Riverstone South

Environmental Assessment Worksheet



Draft December 8, 2020

Responsible Governmental Unit (RGU)

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Memorandum

To: Minnesota Environmental Quality Board
Environmental Review Distribution List

From: Tim Gladhill, Community Development Director

Date: December X, 2020

Subject: Riverstone South EAW

As the Responsible Governmental Unit (RGU), the City of Ramsey is issuing this Environmental Assessment Worksheet (EAW) for Riverstone South. The public comment period on this EAW begins when the public notice is published in the Minnesota Environmental Quality Board (EQB) Monitor on December X, 2020. A press release and 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 January X, 2021.

Environmental Assessment Worksheet (EAW)

Riverstone South

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Environmental Assessment Worksheet (EAW)

Riverstone South

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: **Riverstone South**

2. Proposer:	Riverstone Development, LLC	**RGU:**	City of Ramsey
Contact person:	Tom Bakritges	Contact person:	Tim Gladhill
Title:	Land Project Manager	Title:	Community Development Dir.
Address:	14015 Sunfish Lake Blvd.	Address:	7550 Sunwood Drive NW
	Ramsey, MN 55303		Ramsey, MN 55303
Phone:	(763) 450-1213	Phone:	(763) 433-9826
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Email	tbakritges@capstonehomes-mn.com	Email	tgladhill@cityoframsey.com

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):
The EAW is Not Mandatory, MN Rules Part 4410.4300, Subp. 19.D. (Residential development)

5. Project Location

County: Anoka County, Minnesota
City/Township: City of Ramsey
PLS Location (¼, ¼, Section, Township, Range): part of W ½ of Section 29 and part of the E ½ of Section 30, T32N, R25W
Watershed (81 major watershed scale): Mississippi River Twin Cities (20)
GPS Coordinates: 45.236147, -93.489185
Tax Parcel Number(s): part of 30-32-25-11-0032, part of 29-32-25-22-0003, and all of 29-32-25-23-0004

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).

Riverstone South is proposed on 78.63 acres of land in southwestern Anoka County. The project will include 165 detached single-family homes, 78 detached townhomes, and parkland with tree preservation. Site development will include installation of municipal sewer and water, mass grading, and stormwater management practices.

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.

Riverstone South is proposed on 78.63 acres of land in the southwestern part of the City of Ramsey, Anoka County, Minnesota (**Figure 1**). The project area is about 70% cropland and 30% woodland. The site is located in the West ½ of Section 29 and part of the E ½ of Section 30, Township 32 North, Range 25 West (**Figure 2**). The project area is bordered on the south and west by residential lots and Bowers Drive NW, on north by cropland, and on the east by cropland and a Connexus Energy solar farm. The Mississippi River is located 650 to 780 feet southwest of the site and the U.S. Highway 10 is located 530 feet north of the site. The cropland immediately north of the site is planned for extension of Riverdale Drive and commercial development.

The project will include 165 detached single-family homes, 78 detached townhomes, installation of municipal sewer and water, mass grading, and stormwater management practices. The proposed Site Plan is shown in **Figure 3**. The Site Plan and Grading Plan are shown in **Appendix A**. The project will convert about 54.14 acres of cropland and 16.17 acres of woodland to streets, homes, lawns, landscaping, and stormwater features. The balance of the site will include about 7.73 acres of tree preservation and about 0.59 acre of grassland preservation. The project will include about 17.46 acres of open space consisting of tree preservation, stormwater features, parks, and buffers. The project area does not include wetlands, but 42% of the site (33.30 acres) falls within the Mississippi River Corridor Critical Area (**Figure 4**).

The site includes sandy soils, 22 feet of topographic relief, and mostly flat to gradual slopes. The steepest slopes on the site, at 12-14%, cover only about an acre in the northwestern part of the site (**Figure 5**). This sloping area will be graded and recontoured during project construction. The development area will be mass graded to install utilities, streets, residential building pads, and stormwater basins. A 30-foot landscape buffer will be provided along the northern edge of the site

next to Riverdale Drive and the project will not affect the existing 50-foot wooded buffer behind residential lots located southwest of the site.

Single-family lots will generally range from 40 to 65 feet wide and will typically be at least 11 feet deep. Most public streets are expected to be 29 feet wide and located within 60-foot rights-of-ways. Pearson Boulevard, which will be routed through the approximate center of the site, will be slightly wider at 32 feet. A 60-foot-wide open grass strip will provide an informal and emergency access to Bowers Drive, which is located 400 feet southwest of the site. The development will operate under a homeowners' association.

Development of the project area will involve installation of public and private infrastructure, including streets, 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 spring or summer of 2021 or 2022 and be phased over 3 to 5 years, depending on market conditions. Construction will generally be phased from the north to the south based on the extension of municipal water and sewer, which will be extended with Riverdale Drive, to be constructed along the north 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 basin 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	78.63
Linear project length	NA
Number and type of residential units	165 single-family detached 78 detached townhomes 243 total detached units
Number and type of residential units	0
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 Riverstone South 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	54.14	0.00
Woodland	23.90	7.73
Grassland	0.59	0.95
Lawn and landscaping	0.00	39.51
Impervious surface (developed)	0.00	25.62
Stormwater basins	0.00	4.82
Totals	78.63	78.63

Existing cover types 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	Discretionary EAW Decision	To be applied for
City of Ramsey	Comprehensive Plan Amendment	Submitted
City of Ramsey	Zoning Amendment	Submitted
City of Ramsey	Concept Plan Approval	Submitted
City of Ramsey	Preliminary and Final Plat Approval	Submitted
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	Concurrence with No Wetland Determination	Approved
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 if needed
Minnesota Pollution Control Agency	NPDES/SDS General Permit	To be applied for
Minnesota Pollution Control Agency	Sanitary Sewer Extension Approval	To be applied for
U. S. Army Corps of Engineers	Concurrence with No Wetlands/Waters Delineation	Approved

Cumulative potential effects may be considered and addressed in response to individual EAW Item Nos. 9-18, or the RGU can address all cumulative potential effects in response to EAW Item No. 19. If addressing cumulative effect under individual items, make sure to include information requested in EAW Item No. 19

9. Land Use

a. Describe:

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

About 70% of the project area has been in agricultural use since at least the 1930s and the remaining 30% has been in woodland and grassland. Surrounding land use is residential to the south and west, agricultural (future commercial) to the north, and agricultural (future residential) and solar to the east (**Figure 4**).

Farmland ratings for soils mapped in the project area are listed in **Table 4** under **Item 10b** of this EAW. Of the seven soil map units present in the project area, one soil type covering 9.5% of the site is prime farmland, two soils covering 50% of the site are farmland of statewide importance, and four soils covering 40.5% of the site are not prime farmland.

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 2040 Comprehensive Plan guides the site for Low Density Residential (LDR, generally 3-4 lots/net acre). The net density of the site, after factoring out open space, is 3.95 lots/acre. The part of the site planned for 40-foot-wide lots will exceed a net density of 4 lots/acre and will require a Comprehensive Plan Amendment to Medium Density Residential (MDR, average of 7 units/acre). The City of Ramsey Comprehensive Parks and Recreation Plan shows the Mississippi Regional Trail, to be constructed on property north of the site near the U.S. Highway 10 corridor. Mapping prepared by the Minnesota DNR shows Metro Conservation Corridors in the vicinity of the project.

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 shows the project area zoned for R-1 (Low-Density Residential [MUSA]). The City of Ramsey is in the process of a Zoning Amendment for consistency with the 2040 Comprehensive Plan. The proposed 65- to 40-foot-wide residential lots will be allowed under the Zoning Amendment.

The project area does not fall in or near a wild and scenic river or an agricultural preserve.

Floodplains

The site is outside the floodplain of the Mississippi River (**Figure 5**). The site falls in FEMA (Federal Emergency Management Agency) FIRM (Flood Insurance Rate Map) Panel 27003C0280E, which shows that the floodway elevation of the Mississippi River, Flood Zone AE (1% annual

chance flood), ranges from 855 feet at the upstream end of the site to 853 feet at the downstream end of the site. The lowest elevation onsite (at the southeast corner of the site) is 858 feet. The site is outside the floodplain because the lowest part of the site is 5 feet higher than the corresponding flood elevation. 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.

Shorelands

The site is outside the shoreland overlay district of the Mississippi River (**Figure 5**). The shoreland overlay district extends 300 feet from the edge of the bank of the river channel, or to the landward extent of the floodplain, whichever is greater. The site is setback about 666 feet from the Mississippi River and is located entirely outside the floodplain, so the shoreland overlay district does not affect the proposed project.

Mississippi River Corridor Critical Area (MRCCA)

About 42% of the site (33.30 acres) falls in the Mississippi River Corridor Critical Area (MRCCA) (**Figure 4**) and the Mississippi National River and Recreation Area (MNRRA). The MRCCA is administered by the City of Ramsey, with oversight by the Minnesota DNR, and sets standards for land development. The MNRRA is overseen by the National Park Service and does not regulate development on private lands. Land use in the MRCCA is regulated under three documents:

1. Section 117-144 to 117-148 (Environmental Protection Overlay Districts) of the City of Ramsey City Code;
2. Chapter 6 Mississippi River Corridor Critical Area Plan, of the City of Ramsey 2040 Comprehensive Plan; and
3. Minnesota Rules Chapter 6106 (Mississippi River Corridor Critical Area).

Minnesota Rules Part 6106 and the City of Ramsey Comprehensive Plan designate the MRCCA within the project area as CA-SR (Critical Area, Separated from River). Land in this district is not readily visible from the river and therefore the district provides flexibility in managing development. Maximum structure height is 35 feet. Lot area and width standards must comply with requirements of the underlying zoning district. Primary conservation areas must be set aside as open areas, and the required set-aside is 10% of the parcel if the parcel includes native plant communities.

The proposed Site Plan (**Figure 3**) will preserve woodland open space over 10% of the project area and about 24% of the MRCCA area within the site (roughly 8 acres). In addition, the project design transitions from larger lots near in the southwestern part of the site within the MRCCA and near existing residential lots, to smaller lots in the northeastern part of the site near the existing solar farm and future commercial development area. The MRCCA area includes additional open space allocated to stormwater management and a grassed public safety connection to Bowers Drive.

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 residential, agricultural, and solar energy. The City of Ramsey 2040 Comprehensive Plan guides the site for Low Density Residential (LDR, generally 3-4 lots/net acre). The net density of the site, after factoring out open space, is 3.97 lots/acre.

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 part of the site planned for 40-foot-wide lots for Medium Density Residential (MDR, average of 7 units/acre). The project area will also fall under a rezoning amendment to allow 40-foot-wide lots. The project is designed to balance smaller lots with public open space. The project will include about 17.46 acres of open space consisting of tree preservation, stormwater basins, parks, and buffers strips that will separate the project from adjacent residential and commercial areas. The proposed project is compatible with the proposed zoning, and the 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 (Minnesota Geological Survey 2013) indicates the surficial geology of the area is characterized by terrace sand and gravel. The bedrock geology of the site falls in the Tunnel City Group and consists of fine-grained sandstone, siltstone, and shale. s dominantly quartz sandstone.

The estimated depth to bedrock in the project area, based on the Geologic Atlas, generally ranges between 100 and 200 feet. As indicated under **Item 11.a.ii**, the depth to bedrock in nearby groundwater wells ranges from 95 to 180 feet and the depth to static groundwater ranges from 10 to 50 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 seven soil mapping units that consist of mostly loamy sands (**Table 4** and **Figure 7**).

Table 4. Soil Classifications

Symbol	Soil Name	% of Area	% Hydric	Hydric Category	Farmland Category
Ba	Becker very fine sandy loam	9.5	7	Predominantly non-hydric	Prime farmland
D67A	Hubbard loamy sand, 0-2% slopes	20.0	1	Predominantly non-hydric	Not prime farmland
D67B	Hubbard loamy sand, 1-6% slopes	16.0	3	Predominantly non-hydric	Not prime farmland
D67C	Hubbard loamy sand, 2-12% slopes	2.8	0	Non-hydric	Not prime farmland
DnA	Dickman sandy loam, 0-2% slopes	37.6	0	Non-hydric	Farmland of statewide importance
DnB	Dickman sandy loam, 2-6% slopes	12.5	0	Non-hydric	Farmland of statewide importance
NrD	Nymore loamy coarse sand, 12-25% slopes	1.7	0	Non-hydric	Not prime farmland

Five of the seven soils do not have limitations for dwelling units and local streets. Two of the soils (Ba and NrD) have limitations due to factors such as flooding, depth to saturated zone, frost action, and slope. 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 0.02 and 0.37.

Grading operations for residential development construction are expected to affect about 68.0 acres and involve movement of about 350,000 cubic yards of soil to construct streets, residential building pads, and stormwater features. Grading is expected to avoid disturbance of trees that will be preserved, which cover about 7.73 acres.

Elevations in the project area range from 880 feet above mean sea level at the highest point in the northwestern part of the site to 858 feet at the lowest point in the southeastern part of the site. Review of two-foot contour mapping indicates the northwestern part of the site includes about one acre of 12-14% slopes and the site does not include any bluffs (**Figure 5**). Soils mapping classifies the steepest part of the site, about 1.33 acre, as 12-25% slopes (**Table 4, Figure 7**). As shown on the

Site Plan (**Figure 3, Appendix A**), these slopes are proposed to be developed into residential lots and a street. The area of 12-14% slopes will be graded and recontoured as part of project construction.

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 does not include any surface waters, wetlands, streams, or channels. The site has sandy soils and drains overland toward the Mississippi River. The National Wetlands Inventory shows one PFO1A wetland onsite (**Figure 8**) and soils mapping shows the entire site mapped as non-hydric and predominantly non-hydric soils (**Table 4, Figure 7**). Kjolhaug Environmental Services (KES) reviewed the site in the field for wetlands on October 19, 2019 and determined that the site include no wetland. At that time, the site consisted mostly of cornfield and woodland. The woodland was dominated by oak and elm trees and did not contain any depressions dominated by hydrophytic plants. Aerial photographs of the cropland were reviewed for wetland signatures using guidance from the Minnesota Board of Water and Soil Resources (BWSR) and the U.S. Army Corps of Engineers (USACE). The aerial photograph review found the cropland did not have any areas with enough wetland signatures to warrant a field review. Nevertheless, soils were sampled in two locations that showed some wetland signatures. Non-hydric sandy soils were found at both sample points and KES concluded that the site does not include any wetlands.

The Lower Rum River Watershed Management Organization (LRRWMO) concurred with the no wetland determination on November 21, 2019 and the U.S. Army Corps of Engineers (USACE) sent a letter concurring that the site does not include aquatic resources on June 15, 2020. **Appendix B** includes the site assessment for wetlands and concurrence with the no wetland determination from wetland agencies. The Mississippi River is a MN DNR public watercourse and is located about 666

feet southwest of the project area. Land use within the Mississippi River Corridor Critical Area is discussed under **Item 9**.

Impaired waters listed by the Minnesota Pollution Control Agency (MPCA) and located within 1 mile of the site include only the Mississippi River (07010206-805), which is impaired for aquatic consumption (AQC), aquatic life (AQL), and aquatic recreation (AQR) from the Crow River to Upper St. Anthony Falls.

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 static groundwater levels in 41 groundwater wells located near the project area ranged from 10 to 50 feet (**Table 5** and **Appendix C**). The project area does not fall within a Minnesota Department of Health (MDH) wellhead protection area. The nearest Source Water Protection area is the Ramsey West Drinking Water Supply Management Area, located 0.5 mile east of the project area. Although several groundwater wells are located in the general vicinity of the site, the Minnesota County Well Index does not identify any wells located onsite. One unregistered well was found in the southeastern corner of the site during the land survey for the property. The project proponent is determining whether this well has been abandoned and will ensure it is abandoned prior to construction as noted under **Item 11.b.iii**.

