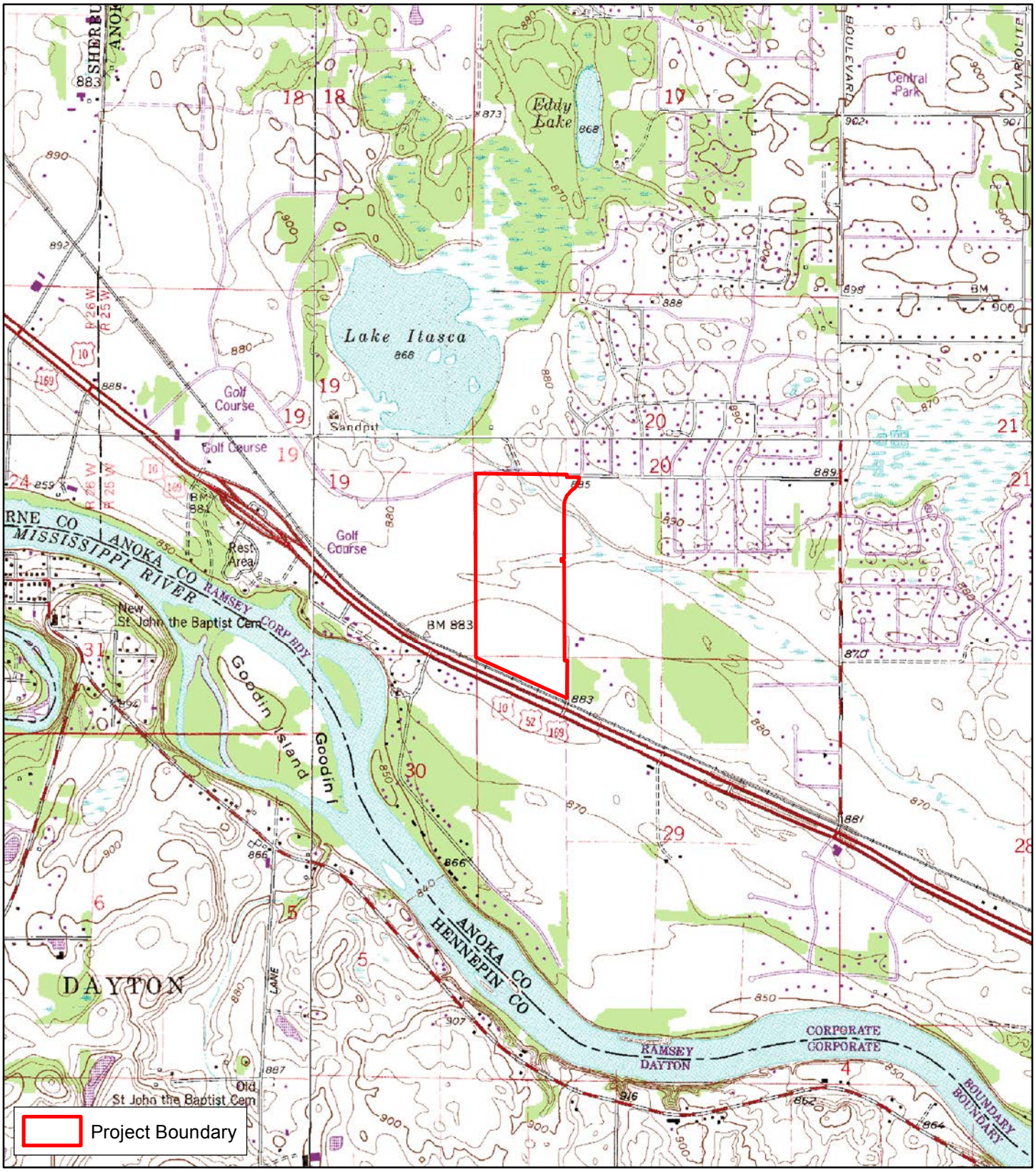

Figure 2 - USGS Topography

N

0 2,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Pearson Farm Residential Development (KES 2017-004)
Ramsey, Minnesota

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

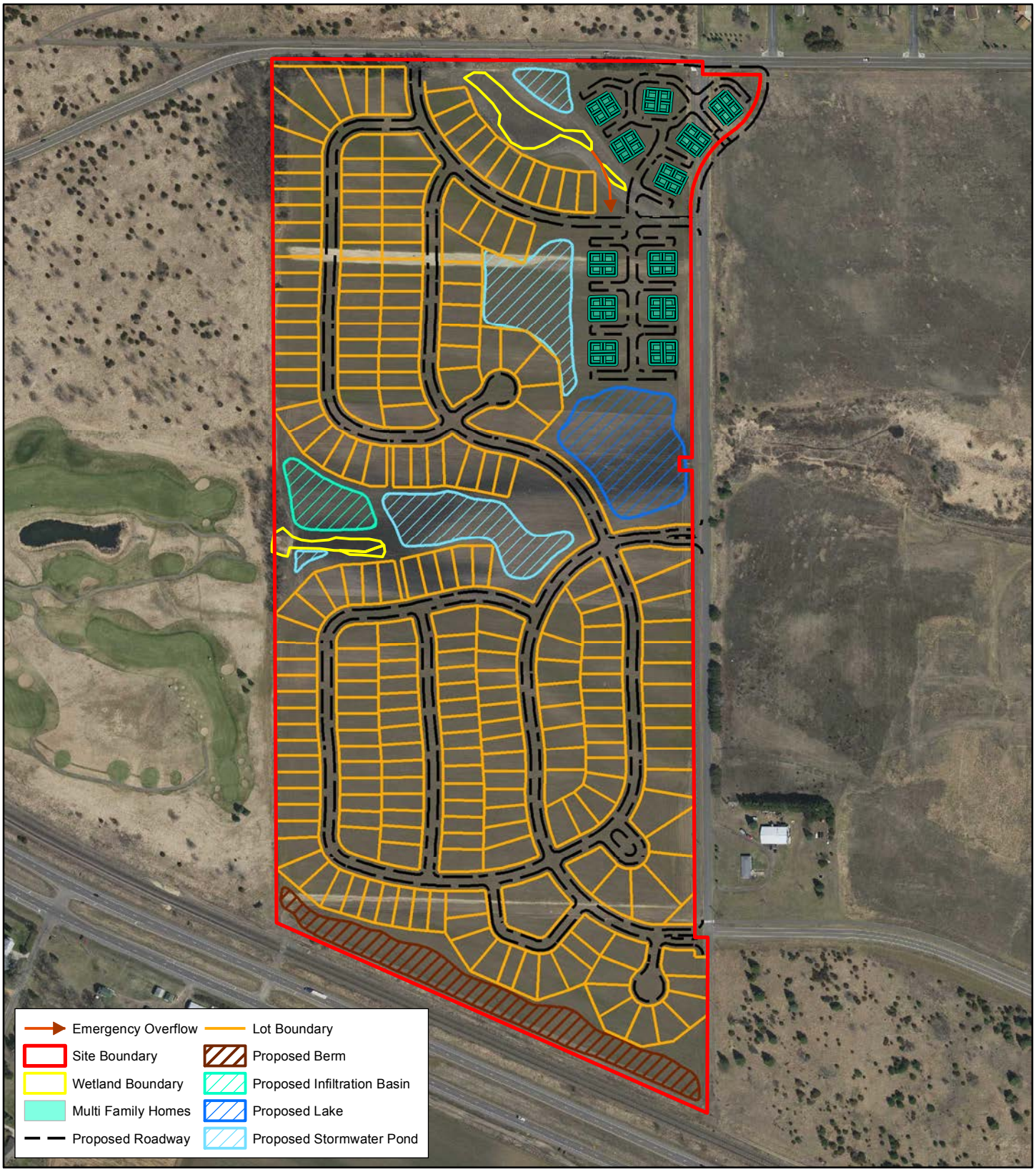

Figure 3 - Proposed Site Plan

N

0 425 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: Minnesota DNR (2013), USFWS

Pearson Farm Residential Development (KES 2017-004)
Ramsey, Minnesota

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

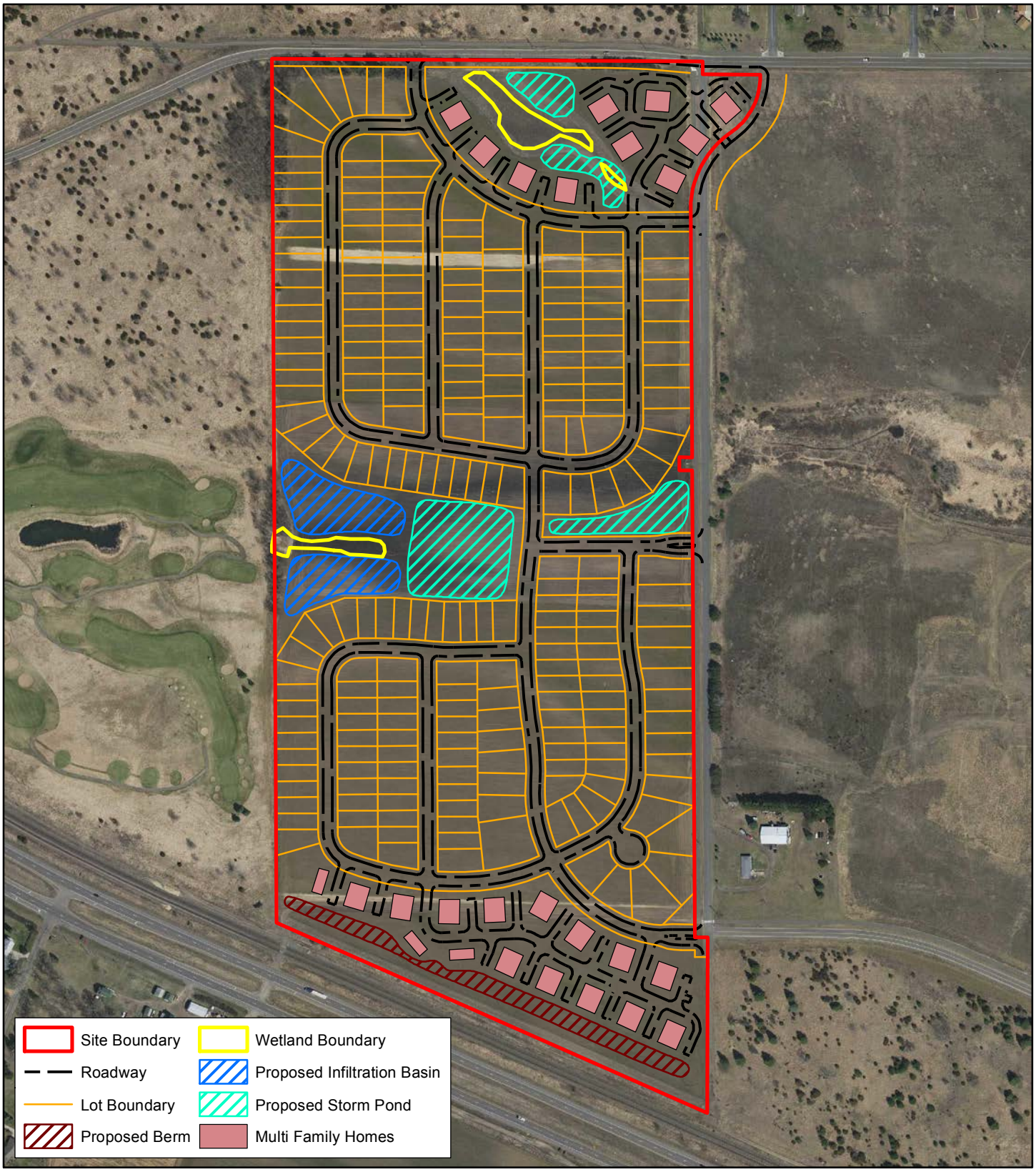

Figure 4 - Maximum Density Site Plan

N

0 425 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: Minnesota DNR (2013), USFWS

Pearson Farm Residential Development (KES 2017-004)
Ramsey, Minnesota

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

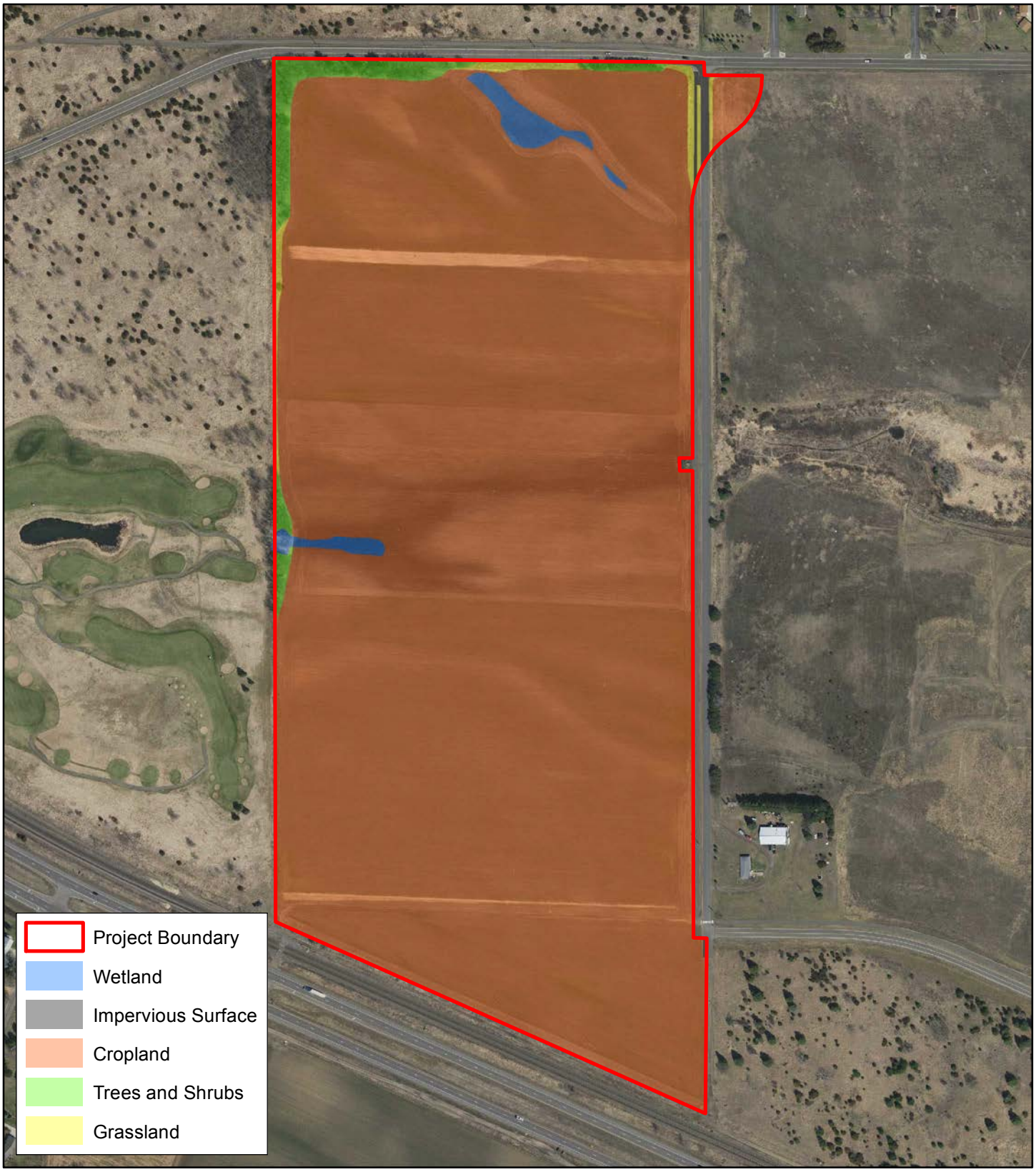

Figure 5 - Existing Cover Types

N

0 425 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: USDA, NRCS

Pearson Farm Residential Development (KES 2017-004)
Ramsey, Minnesota

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

Figure 6 - Delineated Wetlands and Waters

N

0 1,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: Minnesota DNR

Pearson Farm Residential Development (KES 2017-004)
Ramsey, Minnesota

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

Figure 7 - Existing Land Use

N

0 1,000 Feet

Pearson Farm Residential Development (KES 2017-004)
Ramsey, Minnesota

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: USGS

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

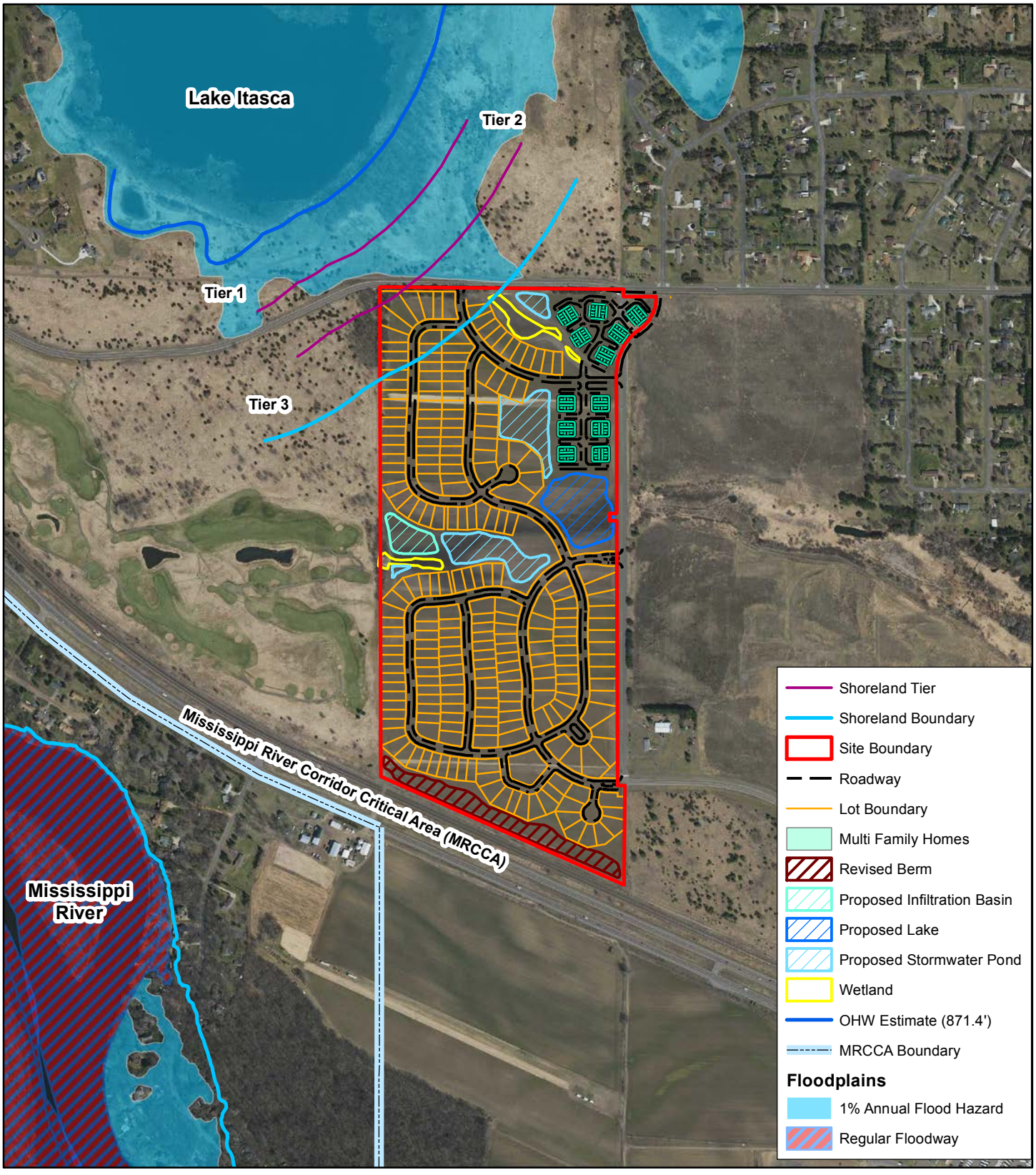

Figure 8 - Shorelands and Floodplains

N

0 750 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Pearson Farm Residential Development (KES 2017-004)
Ramsey, Minnesota

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

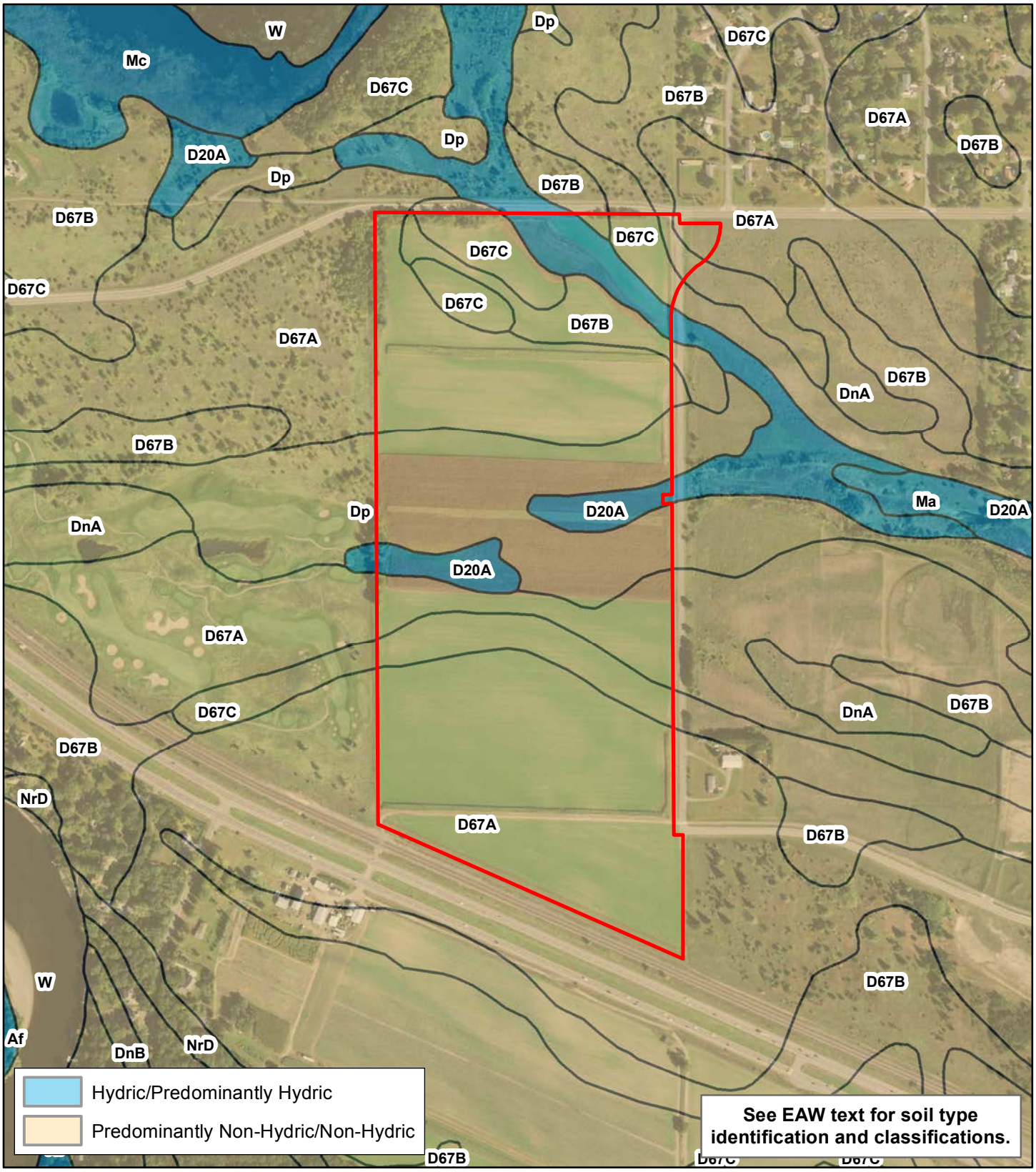

Figure 9 - Soil Types

N

0 600 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Pearson Farm Residential Development (KES 2017-004)
Ramsey, Minnesota

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

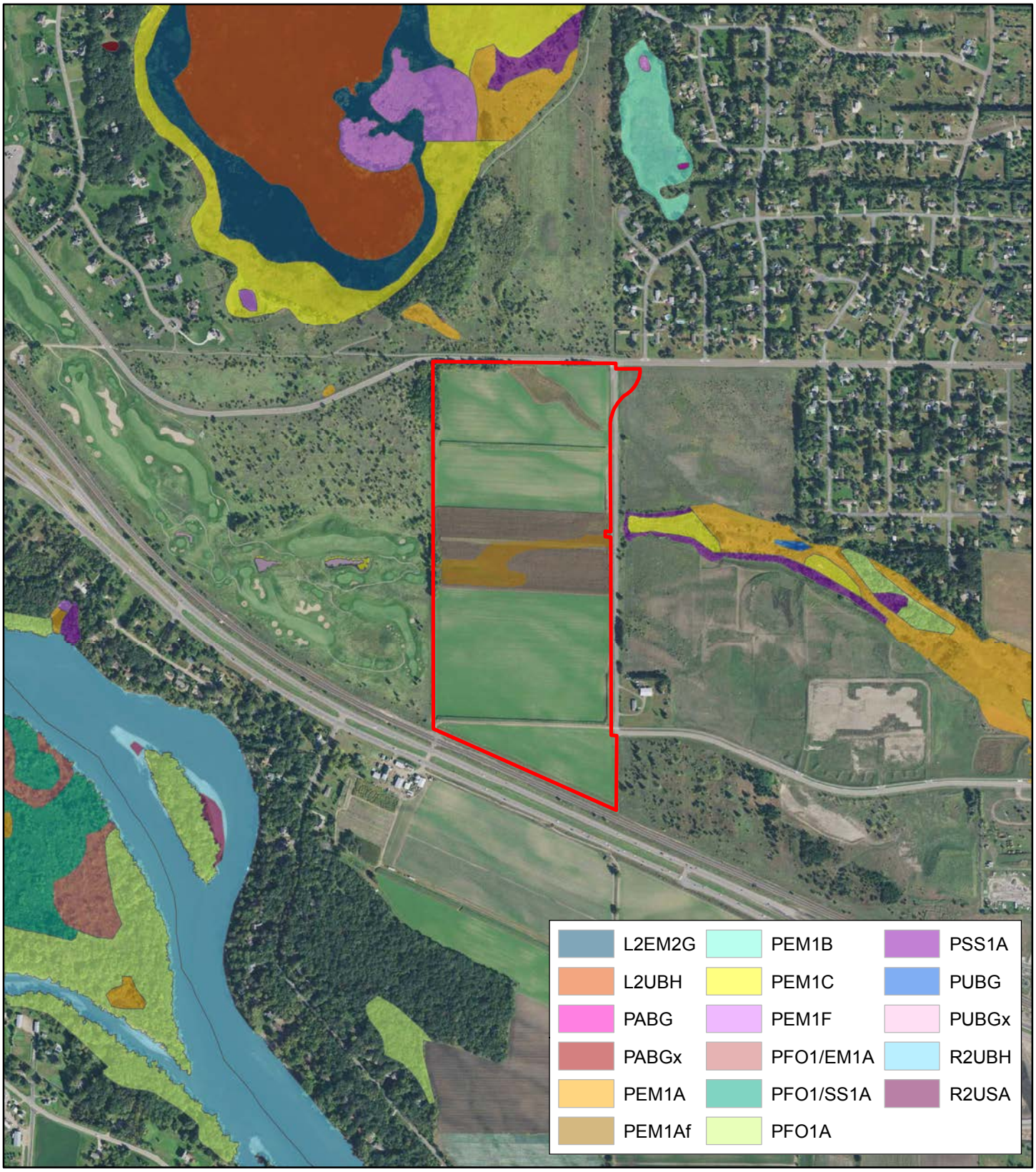

Figure 10 - National Wetlands Inventory

N

0 1,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MnGeo, ESRI Imagery Basemap

Pearson Farm Residential Development (KES 2017-004)
Ramsey, Minnesota

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

Appendix A
Wetland Delineation Approval

Pearson Farm Residential Development EAW

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LOWER RUM RIVER WATERSHED MANAGEMENT ORGANIZATION
ANDOVER - ANOKA - RAMSEY
2015 First Avenue • Anoka, MN 55303

November 21, 2016

Mr. Stephen Bona
Capstone Homes
14015 Sunfish Lake Blvd. NW
Ramsey, MN 55303

Subject: LRRWMO Permit #2016-19 ~ Pearson Property - **Wetland Boundary & Type** ~ Ramsey

Dear Mr. Bona,

The LRRWMO, at its November 17, 2016 meeting, addressed the permit indicated above.

The Board has taken action to approve the wetland boundary and type as indicated on the attached Notice of Decision.