Table 5. Nearby Field Verified Groundwater Wells

Well No.	Surface Elevation (feet)	Depth (feet)	Cased Depth (feet)	Depth to		Location (Direction from Site)	Aquifer
				Static Water Level (feet)	Bedrock (feet)		
503721	882	221	156	35	118	Northwest	St. Lawrence-Tunnel City
430232	883	338	294	30	116	Northeast	Wonewoc
511952	860	170	134	28	122	West	Tunnel City
486181	858	145	135	13	-	West	Quat. buried
227345	883	75	71	30	-	Northwest	Quat. buried
256060	863	186	130	40	112	West	St. Lawrence-Tunnel City
114352	877	176	134	40	95	Northwest	Tunnel City
124137	861	246	161	20	149	West	Tunnel City
711529	863	155	142	30	-	West	Quat. buried
516054	864	190	146	30	145	South	Tunnel City
133390	875	190	162	39	138	Northwest	Tunnel City
193778	880	186	155	18	155	Northwest	Tunnel City
672386	849	70	65	14	-	West	Quat. buried
124138	862	246	170	20	151	South	Tunnel City
242411	871	178	null	14	149	West	Tunnel City
416682	861	186	133	18	103	Northwest	Tunnel City

Table 5. Nearby Field Verified Groundwater Wells

Well No.	Surface Elevation (feet)	Depth (feet)	Cased Depth (feet)	Depth to		Location (Direction from Site)	Aquifer
				Static Water Level (feet)	Bedrock (feet)		
179361	878	210	170	35	114	Northwest	Tunnel City
541778	883	66	63	28	-	Northwest	Quat. buried
160047	865	260	215	18	143	South	Tunnel City
169236	870	82	78	40	-	Northwest	Quat. buried
155281	866	248	186	30	150	South	Tunnel City
417963	850	170	124	10	96	West	Tunnel City
162802	855	130	125	20	-	West	Quat. buried
149458	865	211	200	50	180	South	Tunnel City
431401	852	127	123	15	108	West	Tunnel City
656433	865	175	147	25	137	South	Tunnel City
126498	865	201	188	15	146	South	Tunnel City
409591	881	213	168	32	119	Northwest	Tunnel City
146087	865	160	155	20	150	South	Tunnel City
634427	862	120	110	25	120	south	Quat. buried
418904	881	170	148	45	110	Northwest	Tunnel City
425746	860	135	120	12	-	West	Quat. buried
494213	878	211	151	33	130	Northwest	Tunnel City
722207	860	200	135	23	111	West	Tunnel City
656104	853	73	68	25	-	West	Quat. buried
104707	863	225	194	26	160	South	Tunnel City
454349	850	92	87	30	-	West	Quat. buried
768697	867	185	145	21	130	South	St. Lawrence-Tunnel City
680275	853	186	149	30	125	West	Tunnel City
490097	866	250	201	22	121	West	Tunnel City
146160	863	156	151	20	-	South	Quat. buried

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 66,582 gallons of wastewater per day. Sanitary sewer will be extended from Riverdale Drive to serve the development area. The project will be served by a sanitary sewer lift station that will be installed along Pearson Boulevard in the southeastern part of the site. This lift station will also serve future residential development east of the site and future commercial development north of the site.

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. 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, which included 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 ground, 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 north end of the site, south toward the Mississippi River. Although the area contains highly permeable soils, some surface runoff from the site may reach the Mississippi River during 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 and woodland to residential with streets and parks. This land use change is expected to have mixed effects on runoff water volume and quality. 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 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.

Residential project construction will add about 25.62 acres of impervious surface, consisting of streets, homes, and driveways. The increased impervious surface area is expected to increase runoff volume and urban pollutants locally during significant storm events. However, stormwater rate and volume controls that comply with City of Ramsey and LRRWMO requirements will limit increases in runoff volume and associated pollutant transport. Much of the increased runoff and pollution is expected to be associated with large infrequent storm events. The creation of stormwater ponds and infiltration basins is expected to mitigate potential adverse effects from the increased impervious surface area.

The project will include approximately 4.82 acres of stormwater and infiltration basins in compliance City of Ramsey and LRRWMO requirements (**Figure 3, Appendix A**). 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 two stormwater ponds and two infiltration basins. These basins will include a 3.5-acre pond or 'lake' that will be excavated to a depth of about 26 feet. This deep pond will not have an outlet, but will be designed to serve as the

end receiving water for stormwater from the site, with a water level that bounces about 6.6 feet in response to a 1% frequency storm event. The deep pond will also serve some infiltration functions.

Surface water runoff from the project will mostly infiltrate into the ground. Runoff from large storm events may also flow overland to the southeast of the project and the Mississippi River. Proposed discharge flow rates are expected to be equal to or less than the existing flow rates. Requirements for stormwater management and erosion and sediment control are expected to minimize cumulative effects of post-development runoff on downstream waters. Project construction will include other water quality BMPs such as temporary sediment basins to comply with the MPCA General Stormwater Permit for Construction Activity.

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. 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.

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.

Stormwater and Erosion Control BMPs

Because project construction will disturb 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 may require temporary dewatering and groundwater appropriation to facilitate installation of sanitary sewer and excavation to construct the 3.5-acre deep pond. The project will not involve installation of new water wells. Project construction 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 a total of 50 million gallons and one year in duration, the project proponent will be eligible for coverage under the amended MN DNR General Permit 1997-0005 for temporary water appropriations. The extent and duration of temporary construction dewatering needed is currently unknown. Construction dewatering may be unnecessary. 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 registered wells according to the Minnesota Well Index (**Table 5, Appendix C**). However, one unregistered well was found in the southeastern corner of the site during the land survey for the property. The project proponent is determining whether this well has been abandoned, and will ensure the well is abandoned in compliance with MDH requirements prior to project construction as noted under **Item 11.a.ii**.

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. These existing

wells have a combined permitted capacity to pump 6,800 million gallons of water per year (MGY) based on Minnesota DNR water use data (**Table 6**).

Table 6. City of Ramsey Municipal Water Appropriation Permits

Permit No.	Well No.	Permitted Volume (MGY)	Average Use 2013-2018 (MGY)	Maximum Use 2013-2018 (MGY)
1985-6005	161441	850	113.8	144.3
1985-6005	416183	850	0.9	5.5
1985-6005	580303	850	88.2	164.9
1985-6005	580313	850	124.2	194.0
1985-6005	593672	850	56.3	82.3
1985-6005	706840	850	122.9	138.1
1985-6005	743832	850	89.1	161.6
1985-6005	743833	850	51.5	129.9
Total		6,800	646.9	1,020.6

During 2013-2018, these wells used a combined average of 646.9 MGY, indicating an available unused permitted volume of over 5,000 MGY. Based on past use and permitted capacity, the existing municipal wells have sufficient surplus capacity to serve the proposed project. A trunk water main will be extended from Riverdale Drive 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.

As discussed under **Item 11.a.i.**, the project area does not include any surface waters, wetlands, streams, or channels.

Wetlands and waters 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); and the MPCA, which administers Minnesota water quality standards and Section 401 of CWA.

The project will not involve physical effects on or alterations of any surface waters, wetlands, streams, or channels.

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 650 to 780 feet southwest of the site. The project will not have physical effects on the Mississippi River, will not directly affect the number of watercraft on the river, and will treat stormwater runoff prior to discharge to the river.

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.

About 70% of the project area has been in agricultural use since at least the 1930s and the remaining 30% has been in woodland and grassland. The project area does not include any known pipelines, transmission lines, or registered storage tanks. 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 (Phase I ESA) for the property in August 2020, and did not identify evidence of recognized environmental conditions or historical recognized environmental conditions in their assessment.

The Phase I ESA reported that the site contained no buildings, and recognized that the past agricultural land use generally involved use of pesticides and herbicides, some of which can persist in the environment. However, no evidence of bulk storage or improper application of agricultural chemicals was identified. The conclusions and summary from the Phase I ESA are included in **Appendix D**.

<u>What's in My Neighborhood</u>

Review of MPCA and Minnesota Department of Agriculture (MDA) "What's in My Neighborhood" (WIMN) interactive websites did not identify any potential contamination sites, environmental

permits, or registrations located within the project area. However, within an 0.25-mile radius of the project area, the MPCA WIMN website identified 10 sites, including six construction stormwater permit sites, two hazardous waste sites, one petroleum brownfield site, and one petroleum leak site (**Table 7**). The MDA website did not identify any spills, incidents, or contingency areas within 0.25 mile of the project area.

The construction stormwater permit sites relate to recent or ongoing construction projects approved in the vicinity of the proposed project. The MPCA file on the brownfield site has been closed since 2007. One of the hazardous waste sites is a very small quantity generator and the MPCA file on this other is hazardous waste site is inactive. None of these sites are known to pose an environmental contamination threat to the project area.

The MPCA's WIMN database identified the Dave Nathe Farm as a nearby petroleum Leak Site. This Leak Site is located about 320 feet north of the northwest corner of the project area (**Figure 7**). The MPCA lists it as Leak Site 6487. The Leak Site is described in the Phase I ESA (**Appendix D**) and listed in **Table 7**. The site was discovered on June 28, 1993, reported to the MPCA on June 30, 1993. The leak site file was listed as closed by the MPCA on April 24, 1996. Contaminated soils remaining are listed as unknown, offsite contamination is listed as unknown, groundwater contamination is listed as not reported and product released is listed as diesel. The Phase I ESA did not consider the site to be a recognized environmental condition because the site is separated from the project area by distance and a hydraulic side-gradient.

Table 7. What's in My Neighborhood MPCA Sites near Project Area

Site ID	Type	Name	Status[1]	Direction from Project
196399	Petroleum Remediation, Leak Site LS0006487	Dave Nathe Farm	Inactive	North
217523	Construction Stormwater	Riverstone	Active	North
225576	Construction Stormwater	Bunker Lake Blvd and Puma Str. Improv	Active	North
217643	Construction Stormwater	Bunker Lake Blvd Utilities Extension	Active	North
190937	Brownfields, Petroleum Brownfield PB3473	Hi-Ten Sports Center	Inactive	East
19731	Hazardous Waste, very small quantity generator MNR000054841	Lazydays of Minneapolis	Active	East
20905	Hazardous Waste MNR000059618	Shorewood Rv Center	Inactive	East
223243	Construction Stormwater	Anoka Solar	Active	East
217605	Construction Stormwater	Bunker Lake Industrial Park	Active	East
221392	Construction Stormwater	Pearson Place	Active	South

[1]Status is according to information available on the MPCA website.

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 will generate wastes typical of residential development operations. Most solid waste is expected to include organics, paper, other waste, and plastic (**Table 8**).

Neither the construction process nor the proposed residential development is expected to generate substantial solid or hazardous wastes, solid animal manure, sludge, or ash. Construction contractors will be required to dispose of wastes generated at the site during construction using approved methods and facilities. Contractor will be expected to 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 of the Riverstone South 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 solid waste collectors. 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.

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).

Solid waste generated in the City of Ramsey that is not recycled or hazardous is trucked to a nearby landfill such as the Elk River Landfill.

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 are not likely to occur, but a substantial spill could require 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 6**). The project area is about 70% cropland and 30% woodland, with less than one acre of 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. Land use in the area includes row crops, small grains, suburban development, wetlands, woodlands.

Much of the project area has limited wildlife habitat value because it has been occupied by annually tilled agricultural crops for years. Cropland consisted of corn, soybeans, wheat, pumpkins, and cabbage during field surveys in 2020. Kjolhaug Environmental Services completed a survey of significant trees on the site during April 13-16, 2020. Significant trees included oaks and evergreens measuring at least 4 inches DBH (diameter breast height) and all other tree species measuring at least 8 inches DBH. The tree survey identified 2,305 significant trees of 28 species. The Tree Survey Memorandum is included in **Appendix E**. Elm and oak trees accounted for 72% of the significant trees, and hackberry trees were subdominant, with 12% of the trees. Together, all other tree species accounted for 16% of the significant trees. Dominant shrubs in the woodland included honeysuckle, prickly ash, gooseberry, and raspberry. 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-989**) and/or correspondence number (**ERDB [none assigned]**) 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.*

State

A Natural Heritage Inventory System (NHIS) data request was submitted to the MN DNR to assess whether known locations of rare plant or animal species or other significant natural features are known to occur within an approximate 1-mile radius of the project area. A response had not yet been obtained from the MN DNR at the time this EAW was approved for distribution. In lieu of an MN DNR NHIS database search, Kjolhaug Environmental Services queried a licensed copy of the NHIS database to assess rare species and natural features.

The NHIS review identified records of one state special concern species and one state threatened species recorded within a 1-mile radius of the project area. Neither of these species is on the Federal threatened and endangered species list.

Observations of Blanding's turtles (*Emydoidea blandingii*), a state threatened reptile, were recorded about 1 mile north and northeast of the project area. These observations occurred in areas near Itasca Park, 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 nesting habitat, but Blanding's turtles do not typically lay eggs under forest cover. The site does not include any wetlands. The best Blanding's turtle habitat includes wetland complexes larger than 10 acres surrounded by open sandy uplands.

Other rare features within a 1-mile radius of the site include records of the black sandshell mussel (*Ligumia recta*), and a silver maple floodplain forest. These features were found in and near the Mississippi River, outside of the project area. The black sandshell is a state-listed special concern species.

Federal

Online information on rare species information maintained by the U.S. Fish and Wildlife Service (USFWS) was also reviewed for the project area. The U.S. Fish and Wildlife Service (USFWS) listed the northern long-eared bat (*Myotis septentrionalis*) as federally threatened on May 4, 2015. On February 2, 2017, the USFWS listed the rusty patched bumble bee (*Bombus affinis*) as federally endangered.

Review of the USFWS Information for Planning and Consultation (IPaC) website with a polygon encompassing the project area identified the northern long-eared bat as the only threatened or endangered species that may potentially be affected by activities at the project location. The IPaC website also noted that there are no critical habitats at this location.

The northern long-eared bat hibernates in caves during winter and establishes maternity roosting colonies under the loose bark of trees during the summer. The project area is not known to include caves and includes limited tree cover. As of June 3, 2020, MN DNR data showed no documented maternity roost trees or hibernacula entrances of the northern long-eared bat in the project vicinity.

Review of the USFWS Rusty Patched Bumble Bee Map indicates the project area falls within a Low Potential Zone. This means that the rusty patched bumble bee is not likely to be present in the project area. The nearest High Potential Zone, where rusty patched bumble bees are likely to occupy suitable habitat, is located about 3.5 miles southeast of the project and is associated with the Elm Creek Park Reserve in Hennepin County. Most habitats suitable for rusty patched bumble bees in the Upper Midwest have been converted by agriculture or other land uses. Bumble bees need areas that provide nectar and pollen from flowers, nesting sites (underground and abandoned rodent cavities or clumps of grasses), and overwintering sites for hibernating queens (undisturbed soil). Site reviews have not identified native prairie plantings or diverse areas of native wildflowers in the project area, indicating a lack of highly suitable bumble bee habitat.

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 54.14 acres of cropland and 16.17 acres of woodland to streets, homes, lawns, landscaping, and stormwater features. The balance of the site will include about 7.73 acres of tree preservation and about 0.59 acre of grassland preservation. The project will include about 17.46 acres of open space consisting of tree preservation, stormwater features, parks, and buffers. Of the 23.90 acres of woodland, the project will remove about 16.17 acres and preserve about 7.73 acres (**Figure 9**).

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 adverse effects such as mortality during project construction.

The project is not expected to adversely affect the black sandshell mussel and the silver maple floodplain forest because they were located outside the project area. The project will implement stormwater and erosion control practices to minimized potential indirect effects on the Mississippi River and species like the black sandshell mussel.

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 wetlands, implement sediment and erosion controls, consider use of surmountable curbs on roadways, and consider using erosion control materials constructed of organic fibers rather than plastic.

The project involves removal of woodland that may be suitable for northern long-eared bat roosting, but the federally threatened bat has not been documented on the site and the over half the construction area is cropland devoid of potential roost trees. To the extent practicable, potential effects on northern long-eared bats can be further minimized by clearing trees during October to April when bats roost in hibernaculum rather than woodlands, and by avoiding tree clearing during June 1 to August 15 when bats are rearing young.

Although project construction could be expected to slightly increase the potential for spread of invasive and weedy species, much of 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 8.43 acres of woodland, creation of 4.82 acres of stormwater basins, and setting aside a total of 17.46 acres of open space, including parks and buffers. Specific measures to minimize potential effects on Blanding's turtles are listed above.

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.

The project area includes cropland and woodland that slopes gradually toward the south and the Mississippi River, which is located 650 to 780 feet from the site. In light of the site's proximity to the Mississippi River, Nienow Cultural Consultants was retained to complete a Phase I Archaeological Survey of the project area.

Field work was conducted during October 14-15, 2020, under the direction of Principal Investigator Jeremy Nienow, PhD., RPA, and licensed archaeological surveyor. Fieldwork consisted of surface surveying corn fields, a cabbage, and pumpkin patch, and shovel testing the wooded area. Surface visibility in the agricultural fields ranged between 0 and 80%. Surface survey transects were spaced on four to five-meter intervals. Fifty-two shovel tests were excavated. Shovel tests were typically 35-40 centimeters (cm) wide and at least 80cm deep.

No prehistoric cultural material or archaeological features were identified during the field survey. Shovel test profiles documented consistent ancient floodplain soils. Based on these results, no additional archaeological work was recommended. The Phase I Archaeological Survey Report is included in **Appendix F**.

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. The project area is near the Mississippi River, but the site has relatively gradual topography and does provide any views that overlook the river. 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 main visual effect will be the transition of views of the project area from mostly open agricultural land to residential development. 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, but the project will still involve some stationary source air emissions. New residences and commercial buildings are expected to include heating and cooling systems operated by natural gas and electricity, which will result in direct or indirect sources of stationary greenhouse gas (GHG) emissions. Emissions from heating and cooling systems are expected to be similar to those from other homes in the surrounding area.

The Minnesota Environmental Quality Board is working on a framework for integrating greenhouse gas (GHG) quantification and assessment requirements into the Environmental Review Program. However, standard requirements and assessment methods are not yet complete. In light of this constraint and in the absence of official guidance, the GHG assessment presented here is qualitative.

Common GHG greenhouse gas emissions include CO2, CH4, N2O. GHG emissions are customarily converted to carbon dioxide equivalents (CO2e) using global warming conversion factors to represent the global warming potential over 100 years, equivalent to one ton of CO2 derived from fossil fuel.

GHG emissions are expected to result from:

1. Operation of petroleum fueled equipment during project construction;
2. Use of natural gas and other fossil fuels used for heating homes;
3. Fossil fuels burned to generate electricity used at the project during construction and operation;
4. Vehicle and air transportation related to project construction and operation;
5. Transport, treatment, and storage of solid waste and wastewater produced onsite;
6. Loss of carbon sequestration due to conversion of natural vegetation to developed and paved surfaces; and
7. Refrigeration, air conditioning, and the related manufacturing, service, and leakage of equipment.

GHG emissions from this project, while unquantified, are not expected to cause potential for significant environmental effects because this is a discretionary EAW, the project does not trip any other mandatory EAW thresholds, and there are no available GHG emission estimates that show a comparably sized Minnesota project with potential to exceed the mandatory EAW threshold of 100,000 tons of CO2e per year (Minnesota Rules Part 4410.4300, Subp. 15.B.).

Mitigation and adaption measures could help the project lessen the impacts of climate change and GHG emissions. Such measures may include:

1. Use energy efficient building materials that reduce needs for home heating and cooling.
2. Install energy star appliances and programable thermostats (already assumed).
3. Install smart irrigation, or no irrigation at all, to reduce outdoor water use (many Minnesota lawns now stay green all summer long without irrigation).
4. Encourage residents to sign up for utility-sponsored renewable energy programs, such as renewable connect or windsource.
5. Install high-albedo (reflective) roofing materials that reflect the sun’s UV rays and save energy needed to cool buildings.
6. Plant some turf to no-mow fine fescue mixes or native prairie/pollinator gardens to decrease mowing and increase carbon sequestration.
7. Encourage residents to sign up for utility-sponsored renewable energy programs, such as renewable connect or windsource.

8. Consider rooftop solar, electric vehicle charging stations, and/or battery storage in new homes to make them more energy autonomous and EV-ready.
9. Consider a community compost program for organic solid waste to reduce the burden on and future methane emissions from local solid waste landfills.
10. Consider a microgrid for efficient, automated distribution of energy among participants.
11. Install ground-source or air-source geothermal heat pumps during initial construction when most cost-effective.

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 result in a relatively small corresponding increase in carbon monoxide, carbon dioxide and other vehicle-related air emissions. Project development is expected to have a minor effect on air quality. GHG emissions related to traffic and transportation are listed under **Item 16.a** above. The project does not include air quality monitoring or modeling.

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. Dust and odors produced during construction is expected to be consistent with applicable regulations of the MPCA and local governments. Dust and odor levels are expected to be slightly higher during project construction than project operation.

The construction process is expected to generate some fugitive dust, but dust is not expected to be generated in objectionable quantities. The dust receptors near the project area include the single-family homes along Bowers Drive, west and south 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.

Noise receptors near the project area include the single-family homes along Bowers Drive, west and south of the site. Residences near the project site will experience elevated noise levels at various times during construction compared to existing noise levels. Grading and excavation will require heavy equipment, such as scrapers, bulldozers, and other excavating equipment.

The project is expected to minimize disturbances caused by construction noise and conform to Minnesota noise rules and standards. These rules require noise to stay within specified levels depending on the land use and the time of day or night.

Noise generated by construction equipment and building construction will be limited primarily to daylight hours when noise levels are commonly higher than at night. Contractors will be required to minimize noise impacts by maintaining equipment properly, including the use of mufflers and other noise controls as specified by manufacturers.

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 Solutions 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 Study is included in **Appendix G**.

Existing and Proposed Parking Spaces

The project area does not include any parking stalls under existing conditions. The proposed 165 detached single-family homes and 78 detached townhomes 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, 10th Edition. Spack Solutions used locally collected data to estimate trip generation for this project as it is more representative of the specific traffic patterns of the development area and presented similar trip generation results when compared to ITE.

As the project area is vacant under existing conditions, there are no existing trips to or from the development area and the existing trip generation is zero. The residential development is expected to generate a total of 1,912 estimated daily trips. A breakdown of the expected trip generation is shown in **Table 9**. Peak hour traffic generation was estimated at 140 trips during the existing AM peak hour and 186 trips during the PM peak hour under future conditions. The AM peak hour is estimated to occur between 7:00 and 8:00 AM, and the PM peak hour is estimated to occur between 4:00 and 5:00 PM. The Traffic Impact Study included in **Appendix G** provides a full description and analysis of the peak hour traffic and traffic recommendations.

Table 9. Project Trip Generation Estimates

Land Use	Source	No. of Units	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
				In	Out	Total	In	Out	Total
Single-family detached housing	Local	165	1,488	29	75	104	83	62	145
Detached townhomes	Local	78	424	9	27	36	26	15	41
Total		243	1,912	38	102	140	109	77	186

Availability of Transit and Alternative Transportation

The Ramsey Metro Transit Station is located about 1.25 miles east of the project area on the north side of 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 acceptable levels, except for the future Highway 10/Riverdale Drive intersection, which will be relocated and reconstructed to replace the existing Highway 10/Bowers Drive intersection.

The northbound left-turning movement at the new Highway 10/Riverdale Drive intersection will experience future delays with and without the traffic generated by the proposed project. The cross-street traffic volumes predicted at this location do not meet signal warrants, so an at-grade, ¾-access intersection is recommended. All other intersections are predicted to continue to operate acceptably through the 2040 build scenario.

The Highway 10/Riverdale Drive intersection experiences excessive delays and queueing under the proposed side-street stop control operations during both AM and PM peak hours. All other intersections operate within acceptable bounds with no delays or queueing concerns arising through the 2040 build scenario. Additionally, all site corridors operate with volumes within their planning level capacities through the 2040 build scenario.

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

The Traffic Impact Study recommends construction of the Highway 10/Riverdale Drive intersection to a ¾-access (**Appendix G**). This configuration removes the cross-street left turning movement (northbound left) from the intersection and improves the traffic operations to acceptable timing. This reduction in queueing and delay is a result of rerouting the highest delayed movement (northbound left turning movement) away from the Highway 10/Riverdale Drive intersection to alternative routes.

Vehicles that would normally navigate northbound to westbound at this intersection would instead travel east on Riverdale Drive to the Armstrong Boulevard/Northern Highway 10 Ramps, where they would take a northbound left to proceed westbound. In total, roughly 2.25 miles would be added to their commute with this change. Very few trips are affected by the northbound left turning movement at this location. Existing traffic counts estimate that fewer than 60 vehicles complete this movement each day.

Additionally, pedestrian and bicycle infrastructure upgrades are recommended with trail connections to existing facilities along Riverdale Drive east of Llama Street and the existing trail south of Highway 10 by Bowers Drive.

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 3 to 5 years, but the actual timing of development could vary depending on the demand for housing and market conditions. Seven other projects proposed in the City of Ramsey are expected to develop 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 other development projects that are located 0.2 to 3.8 miles from the Riverstone South development site (**Table 10**). These projects are all residential developments. Projects in close proximity to Riverstone South could potentially interact to result in cumulative effects.

Table 10. Other Projects in the City of Ramsey

Name	Description	Status	Distance/Direction from Riverstone South
Garden View Villas	18 single-family homes	Under review	1.5 miles east-northeast
Hunt Property	76 single-family homes	Under review	3.8 miles northeast
Hampton Townhomes	26 townhomes	Under review	3.8 miles east
River Walk Village	14 single-family homes	Under construction	3.1 miles east-southeast
The Preserve at Northfork	73 single-family homes	Under review	0.5 mile north
Lennar Subdivision	57 single-family homes	Under review	3.4 miles northeast
Riverstone Addition	246 single-family homes and 98 detached townhomes	Under construction	0.2 mile north

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. Geographic separation between projects serves to reduce the potential for cumulative effects. The six projects listed in **Table 10** are an average of 2.5 miles from the Riverstone South.

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. Cumulative effects on public infrastructure are not expected to be significant.

Potential cumulative effects of anticipated future projects on natural resources depend on the type, density, and location of future developments. Effects on natural resources such as wetlands and wildlife habitat vary with project location and biological diversity. Project effects on natural resources may combine with effects of nearby concurrent projects to result in subtle local cumulative effects, such as habitat fragmentation. Surface water runoff from the project will mostly infiltrate into the ground. Runoff from large storm events may also flow overland to the southeast and the Mississippi River. Requirements for stormwater management and erosion and sediment control are expected to minimize cumulative effects of post-development runoff on downstream waters. Policies and regulations of the City of Ramsey, the Lower Rum River Watershed Management Organization, and other government agencies require the stormwater mitigation measures discussed in this EAW. These mitigation measures will help ensure minimization of cumulative effects on the environment.

The project will contribute to and be affected by cumulative effects related to climate change. In Minnesota, climate change has already caused increased extreme heat, large precipitation events, flooding, annual precipitation, and growing season days. These trends will continue and increase until climate change is reversed. Effects of climate change on future project area residents could include flooding; increased maintenance of roadways, storm sewers, and drainage routes; increased human heat stress and health issues, high pollen counts; and decreased need for irrigation. Increased heat could also affect construction practices such as roofing and outdoor activities such as summer and winter sports. Snow skiing and snowmobiling could be impacted due to lack of snow and warmer temperatures. Undesirable pests such as deer ticks and fungal infections could increase as a result of climate change. Some climate change impacts, such as extreme drought, coastal flooding, and shortages of food and water, are expected to affect other parts of the planet more severely than the project area.

Climate change impacts are incremental and cumulative in nature. Just as the project will be impacted by climate change, the project will also make an incremental contribution to climate change impacts through the emission of greenhouse gases.

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 _____

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Figures 1 – 9

Riverstone South EAW

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Figure 1 - Site Location

N

0 665 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: ESRI Streets and NatGeo Basemaps, Carlson McCain