If you have any questions regarding this process, please contact Ms. Karen Wold of Barr Engineering. Good luck with your project.

Sincerely,

Todd Haas
Chair

Enclosure: Notice of Decision
Approved Permit Application #2016-19

cc: Melissa Barrett, Kjolhaug Env. Serv.
Bruce Westby, City of Ramsey Engineer
Chris Lord, Anoka Conservation District
Karen Wold, Barr Engineering
LRRWMO
TEP Agencies
Becky Wozney, Anoka Conservation District
Becky Horton, MnDNR Div. of Ecological & Water Resources
Kate Drewry, MnDNR Water
Ben Meyer, MN Board of Water & Soil Resources
Andrew Beaudet, U.S. Army Corps of Engineers
Marissa Vine, U.S. Army Corps of Engineers

Minnesota Wetland Conservation Act
Notice of Decision

Local Government Unit (LGU)	Address
Lower Rum River WMO (LRRWMO)	**2015 First Avenue** **Anoka, MN 55303**

1. PROJECT INFORMATION

Applicant Name	Project Name	Date of Application	Application Number
Stephen Bona, Capstone Homes Inc.	**Pearson Property**	**10/17/16**	**2016-19**

☒ 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 Report, see below for TEP communication**

2. LOCAL GOVERNMENT UNIT DECISION

Date of Decision: **11/17/16**

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

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

On behalf of Capstone Homes, Kjolhaug Environmental submitted a wetland delineation report and a joint application request for wetland boundary and type concurrence for the Pearson property in Section 20 & 29, Township 32N, Range 25W in the City of Ramsey, within Anoka County.

Two wetlands were delineated within the evaluation area both of which were identified as Type 1 (PEMBf/PEMA) farmed seasonally flooded basins.

The wetland delineation report and a Notice of Application were provided to the TEP on 10/26/16 with a 15-business day comment period.

A site review was conducted on 10/21/16 with Ben Carlson (Kjolhaug) and Karen Wold (Barr Engineering for the LRRWMO) and wetland boundaries were revised on both wetlands. A revised wetland delineation figure was submitted on 10/25/16 which was provided to the TEP with the Notice of Application on 10/26/16.

The revised wetland boundaries and types were found to be accurate, based on the requirements of the 1987 USACE Wetland Delineation Manual, the 2010 Midwest Regional Supplement, and the 2015 Guidance for Submittal of Delineation Reports to the USACE and WCA LGU in Minnesota, Version 2.0.

The comment period ended on 11/16/16 and no additional comments were received.

The wetland boundaries and types are approved.

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 **Todd Haas**	Title **Chairman**	
Signature 	Date **11/17/16**	Phone Number and E-mail **763/755-5100** **thaas@andovermn.gov**

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: **Becky Wozney**
☒ BWSR TEP member: **Dennis Rodacker and Ben Meyer**
☒ DNR TEP member: **Becky Horton, Kate Drewry**
☒ WD or WMO (if applicable): **Todd Haas (LRRWMO), Carla Wirth (Timesaver), Bob Obermeyer and Deb Burt (Barr Engineering Co.)**
☒ City Contact for LRRWMO permitting **Bruce Westby (City of Ramsey)**
☒ Applicant and Landowner (if different) **Stephen Bona (Capstone Homes Inc.), Ben Carlson and Melissa Barrett (Kjolhaug Environmental)**
☒ Corps of Engineers Project Manager**Andrew Beaudet and Marissa Vine**
☐ 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:
☒ **wetland delineation map**
☐

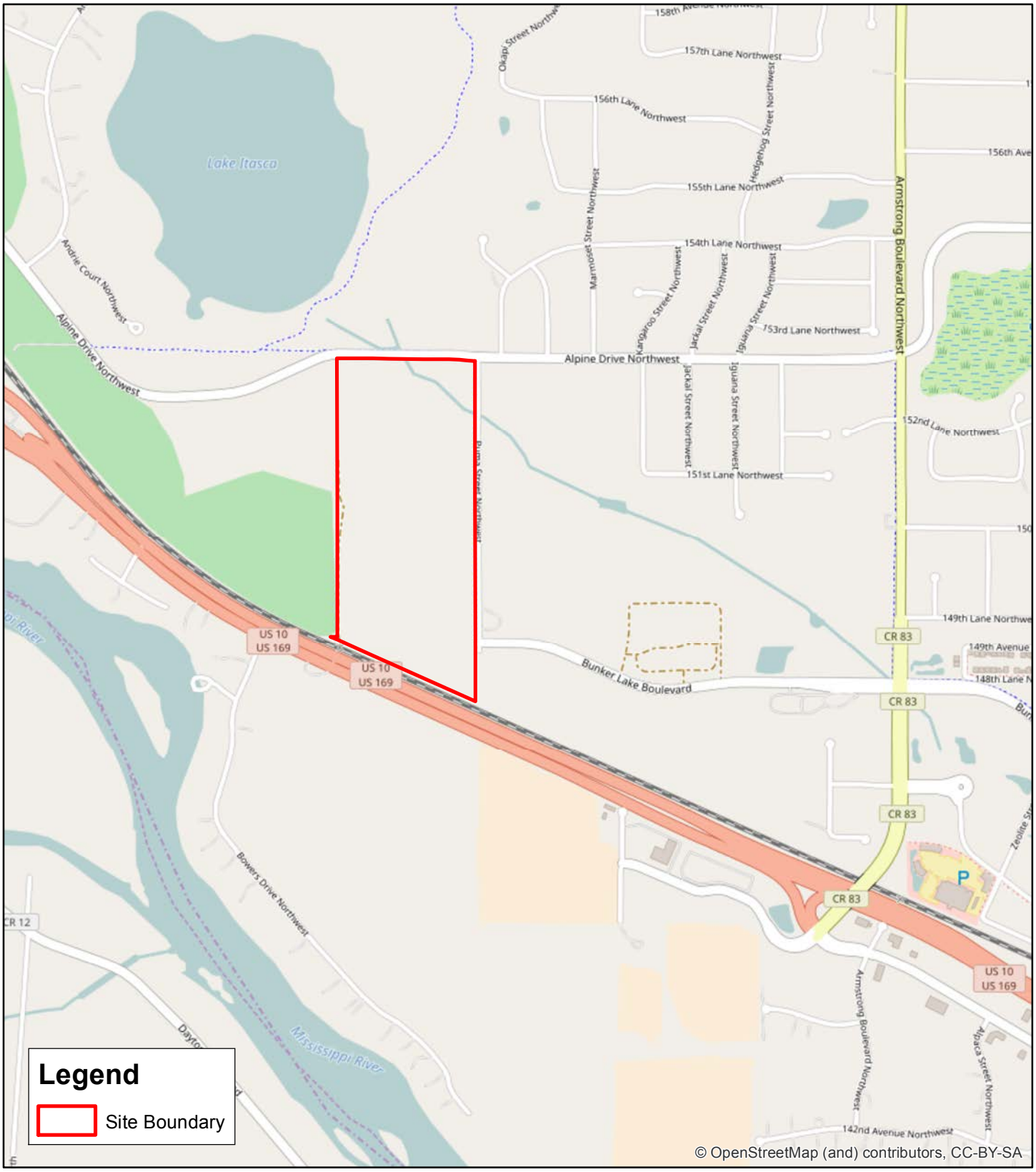


Figure 1 - Site Location

N

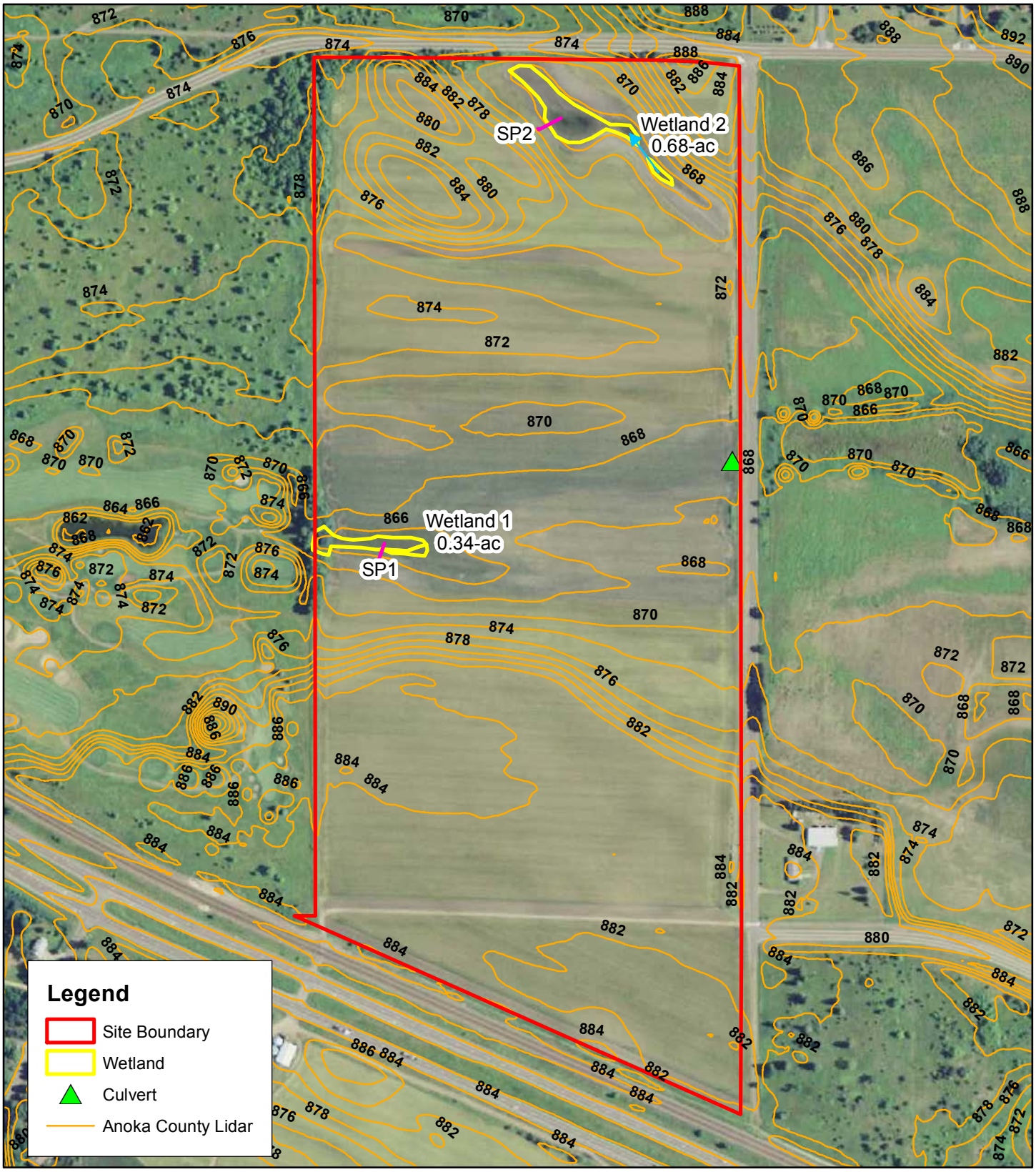
0 2,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: ESRI Streets Basemap

Pearson Property (KES 2016-167)
Ramsey, Minnesota

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



Revised Figure 2 - Existing Conditions (2013 FSA Photo) per 10/21/2016 TEP Review

N

0 500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: Minnesota DNR (2013), USFWS

Pearson Property (KES 2016-167)
Ramsey, Minnesota

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

City Authorization: Ramsey Date Received: 10-17-16 Permit No: 16-19

Lower Rum River Watershed Management Organization ("LRRWMO")

Andover—Anoka—Coon Rapids—Ramsey

2015 First Avenue • Anoka, MN 55303

PERMIT APPLICATION

The $100.00 application fee and the $700.00 escrow deposit must accompany this permit application. Applications for projects involving wetlands and/or involving a Wetland Replacement Plans must include an additional $75 application fee plus an escrow deposit as determined in accordance with Attachment D.

Permits are to be processed at the same time as the site plan, preliminary plat or other city land use or building application submitted to the city in which the work or project is located.

Project Name: Pearson Property

Address/Location: S9 T32N R25W Ramsey, MN

Project Description/Purpose: Wetland Delineation Review

Stephen Bona	Melissa Barrett — Kjolhaug Env. Serv.
Name of Applicant (Site Owner or Property Owner)	**Applicant's Contact — Organization Name**
14015 Sunfish Lake Blvd NW	26105 Wild Rose Lane
Address	**Address**
Ramsey, MN 55303	Shorewood, MN, 55331
City, State, Zip	**City, State, Zip**
(651) 271-4951	(952) 401-8757
Phone — Fax	**Phone — Fax**
Stephen.bona@gmail.com	Melissa@kjolhaugenv.com
Email	**Email**

Submittal Requirements

Complete applications are to be submitted as per attachments A (Permit Requirements), B (Office Procedure), C (LRRWMO Permit Standards). Projects involving wetlands and/or involving a Wetland Replacement Plan have special notice requirements and require submittal of four copies (4) and an electronic copy of all wetland-related submittal materials.

PROJECT SUBMITTALS (check all that apply):

- ☐ **GRADING PLAN:** Including existing and proposed contours and boundaries of all wetlands and surface waters.
- ☐ **STORM SEWER/ DRAINAGE PLAN:** Including all permanent drainage features and all permanent water quality features.
- ☐ **STORM DRAINAGE CALCULATIONS:** Design computations as required by the LRRWMO (see attachment C).
- ☐ **EROSION CONTROL PLAN:** Including all temporary measures proposed to retain all sediment on site.
- ☑ **MITIGATION PLAN*/WETLAND DETERMINATION:** Quality level of mitigated wetland(s) shall be determined by the LRRWMO.
- ☐ **REQUEST FOR EXEMPTION UNDER THE WETLAND CONSERVATION ACT (WCA)**
- ☐ **OTHER**

****NOTE: Four copies of permit submittals are required for projects involving wetland replacement plans.***

City Authorization: _____ Date Received: _____ Permit No: 16-19

Lower Rum River Watershed Management Organization ("LRRWMO")

Andover—Anoka—Coon Rapids—Ramsey

2015 First Avenue • Anoka, MN 55303

START OF PROJECT: _____	EST. COMPLETION DATE: _____	APPROVAL DATE: 11/17/16

By signing this Permit Application, the undersigned consents and agrees on behalf of the Applicant that:

1. The permit application fee is non-refundable. Escrow deposits will be held by the LRRWMO until the project has been completed and all conditions of issuance of the permit are satisfied. The Applicant is responsible for all expenses incurred by the LRRWMO in the processing, administration and enforcement of the permit application and permit. The escrow deposit will be used to reimburse the LRRWMO for all expenses incurred by the LRRWMO in processing, administering and enforcing the permit application and permit, including engineering, legal and other consultant costs. If such expenses exceed the escrow deposit, the LRRWMO will bill the Applicant or Permittee for such excess amount and payment will be due within twenty (20) days of mailing the invoice. Timely payment of such invoices is a condition of all permits and work may be stopped on the project for failure to make payments when due.

2. The undersigned, its agents, principal, assigns and/or representatives (hereinafter "Permittee") shall abide by all the standard conditions and special terms and conditions of the LRRWMO.

3. Any work that violates the terms of the permit may result in the LRRWMO or the City in which the work is being done immediately causing the work on the project relating to the permit to cease and desist. All work on the project shall cease until the permit conditions are met and approved by the LRRWMO and/or the City in which the work is being done.

4. The Permittee agrees to be bound by the terms of the LRRWMO permit requirements, final permit, standard conditions and special conditions required by the LRRWMO for approval of the permit. The undersigned has the authority to bind the permit holder, the owner of the property and/or any entity performing work on the property pursuant to the terms of LRRWMO permit, and shall be responsible for complying with terms of the LRRWMO permit.

"I certify that I have thoroughly read and understand the above information."

Alan R Pearson — Signature of property owner or designated Agent (no agent without a letter of authority)

10/17/16 — Date

Stephen A. Bova — Signature of applicant if different from property owner

10/17/16 — Date

Alan Pearson — Print Signer's name

Stephen A. Bova — Print Signer's name

SIGNATURE OF LRRWMO CHAIRMAN: ** _____

NOTE: Subject to conditions recommended by Bob Obermeyer, Barr Engineering (see attached)

PERMIT IS NOT VALID IF PROJECT HAS NOT STARTED WITHIN ONE YEAR FROM DATE OF APPROVAL

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

10/24/2016

REPLY TO
ATTENTION OF
Operations
Regulatory (MVP-2016-03719-MLV)

THIS IS NOT A PERMIT

Melissa Barrett
Kjolhaug Environmental
26105 Wild Rose Lane
Shorewood, MN 55331

Dear Ms. Barrett:

We have received your submittal described below. You may contact the Project Manager with questions regarding the evaluation process. The Project Manager may request additional information necessary to evaluate your submittal.

File Number: MVP-2016-03719-MLV

Applicant: Capstone Homes - Steve Bona

Project Name: Pearson Property

Received Date: 10/17/2016

Project Manager: Marissa Vine
651-290-5362

Additional information about the St. Paul District Regulatory Program, including the new Clean Water Rule, can be found on our web site at http://www.mvp.usace.army.mil/missions/regulatory.

Please note that initiating work in waters of the United States prior to receiving Department of the Army authorization could constitute a violation of Federal law. If you have any questions, please contact the Project Manager.

Thank you.

U.S. Army Corps of Engineers
St. Paul District
Regulatory Branch

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Appendix B

Well Logs

Pearson Farm Residential Development EAW

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Minnesota Unique Well Number

541778

County Anoka
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/05/1997
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
PEARSON,	32	25	W	30	AABACD

Elevation 883 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 8846 10 SH W RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	23	BROWN	SOFT
CLAY & ROCKS	23	43	BROWN	SOFT
SAND	43	66	GRAY	SOFT
CLAY FIRM	66	66	GRAY	

Remarks

Well Depth 66 ft. **Depth Completed** 66 ft. **Date Well Completed** 08/24/1994

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 63 ft.	10.7 lbs./ft.	8.7 in. To 30 ft.
		6.2 in. To 66 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON 304

Diameter	Slot/Gauze	Length	Set	
4.5 in.	18	4 ft.	62 ft.	66 ft.

Static Water Level

28 ft. land surface Measure 08/24/1994

Pumping Level (below land surface)

48 ft. 3 hrs. Pumping at 40 g.p.m.

Wellhead Completion

Pitless adapter manufacturer BAKER Model SNAPPY

☒ 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	0.8 Cubic yards	ft.	60 ft.

Nearest Known Source of Contamination

50 feet South Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 01/10/1994

Manufacturer's name RED JACKET

Model Number 100CNS1- HP 1 Volt 230

Length of drop pipe 42 ft Capacity 18 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 Aquifer Quat. buried
Last Strat clay-gray Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000)
System UTM - Mad83, Zone 15, Meters X 461347 Y 5009793
Unique Number Verification Address verification Inpute Date 07/03/2008

Angled Drill Hole

Well Contractor

Renner E.H. Well | 71015 | SCHAFFER, R.
Licensee Business | Lic. or Reg. No. | Name of Driller

Minnesota Unique Well Number

227345

County Anoka
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/15/1991
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
PEARSON,	32	25	W	30	AAABCA

Elevation 883 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 8846 10 HY NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	10	BROWN	
GRAVEL & SAND	10	15	YELLOW	
CLAY & GRAVEL	15	60	BROWN	
GRAVEL	60	75	BROWN	

Remarks

WELL LOCATION: SOUTH SIDE OF HIGHWAY 10 & EAST OF PUMA

Well Depth 75 ft. **Depth Completed** 75 ft. **Date Well Completed** 12/13/1972

Drill Method **Drill Fluid**

Use domestic **Status** Active

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

Casing Type Single casing **Joint** Threaded
Drive Shoe? Yes ☐ No ☐ **Above/Below** 0 ft.

Casing Diameter **Weight**
4 in. To 71 ft. lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set
4 in.	20	4 ft.	ft. ft.

Static Water Level
30 ft. land surface Measure 12/13/1972

Pumping Level (below land surface)
40 ft. hrs. Pumping at 17 g.p.m.

Wellhead Completion
Pitless adapter manufacturer BAKER 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 12/00/1972
Manufacturer's name AERMOTOR
Model Number HP 0.75 Volt
Length of drop pipe 50 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 Aquifer Quat. buried
Last Strat gravel (+larger)-brown Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - Mad83, Zone 15, Meters X 461304 Y 5009799
Unique Number Verification Address verification Inpute Date 01/01/1990

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Renner E.H. & Sons	27015	LEDBETTER, B.

Minnesota Unique Well Number

430232

County Anoka
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/15/1991
Update Date 08/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
MCINNIS, DAN	32	25	W	20	CDCCCA

Elevation 883 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14915 PUMA ST NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	27	BROWN	SOFT
CLAY	27	30	BROWN	SOFT
SAND & GRAVEL	30	51	BROWN	SOFT
CLAY & GRAVEL	51	93	BROWN	HARD
CLAY	93	116	GRAY	MEDIUM
SANDROCK & SHALE	116	131	YEL/BRN	HARD
SHALE & SANDROCK	131	140	WHITE	SOFT
SANDROCK & SHALE	140	176	PNK/GRN	SOFT
SANDROCK & SHALE	176	276	GREEN	SOFT
SANDROCK & SHALE	276	338	BRN/GRN	HARD

Remarks

Well Depth	Depth Completed	Date Well Completed
338 ft.	338 ft.	03/17/1988

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

Use domestic **Status** Active

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

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

Casing Diameter	Weight	Hole Diameter
4 in. To 294 ft.	11 lbs./ft.	6.2 in. To 294 ft.
		4 in. To 338 ft.

Open Hole From 294 ft. To 338 ft.

Screen? ☐ **Type** **Make**

Static Water Level
30 ft. land surface Measure 03/17/1988

Pumping Level (below land surface)
100 ft. 3 hrs. Pumping at 50 g.p.m.

Wellhead Completion
Pitless adapter manufacturer MONITOR Model 8PL41UCI
☐ 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.	194 ft.

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

Pump ☐ Not Installed Date Installed 03/21/1988
Manufacturer's name MEYERS
Model Number B352BM- HP 0.5 Volt 230
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 St.Lawrence-Tunnel City Aquifer Wonewoc
Last Strat Wonewoc Sandstone Depth to Bedrock 116 ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - Mad83, Zone 15, Meters X 461892 Y 5009911
Unique Number Verification Address verification Inpute Date 01/01/1990

Angled Drill Hole

Well Contractor
Mork Well Co. 02133 LAWRENCE, R.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

783804

County Anoka
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 09/30/2011
Update Date 08/18/2014
Received Date 12/05/2011

Well Name	Township	Range	Dir	Section	Subsection
WIEHLE, SCOTT	32	25	W	20	BDCCAC

Elevation 885 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 15310 OKAPI ST NW RAMSEY MN 553037004

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	54	BROWN	SOFT
CLAY	54	62	BROWN	SOFT
GRAVEL	62	65	BROWN	SOFT
CLAY	65	107	BROWN	SOFT
SHALE	107	155	VARIED	SOFT

Remarks

OLD WELL ON PROPERTY GAMMA LOGGED 9-30-2011. UNIQUE NO. 272037.

NEAREST CONTAMINATION: TYPE= FLOOR DRAIN.

Well Depth 155 ft. **Depth Completed** 155 ft. **Date Well Completed** 08/26/2011

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

Use domestic **Status** Active

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

Casing Type Single casing **Joint** Glued

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

Casing Diameter	Weight	Hole Diameter
4 in. To 113 ft.	lbs./ft.	7.7 in. To 113 ft.
		6.5 in. To 155 ft.

Open Hole From 113 ft. To 155 ft.

Screen? ☐ **Type** **Make**

Static Water Level

28 ft. land surface Measure null

Pumping Level (below land surface)

60 ft. 1 hrs. Pumping at 60 g.p.m.

Wellhead Completion

Pitless adapter manufacturer AQUASEAL Model T-SERIES

☐ 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	3 Sacks	103 ft.	113 ft.
bentonite	6 Sacks	ft.	103 ft.

Nearest Known Source of Contamination

52 feet East Direction Other Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed

Manufacturer's name GOULDS

Model Number 18GS10 HP 1 Volt 230

Length of drop pipe 60 ft Capacity 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 Tunnel City Group Aquifer Tunnel City

Last Strat Tunnel City Group Depth to Bedrock 107 ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:12,000)

System UTM - Mad83, Zone 15, Meters X 461928 Y 5010727

Unique Number Verification Information from Inpute Date 09/30/2011

Angled Drill Hole

Well Contractor

Mork Well Co., Inc. 1877 RICKE, G.

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

Minnesota Unique Well Number

272037

County Anoka
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 09/30/2011
Update Date 08/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
WIEHELE, DEB	32	25	W	20	BDCCAC

Elevation 886 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 15310 OKAPI ST NW RAMSEY MN 553037004

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	60		
GRAVEL & CLAY	60	110		
GRAVEL & CLAY	110	126		
SANDROCK	126	156		

Remarks

GAMMA LOGGED 9-20-2011. LOGGED FOR ANOKA CO. ATLAS AND MDH.

Well Depth 156 ft. **Depth Completed** 156 ft. **Date Well Completed** 07/30/1974

Drill Method **Drill Fluid**

Use domestic **Status** Inactive

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

Casing Type Single casing **Joint**

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

Casing Diameter	Weight	Hole Diameter
4 in. To 141 ft.	lbs./ft.	4 in. To 156 ft.

Open Hole From 141 ft. To 156 ft.

Screen? ☐ **Type** **Make**

Static Water Level

41 ft. land surface Measure 09/30/2011

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 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 Tunnel City Group Aquifer Tunnel City

Last Strat Tunnel City Group Depth to Bedrock 110 ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:12,000)

System UTM - Mad83, Zone 15, Meters X 461922 Y 5010728

Unique Number Verification Information from Inpute Date 09/30/2011

Angled Drill Hole

Well Contractor

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

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Appendix C

Minnesota DNR Natural Heritage Information System Report

Pearson Farm Residential Development EAW

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The DNR NHIS Report is expected to be available by March 17

Appendix D

State Historic Preservation Office Response

Pearson Farm Residential Development EAW

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From: Thomas Cinadr [mailto:thomas.cinadr@mnhs.org]
Sent: Thursday, February 02, 2017 8:46 AM
To: Andrew Krinke <Andrew@kjolhaugenv.com>
Subject: Re: 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 archaeological sites or historic structures were identified in a search of the Minnesota Archaeological Inventory and Historic Structures Inventory for the search area requested.

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

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

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

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 Wed, Feb 1, 2017 at 1:12 PM, Andrew Krinke <Andrew@kjolhaugenv.com> wrote:

Hi Tom,

We are requesting a historical property information/database search for a 88.4-acre site located in the southwest quarter of Section 20, T32N, R25W, Ramsey, Anoka County, Minnesota. The site corresponds to Anoka County PIN 203225320001, 203225330001, and 293225220004 and the Lat/Long coordinates of the site are 45.243891, -93.488493.

We are requesting this search because the Pearson Farm Residential Development is proposed on this property. The Pearson Farm Residential Development project will include 246 single-family lots and 98 townhomes. Site development will include mass grading and the site will be served by municipal sewer and water. . The project area is dominated by annually tilled cropland, but includes three farmed wetlands and some field edges with trees and grassland.

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

Appendix E
Traffic Impact Study

Pearson Farm Residential Development EAW

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Spack CONSULTING
ENGINEERING TRAFFIC FORWARD

Traffic Impact Study

Pearson Farm Residential Development
Ramsey, Minnesota

I hereby certify this report was prepared by me or under my direct supervision, and I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

By: _____
Vern Swing, P.E.
License No. 41417

Date: March 10, 2017_____

Executive Summary

Background: The Pearson Farms Development is proposed for construction on the vacant land bounded by Puma Street, Alpine Drive, Trunk Highway (TH) 10, and Links at Northfork Golf Course in Ramsey, Minnesota. This development will include 344 total residential units (98 townhomes and 246 single family homes). The purpose of this study is to determine the traffic impacts associated with the build out of the proposed development on the study intersections.

Results: The principal findings of this traffic study are:

- The proposed expansion is expected to generate approximately 2,912 new trips during an average weekday (1,456 entering and 1,456 exiting), approximately 227 new trips during the a.m. peak hour (53 entering and 174 exiting) and approximately 297 new trips during the p.m. peak hour (189 entering and 108 exiting).
- The existing study intersections operate with acceptable delays and vehicle queues today.
- The study intersections are expected to operate acceptably during the 2040 no-build and build scenarios.
- Left turn lanes are not warranted based on the expected 2040 build year volumes and mainline speeds.
- Right turn lane warrants are not fulfilled due to the mainline speeds remaining below 45 MPH, which is consistent for neighborhood streets, however, the right turn lane volume thresholds were reached by the estimated 2040 Build volumes.

Recommendations: The following items are recommended based on the analyses contained in this study:

- No additional intersection mitigation is required to help improve capacity.
- If the speed limits along Puma Street or Alpine Drive are increased to 45 MPH or higher, re-evaluate the Turn-Lane Warrants.
- Construct a new sidewalk/trail along the southern edge of Alpine Drive connecting the proposed access to the existing Alpine Drive/Puma Street intersection. The addition of a north/south crosswalk should also be considered at this intersection to help promote safe crossing to the existing northern sidewalk/trail.
- Ensure the proposed internal sidewalks connect to the external sidewalk/trail system.
- Work with Metro Transit or their affiliates to improve transit options within the project area as the closest existing transit is located roughly 1.5 miles away at Ramsey Station and Platform.

This study is based upon a concept plan from January 6, 2017. Assuming the general characteristics of the proposed development remain approximately the same as documented, minor changes in the final design are not expected to alter the results or recommendations of this study.

TABLE OF CONTENTS

LIST OF TABLES & CHARTS

1. Introduction

a. Proposed Development

The Pearson Farm Development is proposing to construct a new residential development located on the vacant land bounded by Puma Street, Alpine Drive, Trunk Highway (TH) 10, and Links at Northfork Golf Course in Ramsey, Minnesota. The development is currently proposed to include 98 townhomes and 246 single family homes for a total of 344 units.

For the purposes of this study, the development is expected to be fully built and occupied by the 2040 forecast year.

b. Purpose of Study

The purpose of this study is to:

i. Examine the existing operations of the surrounding study intersections.
ii. Forecast the amount of traffic expected to be generated by the proposed development.
iii. Determine the traffic impacts associated with the build out of the proposed development.

The traffic impacts are studied on the roads and intersections where significant impact is anticipated and improvements are recommended where mitigation is needed. For those not familiar with the general concepts and terms associated with traffic engineering, *The Language of Traffic Engineering* guide is included in the Appendix.

c. Study Objectives

The objectives of this study are:

i. Document how the study intersections and roadways currently operate.
ii. Forecast the amount of traffic expected to be generated by the proposed development.
iii. Determine how the study intersections and roadways will operate in the future AM and PM peak hours with the proposed development.
iv. Recommend appropriate mitigation and operation measures to improve operations if deficiencies are identified within the development or on the study intersections.

The study intersections closest to the proposed development were chosen for review as these will experience the greatest impact from traffic associated with the development. The study intersections include:

i. Alpine Drive/Puma Street
ii. Bunker Lake Boulevard/Puma Street
iii. Alpine Drive/Site Access
iv. Puma Street/Site Access

2. Existing Conditions

a. Corridor Characteristics

As mentioned, the proposed site is located to the west of Puma Street, south of Alpine Drive, and north of Trunk Highway (TH) 10 in Ramsey, Minnesota. Table 1 shows the characteristics of the key roadway corridors around this site and within the study area.

Table 1 – Study Corridor Characteristics

Name[1]	Designation	Speed Limit	Lanes	Transit[2]	Peds/ Bicycles
Bunker Lake Boulevard (MSAS 12)	Minor Collector	30 mph	2 undivided	None	Sidewalk on north side
Puma Street (MSAS 109)	Local Street	30 mph	2 undivided	None	Sidewalk on west side
Alpine Drive (MSAS 112)	Minor Collector	40 mph	2 undivided	None	Sidewalk on north side

[1] MSAS = Municipal State Aid Street

[2] Transit routes are available roughly 1.5 miles away at Ramsey Station & Platform

b. Traffic Volumes

48-hour intersection videos were collected at the existing study intersections under normal weekday conditions in February 2017. Using these videos, 24-hour turning movement counts were created by averaging the two days to smooth out any single day anomalies and create a typical day.

Based on these averages, the AM and PM peaks were determined to be 7:00 AM to 8:00AM and 4:45PM to 5:45 PM. The averaged turning movement counts from these two peak hours were used at the study intersections for analysis. The turning movement count data from the counts are contained in fifteen minute intervals in the Appendix.

Based on the Weekday turning movement volumes, the current daily traffic volumes on each study corridor are:

i. 38 vehicles per day on Bunker Lake Boulevard.
ii. 100 vehicles per day on Puma Street.
iii. 1,100 vehicles per day on Alpine Drive.

3. Forecasted Traffic

a. Site Traffic Forecasting

The *Institute of Transportation Engineers (ITE)* provides the *Trip Generation Manual, 9th Edition*, the standard document for determining expected traffic for proposed land uses. Using this ITE information, trip generation forecasts can be made for the development site.

The ITE manual compiles studies from across the country to provide a national average traffic for various land uses. For the proposed residential development, the designation of Single Family Homes and Townhomes were used. Based on information supplied in the site plan, the development is currently proposed to include 98 townhomes and 246 single family homes for a total of 344 units. With this information, the expected trip generation was completed based on the full build out of the development.

The resultant new trips generated by the proposed development are shown in Table 2. A detailed trip generation table showing the exact breakdowns is provided in the Appendix.

Table 2 – New Trip Generation

Land Use Code – Source	Description & Size	Daily		AM Peak Hour		PM Peak Hour	
		Total In	Total Out	Total In	Total Out	Total In	Total Out
210	Single Family Home	1,171	1,171	46	138	155	91
230	Townhomes	285	285	7	36	34	17
TOTAL		**1,456**	**1,456**	**53**	**174**	**189**	**108**

A trip distribution pattern was developed for the site generated traffic going to and from the proposed development. This pattern is based on the existing traffic volumes, access locations, location of major roadways leading to and from the site, and prior studies within the project area. The general trip distribution pattern for this study is:

i. 22 percent of the site generated traffic to/from the west on Alpine Drive.
ii. 78 percent of the site generated traffic to/from the east on Alpine Drive and Bunker Lake Boulevard.

Traffic generated by the development of the site was assigned to the area roadways per this distribution pattern.

b. Non-site Traffic Forecasting

To forecast future traffic volumes for the year 2040 in the study area outside of the proposed development's traffic, additional trip generations were considered based on proposed developments within the project area. These trip generations were based on a prior study completed by Bolton & Menk analyzing the Future

Business Park, which included a preliminary look at the Pearson Farm Development. Using this study the total acreage of the new proposed land uses were determined and their corresponding trip generations were completed. The proposed developments and trip generations can be found in the Appendix.

Applying the background growth rate and surrounding development trip generations to the existing traffic volumes established the 2040 No-Build forecasts.

c. Total Traffic

Traffic forecasts were developed for the 2040 Build scenarios by adding the traffic generated by the proposed development to the non-site forecast volumes. Peak hour forecasts are shown in the Appendix.

4. Analyses

a. *Intersection Vehicular Analysis*

The scenarios analyzed in this study for both the a.m. and p.m. peak hours were the existing, 2040 No-Build, and 2040 Build scenarios. Capacity analyses are performed for the study intersections to determine if they need improvements such as turn lanes or an upgrade in traffic control. It should be noted that for the No-Build and Build scenarios it is assumed Puma Street will be realigned on the north end to line up with Okapai Street as shown in the site plan in the Appendix.

The existing and forecasted turning movement volumes along with the existing intersection configurations and traffic control were used to develop the average delay per intersection in each study scenario. The delay calculations were done in accordance with the *Highway Capacity Manual 6th Edition* using the Vistro software package. The full calculations for each study scenario, including Level of Service (LOS) grades and queue lengths, are included in the Appendix. Also, included in the Appendix is a guide explaining the Level of Service grade concept.

Chart 1 (a.m. peak hour) and Chart 2 (p.m. peak hour) show the 95th percentile queue lengths on the busiest stop sign controlled approach at intersections with side street stop sign control. Average delays are not calculated for intersections with side street stop sign control because the vast majority of vehicles going through the intersection are on the main roadway and have zero delay, which leads to low overall average delays. At side street stop sign controlled approaches to busy roadways, the average delay for all the vehicles on the approach often exceeds 60 seconds. This can be the case for a few vehicles waiting at the stop sign where improvements would not be justified for the low traffic volume. In general, vehicle queuing of five cars or more is considered unreasonable and could warrant mitigation.

Chart 1 – A.M. Peak Hour Queues: Side-Street Stop-Controlled Intersections

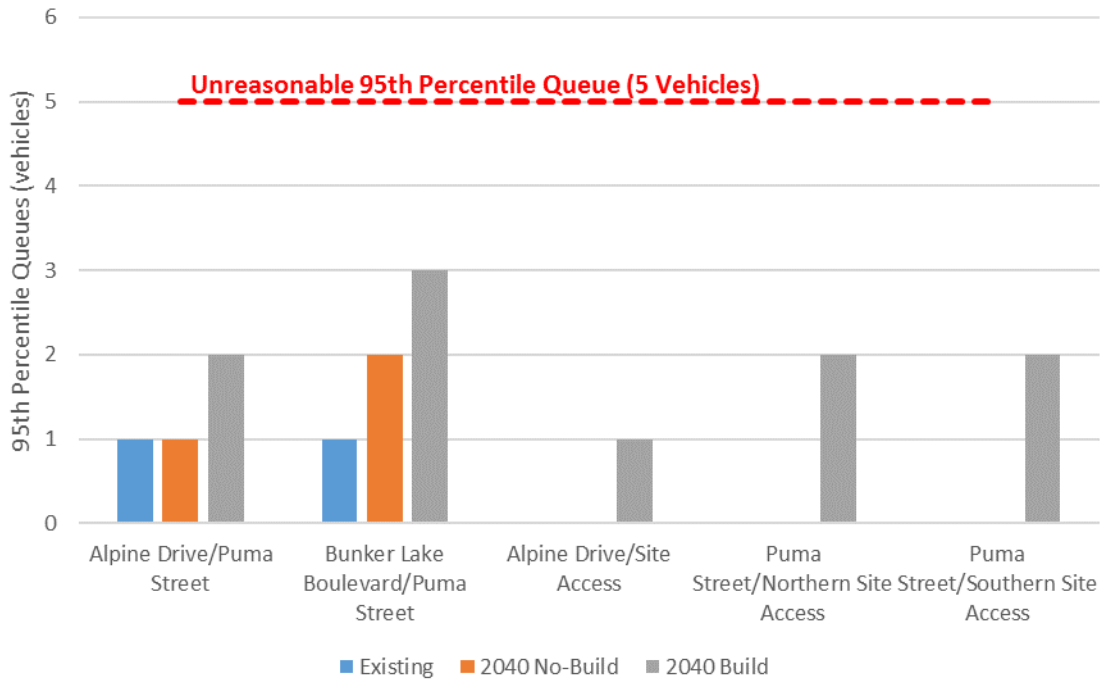
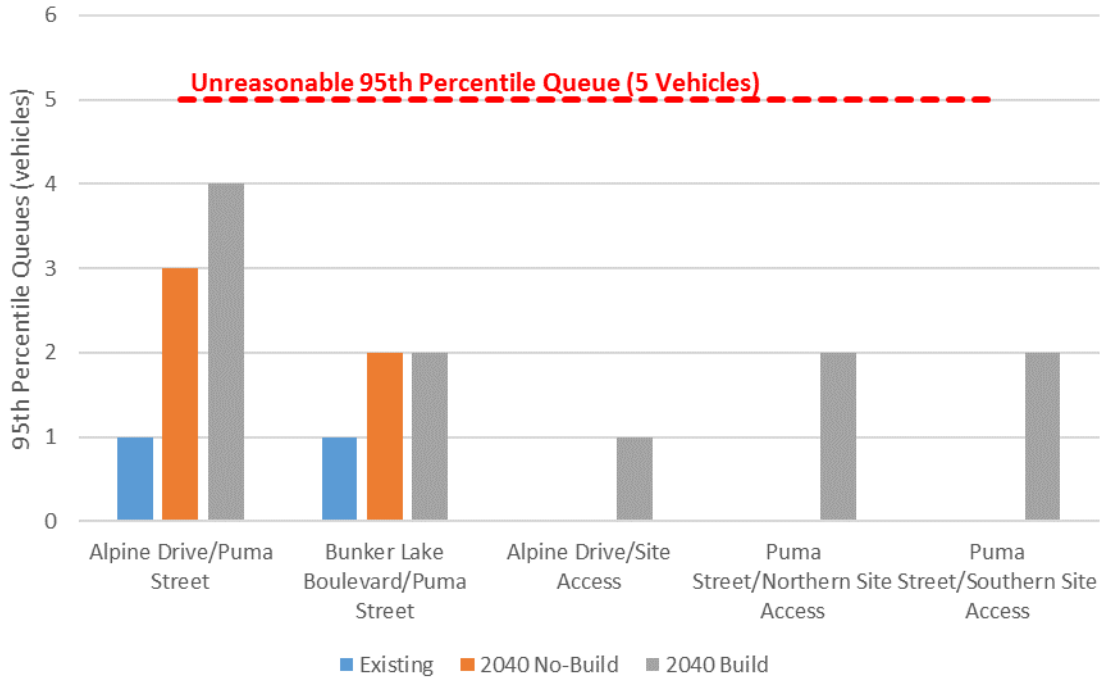


Chart 2 – P.M. Peak Hour Queues: Side-Street Stop-Controlled Intersections



b. Vehicular Mitigation Analysis

The above analyses indicate all study intersections are forecast to operate acceptably under all scenarios, including with the addition of traffic generated by the proposed addition of the Pearson Farm Development. As Charts 1 and Chart 2 show, the existing, no-build, and build queues stay consistent and well below the standard thresholds. All 95th percentile queues remain at or below four vehicles per approach at all study intersections. These results suggest that the addition of the Pearson Farm Development will not adversely impact the traffic operations at the study intersections. No mitigation is required at these intersections to help improve capacity.

With the existing low speed along Alpine Drive and Puma Street, the Turn-Lane Warrants published by MnDOT will not be fulfilled, as a 45 MPH minimum speed limit is not present on either roadway. The 30 MPH speed limit is consistent for a neighborhood street. A preliminary Turn-Lane Warrant analysis was completed based on volumes alone and ignoring the 45 MPH minimum speed requirement.

The daily total traffic entering and exiting the site accesses based on the collected turning movement counts, surrounding development trip generations, and the site trip generation were estimated as follows:

i. Southern site access at Bunker Lake Boulevard – 970 Vehicles per day
ii. Center site access onto Puma Street – 920 Vehicles per day
iii. Northern site access onto Puma Street – 680 Vehicles per day
iv. Site access onto Alpine Drive – 350 Vehicles per day

Main Line ADTs are roughly:

i. Puma Street – 4,400 Vehicles per day
ii. Alpine Drive – 2,700 Vehicles per day

Based on these estimated volumes and the criteria published in Warrant 9 (Vehicular Volume Warrant) from the *MnDOT Access Management Manual's Turn-Lane Warrants for Undivided Highways*, Table 3, below, was created. This table shows the estimated mainline and access volumes and the corresponding MnDOT Warrant thresholds.

Table 3 – New Trip Generation

Intersection	Left Turn Lane		Right Turn Lane	
	Street ADT	Access ADT	Street ADT	Access ADT
Southern site access at Bunker Lake Boulevard	4,400	970	4,400	970
Center site access onto Puma Street	4,400	920	4,400	920
Northern site access onto Puma Street	4,400	680	4,400	680
Site access onto Alpine Drive	2,700	350	2,700	350
Criteria	**4,000 – 4,999 -or- 1,500 – 2,999**	**> 1,000 -or- > 1,500**	**> 1,500**	**> 100**

As Table 3 shows, left-turn lanes are not warranted based on the estimated 2040 Build volumes while the right-turn lane warrant is satisfied. Again, these values are based upon a 45 MPH speed limit, which is not present on either Alpine Drive or Puma Street. If the speed along these streets are raised to 45 MPH or higher the Turn-Lane Warrants should be re-assessed.

It should be noted that this analysis did not consider modification to Armstrong Boulevard & Bunker Lake Boulevard as the prior Future Business Park Traffic Memorandum completed by Bolton & Menk already defined necessary upgrades for the intersection that would be required for proper traffic flow through the intersection.

c. Concept Site Plan & Multi-Modal Review

The concept site plan contained in the Appendix was reviewed to determine what changes are recommended, if any, to the proposed Pearson Farm Development. Following are key transportation elements of the concept site plan that should be implemented:

i. **Car Circulation**: The proposed site plan provides sufficient vehicle circulation with four accesses spaced evenly throughout the development. These accesses allow vehicles multiple options for entering and exiting the development which will help spread traffic more evenly throughout the site

ii. **Bicycle and pedestrian infrastructure:** An additional sidewalk/trail should be considered along the southern side of Alpine Drive from the proposed site access to the intersection of Alpine Drive and Puma Street. At this intersection, an additional crosswalk should be considered, connecting pedestrians north to the existing sidewalk/trail along the northern side of Alpine Drive. This new sidewalk/trail connection will provide a safe crossing and clear route for pedestrians and bicyclist to connect to the existing infrastructure. The existing trail along the western side of Puma Street will be lengthened to the southern edge of the development and an additional leg will be brought into the development at the Center Site Access location on Puma Street. This segment will stretch to the internal park to the north. Additional internal sidewalks will also be provided on one side of each street within the development and

should connect to the existing sidewalk/trail along Puma Street, as well as the proposed additional sidewalk/trail along the southern side of Alpine Drive.

iii. **Adjacent Transit:** The addition of transit near the Pearson Farm Development should be considered. Having access to other modes of travel is often seen as an amenity and a general benefit to a site, while helping to reduce the overall number of vehicles throughout the study area.

5. Conclusions and Recommendations

The traffic impacts and operation of the proposed Pearson Farm Development were thoroughly studied and the principal findings are:

- The proposed expansion is expected to generate approximately 2,912 new trips during an average weekday (1,456 entering and 1,456 exiting), approximately 227 new trips during the a.m. peak hour (53 entering and 174 exiting) and approximately 297 new trips during the p.m. peak hour (189 entering and 108 exiting).
- The existing study intersections operate with acceptable delays and vehicle queues today.
- The study intersections are expected to operate acceptably during the 2040 no-build and build scenarios.
- Left turn lanes are not warranted based on the expected 2040 build year volumes and mainline speeds.
- Right turn lane warrants are not fulfilled due to the mainline speeds remaining below 45 MPH, which is consistent for neighborhood streets, however, the right turn lane volume thresholds were reached by the estimated 2040 Build volumes.

The following recommendations are made based on the above findings:

- No additional intersection mitigation is required to help improve capacity.
- If the speed limits along Puma Street or Alpine Drive are increased to 45 MPH or higher, re-evaluate the Turn-Lane warrants.
- Construct a new sidewalk/trail along the southern edge of Alpine Drive connecting the proposed access to the existing Alpine Drive/Puma Street intersection. The addition of a north/south crosswalk should also be considered at this intersection to help promote safe crossing to the existing northern sidewalk/trail.
- Ensure the proposed internal sidewalks connect to the external sidewalk/trail system.
- Work with Metro Transit or their affiliates to improve transit options within the project area as the closest existing transit is located roughly 1.5 miles away at Ramsey Station and Platform.

6. Appendix

A. Site Plan

B. The Language of Traffic Engineering

C. Traffic Counts

D. Trip Generation Tables

E. Peak Hour Volumes

F. Level of Service (LOS)

G. Capacity Analysis Backup

- AM Existing
- PM Existing
- AM 2040 No-Build
- PM 2040 No-Build
- AM 2040 Build
- PM 2040 Build

TOWNHOME DETAIL

50' VILLA LOT DETAIL

50' LOT DETAIL

65' LOT DETAIL

SITE DATA

TOTAL AREA	±88.44 AC.	SETBACK DATA:	
TOTAL NUMBER OF LOTS	344	50' S.F. – SIDE	5 FT.
50' S.F.	111	65' S.F. – SIDE	7.5 FT.
65' S.F.	48	50' VILLAS – SIDE	5 FT.
50' VILLAS	87	FRONT (ALL)	25 FT.
TOWNHOMES	98	REAR	20 FT. MIN.

SOUTH HALF DATA

TOTAL NUMBER OF LOTS	172	SETBACK DATA:	
50' S.F.	55	50' S.F. – SIDE	5 FT.
65' S.F.	24	65' S.F. – SIDE	7.5 FT.
50' VILLAS	35	50' VILLAS – SIDE	5 FT.
TOWNHOMES	58	FRONT (ALL)	25 FT.
		REAR	20 FT. MIN.

N

0 50 100 200

(IN FEET)

Carlson McCain
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PEARSON FARM
Ramsey, Minnesota

CONCEPT PLAN

1 of 1

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The Language of Traffic Engineering

Traffic Engineering, and Traffic Engineers, often use technical terms or jargon that may be confusing or tough to understand even within the context of a sentence. Key terms and acronyms that can generally be found in all types of traffic studies are defined in this document.

Types of Studies

Access Management – The practice of government agencies limiting the amount of intersections (both public roadway crossings and private driveways) along a roadway corridor based on the function of the roadway to improve safety and mobility while streamlining access.

Corridor Study – A transportation review and analysis of the existing and future traffic operations of a roadway segment. Varies in length from a couple blocks to a few miles and typically covers all modes of travel.

Intersection Control Evaluation (ICE) Report – A document that examines and determines the most appropriate type of control (stop sign, signal, roundabout, or other) at one or more intersections.

Safety Study – An examination of crash records to identify potential trends, issues, and problem intersections/ corridors. Usually includes potential mitigation options expected to decrease crash rates in the future.

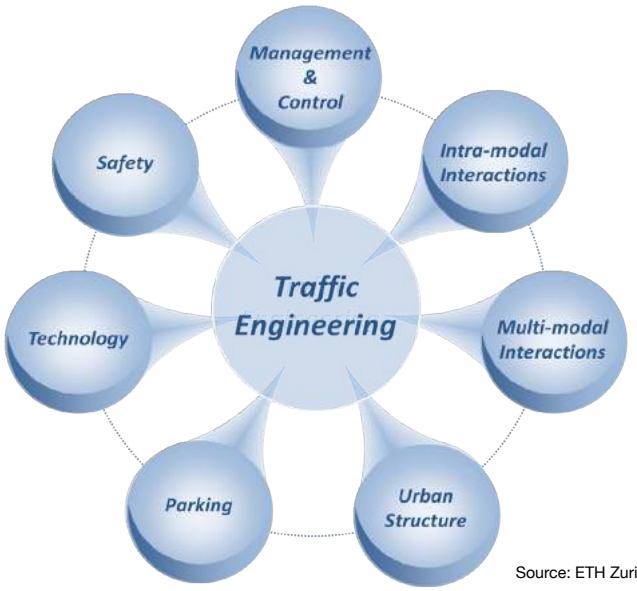
Speed Study – A review of existing travel speeds and the corridor characteristics to determine if speeding is an issue, the appropriate speed to post as the limit, and/or areas to provide reduced speed warnings.

Traffic Impact Study (TIS) – A document that addresses the expected traffic impacts of a development and, if necessary, mitigation options that will reduce or eliminate negative impacts. Also referred to as a Traffic Impact Analysis.

Transportation Plan – A document developed by a government agency to take inventory of their transportation network, identify concerns or issues and lay out the path for improvement of the system.

Travel Demand Management Plan (TDMP) – A plan that documents the existing infrastructure around a site, including transit and non-motorized vehicle options, and develops measures to be implemented to encourage those alternative modes of travel.

Warrant Evaluation – Review of traffic volumes and other characteristics at an intersection against thresholds to determine if a traffic signal or other traffic control option is needed/warranted.



Source: ETH Zurich

Traffic Engineering is a branch of civil engineering that focuses on the safe and efficient movement of people and vehicles. It is part science and part art, requiring not only technical skills for analysis but an understanding of motivations in choosing travel routes.

Key Organizations

AASHTO – American Association of State Highway and Transportation Officials. A nonprofit, nonpartisan association representing transportation departments with a primary goal of fostering the development, operation, and maintenance of an integrated national transportation system.

DOT – Department of Transportation. Government organizations within federal and state agencies dedicated to serving the transportation needs of the community and typically responsible for study, design, operation, and maintenance of all facets of transportation.

FHWA – Federal Highway Administration. An agency within the US Department of Transportation that supports State and local governments in the design, construction, and maintenance of the highway system.

ITE – Institute of Transportation Engineers. An international educational and scientific association of transportation professionals who are responsible for meeting mobility and safety needs.

Results

85th Percentile Speed – Speed at which 85 percent of drivers are traveling at or below. Speed limits are typically set at the 85th percentile speed.

95th Percentile Queue – The distance, generally measured in feet or number of vehicles, which will be exceeded in a lane, typically at an intersection, only five percent of the time. Usually used to help determine intersection turn lane lengths.

Control Delay – The total amount of time a motorist takes to get through a road segment or intersection minus the time it would take without stopping due to traffic controls (like stop signs or traffic signals). Control delay includes decelerating and accelerating back to full driving speed.

Functional Classification – the grouping of streets and highways into categories according to their characteristics and emphasis on mobility or access. Generally, categories include arterials (emphasizing mobility and fast travel), local roads (emphasizing access to adjoining properties), and collector roads (emphasizing a balance between the two and usually connecting arterials to local roads).

Intersection Delay – The average amount of time, usually expressed in seconds, experienced by any vehicle traveling through an intersection.

Level of Service (LOS) – Qualitative measure of traffic operations related to the amount of average delay experienced. Expressed in letter grades with LOS A representing the best operations with little to no delay and LOS F representing the worst operations with excessive delays and congestion.

Measures of Effectiveness – Performance measures that define how well traffic is moving along a corridor or thru an intersection. The common MOEs are travel time, corridor speed, delay, and queues.

Mitigation – Measures intended to reduce the impact of a development or improve an identified traffic issue by either improving capacity (like adding lanes) or reducing demand (like encouraging carpooling).

Queue – Length of line of cars waiting at an intersection or at a bottleneck in a corridor, typically measured for each individual lane of traffic in feet or number of vehicles.

Volume to Capacity (v/c) ratio – the number of vehicles through an intersection or roadway segment in a specific amount of time divided by the expected capacity of the road. Less than 1.0 indicates available capacity and above 1.0 indicates more vehicles than can be accommodated. Typically, a v/c ratio above 0.85 suggests operational issues.

Trip Generation – The amount of vehicle traffic generated by a land use. One trip is equal to one vehicle traveling from an origin to a destination (traveling to and from work equals two trips).

Warrants – Criteria based on volumes and other Measures of Effectiveness for determining when all way stop signs, roundabouts, traffic signals, or other type of control should be installed.

Important Manuals/Guides

HCM – Highway Capacity Manual (released by the Transportation Research Board, or TRB). The guide for engineers and planners to assess traffic and environmental effects of highway projects. This manual presents the foundation of traffic analysis procedures in the US.

MUTCD – Manual of Uniform Traffic Control Devices. A document that sets minimum standards and provides guidance to ensure uniformity of traffic control devices (such as messages, location, size, shapes, and colors) across the nation. All roads are subject to its jurisdiction.

HSM – Highway Safety Manual (released by AASHTO). A guide that presents a variety of methods for quantitatively estimating crash frequency or severity.

Resources

MUTCD, 2009 Edition, published by FHWA

Highway Capacity Manual, HCM2010

Highway Safety Manual, HSM

About This Brief

Spack Consulting prepared this brief as part of our company's vision to significantly improve the practice of traffic engineering and transportation planning. Transportation professionals from around the world have assisted us in developing this document. We are providing this brief under the Creative Commons Attribution License. Feel free to use-modify-share this guide, but please give us some credit in your document. To request our whole series of Design Briefs and to be included on our distribution list for new materials, please email mspack@spackconsulting.com. And please reach out if you have any comments or questions related to this Design Brief.