Riverstone South (KES 2020-162)
Ramsey, Minnesota

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

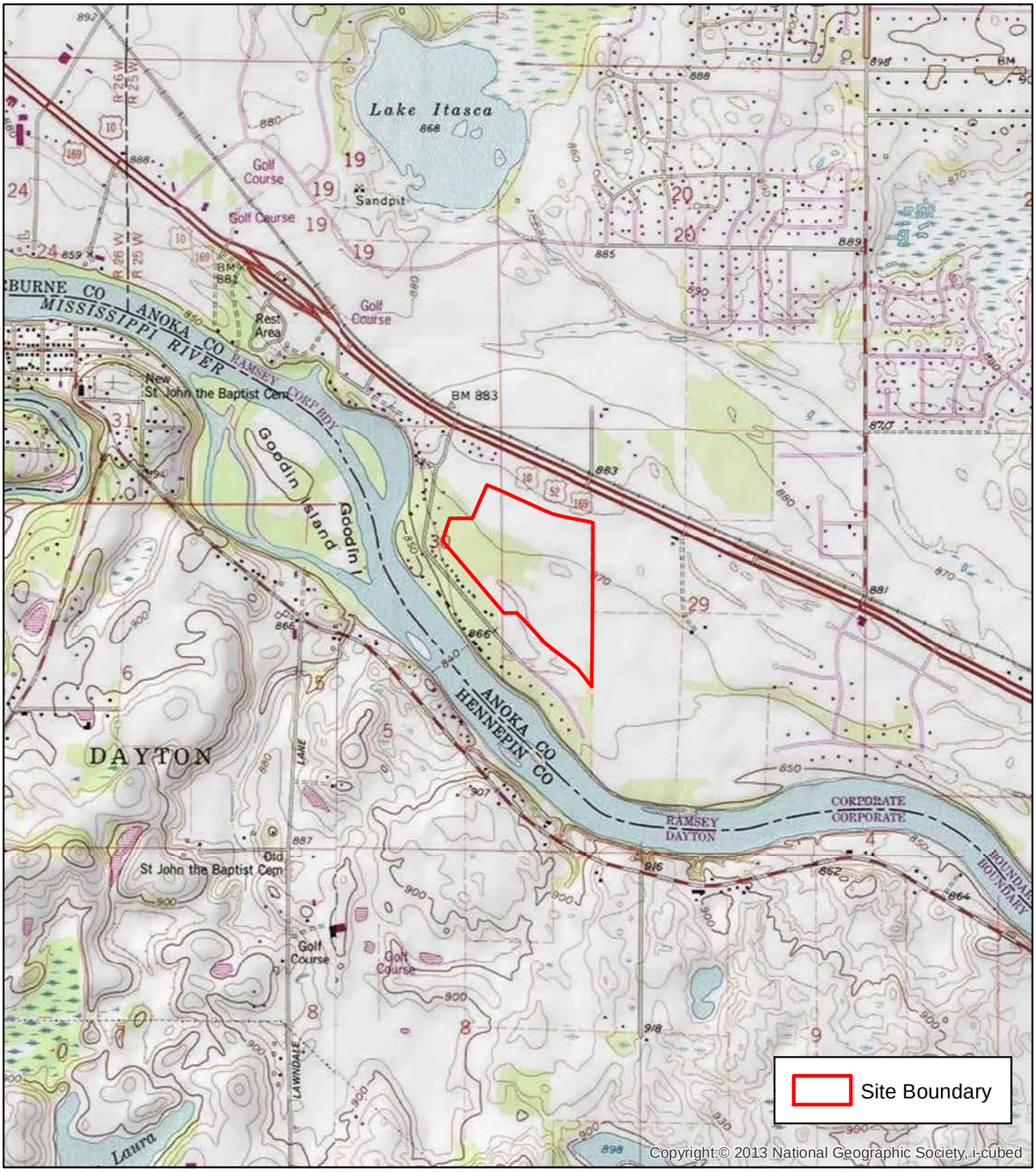


Figure 2 - USGS Topography

N

0 2,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: USGS

Riverstone South (KES 2020-162)
Ramsey, Minnesota

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



Figure 3 - Proposed Site Plan

N

0 500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons, Carlson McCain

Riverstone South (KES 2020-162)
Ramsey, Minnesota

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

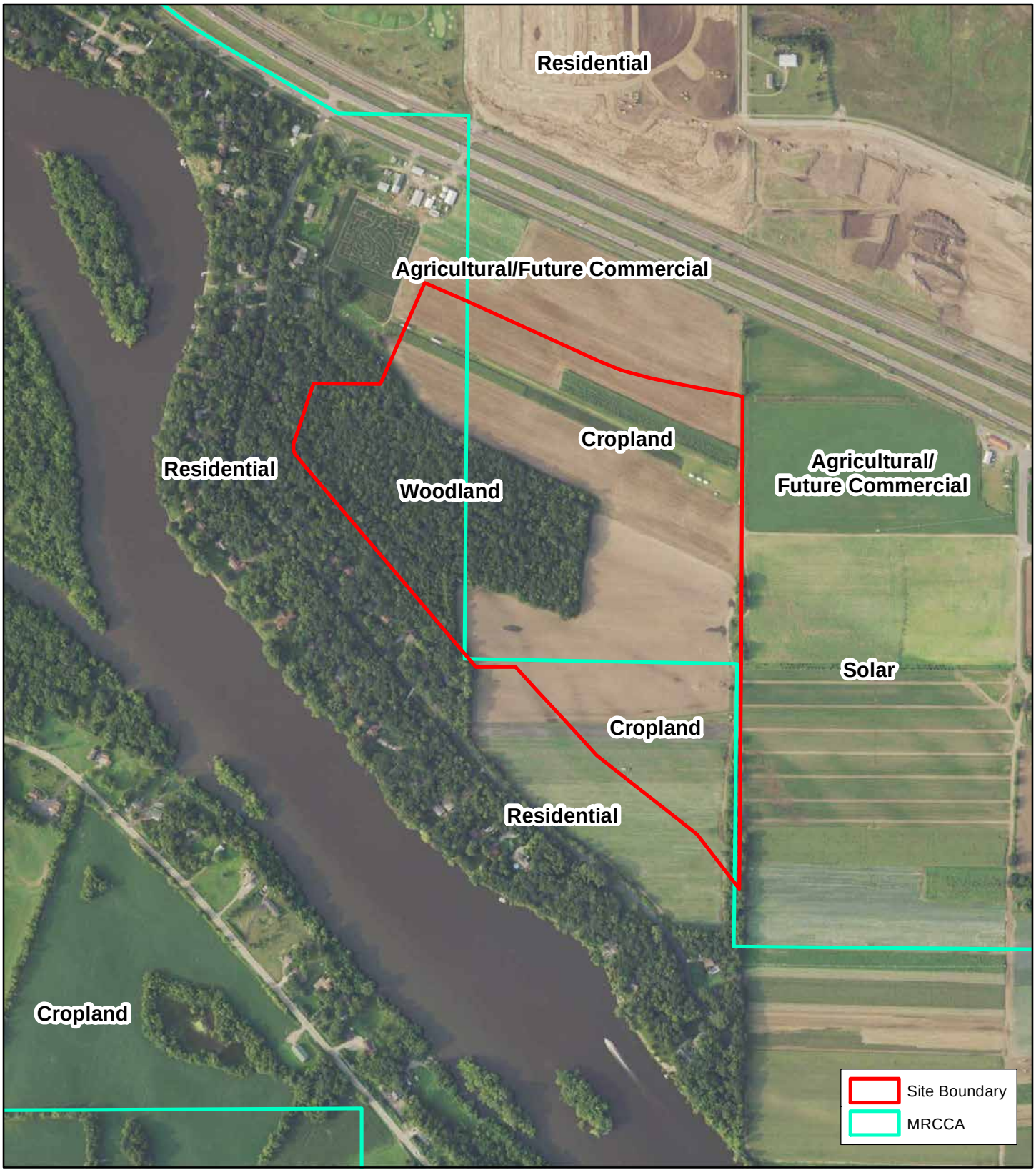


Figure 4 - Existing Land Use and Mississippi River Critical Corridor Area

N

0 665 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

Riverstone South (KES 2020-162)
Ramsey, Minnesota

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

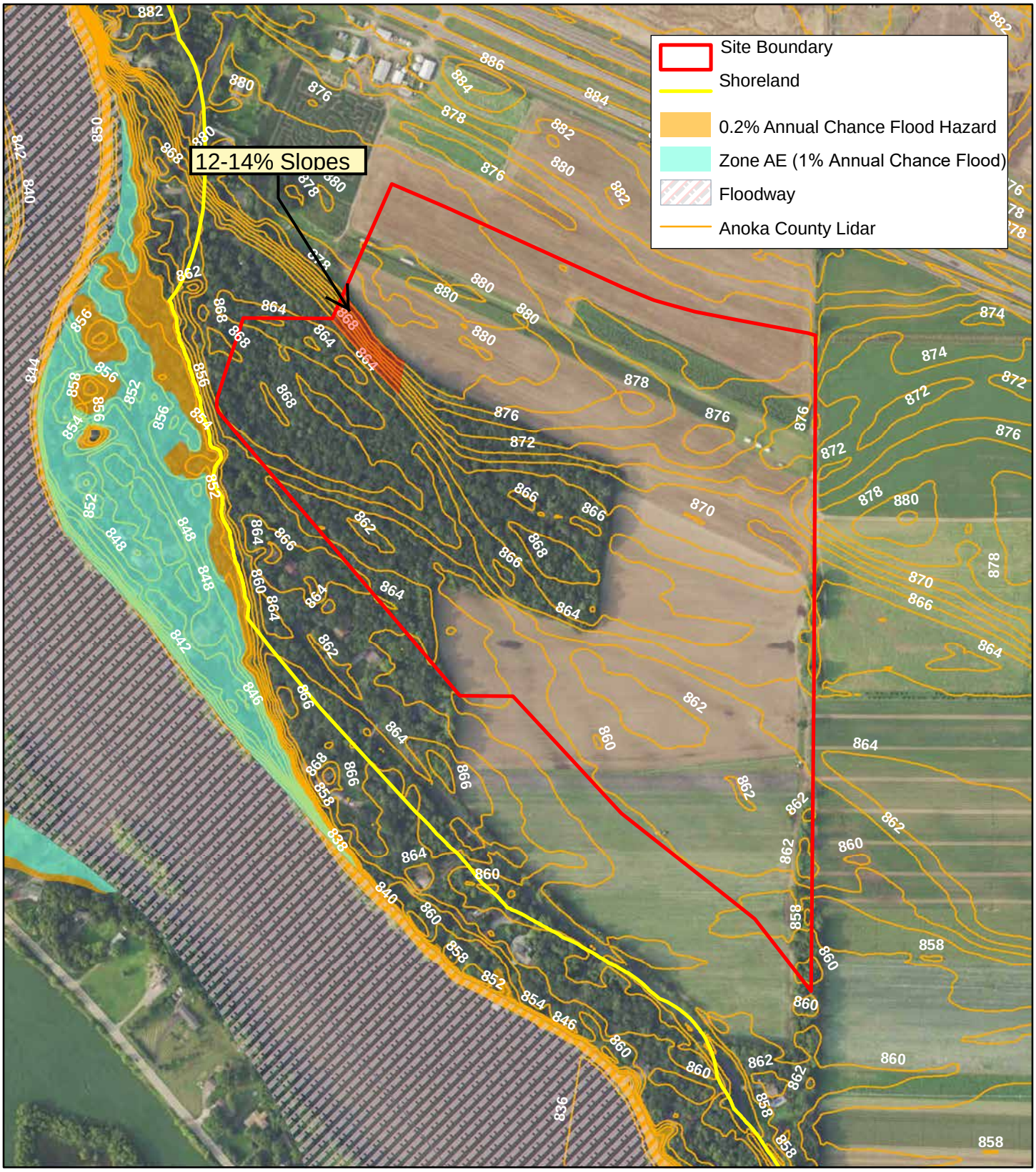


Figure 5 - Floodplains, Shorelands, and Slopes

N

0 500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons, FEMA

Riverstone South (KES 2020-162)
Ramsey, Minnesota

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

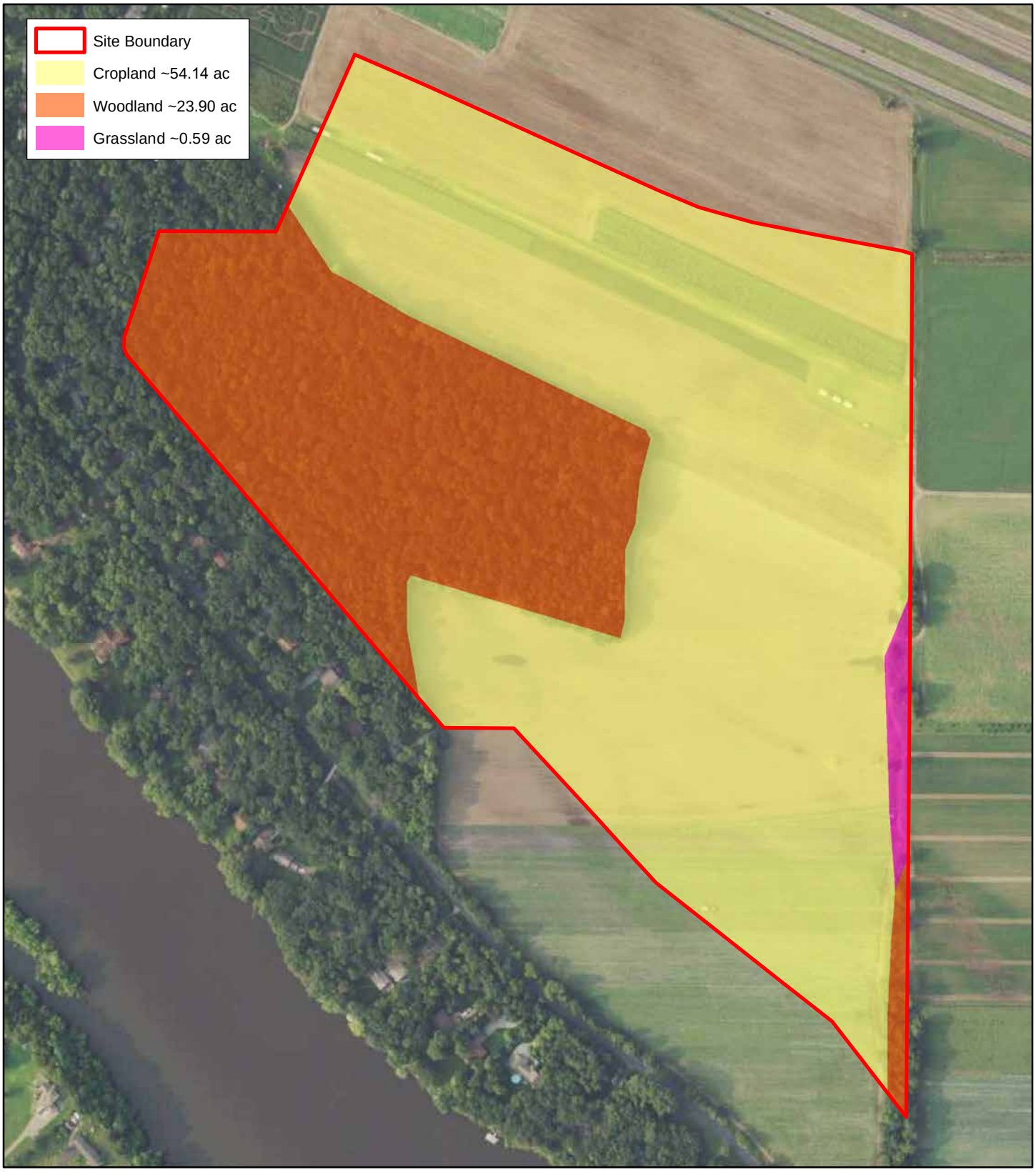


Figure 6 - Existing Cover Types

N

0 380 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

Riverstone South (KES 2020-162)
Ramsey, Minnesota

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

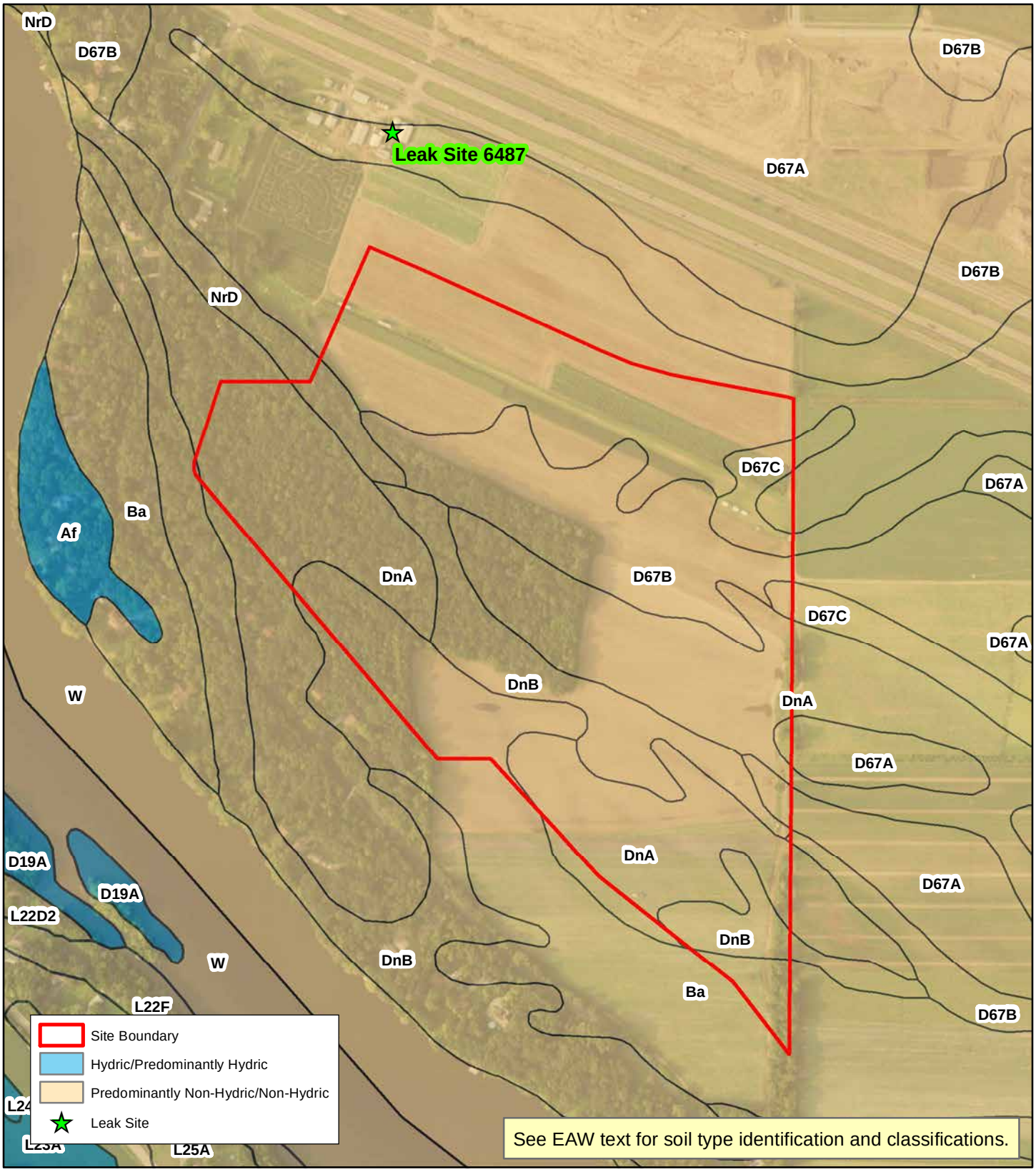


Figure 7 - Soil Types and Location of Leak Site

N

0 500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons, MPCA

Riverstone South (KES 2020-162)
Ramsey, Minnesota

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

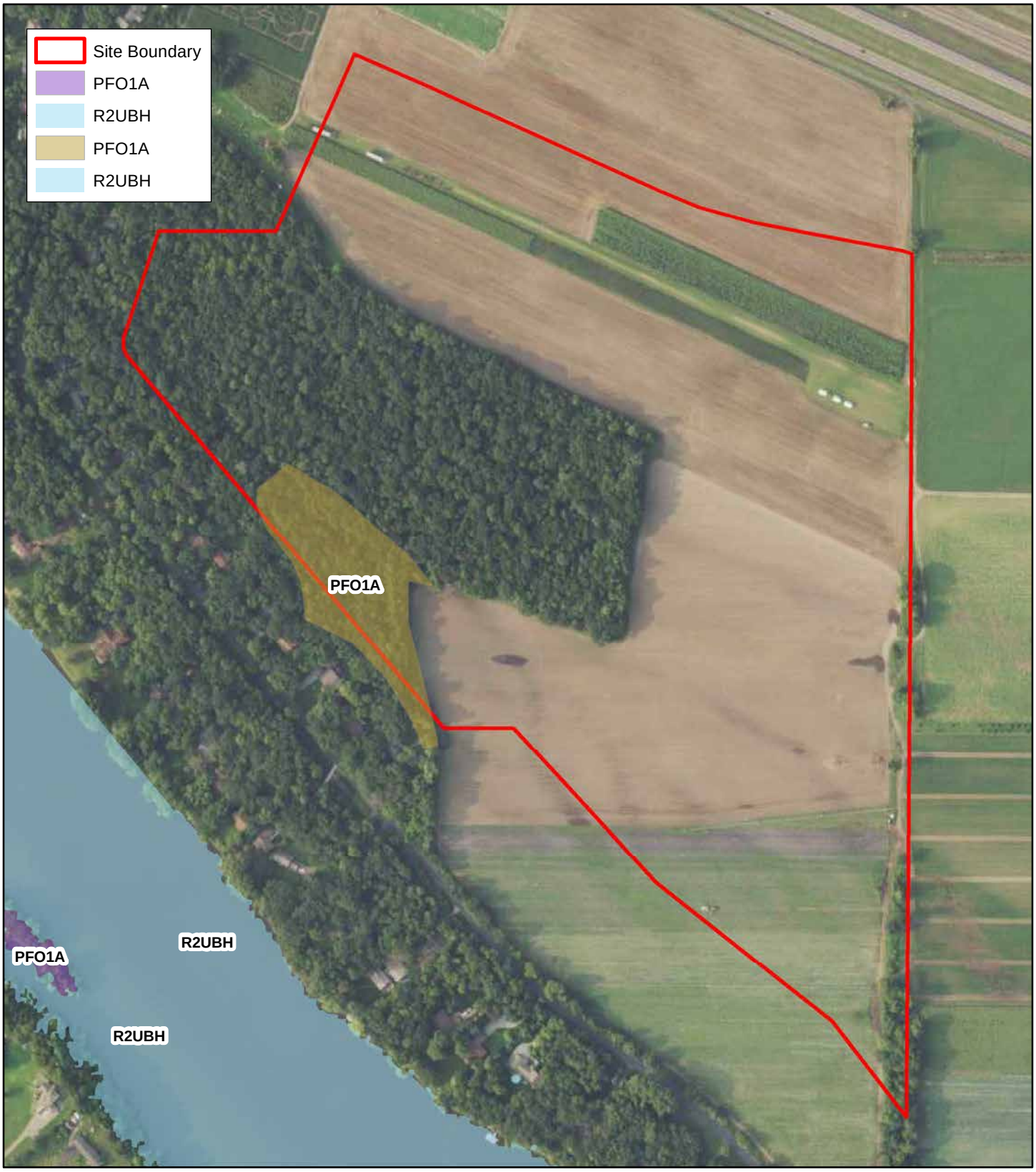


Figure 8 - National Wetlands Inventory

N

0 380 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons, USFWS

Riverstone South (KES 2020-162)
Ramsey, Minnesota

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

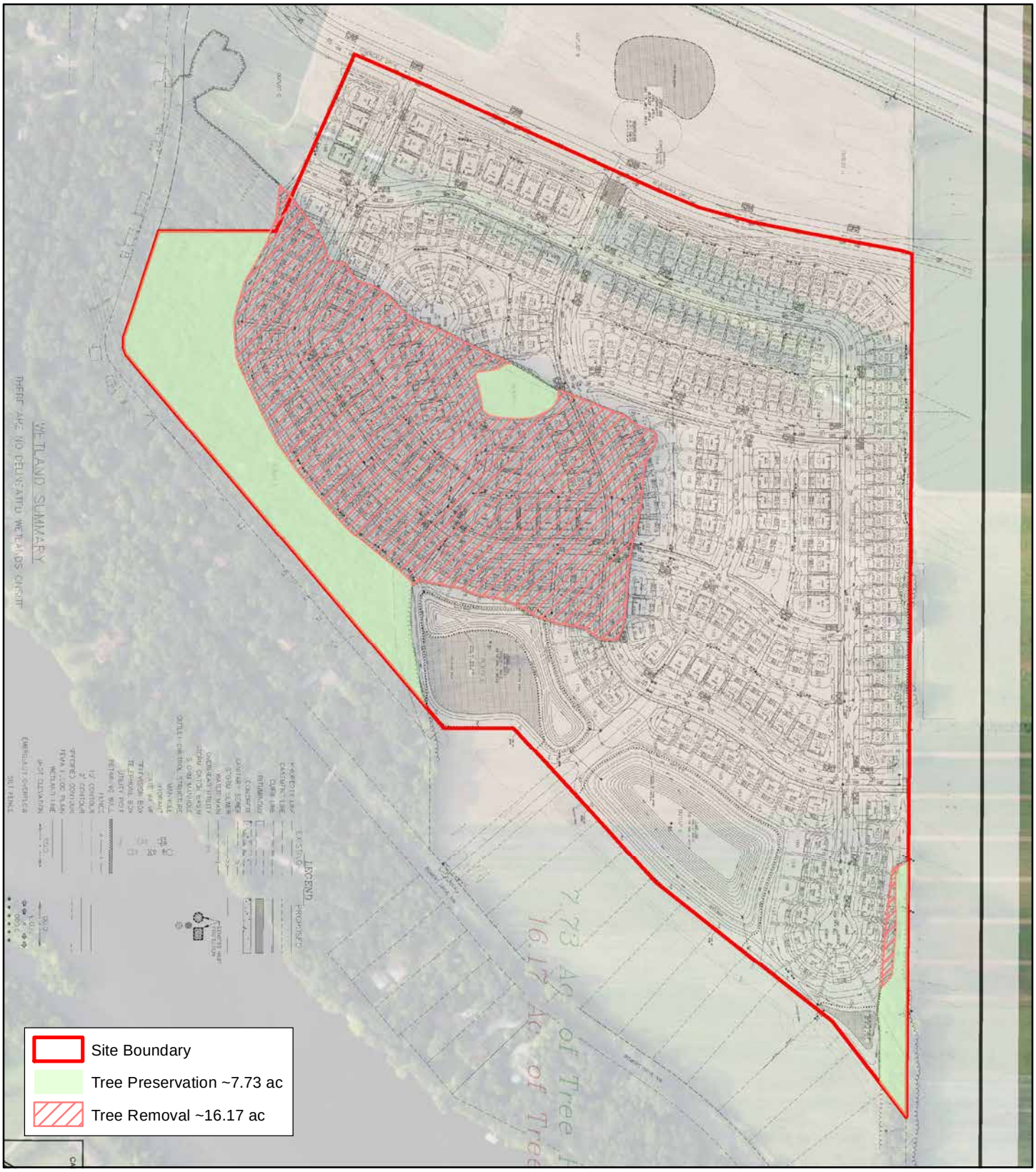


Figure 9 - Tree Removal and Preservation

N

0 380 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons, Carlson McCain

Riverstone South (KES 2020-162)
Ramsey, Minnesota

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

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Appendix A
Site Plan and Grading Plan

Riverstone South EAW

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LEGAL DESCRIPTION

PARCEL DESCRIPTION: (Per Schedule A of Title Commitment File No. 2651, with a commitment date of October 17, 2019 at 7:00 am, prepared Twin City Title Company, LLC as issuing agent for Old Republic National Title Insurance Company)

Parcel A: Outlot B, Pearson Place, Anoka County, Minnesota.

Parcel B: That part of the Northwest Quarter of the Northwest Quarter of Section 29, Township 32, Range 25, Anoka County, Minnesota, lying southerly of U.S. Highway 10 and 169.

Parcel C: Lot 2, Block 3, Pearson Place, Anoka County, Minnesota.

Parcel D: Lot 1, Block 3, Pearson Place, Anoka County, Minnesota.

(abstract property)

LEGEND

- OPEN SPACE
- OPEN SPACE – WOODED
- STORMWATER POND
- INFILTRATION BASIN

U.S. HIGHWAY NO. 10 & 169

COMMERCIAL DEVELOPMENT 21.96 AC

S66°01'47"E 1951.85

S00°08'36"W 1705.32

LIFT STATION AREA 0.22 AC

S00°17'33"W 1093.62

LIFT STATION

STREET A

STREET B

STREET C

STREET D

STREET E

PEARSON BLVD

RESIDENTIAL DEV. 78.63 AC

8' TRAIL

PUBLIC PARK 1.0 AC

RIVERDALE DRIVE

BUFFER AREA 1.05 AC

LAKE

POND

INFILTRATION BENCH

OPEN SPACE / PONDING AREA - 8.08 AC

INF. BASIN

S34.66°37'59"W

S81.89 S42°51'14"E

620.99 N51°55'40"W

193.74 N89°47'35"W

BOWERS DRIVE NW

MISSISSIPPI RIVER

AREA RETAINED BY LANDOWNER 9.70 AC

TREE PRESERVATION AREA 7.0 AC

EXISTING 50 TREE BUFFER

50.00 N76°47'15"W

270.04 Δ=077°12'00" R=200.00

451.73 N22°50'16"E

205.79 N67°09'59"W

159.73 Δ=12°58'27" R=706.37

76.30 S00°14'16"W

395.06 Δ=17°40'00" R=1281.25

322.61 N17°54'18"E

1349.11 N40°39'13"W

100.41 Δ=06°01'20" R=955.37

61.69 Δ=58°33'37" R=60.36

SITE DATA

TOTAL AREA	±110.29 AC.
RESIDENTIAL DEVELOPMENT AREA	78.63
PUBLIC PARK AREA	1.0
TREE PRESERVATION AREA	7.0
OPEN SPACE / PONDING AREA	8.08
RIVERDALE BUFFER AREA	1.05
ROW AREA	15.37
LIFT STATION AREA	0.22
COMMERCIAL DEVELOPMENT AREA	21.96
AREA RETAINED BY LANDOWNER	9.70

N

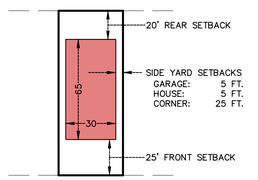
0 60 120 240

(SCALE IN FEET)

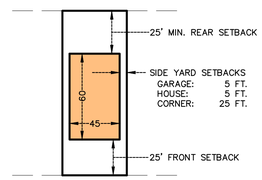
RESIDENTIAL DEVELOPMENT DATA

TOTAL NUMBER OF LOTS	243
GROSS DENSITY	3.1 U/AC
DETACHED TOWNHOMES	78
55' SINGLE FAMILY	116
65' SINGLE FAMILY	49

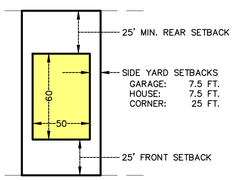
40' DETACHED TOWNHOME LOT DETAIL



55' SINGLE FAMILY LOT DETAIL



65' SINGLE FAMILY LOT DETAIL



CARLSON McCAIN
ENGINEERING SURVEYING ENVIRONMENTAL
3890 PHEASANT RIDGE DR NE
SUITE 100
BLAINE, MN 55449
TEL 763.489.7900
FAX 763.489.7959
CARLSONMCCAIN.COM

DRAWN BY: C#/RR
ISSUE DATE: 12/3/20
Revisions:

CAPSTONE HOMES, INC.
14015 Sunfish Lake Blvd. NW, Suite 400
Ramsey, MN 55303

RIVERSTONE SOUTH
Ramsey, Minnesota

SKETCH PLAN W/AERIAL

1 of 1

[Save Date: 12/03/20] F:\jobs\8481 - 8500\8494 - pearson place 2nd\cad c3d\survey\layouts\8494_sketch plan.dwg



WETLAND SUMMARY

THERE ARE NO DELINEATED WETLANDS ONSITE.

LEGEND

	EXISTING	PROPOSED
PROPERTY LINE		
EASEMENT LINE		
CURB LINE		
BITUMINOUS		
CONCRETE		
SANITARY SEWER		
STORM SEWER		
WATER MAIN		
OVERHEAD UTILITY	ohe	
STORM CATCH BASIN		
STORM MANHOLE		
OUTLET CONTROL STRUCTURE		
MANHOLE	MH SAN	
HYDRANT		
GATE VALVE	GV	
TELEVISION BOX	TV	
TELEPHONE BOX	TB	
UTILITY POLE		
RETAINING WALL		
FENCE	x x	
10' CONTOUR		
2' CONTOUR		
SPECIFIED CONTOUR		
FEMA FLOOD PLAIN		
WETLAND LINE		
SPOT ELEVATION	00.0 x	00.0 x
EMERGENCY OVERFLOW		E.O.F. x 000.0
SILT FENCE		
TREE FENCE		
GRADING LIMITS		
TREELINE		
SOIL BORING		TP

DENOTES INLET PROTECTION

N

0 75 150 300

(IN FEET)

BENCHMARKS

1. Minnesota Department of Transportation GSID Station #66054 (Name: PUMA MNDT RM 1). Elev.= 884.89 ft.
2. Minnesota Department of Transportation GSID Station #802 (Name: H 257). Elev.= 882.78 ft.

CALL BEFORE YOU DIG

811 Know what's below. Call before you dig.

The subsurface utility information shown on this plan is utility Quality Level D. This quality level was determined according to the guidelines of CI/ASCE 38-02, entitled "Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data."

CARLSON McCAIN ENGINEERING SURVEYING ENVIRONMENTAL
3880 PHEASANT RIDGE DR NE
SUITE 100
BLAINE, MN 55449
TEL 763.488.7800
FAX 763.488.7888
CARLSONMCCAIN.COM

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

Print Name: Brian J. Krystofiak, P.E.
Signature:
Date: 11/25/20 License #: 25063

Drawn: ADB
Designed: BJK
Date: 11/25/20

Revisions:
1.

RIVERSTONE DEVELOPMENT, LLC
14015 Sunfish Lake B, Suite 400
Ramsey, MN 55303

RIVERSTONE SOUTH
Ramsey, MN

GRADING INDEX

14 of 25

Save Date: 11/24/20 F:\jobs\8481 - 8500\8494 - pearson place 2nd\cad c3d\engineering\prelim plans\8494_ind.dwg