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File Name : 1 - Alpine Dr & Puma St, 2-15-17
Site Code : 1
Start Date : 2/15/2017
Page No : 1

Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Southbound						Alpine Drive Westbound						Puma Street Northbound						Alpine Drive 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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Oxford Street & Fairmount Avenue
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Groups Printed- Cars + - Trucks

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08:45 AM	0	0	0	0	0	0	0	0	9	0	0	9	0	1	0	1	0	2	0	0	11	0	0	11	22
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11:15 AM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	5	1	0	6	11
11:30 AM	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	9	0	0	9	15
11:45 AM	0	0	0	0	0	0	0	0	14	0	0	14	0	0	0	0	0	0	0	0	8	0	0	8	22
Total	0	0	0	0	0	0	0	0	29	0	0	29	0	0	0	0	0	0	0	0	26	2	0	28	57
12:00 PM	0	0	0	0	0	0	0	0	5	0	0	5	0	1	0	0	0	1	0	0	4	0	0	4	10
12:15 PM	0	0	0	0	0	0	0	0	5	0	0	5	0	1	0	0	0	1	0	0	8	0	0	8	14
12:30 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	2	0	0	0	2	0	0	9	1	0	10	15
12:45 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	1	0	0	0	1	0	0	8	0	0	8	16
Total	0	0	0	0	0	0	0	0	20	0	0	20	0	5	0	0	0	5	0	0	29	1	0	30	55
01:00 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	1	0	0	0	1	0	0	8	0	0	8	17
01:15 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	1	0	0	0	1	0	0	7	0	0	7	16
01:30 PM	0	0	0	0	0	0	0	0	6	0	0	6	0	2	0	0	0	2	0	0	5	1	0	6	14
01:45 PM	0	0	0	0	0	0	0	1	6	0	0	7	0	1	0	1	0	2	0	0	6	0	0	6	15
Total	0	0	0	0	0	0	0	1	28	0	0	29	0	5	0	1	0	6	0	0	26	1	0	27	62

Traffic Data Inc
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File Name : 1 - Alpine Dr & Puma St, 2-15-17
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Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Southbound						Alpine Drive Westbound						Puma Street Northbound						Alpine Drive 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
02:00 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
02:15 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	2	0	1	0	3	0	0	3	0	0	3	14
02:30 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	1	0	1	0	0	7	0	0	7	15
02:45 PM	0	0	0	0	0	0	0	0	14	0	0	14	0	0	0	1	0	1	0	0	11	1	0	12	27
Total	0	0	0	0	0	0	0	0	33	0	0	33	0	2	0	3	0	5	0	0	28	1	0	29	67
03:00 PM	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	0	0	7	1	0	8	19
03:15 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	0	9	1	0	10	18
03:30 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	8	1	0	9	16
03:45 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	1	0	0	0	1	0	0	16	0	0	16	25
Total	0	0	0	0	0	0	0	0	34	0	0	34	0	1	0	0	0	1	0	0	40	3	0	43	78
04:00 PM	0	0	0	0	0	0	0	1	3	0	0	4	0	0	0	0	0	0	0	0	13	0	0	13	17
04:15 PM	0	0	0	0	0	0	0	0	16	0	0	16	0	1	0	0	0	1	0	0	11	0	0	11	28
04:30 PM	0	0	0	0	0	0	0	0	16	0	0	16	0	1	0	0	0	1	0	0	10	1	0	11	28
04:45 PM	0	0	0	0	0	0	0	1	11	0	0	12	0	0	0	0	0	0	0	0	15	1	0	16	28
Total	0	0	0	0	0	0	0	2	46	0	0	48	0	2	0	0	0	2	0	0	49	2	0	51	101
05:00 PM	0	0	0	0	0	0	0	0	10	0	0	10	0	2	0	1	0	3	0	0	17	0	1	18	31
05:15 PM	0	0	0	0	0	0	0	1	13	0	0	14	0	0	0	0	0	0	0	0	18	0	0	18	32
05:30 PM	0	0	0	0	0	0	0	0	15	0	0	15	0	2	0	0	0	2	0	0	14	0	0	14	31
05:45 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	0	13	0	0	13	21
Total	0	0	0	0	0	0	0	1	46	0	0	47	0	4	0	1	0	5	0	0	62	0	1	63	115
06:00 PM	0	0	0	0	0	0	0	1	9	0	0	10	0	0	0	0	0	0	0	0	9	1	0	10	20
06:15 PM	0	0	0	0	0	0	0	0	13	0	0	13	0	2	0	0	0	2	0	0	13	1	0	14	29
06:30 PM	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	0	0	7	0	0	7	19
06:45 PM	0	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	0	0	7	0	0	7	17
Total	0	0	0	0	0	0	0	1	44	0	0	45	0	2	0	0	0	2	0	0	36	2	0	38	85
07:00 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
07:15 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
07:30 PM	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
07:45 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	0	0	0	0	0	0	0	20	0	0	20	0	0	0	0	0	0	0	0	20	0	0	20	40
08:00 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
08:15 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	1	0	0	1	8
08:30 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
08:45 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
Total	0	0	0	0	0	0	0	0	20	0	0	20	0	0	0	0	0	0	0	0	19	0	0	19	39

Traffic Data Inc
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File Name : 1 - Alpine Dr & Puma St, 2-15-17
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Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Southbound						Alpine Drive Westbound						Puma Street Northbound						Alpine Drive 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
09:00 PM	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
09:15 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	3	1	0	4	7
09:30 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
09:45 PM	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	9	0	0	9	0	0	0	0	0	0	0	0	10	1	0	11	20
10:00 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
10:15 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
10:30 PM	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
10:45 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
Total	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
11:00 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
11:15 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
11:30 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
11:45 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
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
Grand Total	0	0	0	0	0	0	0	5	510	0	0	515	0	27	0	7	0	34	0	0	529	27	1	557	1106
Apprch %	0	0	0	0	0		0	1	99	0	0		0	79.4	0	20.6	0		0	0	95	4.8	0.2		
Total %	0	0	0	0	0	0	0	0.5	46.1	0	0	46.6	0	2.4	0	0.6	0	3.1	0	0	47.8	2.4	0.1	50.4	
Cars +	0	0	0	0	0	0	0	5	500	0	0	505	0	21	0	6	0	27	0	0	519	27	1	547	1079
% Cars +	0	0	0	0	0	0	0	100	98	0	0	98.1	0	77.8	0	85.7	0	79.4	0	0	98.1	100	100	98.2	97.6
Trucks	0	0	0	0	0	0	0	0	10	0	0	10	0	6	0	1	0	7	0	0	10	0	0	10	27
% Trucks	0	0	0	0	0	0	0	0	2	0	0	1.9	0	22.2	0	14.3	0	20.6	0	0	1.9	0	0	1.8	2.4

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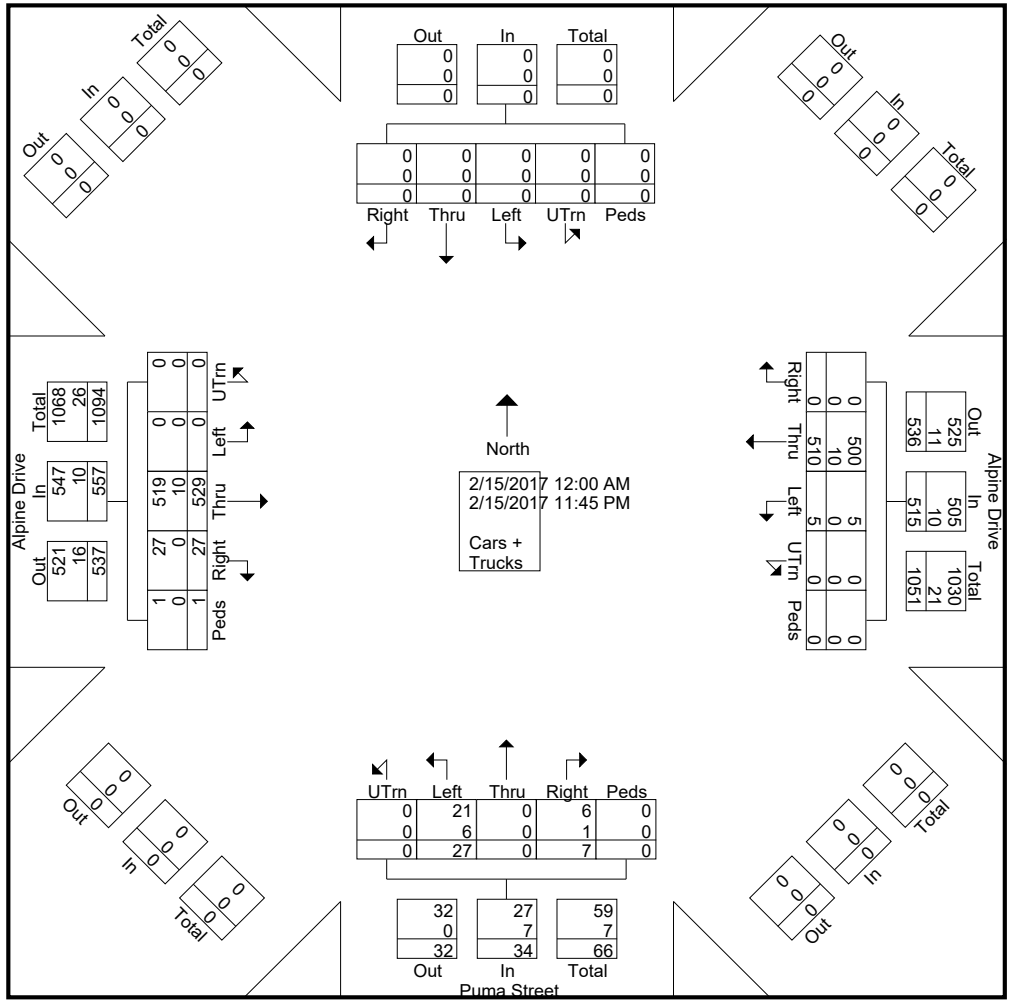
Oxford Street & Fairmount Avenue
Saint Paul, MN



Traffic Data Inc
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File Name : 1 - Alpine Dr & Puma St, 2-15-17
Site Code : 1
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Oxford Street & Fairmount Avenue
Saint Paul, MN

	Southbound						Alpine Drive Westbound						Puma Street Northbound						Alpine Drive 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**	**10**	**0**	**0**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	23	2	0	25	35
07:30 AM	0	0	0	0	0	0	0	0	**13**	0	0	**13**	0	0	0	0	0	0	0	0	10	2	0	12	25
07:45 AM	0	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	0	0	12	2	0	14	24
08:00 AM	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	**1**	0	**1**	0	0	11	0	0	11	18
Total Volume	0	0	0	0	0	0	0	0	39	0	0	39	0	0	0	1	0	1	0	0	56	6	0	62	102
% App. Total	0	0	0	0	0		0	0	100	0	0		0	0	0	100	0		0	0	90.3	9.7	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.750	.000	.000	.750	.000	.000	.000	.250	.000	.250	.000	.000	.609	.750	.000	.620	.729
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	0	0	0	0	0	0	3	0	0	3	0	**2**	0	0	0	**2**	0	0	**9**	**1**	0	**10**	15
12:45 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	1	0	0	0	1	0	0	8	0	0	8	16
01:00 PM	0	0	0	0	0	0	0	0	**8**	0	0	**8**	0	1	0	0	0	1	0	0	8	0	0	8	**17**
01:15 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	1	0	0	0	1	0	0	7	0	0	7	16
Total Volume	0	0	0	0	0	0	0	0	26	0	0	26	0	5	0	0	0	5	0	0	32	1	0	33	64
% App. Total	0	0	0	0	0		0	0	100	0	0		0	100	0	0	0		0	0	97	3	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.813	.000	.000	.813	.000	.625	.000	.000	.000	.625	.000	.000	.889	.250	.000	.825	.941
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	0	0	0	0	0	**1**	11	0	0	12	0	0	0	0	0	0	0	0	15	**1**	0	16	28
05:00 PM	0	0	0	0	0	0	0	0	10	0	0	10	0	**2**	0	**1**	0	**3**	0	0	17	0	**1**	**18**	31
05:15 PM	0	0	0	0	0	0	0	1	13	0	0	14	0	0	0	0	0	0	0	0	**18**	0	0	18	**32**
05:30 PM	0	0	0	0	0	0	0	0	**15**	0	0	**15**	0	2	0	0	0	2	0	0	14	0	0	14	31
Total Volume	0	0	0	0	0	0	0	2	49	0	0	51	0	4	0	1	0	5	0	0	64	1	1	66	122
% App. Total	0	0	0	0	0		0	3.9	96.1	0	0		0	80	0	20	0		0	0	97	1.5	1.5		
PHF	.000	.000	.000	.000	.000	.000	.000	.500	.817	.000	.000	.850	.000	.500	.000	.250	.000	.417	.000	.000	.889	.250	.250	.917	.953

Traffic Data Inc
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Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Southbound						Alpine Drive Westbound						Puma Street Northbound						Alpine Drive 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	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	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	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	2
01:00 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
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	1	0	0	1	1
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	2	0	0	2	3
02:00 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
02:15 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
02:30 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
02:45 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	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	3	0	0	3	7
03:00 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
03:15 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
03:30 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
03:45 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	5	0	0	5	0	0	0	0	0	0	0	0	2	0	0	2	7
04:00 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
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	0	0	0	0	1
04:45 AM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
Total	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	6
05:00 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
05:15 AM	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
05:30 AM	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	8
05:45 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	12	0	0	12	0	0	0	0	0	0	0	0	6	0	0	6	18
06:00 AM	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
06:15 AM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	1	1	0	2	9
06:30 AM	0	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	0	0	8	0	0	8	18
06:45 AM	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	0	0	6	1	0	7	16
Total	0	0	0	0	0	0	0	0	32	0	0	32	0	0	0	0	0	0	0	0	20	2	0	22	54

Traffic Data Inc
PO Box 16269
St. Louis Park, MN 55416

File Name : 1 - Alpine Dr & Puma St, 2-16-17
Site Code : 1
Start Date : 2/16/2017
Page No : 2

Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Southbound						Alpine Drive Westbound						Puma Street Northbound						Alpine Drive 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
07:00 AM	0	0	0	0	0	0	0	0	12	0	0	12	0	1	0	0	0	1	0	0	11	0	0	11	24
07:15 AM	0	0	0	0	0	0	0	0	11	0	0	11	0	1	0	0	0	1	0	0	14	0	0	14	26
07:30 AM	0	0	0	0	0	0	0	0	13	0	0	13	0	0	0	0	0	0	0	0	17	1	0	18	31
07:45 AM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	13	4	0	17	24
Total	0	0	0	0	0	0	0	0	43	0	0	43	0	2	0	0	0	2	0	0	55	5	0	60	105
08:00 AM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	12	0	0	12	15
08:15 AM	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	7	1	0	8	14
08:30 AM	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	11	2	0	13	19
08:45 AM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	8	0	0	8	15
Total	0	0	0	0	0	0	0	0	22	0	0	22	0	0	0	0	0	0	0	0	38	3	0	41	63
09:00 AM	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	0	0	8	0	0	8	17
09:15 AM	0	0	0	0	0	0	0	1	6	0	0	7	0	0	0	0	0	0	0	0	5	0	0	5	12
09:30 AM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	3	1	0	4	8
09:45 AM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	1	0	1	0	0	5	0	0	5	9
Total	0	0	0	0	0	0	0	1	22	0	0	23	0	0	0	1	0	1	0	0	21	1	0	22	46
10:00 AM	0	0	0	0	0	0	0	0	5	0	0	5	0	1	0	0	0	1	0	0	8	1	0	9	15
10:15 AM	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
10:30 AM	0	0	0	0	0	0	0	1	4	0	0	5	0	1	0	0	0	1	0	0	2	0	0	2	8
10:45 AM	0	0	0	0	0	0	1	0	3	0	0	4	0	1	0	0	0	1	0	0	9	0	0	9	14
Total	0	0	0	0	0	0	1	1	17	0	0	19	0	3	0	0	0	3	0	0	27	1	0	28	50
11:00 AM	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	6	1	0	7	13
11:15 AM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	1	1	0	0	5	0	0	5	11
11:30 AM	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
11:45 AM	0	0	0	0	0	0	0	0	6	0	0	6	0	1	0	0	0	1	0	0	6	0	0	6	13
Total	0	0	0	0	0	0	0	0	21	0	0	21	0	1	0	0	1	2	0	0	18	1	0	19	42
12:00 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	8	1	0	9	11
12:15 PM	0	0	0	0	0	0	0	0	5	0	1	6	0	1	0	0	1	2	0	0	2	0	0	2	10
12:30 PM	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	7	0	0	7	13
12:45 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	0	0	0	0	16	0	1	17	0	1	0	0	1	2	0	0	21	1	0	22	41
01:00 PM	0	0	0	0	0	0	0	0	6	0	0	6	0	2	0	0	0	2	0	0	10	0	0	10	18
01:15 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	1	0	0	0	1	0	0	8	1	0	9	13
01:30 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	1	0	0	0	1	0	0	6	0	0	6	9
01:45 PM	0	0	0	0	0	0	0	1	5	0	0	6	0	1	0	1	0	2	0	0	9	0	0	9	17
Total	0	0	0	0	0	0	0	1	16	0	0	17	0	5	0	1	0	6	0	0	33	1	0	34	57

Traffic Data Inc
PO Box 16269
St. Louis Park, MN 55416

File Name : 1 - Alpine Dr & Puma St, 2-16-17
Site Code : 1
Start Date : 2/16/2017
Page No : 3

Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Southbound						Alpine Drive Westbound						Puma Street Northbound						Alpine Drive 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
02:00 PM	0	0	0	0	0	0	0	0	10	0	0	10	0	2	0	0	0	2	0	0	6	0	0	6	18
02:15 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	1	0	0	7	1	0	8	10
02:30 PM	0	0	0	0	0	0	0	1	8	0	0	9	0	1	0	1	0	2	0	0	6	0	0	6	17
02:45 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	1	0	1	0	2	0	0	9	2	0	11	20
Total	0	0	0	0	0	0	0	1	26	0	0	27	0	5	0	2	0	7	0	0	28	3	0	31	65
03:00 PM	0	0	0	0	0	0	0	0	11	0	0	11	0	1	0	0	0	1	0	0	6	2	0	8	20
03:15 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	2	0	0	0	2	0	0	10	1	0	11	20
03:30 PM	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	0	0	15	0	0	15	26
03:45 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	1	0	0	0	1	0	0	10	0	0	10	19
Total	0	0	0	0	0	0	0	0	37	0	0	37	0	4	0	0	0	4	0	0	41	3	0	44	85
04:00 PM	0	0	0	0	0	0	0	1	18	0	0	19	0	2	0	0	0	2	0	0	14	1	0	15	36
04:15 PM	0	0	0	0	0	0	0	0	13	0	0	13	0	3	0	0	0	3	0	0	13	0	0	13	29
04:30 PM	0	0	0	0	0	0	0	0	21	0	0	21	0	1	0	0	0	1	0	0	8	0	0	8	30
04:45 PM	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	0	0	14	2	0	16	28
Total	0	0	0	0	0	0	0	1	64	0	0	65	0	6	0	0	0	6	0	0	49	3	0	52	123
05:00 PM	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	2	2	0	0	15	1	0	16	27
05:15 PM	0	0	0	0	0	0	0	0	12	0	0	12	0	1	0	0	0	1	0	0	13	1	0	14	27
05:30 PM	0	0	0	0	0	0	0	0	18	0	0	18	0	2	0	0	0	2	0	0	14	1	0	15	35
05:45 PM	0	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	0	0	20	1	0	21	31
Total	0	0	0	0	0	0	0	0	49	0	0	49	0	3	0	0	2	5	0	0	62	4	0	66	120
06:00 PM	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	0	0	16	1	0	17	26
06:15 PM	0	0	0	0	0	0	1	0	7	0	0	8	0	0	0	0	0	0	0	0	11	0	0	11	19
06:30 PM	0	0	0	0	0	0	0	0	6	0	0	6	0	3	0	0	0	3	0	0	6	1	0	7	16
06:45 PM	0	0	0	0	0	0	0	0	5	0	0	5	0	1	0	0	0	1	0	0	6	0	0	6	12
Total	0	0	0	0	0	0	1	0	27	0	0	28	0	4	0	0	0	4	0	0	39	2	0	41	73
07:00 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
07:15 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	0	8	0	0	8	16
07:30 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
07:45 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	17	0	0	17	0	0	0	0	0	0	0	0	24	0	0	24	41
08:00 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
08:15 PM	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	6	0	0	6	12
08:30 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
08:45 PM	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	6
Total	0	0	0	0	0	0	0	0	19	0	0	19	0	0	0	0	0	0	0	0	12	0	0	12	31

Traffic Data Inc
PO Box 16269
St. Louis Park, MN 55416

File Name : 1 - Alpine Dr & Puma St, 2-16-17
Site Code : 1
Start Date : 2/16/2017
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Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Southbound						Alpine Drive Westbound						Puma Street Northbound						Alpine Drive 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
09:00 PM	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
09:15 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	1	0	0	0	1	0	0	5	0	0	5	8
09:30 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
09:45 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
Total	0	0	0	0	0	0	0	0	14	0	0	14	0	1	0	0	0	1	0	0	19	0	0	19	34
10:00 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
10:15 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
10:30 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
10:45 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
Total	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	11	0	0	11	16
11:00 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
11:15 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
11:30 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
11:45 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	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	7	0	0	7	9
Grand Total	0	0	0	0	0	0	2	5	478	0	1	486	0	35	0	4	4	43	0	0	539	30	0	569	1098
Apprch %	0	0	0	0	0		0.4	1	98.4	0	0.2		0	81.4	0	9.3	9.3		0	0	94.7	5.3	0		
Total %	0	0	0	0	0	0	0.2	0.5	43.5	0	0.1	44.3	0	3.2	0	0.4	0.4	3.9	0	0	49.1	2.7	0	51.8	
Cars +	0	0	0	0	0	0	1	5	468	0	1	475	0	33	0	4	1	38	0	0	526	30	0	556	1069
% Cars +	0	0	0	0	0	0	50	100	97.9	0	100	97.7	0	94.3	0	100	25	88.4	0	0	97.6	100	0	97.7	97.4
Trucks	0	0	0	0	0	0	1	0	10	0	0	11	0	2	0	0	3	5	0	0	13	0	0	13	29
% Trucks	0	0	0	0	0	0	50	0	2.1	0	0	2.3	0	5.7	0	0	75	11.6	0	0	2.4	0	0	2.3	2.6

Traffic Data Inc
PO Box 16269
St. Louis Park, MN 55416

File Name : 1 - Alpine Dr & Puma St, 2-16-17
Site Code : 1
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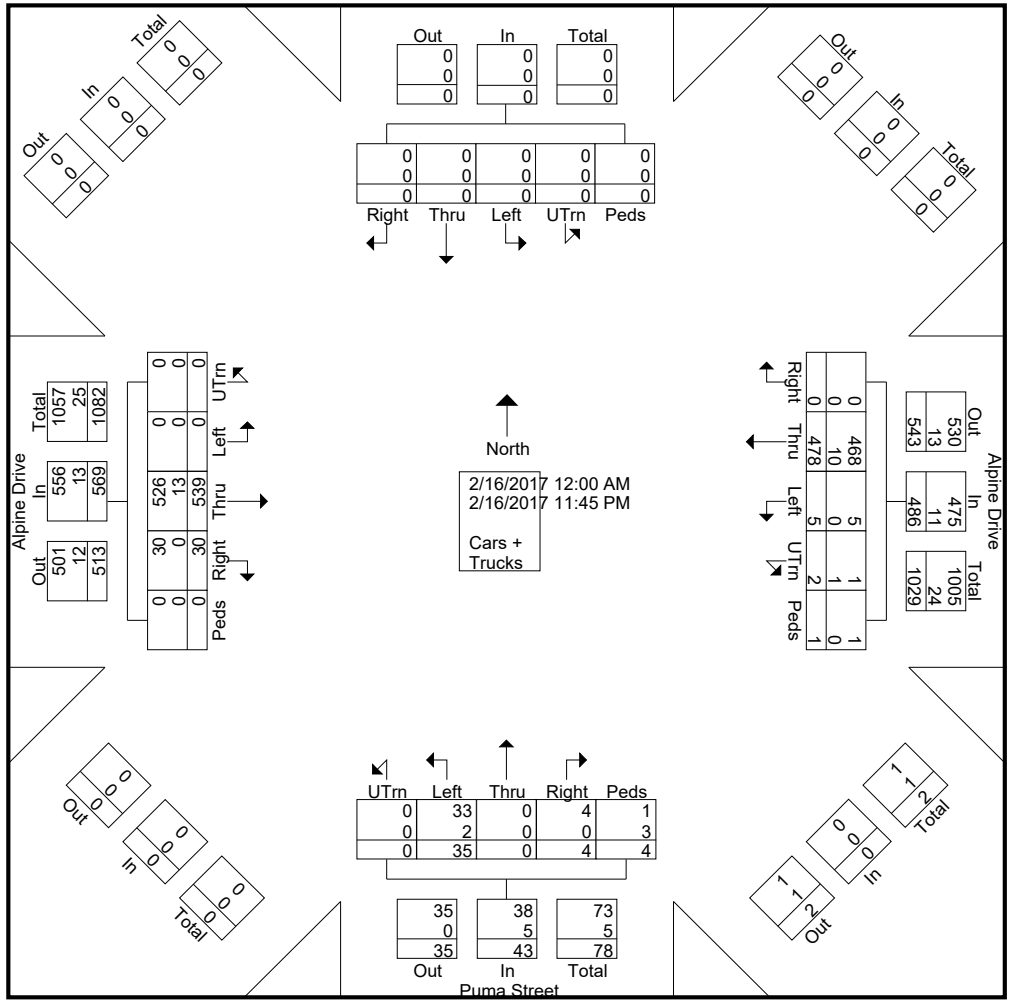
Oxford Street & Fairmount Avenue
Saint Paul, MN



Traffic Data Inc
PO Box 16269
St. Louis Park, MN 55416

File Name : 1 - Alpine Dr & Puma St, 2-16-17
Site Code : 1
Start Date : 2/16/2017
Page No : 6

Oxford Street & Fairmount Avenue
Saint Paul, MN

	Southbound						Alpine Drive Westbound						Puma Street Northbound						Alpine Drive 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**	**0**	**0**	**0**	**0**	**0**	**12**	**0**	**0**	**12**	**0**	1	0	0	0	1	0	0	11	0	0	11	24
07:15 AM	0	0	0	0	0	0	0	0	11	0	0	11	0	1	0	0	0	1	0	0	14	0	0	14	26
07:30 AM	0	0	0	0	0	0	0	0	13	0	0	13	0	0	0	0	0	0	0	0	**17**	1	0	**18**	**31**
07:45 AM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	13	**4**	0	17	24
Total Volume	0	0	0	0	0	0	0	0	43	0	0	43	0	2	0	0	0	2	0	0	55	5	0	60	105
% App. Total	0	0	0	0	0		0	0	100	0	0		0	100	0	0	0		0	0	91.7	8.3	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.827	.000	.000	.827	.000	.500	.000	.000	.000	.500	.000	.000	.809	.313	.000	.833	.847
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 01:00 PM																									
01:00 PM	0	0	0	0	0	0	0	0	**6**	0	0	**6**	0	**2**	0	0	0	**2**	0	0	**10**	0	0	**10**	**18**
01:15 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	1	0	0	0	1	0	0	8	**1**	0	9	13
01:30 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	1	0	0	0	1	0	0	6	0	0	6	9
01:45 PM	0	0	0	0	0	0	0	**1**	5	0	0	6	0	1	0	**1**	0	2	0	0	9	0	0	9	17
Total Volume	0	0	0	0	0	0	0	1	16	0	0	17	0	5	0	1	0	6	0	0	33	1	0	34	57
% App. Total	0	0	0	0	0		0	5.9	94.1	0	0		0	83.3	0	16.7	0		0	0	97.1	2.9	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.250	.667	.000	.000	.708	.000	.625	.000	.250	.000	.750	.000	.000	.825	.250	.000	.850	.792
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	0	0	0	0	0	0	**1**	18	0	0	19	0	2	0	0	0	2	0	0	**14**	1	0	15	**36**
04:15 PM	0	0	0	0	0	0	0	0	13	0	0	13	0	**3**	0	0	0	**3**	0	0	13	0	0	13	29
04:30 PM	0	0	0	0	0	0	0	0	**21**	0	0	**21**	0	1	0	0	0	1	0	0	8	0	0	8	30
04:45 PM	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	0	0	14	**2**	0	**16**	28
Total Volume	0	0	0	0	0	0	0	1	64	0	0	65	0	6	0	0	0	6	0	0	49	3	0	52	123
% App. Total	0	0	0	0	0		0	1.5	98.5	0	0		0	100	0	0	0		0	0	94.2	5.8	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.250	.762	.000	.000	.774	.000	.500	.000	.000	.000	.500	.000	.000	.875	.375	.000	.813	.854

Traffic Data Inc
PO Box 16269
St. Louis Park, MN 55416

File Name : 2 - Bunker Lake Blvd & Puma St, 2-15-17
Site Code : 1
Start Date : 2/15/2017
Page No : 1

Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Puma Street Southbound						Bunker Lake Boulevard Westbound						Puma Street 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	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	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	0	0	0	0	0
05:30 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
05:45 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
06:00 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
06:15 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
06:30 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
06:45 AM	0	2	0	0	0	2	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3
Total	0	3	0	0	0	3	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	4