#8494

Appendix B

No Wetlands Determination and Agency Concurrence

Riverstone South EAW

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KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Providing Sound, Balanced, Comprehensive Natural Resource Solutions

Memorandum

Date: October 14, 2019

To: Karen Wold, Barr Engineering
Project Manager, U.S. Army Corps of Engineers (USACE)

CC: Steve Bona, Capstone Homes

From: Melissa Barrett, Kjolhaug Environmental Services Company (KES)

Re: Site Assessment for Wetlands – Pearson Farm South, Ramsey, MN
KES#2019-154

The Pearson Farm South site was examined on October 9, 2019 for the presence and extent of wetland. The site was located in Sections 29 & 30, Township 32N, Range 25W, City of Ramsey, Anoka County, Minnesota. More specifically, the site was located approximately three-fourths mile to the west of the intersection of Highway 10 and County Road 83 (Armstrong BLVD NW) (**Figure 1**). The site boundaries corresponded to Anoka County PIDs 30-32-25-11-0032 (8846 Highway 10 NW; 16.69-ac), 29-32-25-22-0003 (no address; 20.16-ac), and 29-32-25-23-0004 (no address; 70.87-ac).

The 107.72-acre site was comprised primarily of cornfield and woodland, with a pumpkin patch in the northwest portion of the site. A grass airstrip bisected the north half of the site, and a farm/business with numerous outbuildings was located in the very northwest corner of the site (**Figure 2**).

Attachment A of this memo includes a Joint Application Form for Activities Affecting Water Resources in Minnesota, which is submitted in request for: (1) concurrence with the no wetland determination from the Lower Rum River Watershed Management Organization under the Minnesota Wetland Conservation Act (WCA), and (2) concurrence from the U.S. Army Corps of Engineers (USACE) that the site lacks waters of the U.S. for Section 404 of the Federal Clean Water Act.

Review of NWI, Soils, DNR, and NHD Information

The National Wetlands Inventory (NWI) (Minnesota Geospatial Commons 2009-2014 and U.S. Fish and Wildlife Service) showed one PFO1A wetland in the south portion of the onsite woodland (**Figure 3**).

The Soil Survey (USDA NRCS 2015) did not show any mapped hydric soil types within or near site boundaries. Soil types mapped on the property are listed in **Table 1** and a map showing soil types is included in **Figure 4**.

Table 1. Soil types mapped on the Pearson Farm South site.

Symbol	Soil Name	Approx. Acres AOI	Approx. % of AOI	% Hydric	Hydric Category
Ba	Becker very fine sandy loam	23.7	16.60%	7	Predominantly Non-Hydric
D67A	Hubbard loamy sand, 0 to 2 percent slopes	42	29.30%	1	Predominantly Non-Hydric
D67B	Hubbard loamy sand, 1 to 6 percent slopes	21.2	14.80%	3	Predominantly Non-Hydric
D67C	Hubbard loamy sand, 2 to 12 percent slopes	2.3	1.60%	0	Non-Hydric
DnA	Dickman sandy loam, 0 to 2 percent slopes	36.7	25.60%	0	Non-Hydric
DnB	Dickman sandy loam, 2 to 6 percent slopes	14.2	9.90%	0	Non-Hydric
NrD	Nymore loamy coarse sand, 12 to 25 percent slopes	3	2.10%	0	Non-Hydric

The Minnesota DNR Public Waters Inventory (Minnesota Department of Natural Resources 2015) showed a DNR Public Watercourse (Mississippi River) more than 300-feet from the south and west site boundaries (**Figure 5**).

The National Hydrography Dataset (U.S. Geological Survey 2015) showed one Stream/River more than 300-feet from the south and west site boundaries (**Figure 6**).

No Wetland Determination

The site was examined on October 9, 2019 for the presence and extent of wetlands. At the time of the site visit, select corn crop fields had already been harvested and climatic conditions were wet (atypical) based on the gridded database method. Additionally, climatic conditions were wetter than the normal range for most of the 2019 growing season based on 30-day rolling precipitation totals (**Attachment B**).

Woodland Investigation

The entire woodland was investigated for depressional areas with hydrophytic vegetation, including the area identified as PFO1A wetland on the NWI map. No depressional areas with a dominant hydrophytic plant community or drowned out vegetation/no vegetation were observed. Woodland (which was formerly used as cattle pasture according to the landowner) was comprised of the following species:

Woodland Species Observed

Common Name	Latin Name	Ind Status	Common Name	Latin Name	Ind Status
Bur oak (trees, seedlings)	*Quercus macrocarpa*	FACU	Sweet cicely	*Osmorhiza claytonii*	FACU
Boxelder	*Acer negundo*	FACU	Avens	*Geum canadense*	FAC
American elm (trees, saplings, seedlings)	*Ulmus americana*	FACW	Wood aster	*Symphyotrichum cordifolium*	none
Hackberry	*Celtis occidentalis*	FAC	Prickley ash (shrubs)	*Zanthoxylum americanum*	FACU
Honeysuckle	*Lonicera tatarica*	FACU	Virginia creeper	*Parthenocissus quinquefolia*	FACU
Gooseberry	*Ribes cynosbati*	FACU	Violet	*Viola sororia*	FAC
Raspberry	*Rubus idaeus*	FAC	Wood sedge	*Carex blanda*	FAC
White snakeroot	*Ageratina altissima*	FACU	Pennsylvania sedge	*Viola sororia*	none
Clearweed	*Pilea pumila*	FACW	Stickseed	*Hackelia virginiana*	FACU
Creeping Charlie	*Glechoma hederacea*	FACU	American plum (seedling)	*Prunus americana*	UPL
Canada moonseed	*Menispermum canadense*	FAC	Stinging nettle	*Urtica dioica*	FAC
Motherwort	*Leonurus cardiaca*	none			

Due to the absence of depressional areas and the lack of dominant hydrophytic plant communities, no wetlands were delineated within the woodland area including that area identified as PFO1A wetland on the NWI map.

Cropland Investigation - Aerial Review for Offsite Hydrology Determinations

Method

Areas in agricultural cropland that exhibited potential wetland signatures on aerial photography and with low or depressional topography were reviewed generally following methods described in Using Aerial Imagery to Assess Wetland Hydrology (Minnesota Board of Water and Soil Resources (BWSR) 2010) and Guidance for Submittal of Delineation Reports to the St. Paul District Corps of Engineers and Wetland Conservation Act Local Governmental Units in Minnesota, Version 2.0 (USACE 2015). These methods use aerial photography and antecedent precipitation conditions to identify areas that have wetland hydrology signatures during periods of typical precipitation.

Available years of Farm Service Agency (FSA) aerial photography were reviewed for the site to determine long-term hydrology. In cases where additional aerial photography was relevant, available, and necessary to make hydrology determinations, we reviewed aerial photography from other sources such as the Minnesota Geospatial Information Office (MnGEO) and Google Earth.

Signatures at locations of potential wetlands on aerial photographs were interpreted and classified using seven codes (**Table 2**).

Table 2. Aerial photograph interpretation codes

Code	Classification
CS	Crop stress
DO	Drowned out
NC	Not cropped
SW	Standing water
WS	Wetland signature
AP	Altered pattern
NV	Normal vegetation

This analysis used only aerial photographs taken following periods of precipitation within the normal range as determined using the Wetland Delineation Precipitation Data Retrieval tool (Minnesota Climatology Office 2015). This tool classifies antecedent precipitation as Normal (N), Wet (W) or Dry (D) by comparing precipitation during the three months preceding the estimated date of aerial photography to the 30-year average from 1981-2010.

Results

Available aerial FSA photographs from the 5 most recent and available normal years (1995, 1996, 2008, 2010, and 2015) were assessed. Photo years were assessed for wet/normal/dry climatic conditions using the Wetland Delineation Precipitation Data Retrieval tool using a date of July 1. Areas showing at least a wetland signature for a recent Wet year (2013) were included in the aerial review. The review areas are shown on **Figure 7**. The Wetland Hydrology Recording from Aerial Imagery - Recording Form, photos of each Review Area, and FSA photographs for each year of review are included in **Attachment C**.

Based on the results of the offsite hydrology review, none of the areas warranted field review.

However, sample points (**Attachment D**) were taken in Areas A and C for documentation of field conditions. Both soil points lacked hydric soils and contained high amounts of sand throughout the soil profile which likely precludes these areas from ponding/holding water for more than 14 consecutive days. Area B was not observable in the field (no observable depression, standing water, or drowned out vegetation).

Based on the lack of sufficient hydrology signatures in normal climatic years, plus additional soil information confirming the lack of hydric soil, no wetlands were identified within cropped portions of the site.

Summary

No other depressional areas were observed onsite. No other areas were shown as wetland on the NWI-map, and no areas were mapped with hydric soil on the soil survey. No wetlands were delineated on the Pearson Farm South site in Ramsey.

Attachment A of this memo includes a Joint Application Form for Activities Affecting Water Resources in Minnesota, which is submitted in request for: (1) concurrence with the no wetland determination from the Lower Rum River Watershed Management Organization under the Minnesota Wetland Conservation Act (WCA), and (2) concurrence from the U.S. Army Corps of Engineers (USACE) that the site lacks waters of the U.S. for Section 404 of the Federal Clean Water Act.

Pearson Farm South, Ramsey, MN

Site Assessment for Wetlands

FIGURES

1. Site Location
2. Existing Conditions
3. National Wetlands Inventory
4. Soil Survey
5. DNR Public Waters Inventory
6. National Hydrography Dataset



Figure 1 - Site Location

N

0 1,500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: ESRI Streets Basemap

Pearson Farm South (KES 2019-154)
Ramsey, Minnesota

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

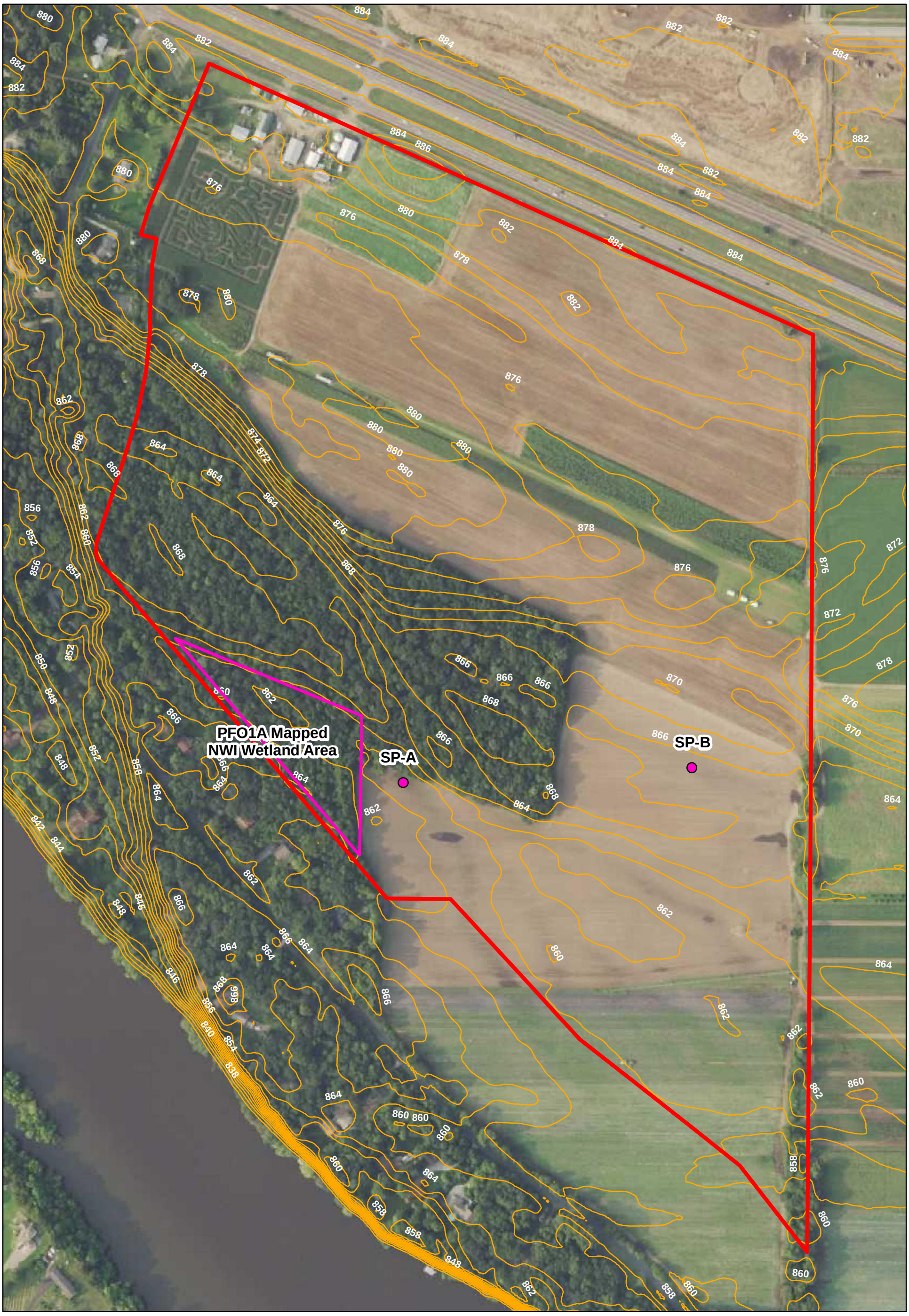


Figure 2 - Existing Conditions (2017 FSA Photo - Wet Year)