Traffic Data Inc
PO Box 16269
St. Louis Park, MN 55416

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Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Puma Street Southbound						Bunker Lake Boulevard Westbound						Puma Street 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
07:00 AM	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
07:15 AM	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
07:30 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
07:45 AM	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Total	0	7	0	0	0	7	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	8
08:00 AM	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
08:15 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
08:30 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
08:45 AM	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	3	0	0	0	3	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	6
09:00 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
09:15 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
09:30 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
09:45 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
10:00 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
10:15 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
10:30 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
10:45 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
11:00 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
11:15 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
11:30 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
11:45 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
12:00 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
12:15 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
12:30 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
12:45 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
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 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
01:15 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
01:30 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
01:45 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
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

Traffic Data Inc
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Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Puma Street Southbound						Bunker Lake Boulevard Westbound						Puma Street 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
02:00 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
02:15 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
02:30 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
02:45 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
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 PM	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
03:15 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
03:30 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
03:45 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	2	0	0	0	2	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	4
04:00 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
04:15 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
04:30 PM	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
04:45 PM	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	4	0	0	0	4	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	6
05:00 PM	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
05:15 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:30 PM	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
05:45 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
Total	0	1	0	0	0	1	0	0	0	6	0	6	0	0	0	0	0	0	0	0	0	0	0	0	7
06:00 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
06:15 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
06:30 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
06:45 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
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
07:00 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
07:15 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
07:30 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
07:45 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
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
08:00 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
08:15 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
08:30 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
08:45 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
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

Traffic Data Inc
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Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Puma Street Southbound						Bunker Lake Boulevard Westbound						Puma Street 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
09:00 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
09:15 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
09:30 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
09:45 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
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
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 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
10:45 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
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
11:00 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
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	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
Grand Total	0	20	0	0	0	20	0	0	0	15	0	15	0	0	0	0	0	0	0	0	0	0	0	0	35
Apprch %	0	100	0	0	0		0	0	0	100	0		0	0	0	0	0		0	0	0	0	0		
Total %	0	57.1	0	0	0	57.1	0	0	0	42.9	0	42.9	0	0	0	0	0	0	0	0	0	0	0	0	
Cars +	0	20	0	0	0	20	0	0	0	12	0	12	0	0	0	0	0	0	0	0	0	0	0	0	32
% Cars +	0	100	0	0	0	100	0	0	0	80	0	80	0	0	0	0	0	0	0	0	0	0	0	0	91.4
Trucks	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
% Trucks	0	0	0	0	0	0	0	0	0	20	0	20	0	0	0	0	0	0	0	0	0	0	0	0	8.6

Traffic Data Inc
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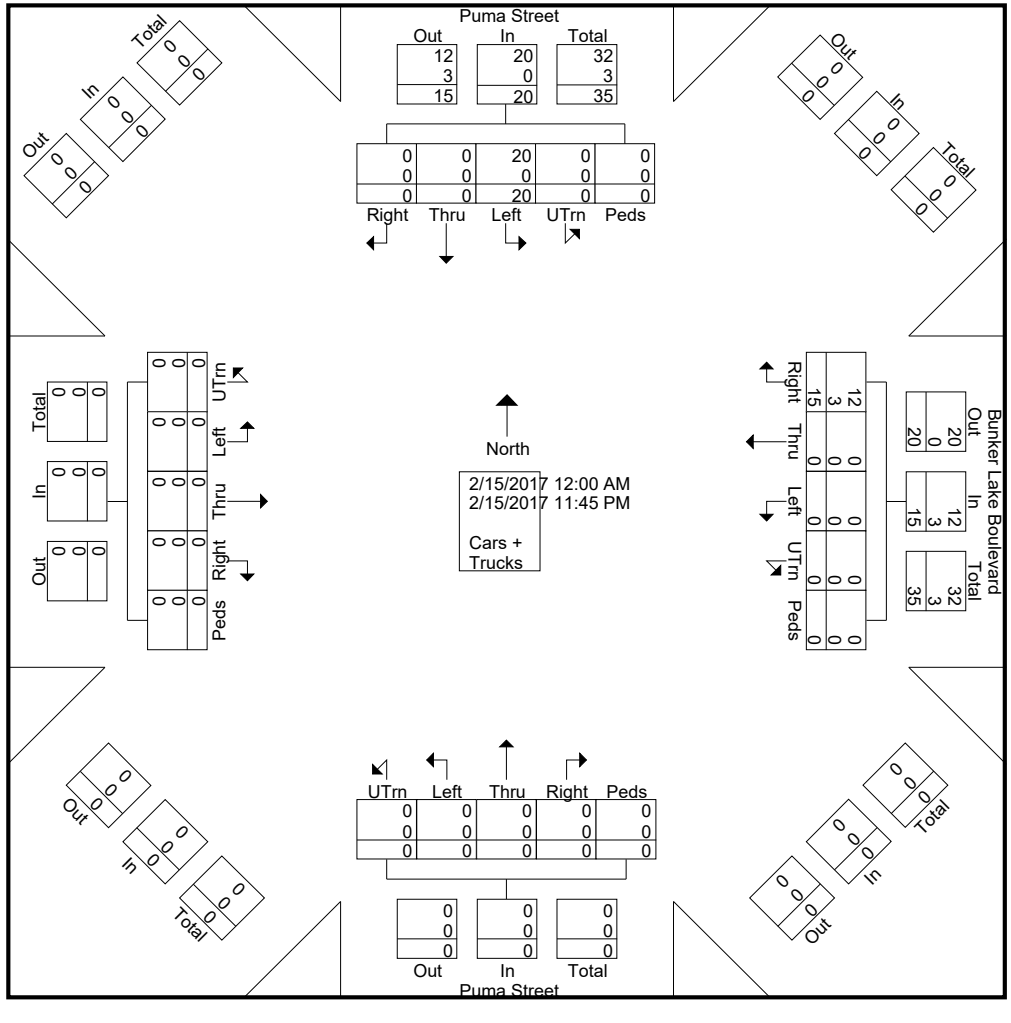
Oxford Street & Fairmount Avenue
Saint Paul, MN



Traffic Data Inc
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File Name : 2 - Bunker Lake Blvd & Puma St, 2-15-17
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Oxford Street & Fairmount Avenue
Saint Paul, MN

	Puma Street Southbound						Bunker Lake Boulevard Westbound						Puma Street 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 06:45 AM																									
06:45 AM	**0**	₂	0	0	0	₂	0	0	0	₁	0	₁	0	0	0	0	0	0	0	0	0	0	0	0	**3**
07:00 AM	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
07:15 AM	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
07:30 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Volume	0	6	0	0	0	6	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	8
% App. Total	0	100	0	0	0		0	0	0	100	0		0	0	0	0	0		0	0	0	0	0		
PHF	.000	.750	.000	.000	.000	.750	.000	.000	.000	.500	.000	.500	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.667
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 10:00 AM																									
10:00 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
10:15 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
10:30 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
10:45 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 Volume	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
% App. Total	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
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	**2**	0	0	0	**2**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
05:00 PM	0	0	0	0	0	0	0	0	0	**3**	0	**3**	0	0	0	0	0	0	0	0	0	0	0	0	**3**
05:15 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:30 PM	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
Total Volume	0	3	0	0	0	3	0	0	0	6	0	6	0	0	0	0	0	0	0	0	0	0	0	0	9
% App. Total	0	100	0	0	0		0	0	0	100	0		0	0	0	0	0		0	0	0	0	0		
PHF	.000	.375	.000	.000	.000	.375	.000	.000	.000	.500	.000	.500	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.750

Traffic Data Inc
PO Box 16269
St. Louis Park, MN 55416

File Name : 2 - Bunker Lake Blvd & Puma St, 2-16-17
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Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Puma Street Southbound						Bunker Lake Boulevard Westbound						Puma Street 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	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	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	0	0	0	0	0
05:30 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
05:45 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
06:00 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
06:15 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
06:30 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
06:45 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2

Traffic Data Inc
PO Box 16269
St. Louis Park, MN 55416

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Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Puma Street Southbound						Bunker Lake Boulevard Westbound						Puma Street 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
07:00 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
07:15 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
07:45 AM	0	5	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Total	0	5	0	0	0	5	1	0	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	8
08:00 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
08:15 AM	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
08:30 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
08:45 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
09:00 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
09:15 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
09:30 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
09:45 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
10:00 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
10:15 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
10:30 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
10:45 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
11:00 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
11:15 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
11:30 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
11:45 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
12:00 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
12:15 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
12:30 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
12:45 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
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 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
01:15 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
01:30 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
01:45 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
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

Traffic Data Inc
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File Name : 2 - Bunker Lake Blvd & Puma St, 2-16-17
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Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Puma Street Southbound						Bunker Lake Boulevard Westbound						Puma Street 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
02:00 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
02:15 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
02:30 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
02:45 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
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 PM	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
03:15 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	1	0	2	0	0	0	0	0	0	3
03:30 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
03:45 PM	0	0	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	2	0	0	0	2	0	1	0	3	0	4	0	0	1	1	0	2	0	0	0	0	0	0	8
04:00 PM	0	2	0	0	0	2	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	4
04:15 PM	0	1	0	0	0	1	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	4
04:30 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
04:45 PM	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	5	0	0	0	5	0	0	0	6	0	6	0	0	0	0	0	0	0	0	0	0	0	0	11
05:00 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:15 PM	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
05:30 PM	0	2	0	0	0	2	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	5
05:45 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
Total	0	4	0	0	0	4	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	8
06:00 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
06:15 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
06:30 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
06:45 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
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
07:00 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
07:15 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
07:30 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
07:45 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
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
08:00 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
08:15 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
08:30 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
08:45 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
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

Traffic Data Inc
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File Name : 2 - Bunker Lake Blvd & Puma St, 2-16-17
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Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Puma Street Southbound						Bunker Lake Boulevard Westbound						Puma Street 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
09:00 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
09:15 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
09:30 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
09:45 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
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
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 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
10:45 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
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
11:00 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
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	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
Grand Total	0	22	0	0	0	22	1	1	0	15	0	17	0	0	1	1	0	2	0	0	0	0	0	0	41
Apprch %	0	100	0	0	0		5.9	5.9	0	88.2	0		0	0	50	50	0		0	0	0	0	0		
Total %	0	53.7	0	0	0	53.7	2.4	2.4	0	36.6	0	41.5	0	0	2.4	2.4	0	4.9	0	0	0	0	0	0	
Cars +	0	22	0	0	0	22	1	1	0	13	0	15	0	0	1	1	0	2	0	0	0	0	0	0	39
% Cars +	0	100	0	0	0	100	100	100	0	86.7	0	88.2	0	0	100	100	0	100	0	0	0	0	0	0	95.1
Trucks	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
% Trucks	0	0	0	0	0	0	0	0	0	13.3	0	11.8	0	0	0	0	0	0	0	0	0	0	0	0	4.9

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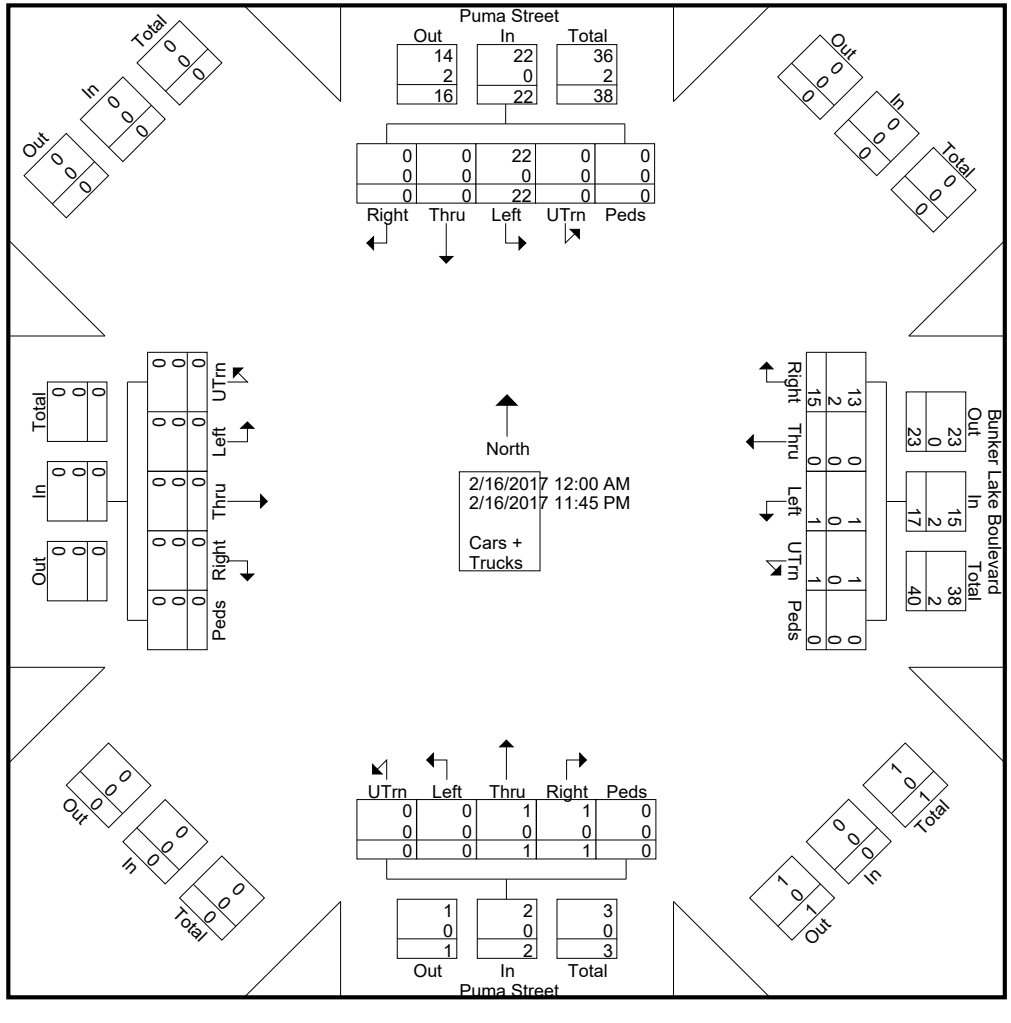
Oxford Street & Fairmount Avenue
Saint Paul, MN



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Oxford Street & Fairmount Avenue
Saint Paul, MN

	Puma Street Southbound						Bunker Lake Boulevard Westbound						Puma Street 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 07:00 AM																									
07:00 AM	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
07:15 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
07:45 AM	0	5	0	0	0	**5**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**5**
Total Volume	0	5	0	0	0	5	1	0	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	8
% App. Total	0	100	0	0	0		33.3	0	0	66.7	0		0	0	0	0	0		0	0	0	0	0		
PHF	.000	.250	.000	.000	.000	.250	.250	.000	.000	.500	.000	.750	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.400
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 10:00 AM																									
10:00 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
10:15 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
10:30 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
10:45 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 Volume	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
% App. Total	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Peak Hour Analysis From 02:00 PM to 11:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 03:30 PM																									
03:30 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
03:45 PM	0	0	0	0	0	0	0	**1**	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
04:00 PM	0	**2**	0	0	0	**2**	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	**4**
04:15 PM	0	1	0	0	0	1	0	0	0	**3**	0	**3**	0	0	0	0	0	0	0	0	0	0	0	0	4
Total Volume	0	4	0	0	0	4	0	1	0	6	0	7	0	0	0	0	0	0	0	0	0	0	0	0	11
% App. Total	0	100	0	0	0		0	14.3	0	85.7	0		0	0	0	0	0		0	0	0	0	0		
PHF	.000	.500	.000	.000	.000	.500	.000	.250	.000	.500	.000	.583	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.688

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St. Louis Park, MN 55416

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Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Okapi Street Southbound						Alpine Drive Westbound						Northbound						Alpine Drive 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	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
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	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
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	1	0	0	1	1
02:15 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
02:30 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
02:45 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	4	0	0	4	5
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	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
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	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	3
Total	0	0	0	1	0	1	0	0	2	0	0	2	0	0	0	0	0	0	0	0	1	0	0	1	4
04:00 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
04:15 AM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
04:30 AM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
04:45 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
Total	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	0	2	0	0	2	10
05:00 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
05:15 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
05:30 AM	0	1	0	0	0	1	0	0	8	0	0	8	0	0	0	0	0	0	0	0	1	0	0	1	10
05:45 AM	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
Total	0	1	0	0	0	1	0	0	16	0	0	16	0	0	0	0	0	0	0	0	2	0	0	2	19
06:00 AM	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	4	0	0	4	10
06:15 AM	0	3	0	0	0	3	0	0	4	0	0	4	0	0	0	0	0	0	0	0	8	0	0	8	15
06:30 AM	0	1	0	0	1	2	0	0	8	0	0	8	0	0	0	0	0	0	0	0	9	0	0	9	19
06:45 AM	0	2	0	0	0	2	0	0	10	0	0	10	0	0	0	0	0	0	0	0	10	0	0	10	22
Total	0	6	0	0	1	7	0	0	28	0	0	28	0	0	0	0	0	0	0	0	31	0	0	31	66

Traffic Data Inc
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Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Okapi Street Southbound						Alpine Drive Westbound						Northbound						Alpine Drive 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
07:00 AM	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	0	0	5	0	0	5	14
07:15 AM	0	0	0	2	0	2	0	0	8	0	0	8	0	0	0	0	0	0	0	0	21	0	0	21	31
07:30 AM	0	2	0	0	0	2	0	0	13	1	0	14	0	0	0	0	0	0	0	0	12	0	0	12	28
07:45 AM	0	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	0	0	12	0	0	12	22
Total	0	2	0	2	0	4	0	0	40	1	0	41	0	0	0	0	0	0	0	0	50	0	0	50	95
08:00 AM	0	1	0	0	0	1	0	0	5	0	0	5	0	0	0	0	0	0	0	0	11	0	0	11	17
08:15 AM	0	2	0	0	0	2	0	0	6	0	0	6	0	0	0	0	0	0	0	0	7	0	0	7	15
08:30 AM	0	0	0	0	0	0	0	0	6	1	0	7	0	0	0	0	0	0	0	0	15	0	0	15	22
08:45 AM	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	0	0	12	0	0	12	21
Total	0	3	0	0	0	3	0	0	26	1	0	27	0	0	0	0	0	0	0	0	45	0	0	45	75
09:00 AM	0	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	0	0	8	0	0	8	18
09:15 AM	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	7	0	0	7	13
09:30 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
09:45 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
Total	0	0	0	0	0	0	0	0	24	0	0	24	0	0	0	0	0	0	0	0	20	0	0	20	44
10:00 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
10:15 AM	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
10:30 AM	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
10:45 AM	0	1	0	0	0	1	0	0	6	0	0	6	0	0	0	0	0	0	0	1	7	0	0	8	15
Total	0	1	0	0	0	1	0	0	19	0	0	19	0	0	0	0	0	0	0	1	18	0	0	19	39
11:00 AM	0	1	0	0	1	2	0	0	4	0	0	4	0	0	0	0	0	0	0	0	4	0	0	4	10
11:15 AM	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
11:30 AM	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	8	0	0	8	14
11:45 AM	0	0	0	1	0	1	0	0	13	0	0	13	0	0	0	0	0	0	0	1	8	0	0	9	23
Total	0	1	0	1	1	3	0	0	28	0	0	28	0	0	0	0	0	0	0	1	26	0	0	27	58
12:00 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
12:15 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	8	0	0	8	15
12:30 PM	0	0	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	0	0	0	9	0	0	9	12
12:45 PM	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	8	0	0	8	14
Total	0	0	0	0	0	0	0	0	19	1	0	20	0	0	0	0	0	0	0	0	29	0	0	29	49
01:00 PM	0	3	0	0	0	3	0	0	10	0	0	10	0	0	0	0	0	0	0	0	8	0	0	8	21
01:15 PM	0	0	0	0	1	1	0	0	7	0	0	7	0	0	0	0	0	0	0	0	6	0	0	6	14
01:30 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	4	0	0	4	11
01:45 PM	0	0	0	0	0	0	0	0	5	1	0	6	0	0	0	0	0	0	0	1	9	0	0	10	16
Total	0	3	0	0	1	4	0	0	29	1	0	30	0	0	0	0	0	0	0	1	27	0	0	28	62

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File Name : 3 - Alpine Dr & Okapi, 2-15-17
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Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Okapi Street Southbound						Alpine Drive Westbound						Northbound						Alpine Drive 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
02:00 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
02:15 PM	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
02:30 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	0	8	0	0	8	16
02:45 PM	0	0	0	1	0	1	0	0	13	1	0	14	0	0	0	0	0	0	0	0	12	0	0	12	27
Total	0	0	0	1	0	1	0	0	32	1	0	33	0	0	0	0	0	0	0	0	31	0	0	31	65
03:00 PM	0	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	0	0	7	0	0	7	17
03:15 PM	0	1	0	0	0	1	0	0	9	1	0	10	0	0	0	0	0	0	0	0	9	0	0	9	20
03:30 PM	0	0	0	0	0	0	0	0	6	2	0	8	0	0	0	0	0	0	0	0	9	0	0	9	17
03:45 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	0	15	0	0	15	23
Total	0	1	0	0	0	1	0	0	33	3	0	36	0	0	0	0	0	0	0	0	40	0	0	40	77
04:00 PM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	13	0	0	13	18
04:15 PM	0	1	0	1	0	2	0	0	15	0	0	15	0	0	0	0	0	0	0	0	12	0	0	12	29
04:30 PM	0	0	0	0	0	0	0	0	15	2	0	17	0	0	0	0	0	0	0	0	10	0	0	10	27
04:45 PM	0	0	0	1	0	1	0	0	11	0	0	11	0	0	0	0	0	0	0	0	13	0	0	13	25
Total	0	1	0	2	0	3	0	0	46	2	0	48	0	0	0	0	0	0	0	0	48	0	0	48	99
05:00 PM	0	0	0	1	0	1	0	0	10	1	0	11	0	0	0	0	0	0	0	1	18	0	0	19	31
05:15 PM	0	0	0	0	0	0	0	0	13	2	0	15	0	0	0	0	0	0	0	1	18	0	0	19	34
05:30 PM	0	0	0	1	1	2	0	0	15	0	0	15	0	0	0	0	0	0	0	0	14	0	0	14	31
05:45 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	0	13	0	0	13	21
Total	0	0	0	2	1	3	0	0	46	3	0	49	0	0	0	0	0	0	0	2	63	0	0	65	117
06:00 PM	0	0	0	1	0	1	0	0	8	0	0	8	0	0	0	0	0	0	0	1	8	0	0	9	18
06:15 PM	0	0	0	0	0	0	0	0	14	1	0	15	0	0	0	0	0	0	0	0	14	0	0	14	29
06:30 PM	0	0	0	1	0	1	0	0	9	1	0	10	0	0	0	0	0	0	0	0	7	0	0	7	18
06:45 PM	0	0	0	1	0	1	0	0	10	0	0	10	0	0	0	0	0	0	0	0	7	0	0	7	18
Total	0	0	0	3	0	3	0	0	41	2	0	43	0	0	0	0	0	0	0	1	36	0	0	37	83
07:00 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	7	0	0	7	9
07:15 PM	0	1	0	0	0	1	0	0	3	0	0	3	0	0	0	0	0	0	0	0	4	0	0	4	8
07:30 PM	0	0	0	0	0	0	0	0	5	1	0	6	0	0	0	0	0	0	0	0	5	0	0	5	11
07:45 PM	0	0	0	0	0	0	0	0	7	1	0	8	0	0	0	0	0	0	0	0	3	0	0	3	11
Total	0	1	0	0	0	1	0	0	17	2	0	19	0	0	0	0	0	0	0	0	19	0	0	19	39
08:00 PM	0	1	0	0	0	1	0	0	3	2	0	5	0	0	0	0	0	0	0	0	5	0	0	5	11
08:15 PM	0	1	0	0	0	1	0	0	7	0	0	7	0	0	0	0	0	0	0	0	1	0	0	1	9
08:30 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
08:45 PM	0	1	0	0	0	1	0	0	6	0	0	6	0	0	0	0	0	0	0	0	6	0	0	6	13
Total	0	3	0	0	0	3	0	0	20	2	0	22	0	0	0	0	0	0	0	0	19	0	0	19	44

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Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Okapi Street Southbound						Alpine Drive Westbound						Northbound						Alpine Drive 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
09:00 PM	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
09:15 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	1	5	0	0	6	9
09:30 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
09:45 PM	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	9	1	0	10	0	0	0	0	0	0	0	1	12	0	0	13	23
10:00 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
10:15 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
10:30 PM	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
10:45 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
Total	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
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	3	0	0	3	0	0	0	0	0	0	0	0	2	0	0	2	5
11:30 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
11:45 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
Total	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
Grand Total	0	23	0	13	4	40	0	0	493	20	0	513	0	0	0	0	0	0	0	7	535	0	0	542	1095
Apprch %	0	57.5	0	32.5	10		0	0	96.1	3.9	0		0	0	0	0	0		0	1.3	98.7	0	0		
Total %	0	2.1	0	1.2	0.4	3.7	0	0	45	1.8	0	46.8	0	0	0	0	0	0	0	0.6	48.9	0	0	49.5	
Cars +	0	22	0	13	4	39	0	0	479	20	0	499	0	0	0	0	0	0	0	7	525	0	0	532	1070
% Cars +	0	95.7	0	100	100	97.5	0	0	97.2	100	0	97.3	0	0	0	0	0	0	0	100	98.1	0	0	98.2	97.7
Trucks	0	1	0	0	0	1	0	0	14	0	0	14	0	0	0	0	0	0	0	0	10	0	0	10	25
% Trucks	0	4.3	0	0	0	2.5	0	0	2.8	0	0	2.7	0	0	0	0	0	0	0	0	1.9	0	0	1.8	2.3

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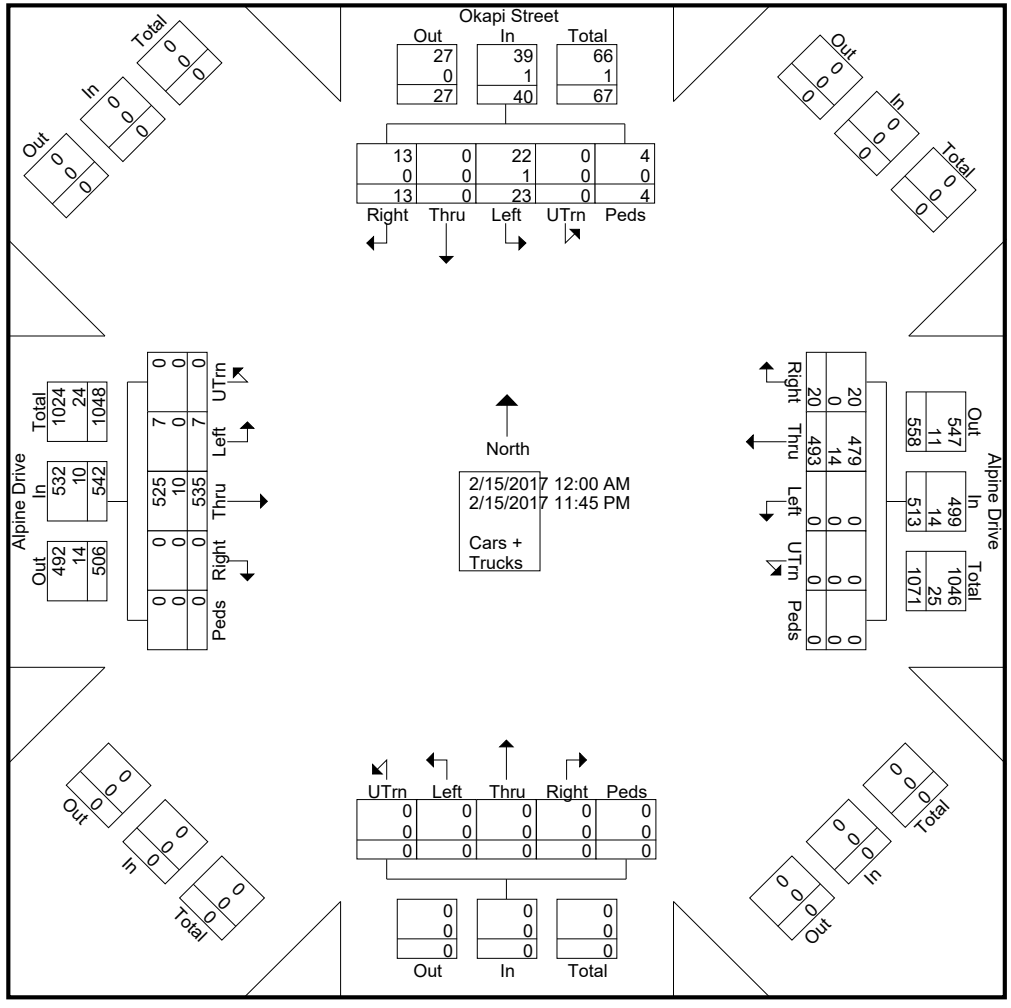
Oxford Street & Fairmount Avenue
Saint Paul, MN



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Oxford Street & Fairmount Avenue
Saint Paul, MN

	Okapi Street Southbound						Alpine Drive Westbound						Northbound						Alpine Drive 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**	2	0	2	0	0	8	0	0	8	0	0	0	0	0	0	0	0	21	0	0	21	**31**
07:30 AM	0	**2**	0	0	0	2	0	0	**13**	**1**	0	**14**	0	0	0	0	0	0	0	0	12	0	0	12	28
07:45 AM	0	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	0	0	12	0	0	12	22
08:00 AM	0	1	0	0	0	1	0	0	5	0	0	5	0	0	0	0	0	0	0	0	11	0	0	11	17
Total Volume	0	3	0	2	0	5	0	0	36	1	0	37	0	0	0	0	0	0	0	0	56	0	0	56	98
% App. Total	0	60	0	40	0		0	0	97.3	2.7	0		0	0	0	0	0		0	0	100	0	0		
PHF	.000	.375	.000	.250	.000	.625	.000	.000	.692	.250	.000	.661	.000	.000	.000	.000	.000	.000	.000	.000	.667	.000	.000	.667	.790
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	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	8	0	0	8	15
12:30 PM	0	0	0	0	0	0	0	0	2	**1**	0	3	0	0	0	0	0	0	0	0	**9**	0	0	**9**	12
12:45 PM	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	8	0	0	8	14
01:00 PM	0	**3**	0	0	0	**3**	0	0	**10**	0	0	**10**	0	0	0	0	0	0	0	0	8	0	0	8	**21**
Total Volume	0	3	0	0	0	3	0	0	25	1	0	26	0	0	0	0	0	0	0	0	33	0	0	33	62
% App. Total	0	100	0	0	0		0	0	96.2	3.8	0		0	0	0	0	0		0	0	100	0	0		
PHF	.000	.250	.000	.000	.000	.250	.000	.000	.625	.250	.000	.650	.000	.000	.000	.000	.000	.000	.000	.000	.917	.000	.000	.917	.738
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	0	**1**	0	1	0	0	11	0	0	11	0	0	0	0	0	0	0	0	13	0	0	13	25
05:00 PM	0	0	0	1	0	1	0	0	10	1	0	11	0	0	0	0	0	0	0	**1**	**18**	0	0	**19**	31
05:15 PM	0	0	0	0	0	0	0	0	13	**2**	0	**15**	0	0	0	0	0	0	0	1	18	0	0	19	**34**
05:30 PM	0	0	0	1	**1**	**2**	0	0	**15**	0	0	15	0	0	0	0	0	0	0	0	14	0	0	14	31
Total Volume	0	0	0	3	1	4	0	0	49	3	0	52	0	0	0	0	0	0	0	2	63	0	0	65	121
% App. Total	0	0	0	75	25		0	0	94.2	5.8	0		0	0	0	0	0		0	3.1	96.9	0	0		
PHF	.000	.000	.000	.750	.250	.500	.000	.000	.817	.375	.000	.867	.000	.000	.000	.000	.000	.000	.000	.500	.875	.000	.000	.855	.890

Traffic Data Inc

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Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Okapi Street Southbound						Alpine Drive Westbound						Northbound						Alpine Drive 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	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	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	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	2
01:00 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
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	1	0	0	1	1
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	2	0	0	2	3
02:00 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
02:15 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
02:30 AM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
02:45 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	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	3	0	0	3	8
03:00 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
03:15 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
03:30 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
03:45 AM	0	0	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	0	0	1	0	1	0	0	4	0	0	4	0	0	0	0	0	0	0	0	2	0	0	2	7
04:00 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
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	0	0	0	0	1
04:45 AM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
Total	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	6
05:00 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
05:15 AM	0	1	0	0	0	1	0	0	4	0	0	4	0	0	0	0	0	0	0	0	1	0	0	1	6
05:30 AM	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	9
05:45 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
Total	0	1	0	0	0	1	0	0	14	0	0	14	0	0	0	0	0	0	0	0	6	0	0	6	21
06:00 AM	0	1	0	0	0	1	0	0	6	0	0	6	0	0	0	0	0	0	0	0	5	0	0	5	12
06:15 AM	0	2	0	0	0	2	0	0	6	0	0	6	0	0	0	0	0	0	0	0	9	0	0	9	17
06:30 AM	0	2	0	0	0	2	0	0	10	0	0	10	0	0	0	0	0	0	0	0	10	0	0	10	22
06:45 AM	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
Total	0	6	0	0	0	6	0	0	32	0	0	32	0	0	0	0	0	0	0	0	29	0	0	29	67

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Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Okapi Street Southbound						Alpine Drive Westbound						Northbound						Alpine Drive 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
07:00 AM	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	0	0	12	0	0	12	24
07:15 AM	0	1	0	1	0	2	0	0	10	0	0	10	0	0	0	0	0	0	0	0	15	0	0	15	27
07:30 AM	0	2	0	0	0	2	0	0	13	1	0	14	0	0	0	0	0	0	0	0	14	0	0	14	30
07:45 AM	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
Total	0	3	0	1	0	4	0	0	43	1	0	44	0	0	0	0	0	0	0	0	55	0	0	55	103
08:00 AM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	12	0	0	12	15
08:15 AM	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	7	0	0	7	13
08:30 AM	0	0	0	0	0	0	0	0	6	1	0	7	0	0	0	0	0	0	0	0	11	0	0	11	18
08:45 AM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	8	0	0	8	15
Total	0	0	0	0	0	0	0	0	22	1	0	23	0	0	0	0	0	0	0	0	38	0	0	38	61
09:00 AM	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	0	0	8	0	0	8	17
09:15 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
09:30 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
09:45 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
Total	0	0	0	0	0	0	0	0	22	0	0	22	0	0	0	0	0	0	0	0	22	0	0	22	44
10:00 AM	0	0	0	0	0	0	0	0	7	1	0	8	0	0	0	0	0	0	0	0	7	0	0	7	15
10:15 AM	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
10:30 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
10:45 AM	0	0	0	0	1	1	0	0	5	0	0	5	0	0	0	0	0	0	0	0	7	0	0	7	13
Total	0	0	0	0	1	1	0	0	22	1	0	23	0	0	0	0	0	0	0	0	23	0	0	23	47
11:00 AM	0	1	0	0	0	1	0	0	6	0	0	6	0	0	0	0	0	0	0	0	6	0	0	6	13
11:15 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
11:30 AM	0	0	0	0	1	1	0	0	4	0	0	4	0	0	0	0	0	0	0	0	1	0	0	1	6
11:45 AM	0	0	0	1	0	1	0	0	6	2	0	8	0	0	0	0	0	0	0	0	5	0	0	5	14
Total	0	1	0	1	1	3	0	0	21	2	0	23	0	0	0	0	0	0	0	0	17	0	0	17	43
12:00 PM	0	0	0	0	1	1	0	0	2	0	0	2	0	0	0	0	0	0	0	0	8	0	0	8	11
12:15 PM	0	0	0	0	1	1	0	0	5	0	0	5	0	0	0	0	0	0	0	0	2	0	0	2	8
12:30 PM	0	0	0	0	1	1	0	0	6	0	0	6	0	0	0	0	0	0	0	0	6	0	0	6	13
12:45 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	5	0	0	5	7
Total	0	0	0	0	3	3	0	0	15	0	0	15	0	0	0	0	0	0	0	0	21	0	0	21	39
01:00 PM	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	0	0	5	0	0	5	16
01:15 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
01:30 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	1	6	0	0	7	9
01:45 PM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	1	9	0	0	10	15
Total	0	0	0	0	0	0	0	0	21	0	0	21	0	0	0	0	0	0	0	2	27	0	0	29	50

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Oxford Street & Fairmount Avenue
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Groups Printed- Cars + - Trucks

	Okapi Street Southbound						Alpine Drive Westbound						Northbound						Alpine Drive 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
02:00 PM	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	0	0	5	0	0	5	16
02:15 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
02:30 PM	0	1	0	0	0	1	0	0	9	0	0	9	0	0	0	0	0	0	0	0	6	0	0	6	16
02:45 PM	0	0	0	0	1	1	0	0	6	0	0	6	0	0	0	0	0	0	0	0	11	0	0	11	18
Total	0	1	0	0	1	2	0	0	27	0	0	27	0	0	0	0	0	0	0	0	29	0	0	29	58
03:00 PM	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	0	1	6	0	0	7	18
03:15 PM	0	1	0	1	0	2	0	0	6	0	0	6	0	0	0	0	0	0	0	0	10	0	0	10	18
03:30 PM	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	0	0	12	0	0	12	24
03:45 PM	0	1	0	0	0	1	0	0	8	1	0	9	0	0	0	0	0	0	0	0	12	0	0	12	22
Total	0	2	0	1	0	3	0	0	37	1	0	38	0	0	0	0	0	0	0	1	40	0	0	41	82
04:00 PM	0	1	0	0	0	1	0	0	19	0	0	19	0	0	0	0	0	0	0	1	13	0	0	14	34
04:15 PM	0	1	0	0	0	1	0	0	14	1	0	15	0	0	0	0	0	0	0	0	13	0	0	13	29
04:30 PM	0	0	0	0	0	0	0	0	19	1	0	20	0	0	0	0	0	0	0	0	7	0	0	7	27
04:45 PM	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	0	1	14	0	0	15	27
Total	0	2	0	0	0	2	0	0	64	2	0	66	0	0	0	0	0	0	0	2	47	0	0	49	117
05:00 PM	0	0	0	0	0	0	0	0	10	3	0	13	0	0	0	0	2	2	0	0	9	0	0	9	24
05:15 PM	0	0	0	2	0	2	0	0	11	1	0	12	0	0	0	0	0	0	0	0	16	0	0	16	30
05:30 PM	0	0	0	0	0	0	0	0	18	0	0	18	0	0	0	0	0	0	0	0	14	0	0	14	32
05:45 PM	0	0	0	0	0	0	0	0	10	1	0	11	0	0	0	0	0	0	0	0	19	0	0	19	30
Total	0	0	0	2	0	2	0	0	49	5	0	54	0	0	0	0	2	2	0	0	58	0	0	58	116
06:00 PM	0	0	0	0	0	0	0	0	9	3	0	12	0	0	0	0	0	0	0	0	16	0	0	16	28
06:15 PM	0	1	0	1	0	2	0	0	9	0	0	9	0	0	0	0	0	0	0	1	12	0	0	13	24
06:30 PM	0	0	0	0	0	0	0	0	6	1	0	7	0	0	0	0	0	0	0	0	6	0	0	6	13
06:45 PM	0	1	0	0	0	1	0	0	5	0	0	5	0	0	0	0	0	0	0	0	6	0	0	6	12
Total	0	2	0	1	0	3	0	0	29	4	0	33	0	0	0	0	0	0	0	1	40	0	0	41	77
07:00 PM	0	0	0	0	0	0	0	0	4	1	0	5	0	0	0	0	0	0	0	0	3	0	0	3	8
07:15 PM	0	0	0	0	0	0	0	0	8	2	0	10	0	0	0	0	0	0	0	0	8	0	0	8	18
07:30 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
07:45 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
Total	0	0	0	0	0	0	0	0	18	3	0	21	0	0	0	0	0	0	0	0	24	0	0	24	45
08:00 PM	0	0	0	0	0	0	0	0	3	1	0	4	0	0	0	0	0	0	0	0	3	0	0	3	7
08:15 PM	0	0	0	0	0	0	0	0	7	1	0	8	0	0	0	0	0	0	0	0	6	0	0	6	14
08:30 PM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	4	0	0	4	9
08:45 PM	0	0	0	0	0	0	0	0	6	1	0	7	0	0	0	0	0	0	0	0	0	0	0	0	7
Total	0	0	0	0	0	0	0	0	21	3	0	24	0	0	0	0	0	0	0	0	13	0	0	13	37

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Oxford Street & Fairmount Avenue
Saint Paul, MN

Groups Printed- Cars + - Trucks

	Okapi Street Southbound						Alpine Drive Westbound						Northbound						Alpine Drive 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
09:00 PM	0	0	0	1	0	1	0	0	3	0	0	3	0	0	0	0	0	0	0	1	3	0	0	4	8
09:15 PM	0	1	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	7	0	0	7	9
09:30 PM	0	0	0	0	0	0	0	0	7	1	0	8	0	0	0	0	0	0	0	0	3	0	0	3	11
09:45 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	5	0	0	5	7
Total	0	1	0	1	0	2	0	0	13	1	0	14	0	0	0	0	0	0	0	1	18	0	0	19	35
10:00 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
10:15 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
10:30 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
10:45 PM	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
Total	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	10	0	0	10	16
11:00 PM	0	2	0	0	0	2	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2	0	0	2	5
11:15 PM	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
11:30 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
11:45 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	2	0	0	0	2	0	0	2	0	0	2	0	0	0	0	0	0	0	0	9	0	0	9	13
Grand Total	0	21	0	8	6	35	0	0	495	24	0	519	0	0	0	0	2	2	0	7	534	0	0	541	1097
Apprch %	0	60	0	22.9	17.1		0	0	95.4	4.6	0		0	0	0	0	100		0	1.3	98.7	0	0		
Total %	0	1.9	0	0.7	0.5	3.2	0	0	45.1	2.2	0	47.3	0	0	0	0	0.2	0.2	0	0.6	48.7	0	0	49.3	
Cars +	0	20	0	7	6	33	0	0	481	22	0	503	0	0	0	0	0	0	0	7	520	0	0	527	1063
% Cars +	0	95.2	0	87.5	100	94.3	0	0	97.2	91.7	0	96.9	0	0	0	0	0	0	0	100	97.4	0	0	97.4	96.9
Trucks	0	1	0	1	0	2	0	0	14	2	0	16	0	0	0	0	2	2	0	0	14	0	0	14	34
% Trucks	0	4.8	0	12.5	0	5.7	0	0	2.8	8.3	0	3.1	0	0	0	0	100	100	0	0	2.6	0	0	2.6	3.1

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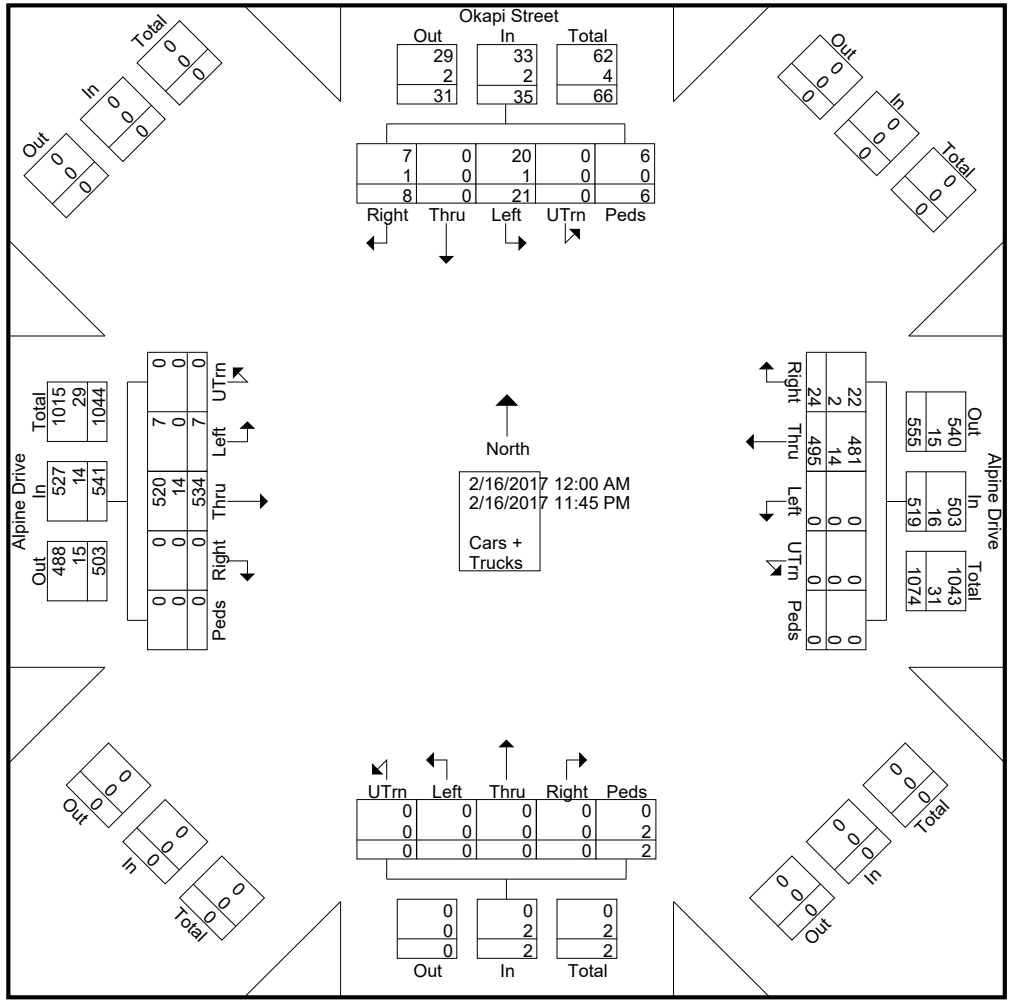
Oxford Street & Fairmount Avenue
Saint Paul, MN



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Oxford Street & Fairmount Avenue
Saint Paul, MN

	Okapi Street Southbound						Alpine Drive Westbound						Northbound						Alpine Drive 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**	**0**	**0**	**0**	**0**	**0**	**12**	**0**	**0**	**12**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**12**	**0**	**0**	**12**	**24**
07:15 AM	**0**	**1**	**0**	1	0	2	0	0	10	0	0	10	0	0	0	0	0	0	0	0	15	0	0	15	27
07:30 AM	0	**2**	0	0	0	2	0	0	**13**	**1**	0	**14**	0	0	0	0	0	0	0	0	14	0	0	14	**30**
07:45 AM	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
Total Volume	0	3	0	1	0	4	0	0	43	1	0	44	0	0	0	0	0	0	0	0	55	0	0	55	103
% App. Total	0	75	0	25	0		0	0	97.7	2.3	0		0	0	0	0	0		0	0	100	0	0		
PHF	.000	.375	.000	.250	.000	.500	.000	.000	.827	.250	.000	.786	.000	.000	.000	.000	.000	.000	.000	.000	.917	.000	.000	.917	.858
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 01:00 PM																									
01:00 PM	0	0	0	0	0	0	0	0	**11**	0	0	**11**	0	0	0	0	0	0	0	0	5	0	0	5	**16**
01:15 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
01:30 PM	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	**1**	6	0	0	7	9
01:45 PM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	1	**9**	0	0	**10**	15
Total Volume	0	0	0	0	0	0	0	0	21	0	0	21	0	0	0	0	0	0	0	2	27	0	0	29	50
% App. Total	0	0	0	0	0		0	0	100	0	0		0	0	0	0	0		0	6.9	93.1	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.477	.000	.000	.477	.000	.000	.000	.000	.000	.000	.000	.500	.750	.000	.000	.725	.781
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	**2**	0	**2**	0	0	11	1	0	12	0	0	0	0	0	0	0	0	16	0	0	16	30
05:30 PM	0	0	0	0	0	0	0	0	**18**	0	0	**18**	0	0	0	0	0	0	0	0	14	0	0	14	**32**
05:45 PM	0	0	0	0	0	0	0	0	10	1	0	11	0	0	0	0	0	0	0	0	**19**	0	0	**19**	30
06:00 PM	0	0	0	0	0	0	0	0	9	**3**	0	12	0	0	0	0	0	0	0	0	16	0	0	16	28
Total Volume	0	0	0	2	0	2	0	0	48	5	0	53	0	0	0	0	0	0	0	0	65	0	0	65	120
% App. Total	0	0	0	100	0		0	0	90.6	9.4	0		0	0	0	0	0		0	0	100	0	0		
PHF	.000	.000	.000	.250	.000	.250	.000	.000	.667	.417	.000	.736	.000	.000	.000	.000	.000	.000	.000	.000	.855	.000	.000	.855	.938

Spack CONSULTING
ENGINEERING TRAFFIC FORWARD

Table D1
Forecasted Trip Generation

Weekday Daily Volumes

LAND USE	ITE CODE #	DEVELOPMENT UNITS	QUANTITY	DAILY RATE	ENTER PERCENT	EXIT PERCENT	NEW TRIPS	
							ENTER	EXIT
Single Family Home	210	Units	246.0	9.52	50%	50%	1,171	1,171
Townhomes	230	Units	98.0	5.81	50%	50%	285	285
Total							**1,456**	**1,456**

AM Peak Volumes

LAND USE	ITE CODE #	DEVELOPMENT UNITS	QUANTITY	PEAK RATE	ENTER PERCENT	EXIT PERCENT	NEW TRIPS	
							ENTER	EXIT
Single Family Home	210	Units	246.0	0.75	25%	75%	46	138
Townhomes	230	Units	98.0	0.44	17%	83%	7	36
Total							**53**	**174**

PM Peak Volumes

LAND USE	ITE CODE #	DEVELOPMENT UNITS	QUANTITY	PEAK RATE	ENTER PERCENT	EXIT PERCENT	NEW TRIPS	
							ENTER	EXIT
Single Family Home	210	Units	246.0	1.00	63%	37%	155	91
Townhomes	230	Units	98.0	0.52	67%	33%	34	17
Total							**189**	**108**

NOTES:

1. **All trip generation rates based on "Trip Generation", Institute of Transportation Engineers, 9th Edition unless otherwise noted.**
2. **A.M. Trip Generation is for the peak hour of adjacent street traffic (one hour between 7 and 9 a.m.).**
3. **P.M. Trip Generation is for the peak hour of adjacent street traffic (one hour between 4 and 6 p.m.).**

Spack CONSULTING
ENGINEERING TRAFFIC FORWARD

Table D2
Forecasted Trip Generation
South of Bunker

Weekday Daily Volumes

LAND USE	ITE CODE #	DEVELOPMENT UNITS	QUANTITY	DAILY RATE	ENTER PERCENT	EXIT PERCENT	NEW TRIPS ENTER	NEW TRIPS EXIT
Industrial Park	130	Acres	45.1	61.17	50%	50%	1,380	1,380
Total								

LAND USE	ITE CODE #	DEVELOPMENT UNITS	QUANTITY	PEAK RATE	ENTER PERCENT	EXIT PERCENT	NEW TRIPS ENTER	NEW TRIPS EXIT
Industrial Park	130	Acres	45.1	8.20	83%	17%	307	63
Total							**307**	**63**

PM Peak Volumes

LAND USE	ITE CODE #	DEVELOPMENT UNITS	QUANTITY	PEAK RATE	ENTER PERCENT	EXIT PERCENT	NEW TRIPS ENTER	NEW TRIPS EXIT
Industrial Park	130	Acres	45.1	8.53	21%	79%	81	304
Total							**81**	**304**

NOTES:

1. **All trip generation rates based on "Trip Generation", Institute of Transportation Engineers, 9th Edition unless otherwise noted.**
2. **AM Peak Trip Generation is for the AM Peak Hour.**
3. **PM Peak Trip Generation is for the Peak Hour of Generator**

Spack CONSULTING
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Table D3
Forecasted Trip Generation
North of Bunker

Weekday Daily Volumes

LAND USE	ITE CODE #	DEVELOPMENT UNITS	QUANTITY	DAILY RATE	ENTER PERCENT	EXIT PERCENT	NEW TRIPS ENTER	NEW TRIPS EXIT
Industrial Park	130	Acres	37.2	61.17	50%	50%	1,137	1,137
Total							**1,137**	**1,137**

AM Peak Volumes

LAND USE	ITE CODE #	DEVELOPMENT UNITS	QUANTITY	PEAK RATE	ENTER PERCENT	EXIT PERCENT	NEW TRIPS ENTER	NEW TRIPS EXIT
Industrial Park	130	Acres	37.2	8.20	83%	17%	253	52
Total							**253**	**52**

PM Peak Volumes

LAND USE	ITE CODE #	DEVELOPMENT UNITS	QUANTITY	PEAK RATE	ENTER PERCENT	EXIT PERCENT	NEW TRIPS ENTER	NEW TRIPS EXIT
Industrial Park	130	Acres	37.2	8.53	21%	79%	67	250
Total							**67**	**250**

NOTES:

1. **All trip generation rates based on "Trip Generation", Institute of Transportation Engineers, 9th Edition unless otherwise noted.**
2. **AM Peak Trip Generation is for the AM Peak Hour.**
3. **PM Peak Trip Generation is for the Peak Hour of Generator**

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Table D4
Forecasted Trip Generation
East of Puma

Weekday Daily Volumes

LAND USE	ITE CODE #	DEVELOPMENT UNITS	QUANTITY	DAILY RATE	ENTER PERCENT	EXIT PERCENT	NEW TRIPS ENTER	NEW TRIPS EXIT
Industrial Park	130	Acres	32.0	61.17	50%	50%	979	979
Single Family Detached Housing	210	Acres	34.6	26.04	50%	50%	451	451
Total								

LAND USE	ITE CODE #	DEVELOPMENT UNITS	QUANTITY	PEAK RATE	ENTER PERCENT	EXIT PERCENT	NEW TRIPS ENTER	NEW TRIPS EXIT
Industrial Park	130	Acres	32.0	8.20	83%	17%	218	45
Single Family Detached Housing	210	Acres	34.6	2.06	31%	69%	22	49
Total							**240**	**94**

PM Peak Volumes

LAND USE	ITE CODE #	DEVELOPMENT UNITS	QUANTITY	PEAK RATE	ENTER PERCENT	EXIT PERCENT	NEW TRIPS ENTER	NEW TRIPS EXIT
Industrial Park	130	Acres	32.0	8.53	21%	79%	57	216
Single Family Detached Housing	210	Acres	34.6	2.74	66%	34%	63	32
Total							**120**	**248**

1. **All trip generation rates based on "Trip Generation", Institute of Transportation Engineers, 9th Edition unless otherwise noted.**
2. **AM Peak Trip Generation is for the AM Peak Hour.**
3. **PM Peak Trip Generation is for the Peak Hour of Generator**

AM Peak Volumes

Figure 1: Existing Peak Volumes

- **AM Peak Hour on top, PM Peak Hour on bottom**

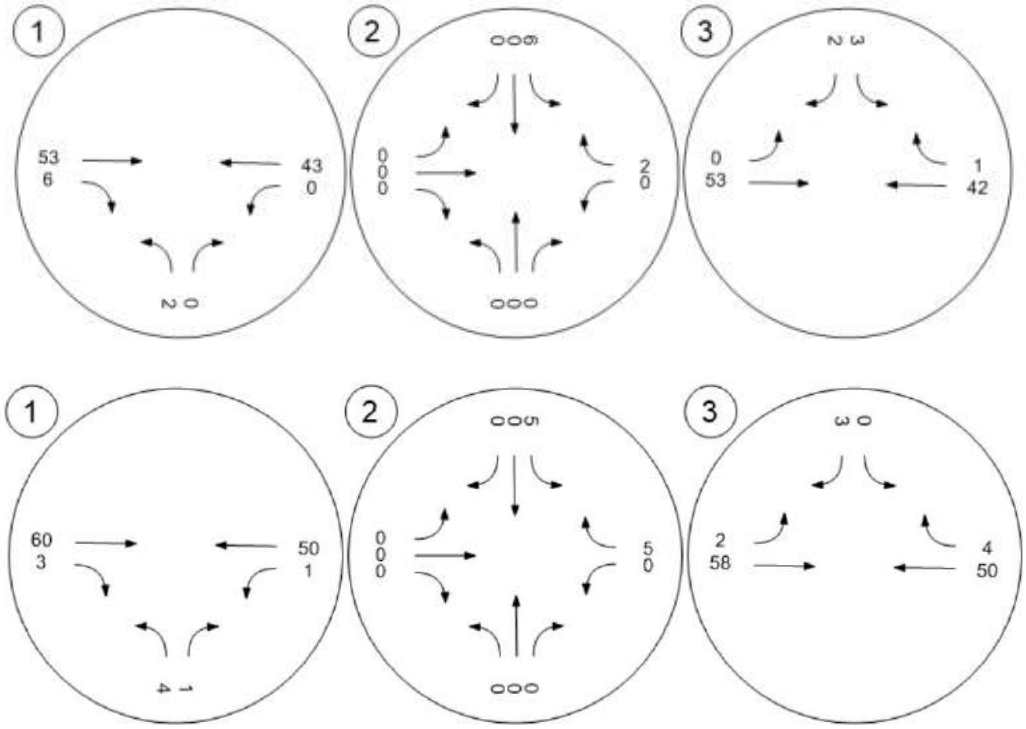


Figure 2: 2018 No-Build Peak Volumes

- **AM Peak Hour on top, PM Peak Hour on bottom**

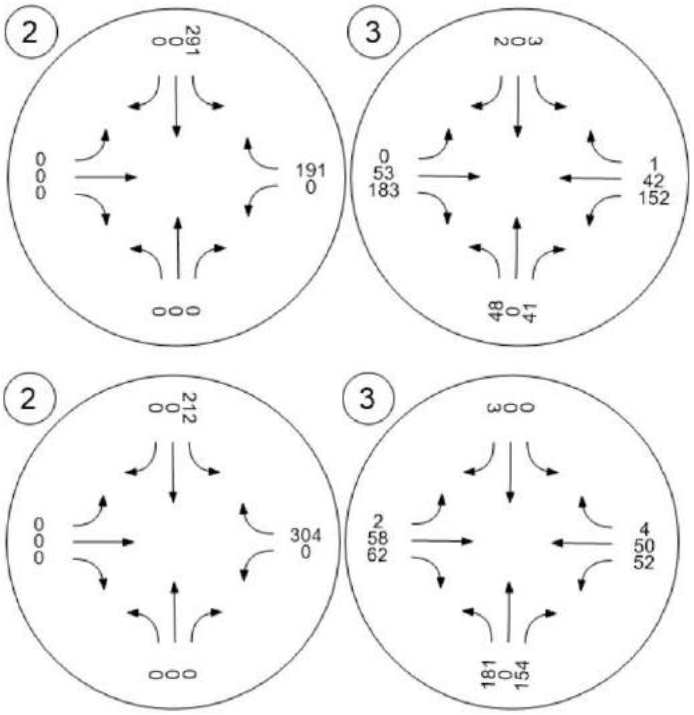


Figure 3: 2018 Build Peak Volumes

- **AM Peak Hour on top, PM Peak Hour on bottom**

Level of Service (LOS)

Level of Service (LOS) is a qualitative description, similar to typical school grades, that traffic engineers use to communicate how good or bad traffic operations are on a corridor, intersection, or interchange.