N

0 500 Feet

Legend

Site Boundary

Sample pt

Anoka County Lidar

Pearson Farm South (KES 2019-154)
Ramsey, Minnesota

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

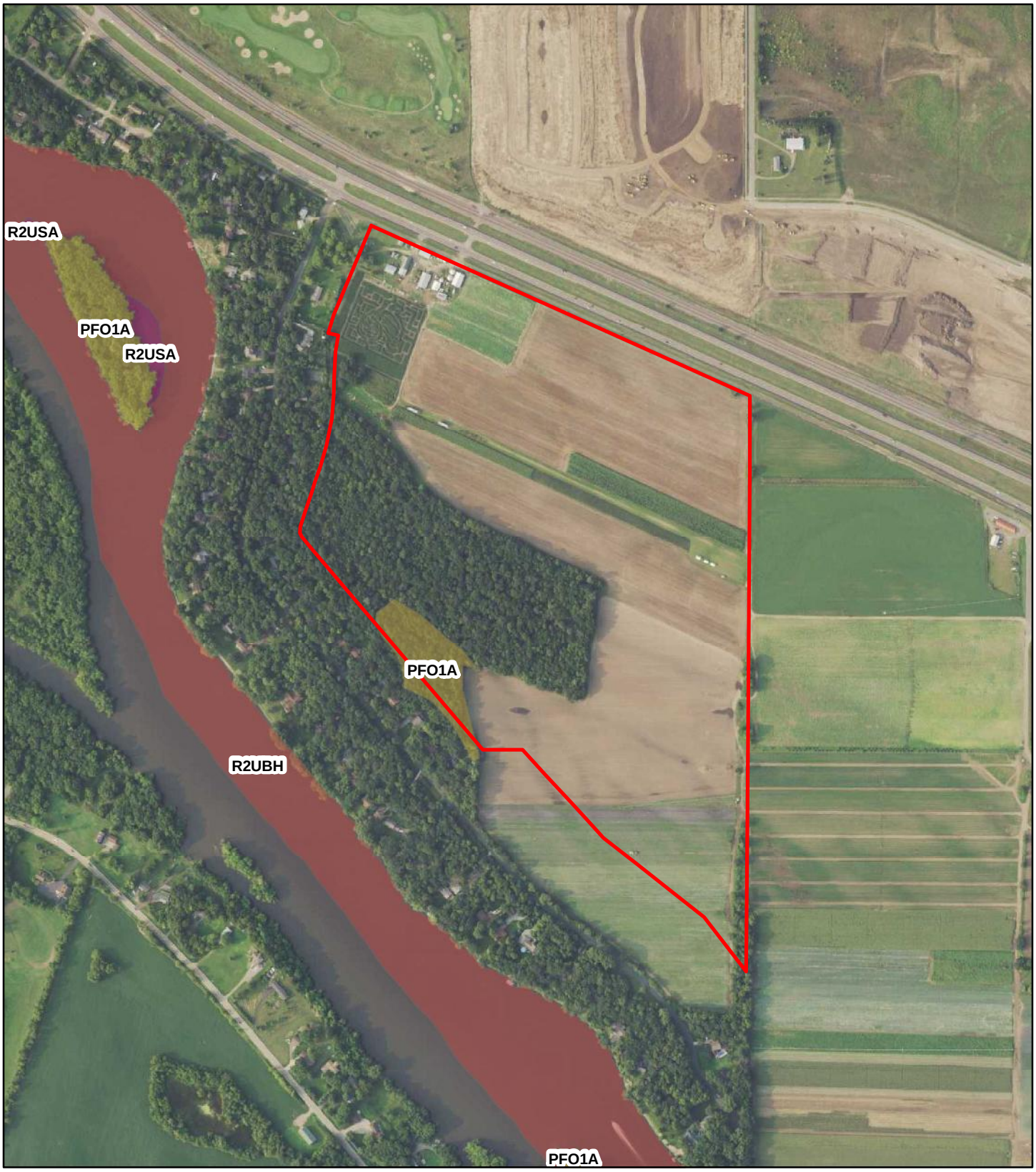


Figure 3 - National Wetlands Inventory

N

0 500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons, USFWS

Pearson Farm South (KES 2019-154)
Ramsey, Minnesota

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

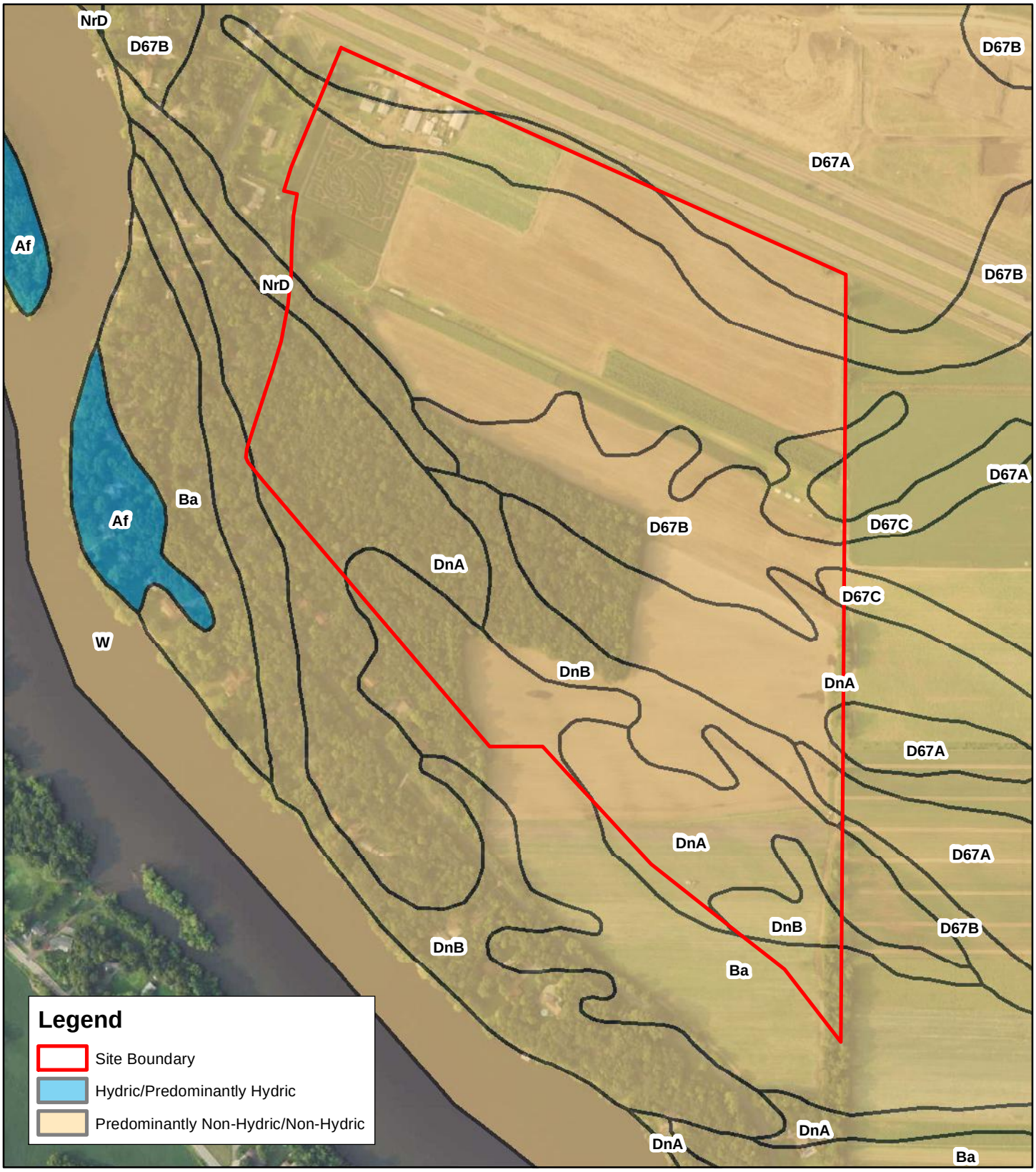


Figure 4 - Soil Survey

N

0 500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons, USDA, NRCS

Pearson Farm South (KES 2019-154)
Ramsey, Minnesota

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

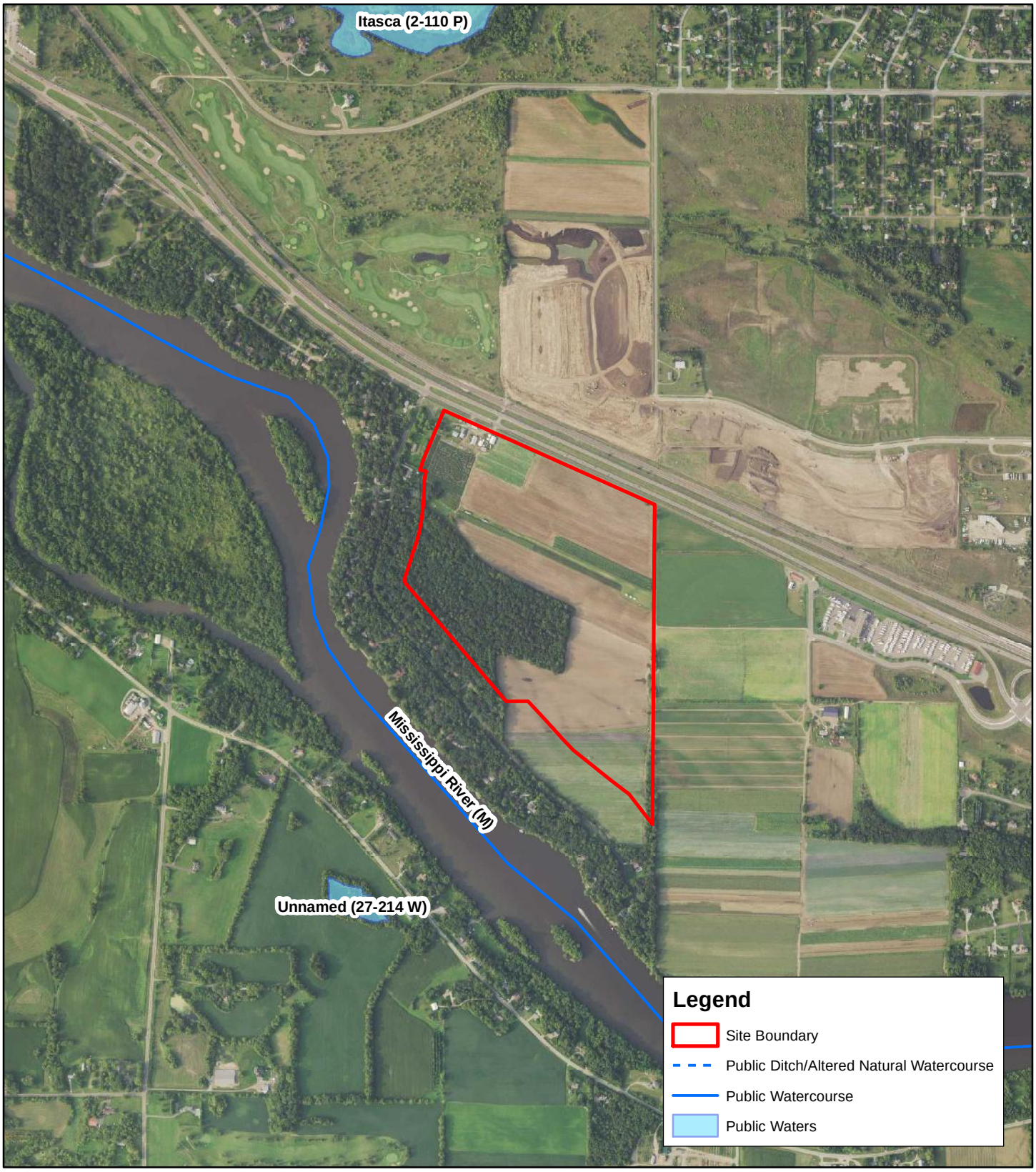


Figure 5 - DNR Public Waters Inventory

N

0 2,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons, MN DNR

Pearson Farm South (KES 2019-154)
Ramsey, Minnesota

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

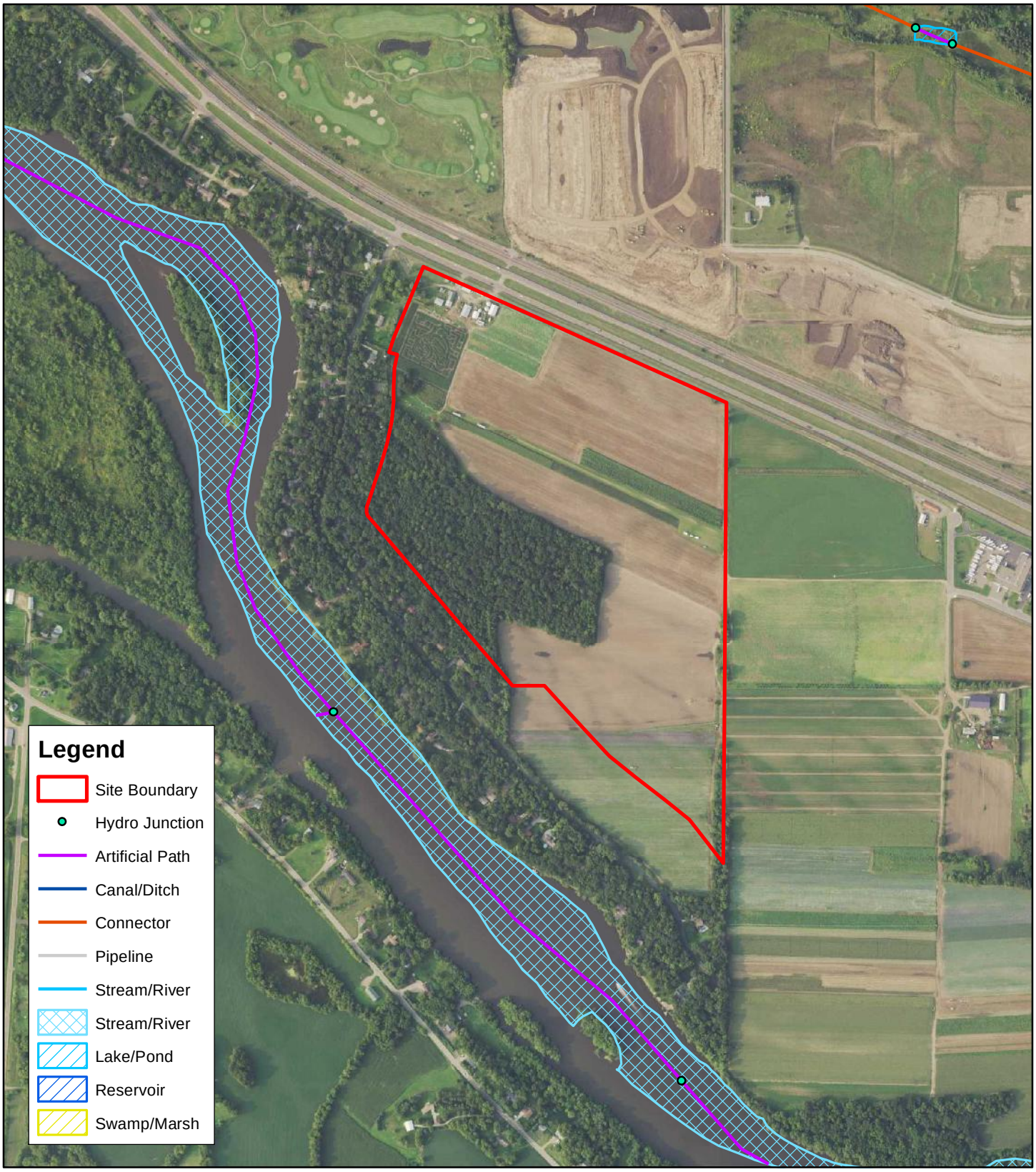


Figure 6 - National Hydrography Dataset

N

0 1,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons, USGS

Pearson Farm South (KES 2019-154)
Ramsey, Minnesota

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

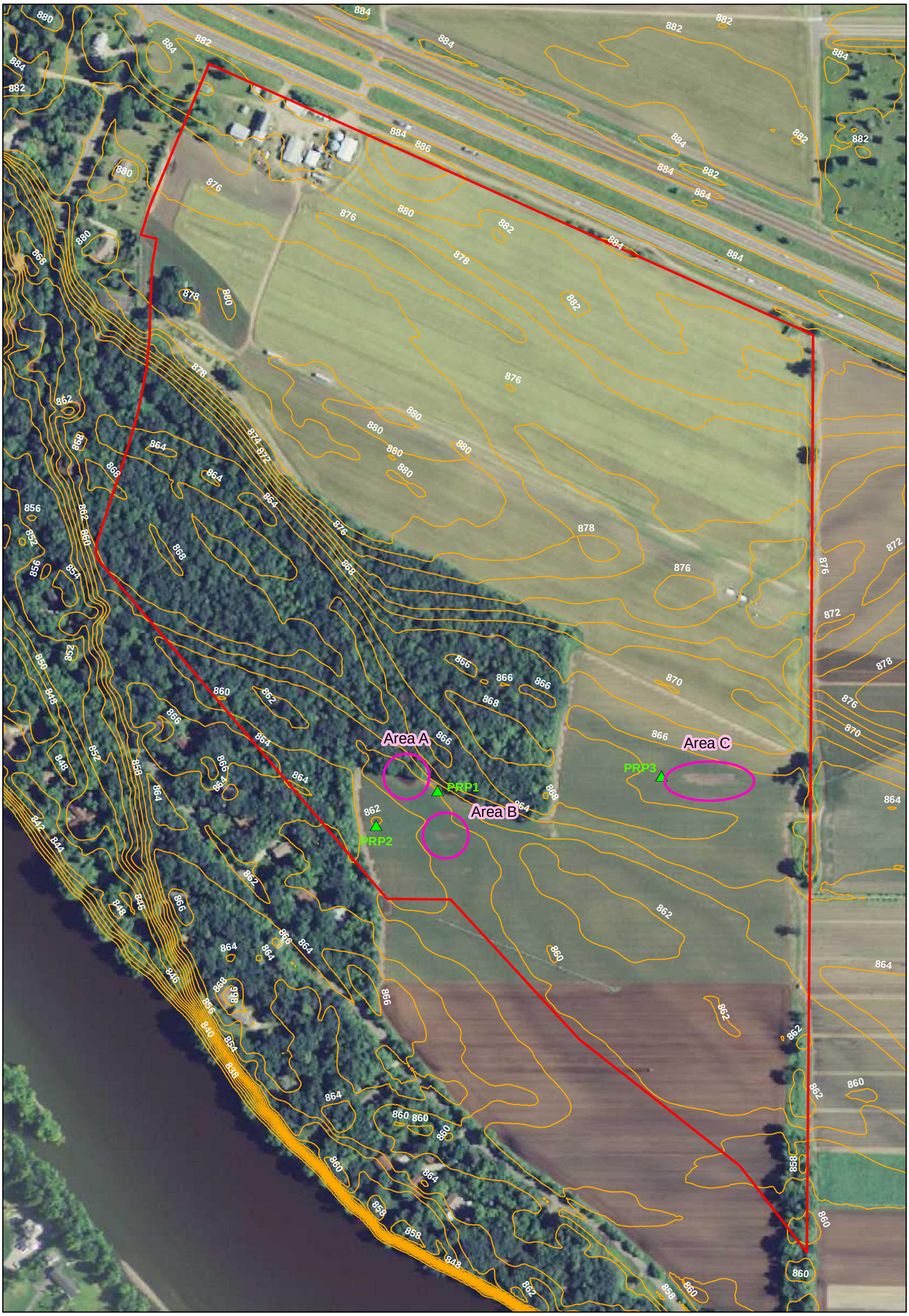


Figure 7 - Offsite Hydrology Review Areas (2013 FSA Photo - Wet Year)

Lower
Rum River
WMO

November 25, 2019

Mr. Steve Bona: stephen@capstonehomes-mn.com
Capstone Homes
14015 Sunfish Lake Blvd.
Suite 400
Ramsey, MN 55303

Subject: LRRWMO Permit #2019-23 ~ Pearson Farm South ~ Ramsey

Dear Mr. Bona:

The LRRWMO, at its November 21, 2019 meeting, addressed the permit indicated above.

The LRRWMO Board as administrator for the Minnesota Wetland Conservation Act has taken action to approve the no-wetland determination as detailed on the attached Barr Engineering memorandum dated November 15, 2019.

If you have any questions regarding this process, please contact Ms. Karen Wold of Barr Engineering.

Sincerely,

Todd Haas
Chair

Attachments: Barr Engineering Memo
Minnesota Wetland Conservation Act Notice of Decision
Approved Permit 2019-23

cc: Melissa Barrett, Kjolhaug Environmental: melissa@kjolhaugenv.com
Bruce Westby, City of Ramsey
Leonard Linton, City of Ramsey
Leslie Parris, MnDNR Div. of Ecological & Water Resources
Becky Wozney, Anoka Conservation District
Ben Meyer, MN Board of Water & Soil Resources
Marissa Merriman, U.S. Army Corps of Engineers
LRRWMO
Bob Obermeyer, Barr Engineering Co.

resourceful. naturally.
engineering and environmental consultants

BARR

Memorandum

To: Lower Rum River Watershed Management Organization (LRRWMO)
From: Karen Wold, Barr Engineering Co.
Subject: Pearson Farm South ~ Ramsey
Date: November 15, 2019
Barr Project: 23020047.00 RJB 1923
LRRWMO Permit: 2019-23

c: Bob Obermeyer, Barr Engineering Co.
Carla Wirth, TimeSaver, LRRWMO Recording Secretary

On October 14, 2019, Barr received a wetland delineation report and request for concurrence with a no-wetland determination from Kjolhaug Environmental for the Pearson Farm South site.
On October 21, 2019, we were notified that a LRRWMO permit application had been received.
We determined the application to be complete and submitted a Minnesota Wetland Conservation Act Notice of Application on October 30, 2019.
A Technical Evaluation Panel (TEP) site review was conducted on October 25, 2019.
The comment period ends on November 21, 2019.

If no comments are received between now and the end of the comment period on November 21st, which is also the date of the LRRWMO meeting, we recommend that the LRRWMO approve the no-wetland determination as described in the attached draft Minnesota Wetland Conservation Act Notice of Decision.

BOARD OF WATER AND SOIL RESOURCES

Minnesota Wetland Conservation Act
Notice of Decision

Local Government Unit (LGU): Lower Rum River Watershed Management Organization (LRRWMO) **County:** Anoka
Applicant Name: Capstone Homes **Applicant Representative:** Steve Bona
Project Name: Pearson Farm South **LGU Project No. (if any):** 2019-23
Date Application Received by LGU: 10/21/2019
Date of LGU Decision: 11/21/2019
Date this Notice was Sent: 11/25/2019

Minnesota Wetland Conservation Act (WCA) Decision Type - check all that apply

☒Wetland Boundary/Type ☐Sequencing ☐Replacement Plan ☐Bank Plan (not credit purchase) ☐No-Loss (8420.0415) ☐Exemption (8420.0420) Part: ☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H Subpart: ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9

Replacement Plan Impacts (replacement plan decisions only)

Total WCA Wetland Impact Area:
Wetland Replacement Type: ☐ Project Specific Credits: ☐ Bank Credits:
Bank Account Number(s):

Technical Evaluation Panel (TEP) Findings and Recommendations (attach if any)

☐ Approve ☐ Approve w/Conditions ☐ Deny ☒ No TEP Findings Report, see TEP involvement and communication described below.

LGU Decision

☐ Approved with Conditions (specify below)[1] List Conditions:	☒ Approved[1]	☐ Denied
Decision-Maker for this Application: ☐ Staff ☒ Governing Board/Council ☐ Other: **Decision is valid for:** ☒ 5 years (default) ☐ Other (specify):		

[1] *Wetland Replacement Plan approval is not valid until BWSR confirms the withdrawal of any required wetland bank credits. For project-specific replacement a financial assurance per MN Rule 8420.0522, Subp. 9 and evidence that all required forms have been recorded on the title of the property on which the replacement wetland is located must be provided to the LGU for the approval to be valid.*

LGU Findings – Attach document(s) and/or insert narrative providing the basis for the LGU decision[1].

☒ Attachment(s) (specify): **site maps** ☒ Summary: **On behalf of Capstone Homes, Kjolhaug Environmental submitted a wetland delineation report and joint application form requesting concurrence with a no-wetland determination for the Pearson Farm South site located in the City of Ramsey (Section 30, Township 32N, Range 25W) within Anoka County.** **The report included a Level II site wetland delineation and a Level I off site aerial imagery review to assess wetland hydrology in agricultural cropland. The report concluded that no wetlands are present within the wetland evaluation area.**

A site review was conducted on 10/25/2019 with Ben Meyer (Minnesota Board of Water and Soil Resources), Karen Wold (Barr Engineering for the LRRWMO), and Adam Cameron (Kjolhaug Environmental).
The wetland delineation report and a WCA Notice of Application were provided to TEP members on 10/30/2019.
The comment period ended on 11/21/2019 and no comments were received.
The no-wetland determination is accurate based on the requirements of the 1987 U.S. Army Corps of Engineers (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.

[1] *Findings must consider any TEP recommendations.*

Attached Project Documents

☒ Site Location Map ☐ Project Plan(s)/Descriptions/Reports (specify):

Appeals of LGU Decisions

If you wish to appeal this decision, you must provide a written request within 30 calendar days of the date you received the notice. All appeals must be submitted to the Board of Water and Soil Resources Executive Director along with a check payable to BWSR for $500 *unless* the LGU has adopted a local appeal process as identified below. The check must be sent by mail and the written request to appeal can be submitted by mail or e-mail. The appeal should include a copy of this notice, name and contact information of appellant(s) and their representatives (if applicable), a statement clarifying the intent to appeal and supporting information as to why the decision is in error. Send to:

Appeals & Regulatory Compliance Coordinator
Minnesota Board of Water & Soils Resources
520 Lafayette Road North
St. Paul, MN 55155
travis.germundson@state.mn.us

Does the LGU have a local appeal process applicable to this decision?

☐ Yes[1] ☒ No

[1]*If yes, all appeals must first be considered via the local appeals process.*

Local Appeals Submittal Requirements (LGU must describe how to appeal, submittal requirements, fees, etc. as applicable)

Notice Distribution (include name)

Required on all notices:

☒ SWCD TEP Member: Becky Wozney	☒ BWSR TEP Member: Ben Meyer
☐ LGU TEP Member (if different than LGU contact):	
☒ DNR Representative: Leslie Parris	
☒ Watershed District or Watershed Mgmt. Org.: Todd Haas (LRRWMO), Bob Obermeyer (Barr Engineering Co.)	
☒ City Contact for LRRWMO permitting: Bruce Westby and Leonard Linton (City of Ramsey)	
☒ Applicant (notice only): Steve Bona (Capstone Homes)	☒ Agent/Consultant (notice only): Melissa Barrett (Kjolhaug Environmental)

Optional or As Applicable:

☒ Corps of Engineers:	
☐ BWSR Wetland Mitigation Coordinator (required for bank plan applications only):	
☐ Members of the Public (notice only):	☐ Other:

Signature:	Date:
	11/21/2019

This notice and accompanying application materials may be sent electronically or by mail. The LGU may opt to send a summary of the application to members of the public upon request per 8420.0255, Subp. 3.

Lower Rum River Watershed Management Organization ("LRRWMO")

Andover—Anoka—Ramsey

2015 First Avenue • Anoka, MN 55303

PERMIT APPLICATION

Permit # 19-23

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 LRRWMO Attachment C.

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.

The permit and supporting documentation must be submitted to the LRRWMO by the THIRD THURSDAY OF THE MONTH TO BE ON THE FOLLOWING REGULARLY SCHEDULED MONTHLY LRRWMO MEETING AGENDA. A PERMIT NUMBER WILL NOT BE ASSIGNED UNTIL CITY AUTHORIZATION IS RECEIVED.