Common Factors

Traffic can be a hard thing to quantify as everyone has a different tolerance for congestion. What seems excessively long to one person may seem good enough for another. These differences are readily apparent when comparing small towns or rural areas, where five cars an hour can be the norm, to big cities or downtowns, where less than hundred cars an hour, even in the middle of night, is rare.

To combat this issue and provide a consistent measuring tool for traffic studies, a "Level of Service" rating was developed. Level of Service ratings are based on the roadway or intersection characteristics and the amount of traffic. Just like grade school, LOS A represents the best traffic operations, where traffic flows freely. LOS F, on the other hand, represents failing operations, where the road or intersection is congested and running beyond maximum capacity. LOS E is typically considered "at capacity" which means the amount of traffic is right at the level the roadway or intersection can adequately accommodate. Using Level of Service letter grades provides an easy way to convey road operations to the general public and has been adopted across the United States.

Common Factors Impacting Level of Service

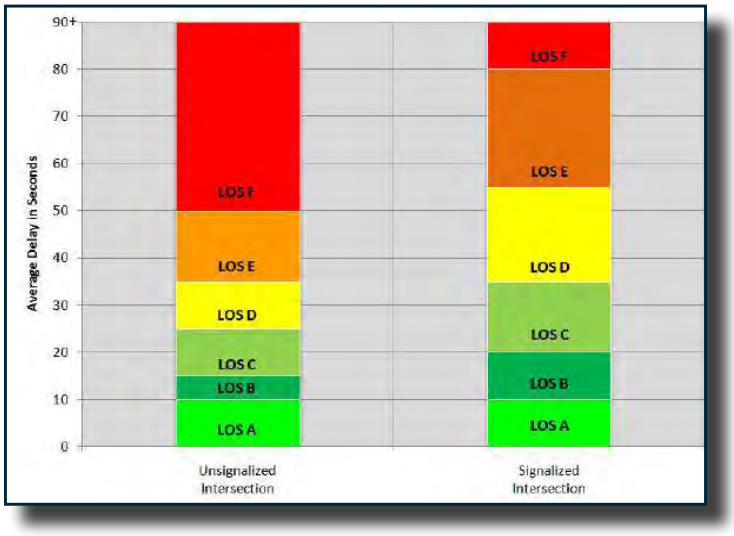
- **Number of Lanes.**
- **Traffic Volumes.**
- **Intersection Control (stop sign, signal, roundabout, interchange.)**
- **Amount of access on a corridor.**
- **Percentage of turning traffic.**
- **Traffic signal cycle length (green time devoted to each approach) and phasing (one green for all approach movements or separate green arrows.)**
- **Percentage of heavy trucks.**
- **Roadway Grades.**
- **Distribution of traffic within a peak hour as well as over the course of a day.**
- **Pedestrian activity.**
- **Bicycle activity.**

Level of Service criteria have been developed for multiple types of traffic operations including:

- Intersections
- Urban Corridors
- Freeways
- Transit Service
- Bicycle Operations
- Pedestrian Operations

The most common LOS criteria used is for car operations at intersections; both signalized and unsignalized. For an intersection Level of Service analysis, average delay for cars travelling through the intersection is used to determine the appropriate grade. A high delay results in a poor LOS rating and equates to poor operations. Similarly, low delay results in a good LOS rating and equates to good or great operations.

LOS can be determined for the intersection as a whole, or for individual movements. It is common during peak periods in major population areas for an intersection to have an acceptable overall LOS rating, but fail to achieve a good grade for individual movements.



LOS A

LOS C

LOS D = Acceptable

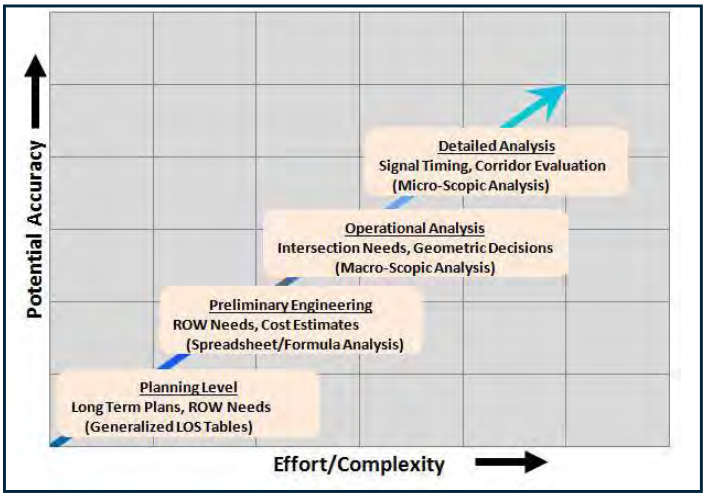
LOS F = Unacceptable

Source: City of San Jose, CA.

Although a Level of Service rating of A represents the best traffic operations, it is not always the most desirable. Providing LOS A for all corridors and all operations at all times would require a significant amount of land to be devoted to the road infrastructure, which makes it extremely costly to build and maintain. During non-peak times, like overnight, much of that infrastructure would sit unused.

On the opposite side of the spectrum, a Level of Service rating of E and F represent traffic operations close to breaking down, or that already have. These ratings mean high delays, long queues, and slow speeds, not to mention driver frustration. Instead of trying to achieve one or the other, government agencies try to strike a balance between providing acceptable operations, neither falling nor flowing too freely. Because of this, LOS D is typically considered the lowest LOS acceptable by government agencies and is reflective of a balanced approach between cost and benefit.

There are many tools and guidelines used to determine a roads Level of Service rating. Simple tools like generalized roadway capacities allow for planning-level efforts. While inexpensive and quick to complete, they are not as accurate as other options. More complicated tools, such as micro-simulations, provide more accurate results, but cost more and take more time. It is important to understand the trade-offs between the analysis types as well as the purpose of the study.



Source: Florida Deptarment of Transportation

Resources

- Highway Capacity Manual, fifth edition
- Nation Cooperative Highway Research Program Report 616; Multimodal Level of Service Analysis for Urban Streets
- http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_616.pdf
- Florida Department of Transportation Quality/Level of Service Handbook
- http://www.dot.state.fl.us/planning/systems/programs/sm/los/pdfs/2009FDOTQLOS_Handbook.pdf

About This Brief

Spack Consulting prepared this brief as part of our company's vision to significantly improve the practice of traffic engineering and transportation planning. Transportation professionals from around the world have assisted us in developing this document. We are providing this brief under the Creative Commons Attribution License. Feel free to use-modify-share this guide, but please give us some credit in your document. To request our whole series of Design Briefs and to be included on our distribution list for new materials, please email mspack@spackconsulting.com. And please reach out if you have any comments or questions related to this Design Brief.

Vistro File: C:\...\Pearson Farm Model.vistro
Report File: C:\Users\Jonah\Desktop\AM EXIST.pdf

Scenario 1 Existing AM Peak
3/7/2017

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Alpine Drive & Puma Street	Two-way stop	HCM 2010	NB Left	0.002	9.0	A
2	Puma Street & Bunker Lake Boulevard	Two-way stop	HCM 2010	SB Thru	0.000	9.0	A
3	Alpine Drive & Okapi Street	Two-way stop	HCM 2010	SB Left	0.005	9.1	A

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: Alpine Drive & Puma Street

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):	0.002

Intersection Setup

Name						
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		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	2	0	53	6	0	43
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]	2	0	53	6	0	43
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	0	13	2	0	11
Total Analysis Volume [veh/h]	2	0	53	6	0	43
Pedestrian Volume [ped/h]	0		0		0	

Appendix G: Capacity Analysis Backup

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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	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.01	8.57	0.00	0.00	7.33	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.01	0.01	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.17	0.17	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.01		0.00		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.17					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 2: Puma Street & Bunker Lake Boulevard

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):	0.000

Intersection Setup

Name											
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			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name											
Base Volume Input [veh/h]	0	0	0	6	0	0	0	0	0	0	2
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
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
Growth Rate	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
Site-Generated Trips [veh/h]	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
Pass-by Trips [veh/h]	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
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	6	0	0	0	0	0	0	2
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	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	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	2	0	0	0	0	0	0	1
Total Analysis Volume [veh/h]	0	0	0	6	0	0	0	0	0	0	2
Pedestrian Volume [ped/h]	0			0			0			0	

Appendix G: Capacity Analysis Backup

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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	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	8.52	9.03	8.32	8.54	9.04	8.34	7.22	0.00	0.00	7.22	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A		A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.44	0.44	0.44	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	8.62			8.54			2.41			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	6.41											
Intersection LOS	A											

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Intersection Level Of Service Report
Intersection 3: Alpine Drive & Okapi Street

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						
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		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	3	2	0	53	42	1
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]	3	2	0	53	42	1
Peak Hour Factor	0.8534	0.8534	0.8534	0.8534	0.8534	0.8534
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	0	16	12	0
Total Analysis Volume [veh/h]	4	2	0	62	49	1
Pedestrian Volume [ped/h]	0		0		0	

Appendix G: Capacity Analysis Backup

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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	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.09	8.56	7.31	0.00	0.00	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.02	0.02	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.49	0.49	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	8.91		0.00		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.45					
Intersection LOS	A					

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Report File: C:\Users\Jonah\Desktop\AM EXIST.pdf

Scenario 1 Existing AM Peak
3/7/2017

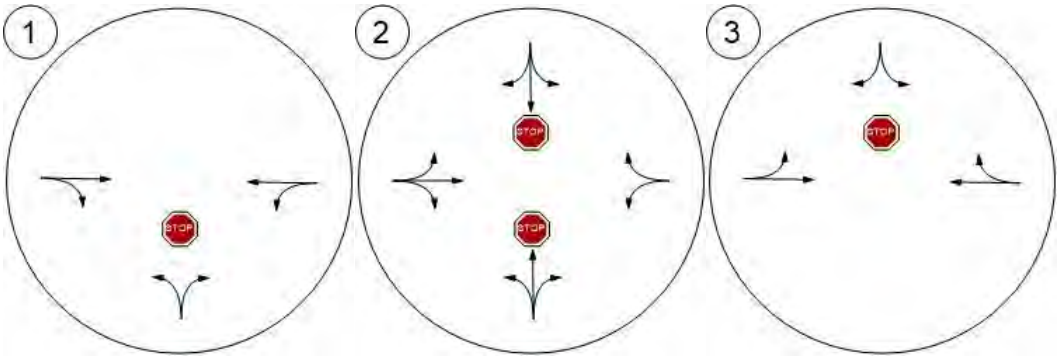
Turning Movement Volume: Summary

ID	Intersection Name	Northbound		Eastbound		Westbound		Total Volume
		Left	Right	Thru	Right	Left	Thru	
1	Alpine Drive & Puma Street	2	0	53	6	0	43	104

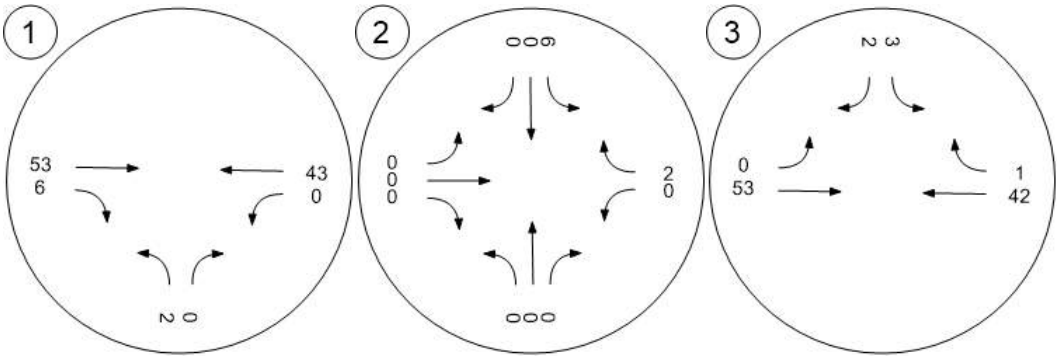
ID	Intersection Name	Northbound			Southbound			Eastbound			Westbound		Total Volume
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Right	
2	Puma Street & Bunker Lake Boulevard	0	0	0	6	0	0	0	0	0	0	2	8

ID	Intersection Name	Southbound		Eastbound		Westbound		Total Volume
		Left	Right	Left	Thru	Thru	Right	
3	Alpine Drive & Okapi Street	3	2	0	53	42	1	101

Lane Configuration and Traffic Control



Traffic Volume - Base Volume



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Report File: C:\Users\Jonah\Desktop\PM EXIST.pdf

Scenario 2 Existing PM Peak
3/7/2017

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Alpine Drive & Puma Street	Two-way stop	HCM 2010	NB Left	0.005	9.1	A
2	Puma Street & Bunker Lake Boulevard	Two-way stop	HCM 2010	SB Thru	0.000	9.0	A
3	Alpine Drive & Okapi Street	Two-way stop	HCM 2010	SB Left	0.000	9.2	A

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: Alpine Drive & Puma Street

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						
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		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	4	1	60	3	1	50
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	1	60	3	1	50
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	0	15	1	0	13
Total Analysis Volume [veh/h]	4	1	60	3	1	50
Pedestrian Volume [ped/h]	0		0		0	

Appendix G: Capacity Analysis Backup

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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	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.10	8.61	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	0.10	0.10
95th-Percentile Queue Length [ft]	0.42	0.42	0.00	0.00	2.57	2.57
d_A, Approach Delay [s/veh]	9.00		0.00		0.14	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.44					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 2: Puma Street & Bunker Lake Boulevard

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):	0.000

Intersection Setup

Name											
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			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name											
Base Volume Input [veh/h]	0	0	0	5	0	0	0	0	0	0	0	5
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	5	0	0	0	0	0	0	0	5
Peak Hour 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
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	0	0	0	0	1
Total Analysis Volume [veh/h]	0	0	0	5	0	0	0	0	0	0	0	5
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]	8.53	9.04	8.32	8.55	9.05	8.35	7.23	0.00	0.00	7.22	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A		A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.01	0.01	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	0.37	0.37	0.37	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	8.63			8.55			2.41			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	4.27											
Intersection LOS	A											

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Intersection Level Of Service Report
Intersection 3: Alpine Drive & Okapi Street

Control Type:	Two-way stop	Delay (sec / veh):	9.2
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name						
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		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	3	2	58	50	4
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	3	2	58	50	4
Peak Hour Factor	0.9023	0.9023	0.9023	0.9023	0.9023	0.9023
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	1	1	16	14	1
Total Analysis Volume [veh/h]	0	3	2	64	55	4
Pedestrian Volume [ped/h]	0		0		0	

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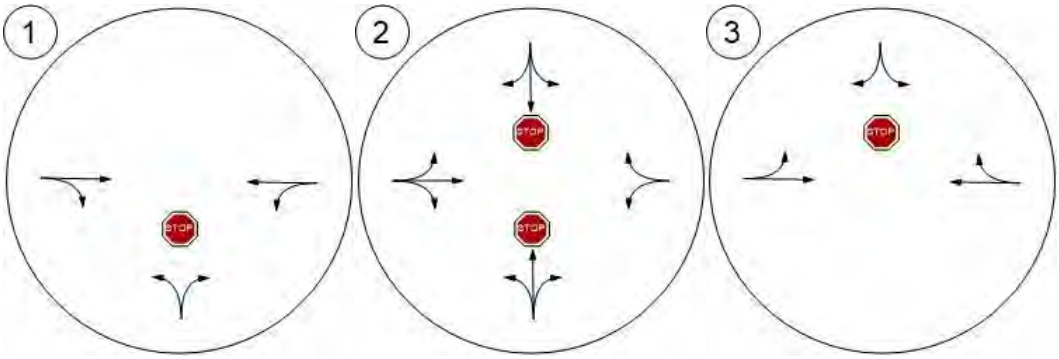
Intersection Settings

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

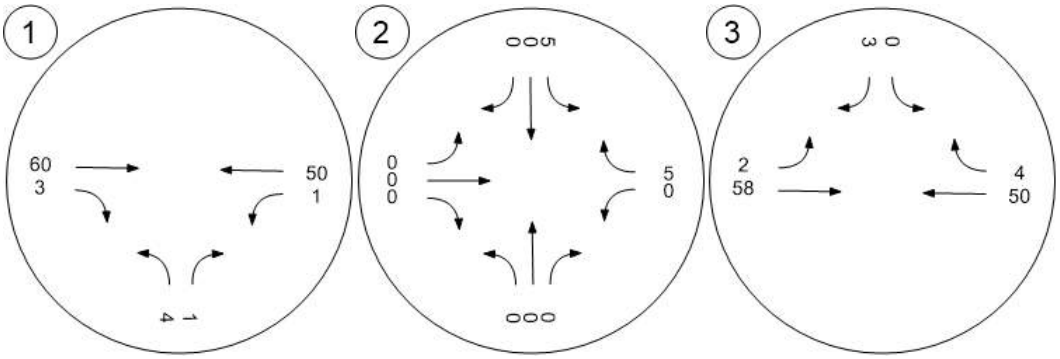
Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.15	8.58	7.33	0.00	0.00	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.01	0.01	0.13	0.13	0.00	0.00
95th-Percentile Queue Length [ft]	0.22	0.22	3.34	3.34	0.00	0.00
d_A, Approach Delay [s/veh]	8.58		0.22		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.32					
Intersection LOS	A					

Lane Configuration and Traffic Control



Traffic Volume - Base Volume



Vistro File: C:\...\Pearson Farm Model.vistro
Report File: C:\...\2040_No-Build AM.pdf

Scenario 4 2040 No-Build_ AM Peak
3/7/2017

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
2	Puma Street & Bunker Lake Boulevard	Two-way stop	HCM 2010	SB Thru	0.000	11.5	B
3	Alpine Drive & Okapi/Puma Street	Two-way stop	HCM 2010	NB Thru	0.000	16.6	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 2: Puma Street & Bunker Lake Boulevard

Control Type:	Two-way stop	Delay (sec / veh):	11.5
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name											
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			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name											
Base Volume Input [veh/h]	0	0	0	6	0	0	0	0	0	0	2
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
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
Growth Rate	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
Site-Generated Trips [veh/h]	0	0	0	285	0	0	0	0	0	0	189
Diverted Trips [veh/h]	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
Existing Site Adjustment Volume [veh/h]	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
Total Hourly Volume [veh/h]	0	0	0	291	0	0	0	0	0	0	191
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	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	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	73	0	0	0	0	0	0	48
Total Analysis Volume [veh/h]	0	0	0	291	0	0	0	0	0	0	191
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	0.33	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	10.11	8.32	11.02	11.50	10.71	7.60	0.00	0.00	7.22	0.00	0.00
Movement LOS	A	B	A	B	B	B	A	A	A	A		A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	1.44	1.44	1.44	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	35.91	35.91	35.91	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.16			11.02			2.53			0.00		
Approach LOS	A			B			A			A		
d_I, Intersection Delay [s/veh]	6.66											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 3: Alpine Drive & Okapi/Puma Street

Control Type:	Two-way stop	Delay (sec / veh):	16.6
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name											
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			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	2	0	1	3	0	2	0	53	6	0	42	1
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]	46	0	40	0	0	0	0	0	177	152	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]	48	0	41	3	0	2	0	53	183	152	42	1
Peak Hour Factor	0.8534	0.8534	0.8534	0.8534	0.8534	0.8534	0.8534	0.8534	0.8534	0.8534	0.8534	0.8534
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]	14	0	12	1	0	1	0	16	54	45	12	0
Total Analysis Volume [veh/h]	56	0	48	4	0	2	0	62	214	178	49	1
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	0.15	0.00	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00
d_M, Delay for Movement [s/veh]	16.20	16.55	10.87	15.44	16.38	8.64	7.31	0.00	0.00	8.25	0.00	0.00
Movement LOS	C	C	B	C	C	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.75	0.75	0.75	0.04	0.04	0.04	0.00	0.00	0.00	0.64	0.64	0.64
95th-Percentile Queue Length [ft]	18.69	18.69	18.69	1.02	1.02	1.02	0.00	0.00	0.00	16.07	16.07	16.07
d_A, Approach Delay [s/veh]	13.74			13.18			0.00			6.44		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	4.85											
Intersection LOS	C											

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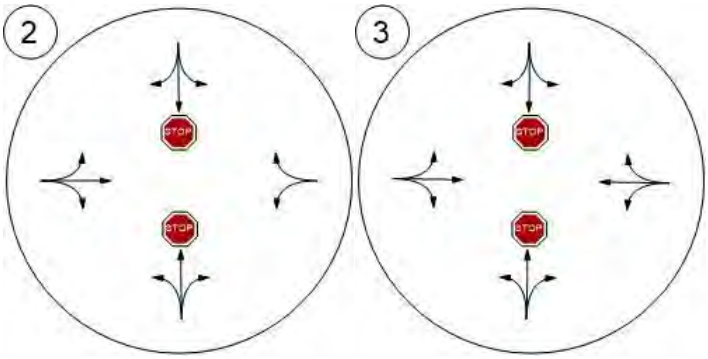
Lane Configuration and Traffic Control



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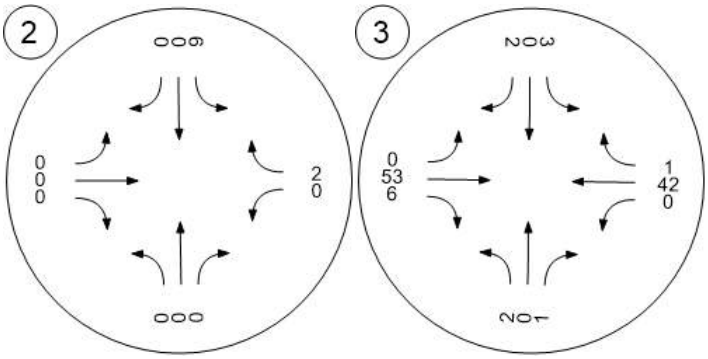
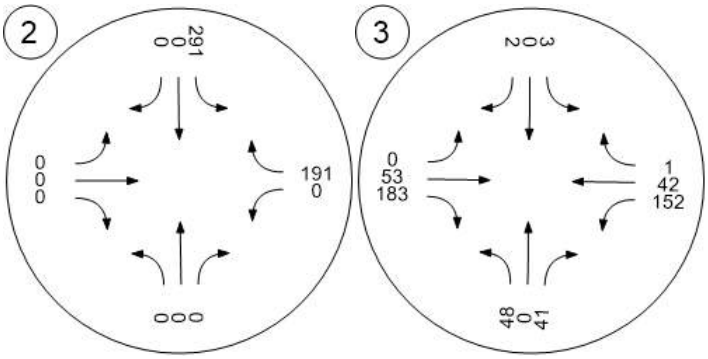
Traffic Volume - Base Volume



Traffic Volume - Future Total Volume



Vistro File: C:\...\Pearson Farm Model.vistro
Report File: C:\...\2040_No-Build PM.pdf

Scenario 5 2040 No-Build_ PM Peak
3/7/2017

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
2	Puma Street & Bunker Lake Boulevard	Two-way stop	HCM 2010	SB Thru	0.000	11.4	B
3	Alpine Drive & Okapi/Puma Street	Two-way stop	HCM 2010	NB Thru	0.000	14.3	B

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 2: Puma Street & Bunker Lake Boulevard

Control Type:	Two-way stop	Delay (sec / veh):	11.4
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name											
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			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name											
Base Volume Input [veh/h]	0	0	0	5	0	0	0	0	0	0	5
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
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
Growth Rate	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
Site-Generated Trips [veh/h]	0	0	0	207	0	0	0	0	0	0	299
Diverted Trips [veh/h]	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
Existing Site Adjustment Volume [veh/h]	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
Total Hourly Volume [veh/h]	0	0	0	212	0	0	0	0	0	0	304
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	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	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	53	0	0	0	0	0	0	76
Total Analysis Volume [veh/h]	0	0	0	212	0	0	0	0	0	0	304
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	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.42	10.91	8.32	10.96	11.41	10.57	7.86	0.00	0.00	7.22	0.00	0.00
Movement LOS	A	B	A	B	B	B	A	A	A	A		A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	1.04	1.04	1.04	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	26.00	26.00	26.00	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.55			10.96			2.62			0.00		
Approach LOS	A			B			A			A		
d_I, Intersection Delay [s/veh]	4.50											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 3: Alpine Drive & Okapi/Puma Street

Control Type:	Two-way stop	Delay (sec / veh):	14.3
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name											
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			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	4	0	1	0	0	3	2	58	3	1	50	4
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]	177	0	153	0	0	0	0	0	59	51	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]	181	0	154	0	0	3	2	58	62	52	50	4
Peak Hour Factor	1.0000	1.0000	1.0000	0.9023	1.0000	0.9023	0.9023	0.9023	1.0000	1.0000	0.9023	0.9023
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]	45	0	39	0	0	1	1	16	16	13	14	1
Total Analysis Volume [veh/h]	181	0	154	0	0	3	2	64	62	52	55	4
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	0.27	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00
d_M, Delay for Movement [s/veh]	13.83	14.27	12.20	12.17	11.05	8.58	7.33	0.00	0.00	7.56	0.00	0.00
Movement LOS	B	B	B	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	2.18	2.18	2.18	0.01	0.01	0.01	0.27	0.27	0.27	0.25	0.25	0.25
95th-Percentile Queue Length [ft]	54.57	54.57	54.57	0.22	0.22	0.22	6.77	6.77	6.77	6.16	6.16	6.16
d_A, Approach Delay [s/veh]	13.08			8.58			0.11			3.54		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	8.35											
Intersection LOS	B											

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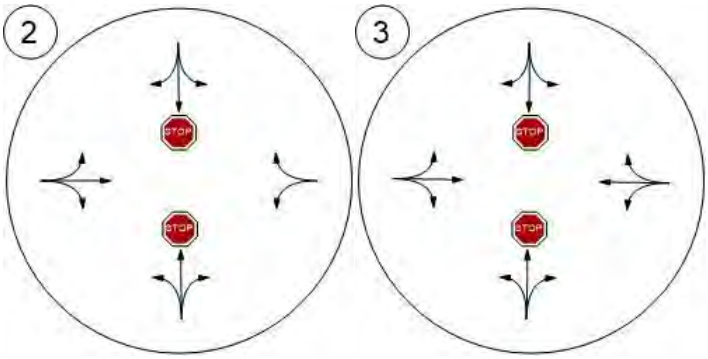
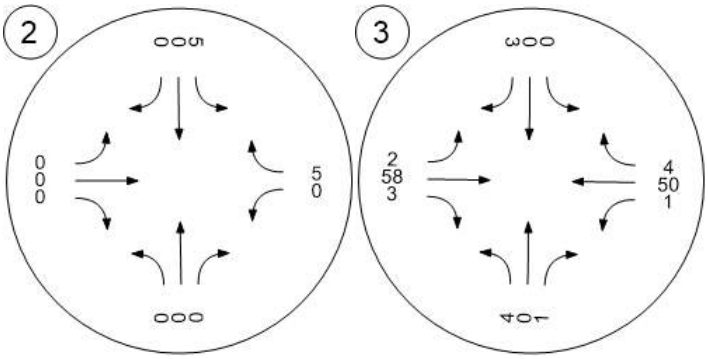
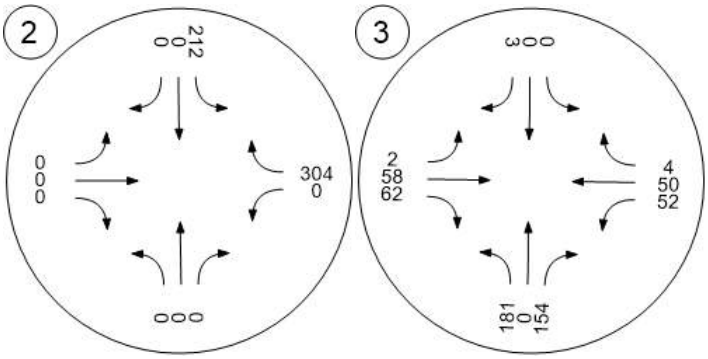
Lane Configuration and Traffic Control



Traffic Volume - Base Volume



Traffic Volume - Future Total Volume



Vistro File: C:\...\Pearson Farm Model.vistro
Report File: C:\...\2040_Build AM.pdf

Scenario 6 2040 Build_ AM Peak
3/7/2017

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
2	Puma Street & Bunker Lake Boulevard	Two-way stop	HCM 2010	SB Thru	0.000	14.0	B
3	Alpine Drive & Okapi Street	Two-way stop	HCM 2010	NB Thru	0.000	18.9	C
4	Puma Street & Northern Site Access	Two-way stop	HCM 2010	WB Left	0.071	14.9	B
5	Puma Street & Southern Site Access	Two-way stop	HCM 2010	WB Left	0.075	15.5	C
6	Alpine Drive & Site Access	Two-way stop	HCM 2010	NB Left	0.021	11.0	B

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 2: Puma Street & Bunker Lake Boulevard

Control Type:	Two-way stop	Delay (sec / veh):	14.0
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name											
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			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	6	0	0	0	0	0	0	0	2
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	357	0	4	11	31	0	0	19	201
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	363	0	4	11	31	0	0	19	203
Peak Hour 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
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	91	0	1	3	8	0	0	5	51
Total Analysis Volume [veh/h]	0	0	0	363	0	4	11	31	0	0	19	203
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	0.46	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.62	10.74	8.45	13.54	13.99	12.82	7.69	0.00	0.00	7.28	0.00	0.00
Movement LOS	A	B	A	B	B	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	2.51	2.51	2.51	0.10	0.10	0.10	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	62.73	62.73	62.73	2.41	2.41	2.41	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.61			13.53			2.02			0.00		
Approach LOS	A			B			A			A		
d_I, Intersection Delay [s/veh]	8.01											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 3: Alpine Drive & Okapi Street

Control Type:	Two-way stop	Delay (sec / veh):	18.9
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name											
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			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	2	0	1	3	0	2	0	53	6	0	42	1
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]	71	0	65	0	0	0	0	8	185	160	3	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]	73	0	66	3	0	2	0	61	191	160	45	1
Peak Hour Factor	0.8534	0.8534	0.8534	0.8534	0.8534	0.8534	0.8534	0.8534	0.8534	0.8534	0.8534	0.8534
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]	21	0	19	1	0	1	0	18	56	47	13	0
Total Analysis Volume [veh/h]	86	0	77	4	0	2	0	71	224	187	53	1
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	0.24	0.00	0.09	0.01	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00
d_M, Delay for Movement [s/veh]	18.62	18.94	12.74	16.83	17.18	8.69	7.32	0.00	0.00	8.33	0.00	0.00
Movement LOS	C	C	B	C	C	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	1.43	1.43	1.43	0.05	0.05	0.05	0.00	0.00	0.00	0.70	0.70	0.70
95th-Percentile Queue Length [ft]	35.73	35.73	35.73	1.14	1.14	1.14	0.00	0.00	0.00	17.53	17.53	17.53
d_A, Approach Delay [s/veh]	15.84			14.12			0.00			6.47		
Approach LOS	C			B			A			A		
d_I, Intersection Delay [s/veh]	5.99											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 4: Puma Street & Northern Site Access

Control Type:	Two-way stop	Delay (sec / veh):	14.9
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.071

Intersection Setup

Name												
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			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	2	0	6	4	0	0	0	0	0	0	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]	6	102	71	50	291	5	14	0	31	28	0	20
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]	6	104	71	56	295	5	14	0	31	28	0	20
Peak Hour 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
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]	2	26	18	14	74	1	4	0	8	7	0	5
Total Analysis Volume [veh/h]	6	104	71	56	295	5	14	0	31	28	0	20
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
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	0.04	0.00	0.00	0.03	0.00	0.04	0.07	0.00	0.02
d_M, Delay for Movement [s/veh]	7.87	0.00	0.00	7.68	0.00	0.00	14.39	14.63	10.36	14.87	14.46	9.68
Movement LOS	A	A	A	A	A	A	B	B	B	B	B	A
95th-Percentile Queue Length [veh]	0.50	0.50	0.50	1.01	1.01	1.01	0.25	0.25	0.25	0.31	0.31	0.31
95th-Percentile Queue Length [ft]	12.52	12.52	12.52	25.34	25.34	25.34	6.18	6.18	6.18	7.67	7.67	7.67
d_A, Approach Delay [s/veh]	0.26			1.21			11.61			12.70		
Approach LOS	A			A			B			B		
d_I, Intersection Delay [s/veh]	2.55											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 5: Puma Street & Southern 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):	0.075

Intersection Setup

Name											
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			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	2	0	0	6	0	0	0	0	0	0	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]	6	135	71	50	292	7	25	0	41	28	0	20
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]	6	137	71	50	298	7	25	0	41	28	0	20
Peak Hour 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
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]	2	34	18	13	75	2	6	0	10	7	0	5
Total Analysis Volume [veh/h]	6	137	71	50	298	7	25	0	41	28	0	20
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
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	0.04	0.00	0.00	0.06	0.00	0.06	0.08	0.00	0.02
d_M, Delay for Movement [s/veh]	7.88	0.00	0.00	7.74	0.00	0.00	15.10	15.28	10.76	15.49	14.81	9.94
Movement LOS	A	A	A	A	A	A	C	C	B	C	B	A
95th-Percentile Queue Length [veh]	0.61	0.61	0.61	1.05	1.05	1.05	0.40	0.40	0.40	0.33	0.33	0.33
95th-Percentile Queue Length [ft]	15.33	15.33	15.33	26.20	26.20	26.20	10.12	10.12	10.12	8.13	8.13	8.13
d_A, Approach Delay [s/veh]	0.22			1.09			12.41			13.18		
Approach LOS	A			A			B			B		
d_I, Intersection Delay [s/veh]	2.76											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 6: Alpine Drive & Site Access

Control Type:	Two-way stop	Delay (sec / veh):	11.0
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.021

Intersection Setup

Name						
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		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	61	0	0	54
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]	13	8	185	4	3	71
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]	13	8	246	4	3	125
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]	3	2	62	1	1	31
Total Analysis Volume [veh/h]	13	8	246	4	3	125
Pedestrian Volume [ped/h]	0		0		0	

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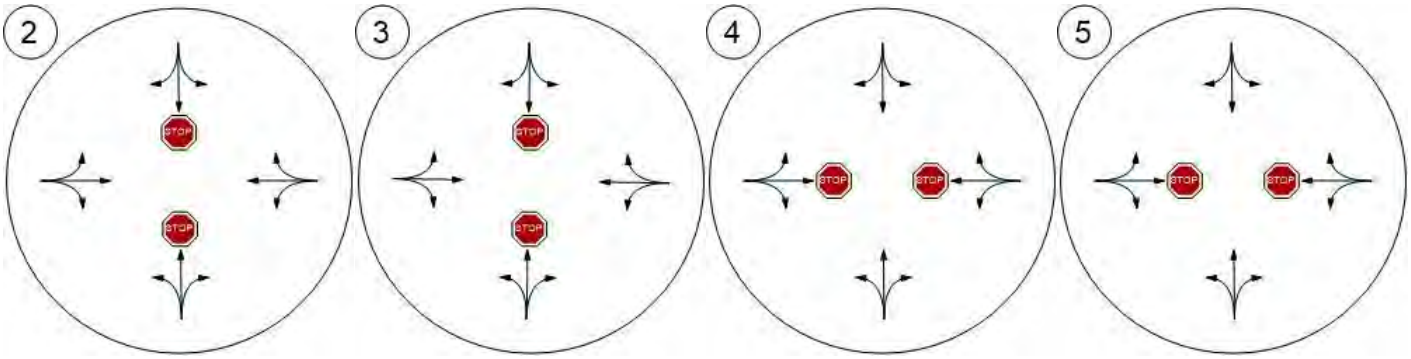
Intersection Settings

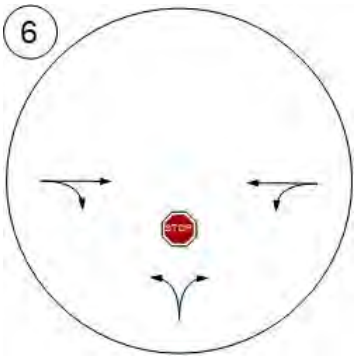
Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

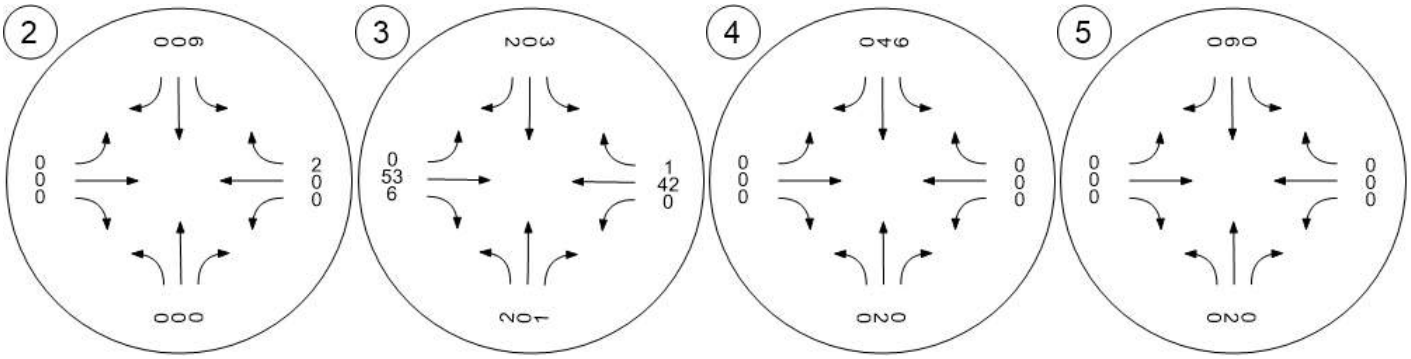
V/C, Movement V/C Ratio	0.02	0.01	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.96	9.72	0.00	0.00	7.74	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.10	0.10	0.00	0.00	0.32	0.32
95th-Percentile Queue Length [ft]	2.40	2.40	0.00	0.00	8.07	8.07
d_A, Approach Delay [s/veh]	10.49		0.00		0.18	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.61					
Intersection LOS	B					

Lane Configuration and Traffic Control





Traffic Volume - Base Volume



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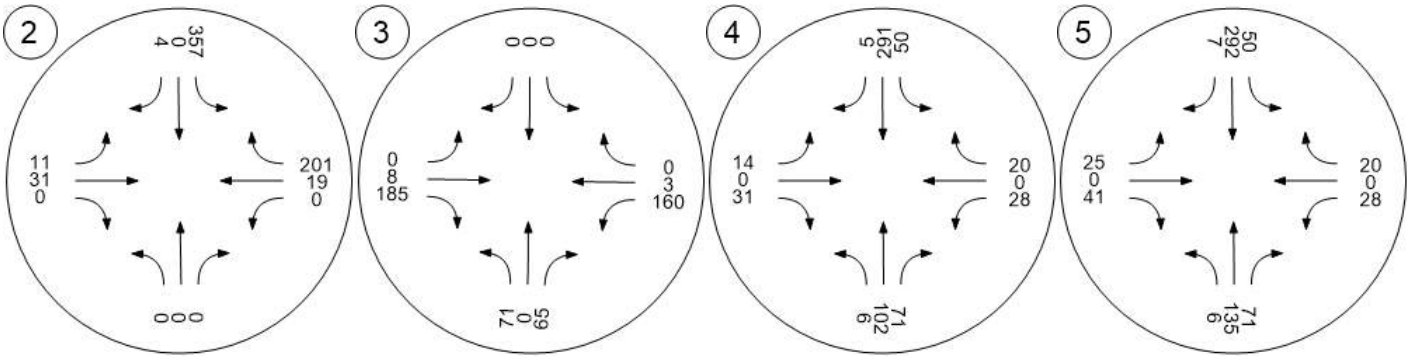
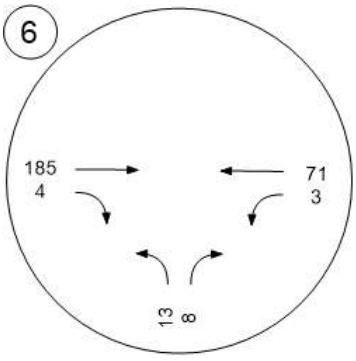
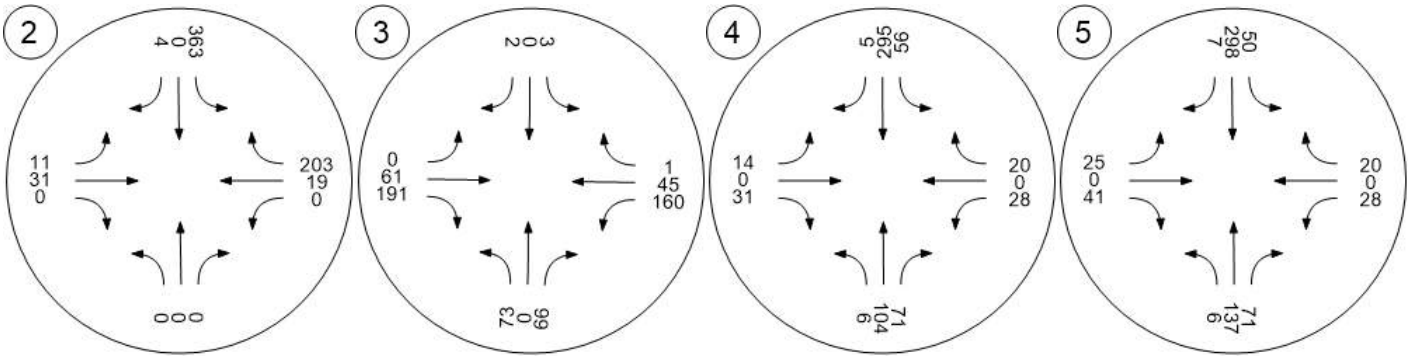
Traffic Volume - Net New Site Trips

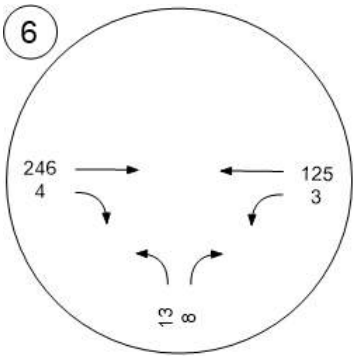




Scenario 6: 6 2040 Build_ AM Peak

Traffic Volume - Future Total Volume





Vistro File: C:\...\Pearson Farm Model.vistro
Report File: C:\...\2040_Build PM.pdf

Scenario 7 2040 Build_ PM Peak
3/7/2017

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
2	Puma Street & Bunker Lake Boulevard	Two-way stop	HCM 2010	SB Thru	0.000	14.2	B
3	Alpine Drive & Okapi Street	Two-way stop	HCM 2010	NB Thru	0.000	17.1	C
4	Puma Street & Northern Site Access	Two-way stop	HCM 2010	WB Left	0.177	16.1	C
5	Puma Street & Southern Site Access	Two-way stop	HCM 2010	WB Left	0.190	17.0	C
6	Alpine Drive & Site Access	Two-way stop	HCM 2010	NB Left	0.014	11.3	B

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 2: Puma Street & Bunker Lake Boulevard

Control Type:	Two-way stop	Delay (sec / veh):	14.2
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name											
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			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	5	0	0	0	0	0	0	0	5
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	251	0	14	7	19	0	0	67	344
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	256	0	14	7	19	0	0	67	349
Peak Hour 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
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	64	0	4	2	5	0	0	17	87
Total Analysis Volume [veh/h]	0	0	0	256	0	14	7	19	0	0	67	349
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	0.38	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.49	12.17	8.40	13.78	14.17	12.96	8.17	0.00	0.00	7.25	0.00	0.00
Movement LOS	B	B	A	B	B	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	1.90	1.90	1.90	0.07	0.07	0.07	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	47.61	47.61	47.61	1.74	1.74	1.74	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.35			13.73			2.20			0.00		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	5.29											
Intersection LOS	B											

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Intersection Level Of Service Report
Intersection 3: Alpine Drive & Okapi Street

Control Type:	Two-way stop	Delay (sec / veh):	17.1
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name											
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			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	4	0	1	0	0	3	2	58	3	1	50	4
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]	193	0	169	0	0	0	0	5	88	78	9	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]	197	0	170	0	0	3	2	63	91	79	59	4
Peak Hour Factor	1.0000	1.0000	1.0000	0.9023	1.0000	0.9023	0.9023	0.9023	1.0000	1.0000	0.9023	0.9023
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]	49	0	43	0	0	1	1	17	23	20	16	1
Total Analysis Volume [veh/h]	197	0	170	0	0	3	2	70	91	79	65	4
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	0.34	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00
d_M, Delay for Movement [s/veh]	16.66	17.08	14.29	13.61	12.03	8.62	7.35	0.00	0.00	7.69	0.00	0.00
Movement LOS	C	C	B	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	3.05	3.05	3.05	0.01	0.01	0.01	0.36	0.36	0.36	0.35	0.35	0.35
95th-Percentile Queue Length [ft]	76.27	76.27	76.27	0.23	0.23	0.23	8.91	8.91	8.91	8.72	8.72	8.72
d_A, Approach Delay [s/veh]	15.56			8.62			0.09			4.10		
Approach LOS	C			A			A			A		
d_I, Intersection Delay [s/veh]	9.34											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 4: Puma Street & Northern Site Access

Control Type:	Two-way stop	Delay (sec / veh):	16.1
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.177

Intersection Setup

Name											
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			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	5	0	0	4	0	0	0	0	0	0	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]	22	302	36	25	125	17	9	0	19	73	0	51
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]	22	307	36	25	129	17	9	0	19	73	0	51
Peak Hour 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
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]	6	77	9	6	32	4	2	0	5	18	0	13
Total Analysis Volume [veh/h]	22	307	36	25	129	17	9	0	19	73	0	51
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
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	0.02	0.00	0.00	0.02	0.00	0.02	0.18	0.00	0.07
d_M, Delay for Movement [s/veh]	7.55	0.00	0.00	8.02	0.00	0.00	14.69	14.02	9.22	16.09	16.01	12.39
Movement LOS	A	A	A	A	A	A	B	B	A	C	C	B
95th-Percentile Queue Length [veh]	1.01	1.01	1.01	0.49	0.49	0.49	0.14	0.14	0.14	0.97	0.97	0.97
95th-Percentile Queue Length [ft]	25.37	25.37	25.37	12.23	12.23	12.23	3.48	3.48	3.48	24.26	24.26	24.26
d_A, Approach Delay [s/veh]	0.45			1.17			10.98			14.57		
Approach LOS	A			A			B			B		
d_I, Intersection Delay [s/veh]	3.61											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 5: Puma Street & Southern Site Access

Control Type:	Two-way stop	Delay (sec / veh):	17.0
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.190

Intersection Setup

Name											
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			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	5	0	0	4	0	0	0	0	0	0	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]	22	293	36	25	166	26	16	0	25	73	0	51
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]	22	298	36	25	170	26	16	0	25	73	0	51
Peak Hour 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
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]	6	75	9	6	43	7	4	0	6	18	0	13
Total Analysis Volume [veh/h]	22	298	36	25	170	26	16	0	25	73	0	51
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
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	0.02	0.00	0.00	0.04	0.00	0.03	0.19	0.00	0.07
d_M, Delay for Movement [s/veh]	7.66	0.00	0.00	8.00	0.00	0.00	15.48	14.71	9.70	17.00	16.77	12.61
Movement LOS	A	A	A	A	A	A	C	B	A	C	C	B
95th-Percentile Queue Length [veh]	1.04	1.04	1.04	0.66	0.66	0.66	0.24	0.24	0.24	1.03	1.03	1.03
95th-Percentile Queue Length [ft]	25.94	25.94	25.94	16.42	16.42	16.42	5.92	5.92	5.92	25.78	25.78	25.78
d_A, Approach Delay [s/veh]	0.47			0.90			11.96			15.19		
Approach LOS	A			A			B			C		
d_I, Intersection Delay [s/veh]	3.70											
Intersection LOS	C											

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Intersection Level Of Service Report
Intersection 6: Alpine Drive & Site Access

Control Type:	Two-way stop	Delay (sec / veh):	11.3
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.014

Intersection Setup

Name						
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		40.00		40.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	61	0	0	54
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]	8	5	88	13	9	193
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]	8	5	149	13	9	247
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]	2	1	37	3	2	62
Total Analysis Volume [veh/h]	8	5	149	13	9	247
Pedestrian Volume [ped/h]	0		0		0	

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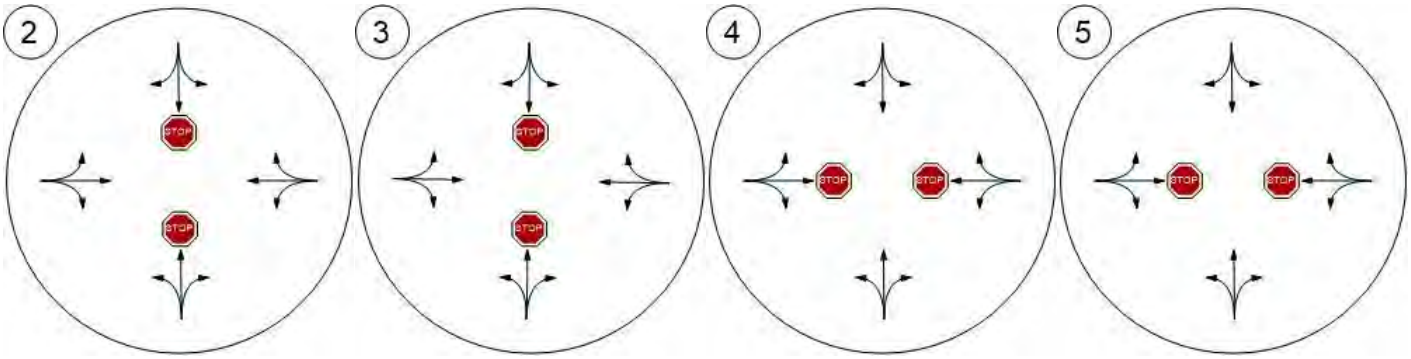
Intersection Settings

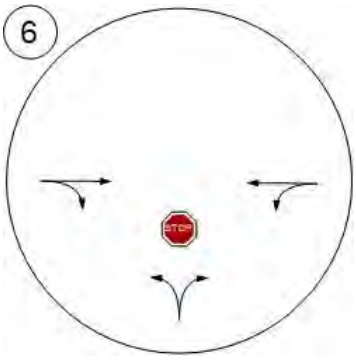
Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

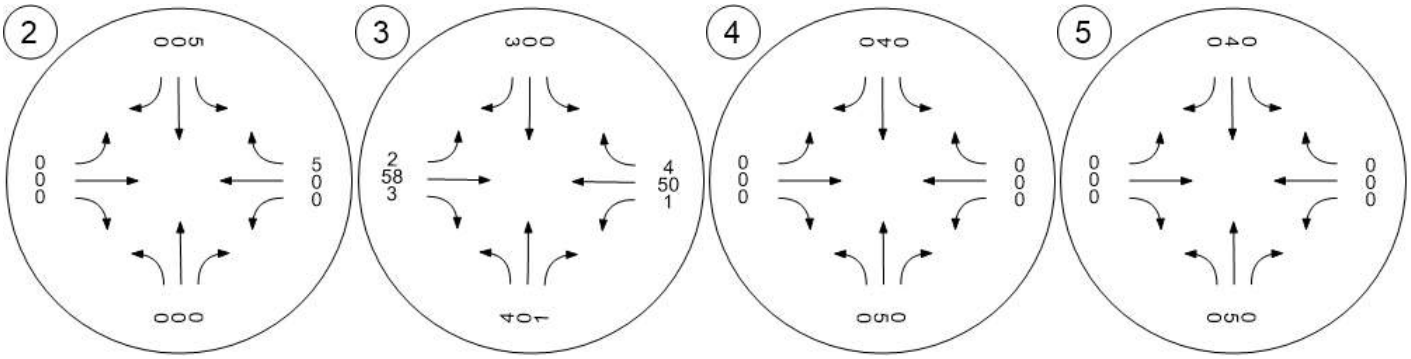
V/C, Movement V/C Ratio	0.01	0.01	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	11.26	9.15	0.00	0.00	7.56	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.06	0.06	0.00	0.00	0.66	0.66
95th-Percentile Queue Length [ft]	1.47	1.47	0.00	0.00	16.47	16.47
d_A, Approach Delay [s/veh]	10.45		0.00		0.27	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.47					
Intersection LOS	B					

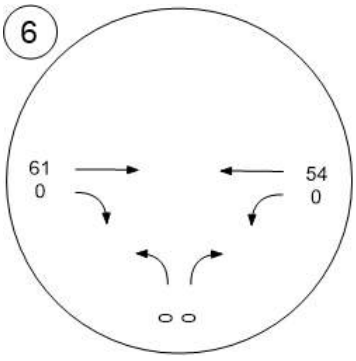
Lane Configuration and Traffic Control



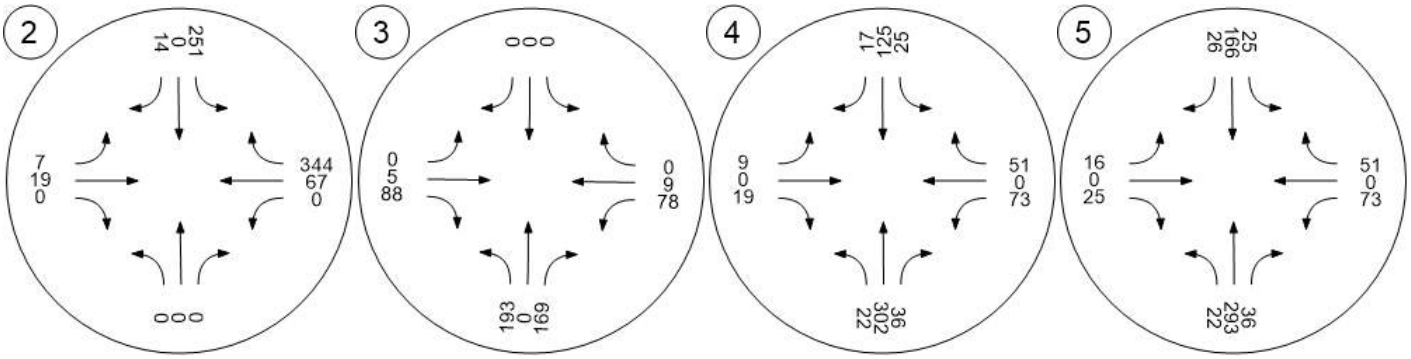


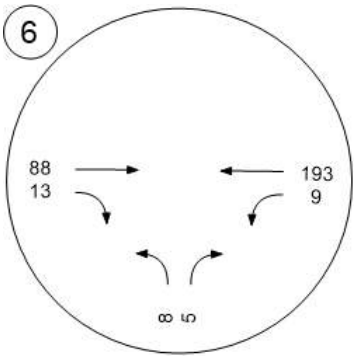
Traffic Volume - Base Volume





Traffic Volume - Net New Site Trips





Traffic Volume - Future Total Volume