Project Name: Pearson Farm South

Address/Location: 8846 Hwy 10 NW

Project Description/Purpose: residential development

Steve Bona, Capstone Homes	Melissa Barrett, Kjolhaug Env.
Name of Applicant (Site Owner or Property Owner)	Applicant's Contact / Organization Name
14015 Sunfish Lk Blvd, Ste 400	2500 Shadywood Rd, Ste 130
Address	Address
Ramsey, MN 55303	Orono, MN 55331
City, State, Zip	City, State, Zip
651-271-4951	952-401-8757
Phone / Fax	Phone / Fax
Stephen@CapstoneHomes-mn.com	mElissa@Kjolhaug-env.com
Email	Email

Submittal Requirements

Complete applications are to be submitted as per LRRWMO attachments A (Permit Requirements), B (Office Procedure), C (Fees, Deposit, and Sureties for Wetland Conservation Act). 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.
- ☐ **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.

Lower Rum River Watershed Management Organization ("LRRWMO")

Andover—Anoka—Ramsey

2015 First Avenue • Anoka, MN 55303

START OF PROJECT: _____ EST. COMPLETION DATE: _____ APPROVAL DATE: 11/21/19

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."

Signature of property owner or designated Agent (no agent without a letter of authority)	Date	Signature of applicant if different from property owner	Date
		Tom Barreiges	10-14-19
Print Signer's name		Print Signer's name	

Application Acknowledged by City: Leonard Linton (Name of City Official) Ramsey (City) 10-18-19 (Date)

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

June 15, 2020

Regulatory File No. 2019-02513-SSC

Capstone Homes
Steve Bona
14015 Sunfish Lake Boulevard, Suite 400
Ramsey, Minnesota 55303

Dear Mr. Bona:

We are responding to your request, submitted by Melissa Barrett (Kjolhaug Environmental Services) on your behalf, for Corps of Engineers (Corps) concurrence with the delineation of aquatic resources completed on the Pearson Farm South site. The project site is in Sections 29 and 30, Township 32 North, Range 25 West, Anoka County, Minnesota.

We have reviewed the aquatic resource delineation memorandum, dated October 14, 2019 and concur that no aquatic resources are present within review area. Therefore, you are not required to obtain Department of the Army authorization to discharge dredged or fill material within this area. This concurrence is only valid for the review area shown on the enclosed figures labeled MVP-2019-02513-SSC Page 1 of 2 through 2 of 2.

This letter does not eliminate the need for state, local, or other authorizations, such as those of the Department of Natural Resources or county.

No jurisdictional determination was prepared for this project, nor is one required to support this concurrence. This concurrence may generally be relied upon for five years from the date of this letter. However, we reserve the right to review and revise our concurrence in response to changing site conditions, information that was not considered during our initial review, or off-site activities that could indirectly alter the extent of aquatic resources on-site. Our concurrence may be renewed at the end of this period provided you submit a written request and our staff are able to verify that the determination is still valid.

If you have any questions, please contact me in our St. Paul office at (651) 290-5268 or Samantha.S.Coungeris@usace.army.mil. In any correspondence or inquiries, please refer to the Regulatory file number shown above.

Sincerely,

Samantha Coungeris

Samantha Coungeris
Project Manager

Enclosure

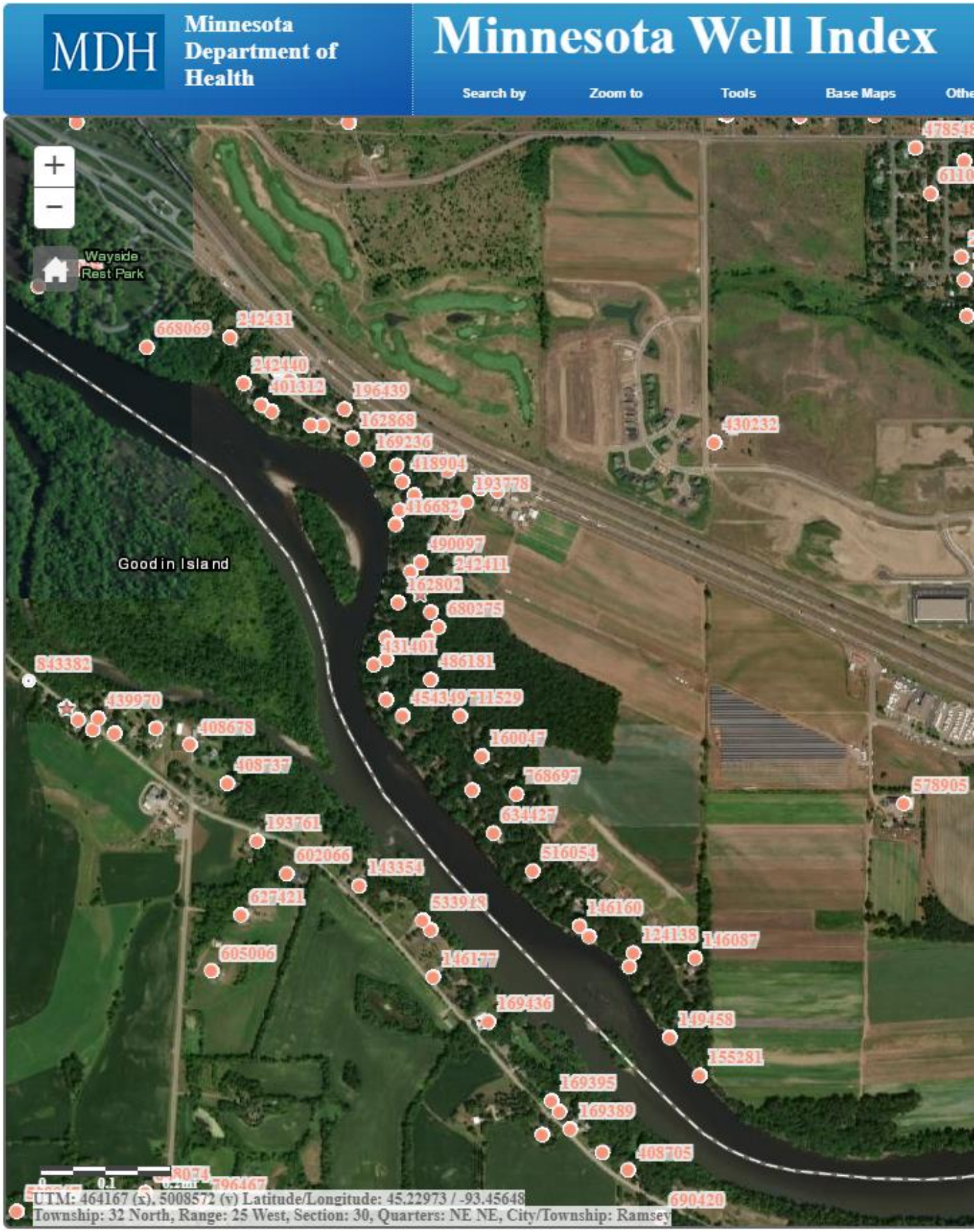
cc:
Melissa Barrett (Agent)
Karen Wold (LGU)
Ben Meyer (BWSR)

Appendix C

Groundwater Well Map and Well Logs

Riverstone South EAW

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MDH
Minnesota Department of Health
Minnesota Well Index
Search by
Zoom to
Tools
Base Maps
Othe
Wayside Rest Park
Good in Island
668069
242431
242440
401312
196439
162868
169236
418904
193778
416682
490097
242411
162802
680275
431401
486181
454349
711529
843382
439970
408678
408737
160047
768697
634427
578905
193761
602066
143354
516054
627421
533949
146160
124138
146087
605006
146177
169436
149458
155281
169395
169389
408705
690420
796467
UTM: 464167 (x), 5008572 (y) Latitude/Longitude: 45.22973 / -93.45648
Township: 32 North, Range: 25 West, Section: 30, Quarters: NE NE, City/Township: Ramsey

Minnesota Unique Well Number

503721

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 10/12/1989

Well Name	Township	Range	Dir	Section	Subsection
OLSON,	32	25	W	30	AABABA

Elevation 882 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14840 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DIRT	0	5	BLACK	SOFT
SAND & GRAVEL	5	37		SOFT
CLAY	37	62	GRAY	MEDIUM
GRAVEL	62	73		HARD
CLAY	73	98	GRAY	MEDIUM
GRAVEL	98	103		HARD
CLAY	103	118	GRAY	MEDIUM
SHALE & SANDROCK	118	221	VARIED	HARD

Remarks

SECTION MAP.

Well Depth 221 ft. **Depth Completed** 221 ft. **Date Well Completed** 08/05/1989

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

Use domestic **Status** Active

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

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

Casing Diameter	Weight	Hole Diameter
4 in. To 156 ft.	11 lbs./ft.	6.2 in. To 156 ft.
		4 in. To 221 ft.

Open Hole From 156 ft. To 221 ft.

Screen? ☐ **Type** **Make**

Static Water Level

35 ft. land surface Measure 08/05/1989

Pumping Level (below land surface)

100 ft. 2.5 hrs. Pumping at 40 g.p.m.

Wellhead Completion

Pitless adapter manufacturer MONITOR Model 8PL41UC1

☐ 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		ft.	ft.
bentonite		ft.	ft.

Nearest Known Source of Contamination

63 feet South Direction Sewer Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 09/10/1989

Manufacturer's name LOWARA

Model Number 11AM07412 HP 0.75 Volt 230

Length of drop pipe 60 ft Capacity 15 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 St.Lawrence-
Last Strat St.Lawrence-Tunnel City Depth to Bedrock 118 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 461225 Y 5009846
Unique Number Verification Address verification Input Date 07/03/2008

Angled Drill Hole

Well Contractor

Mork Well Co.	02133	AESHLIMAN, S.
Licensee Business	Lic. or Reg. No.	Name of Driller

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 - NAD83, Zone 15, Meters X 461892 Y 5009911
Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor

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

Minnesota Unique Well Number

511952

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 01/18/1990

Well Name	Township	Range	Dir	Section	Subsection
	32	25	W	30	ADBBAD

Elevation 860 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14691 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	42	BROWN	SOFT
CLAY	42	122	BROWN	MEDIUM
SAND ROCK W/SHALE	122	170	GRAY	HARD

Remarks

SECTION MAP.

Well Depth 170 ft. **Depth Completed** 170 ft. **Date Well Completed** 11/07/1989

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

Use domestic **Status** Active

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

Casing Type Single casing **Joint** Threaded

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

Casing Diameter	Weight	Hole Diameter
4 in. To 134 ft.	11 lbs./ft.	6.2 in. To 134 ft.
		4 in. To 170 ft.

Open Hole From 134 ft. To 170 ft.

Screen? ☐ **Type** **Make**

Static Water Level

28 ft. land surface Measure 11/07/1989

Pumping Level (below land surface)

40 ft. 3 hrs. Pumping at 35 g.p.m.

Wellhead Completion

Pitless adapter manufacturer WHITEWATER Model

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

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

Material	Amount	From	To
cuttings		ft.	ft.
bentonite		ft. 134	ft.

Nearest Known Source of Contamination

75 feet Southwes Direction Septic tank/drain field Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed 11/08/1989

Manufacturer's name GOULDS

Model Number HP 0.5 Volt 220

Length of drop pipe 60 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 Tunnel City Group Aquifer Tunnel City

Last Strat Tunnel City Group Depth to Bedrock 122 ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 461173 Y 5009427

Unique Number Verification Address verification Input Date 07/03/2008

Angled Drill Hole

Well Contractor

Ruppert & Son 27086 RUPPERT, C.

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

Minnesota Unique Well Number

486181

County Anoka
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 12/12/1991
Update Date 02/14/2014
Received Date 09/13/1991

Well Name	Township	Range	Dir	Section	Subsection
	32	25	W	30	ADBCAD

Elevation 858 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14623 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY & GRAVEL	0	135	BROWN	MEDIUM
GRAVEL	135	145		SOFT

Remarks

SECTION MAP.

Well Depth 145 ft. **Depth Completed** 145 ft. **Date Well Completed** 06/14/1991

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 135 ft.	lbs./ft.	6 in. To 145 ft.

Open Hole From ft. To ft.

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

Diameter	Slot/Gauze	Length	Set
2 in.	15	12.3 ft.	135 ft. 145 ft.

Static Water Level

13 ft. land surface Measure 06/14/1991

Pumping Level (below land surface)

130 ft. 1 hrs. Pumping at 50 g.p.m.

Wellhead Completion

Pitless adapter manufacturer MONITOR Model 8PL41UC1

☐ 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	0	0 ft.	30 ft.

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 07/01/1991

Manufacturer's name MYERS

Model Number 23242D700 HP 0.5 Volt 230

Length of drop pipe 50 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 Aquifer Quat. buried

Last Strat gravel (+larger) Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 461177 Y 5009324

Unique Number Verification Address verification Input Date 07/03/2008

Angled Drill Hole

Well Contractor

Mork Well Co. 02133 AESHLIMAN, S.

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

Minnesota Well Index Report **486181**

Printed on 10/13/2020

HE-01205-15

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 - NAD83, Zone 15, Meters X 461304 Y 5009799
Unique Number Verification Address verification Input 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

256060

County Anoka
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 11/25/2008
Update Date 08/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
LAWRENCE, JIM	32	25	W	30	ACBABA

Elevation 863 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14720 BOWERS DR NW RAMSEY MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	50		
HARD PAN	50	112		
CLAY & ROCKS	112	186		

Remarks

LOT 39 E. V. BUILDERS JOB # 68

Well Depth 186 ft. **Depth Completed** 186 ft. **Date Well Completed** 00/00/1972

Drill Method **Drill Fluid** Bentonite

Use unknown **Status** Active

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

Casing Type **Joint**

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

Casing Diameter	Weight	Hole Diameter
4 in. To 130 ft.	10.7 lbs./ft.	6.2 in. To 130 ft.
		4 in. To 186 ft.

Open Hole From 130 ft. To 186 ft.

Screen? ☐ **Type** **Make**

Static Water Level

40 ft. land surface Measure 00/00/1972

Pumping Level (below land surface)

Wellhead Completion

Pitless adapter manufacturer WHITEWATER 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

50 feet West Direction Septic tank/drain field Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed 00/00/1972

Manufacturer's name AY MCDONALD

Model Number HP 0.5 Volt 230

Length of drop pipe 63 ft Capacity 10 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 St.Lawrence-Tunnel City Aquifer St.Lawrence-

Last Strat St.Lawrence-Tunnel City Depth to Bedrock 112 ft

Located by Minnesota Geological Survey

Locate Method GPS SA Off (averaged) (15 meters)

System UTM - NAD83, Zone 15, Meters X 461150 Y 5009540

Unique Number Verification Address verification Input Date 01/04/2010

Angled Drill Hole

Well Contractor

Torgerson Well Co. 27056

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

Minnesota Well Index Report | **256060** | Printed on 10/13/2020

HE-01205-15

Minnesota Unique Well Number

114352

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
PEARSON,	32	25	W	19	DDCCBD

Elevation 877 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 8964 10 HY NW ANOKA MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	55	BROWN	
SAND	55	88	GRAY	
GRAVEL	88	95	BROWN	
SANDSTONE	95	136	YELLOW	SOFT
SANDSTONE	136	155	WHITE	HARD
SANDSTONE & SHALE	155	176	BLUE	

Remarks

SCREEN SET AT 95 FT. PRODUCED 3 GPM.

Well Depth 176 ft. **Depth Completed** 176 ft. **Date Well Completed** 12/09/1975

Drill Method Cable Tool **Drill Fluid**

Use domestic **Status** Active

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

Casing Type Single casing **Joint** Welded

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

Casing Diameter **Weight**

4 in. To 134 ft. 10.7 lbs./ft.

Open Hole From 134 ft. To 176 ft.

Screen? ☐ **Type** **Make**

Static Water Level

40 ft. land surface Measure 09/12/1975

Pumping Level (below land surface)

50 ft. 3 hrs. Pumping at 20 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 12/10/1975

Manufacturer's name RED JACKET

Model Number BVC 751 HP 0.75 Volt 230

Length of drop pipe 63 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 Tunnel City Group Aquifer Tunnel City

Last Strat Tunnel City Group Depth to Bedrock 95 ft

Located by Minnesota Geological Survey

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

System UTM - NAD83, Zone 15, Meters X 461100 Y 5009915

Unique Number Verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Renner E.H. & Sons 27015

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

Minnesota Unique Well Number

124137

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
SWEDAL,	32	25	W	30	ACBCAB

Elevation 861 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 14723 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	50	BROWN	SOFT
CLAY	50	72	BROWN	SOFT
ROCKS	72	106	BROWN	HARD
CLAY	106	121	BROWN	HARD
SAND	121	149	BROWN	HARD
SANDROCK	149	161	YELLOW	SOFT
SANDROCK	161	246	YELLOW	HARD

Remarks

Well Depth 246 ft. **Depth Completed** 246 ft. **Date Well Completed** 01/24/1976

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

Use domestic **Status** Active

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

Casing Type Single casing **Joint** Threaded
Drive Shoe? Yes ☒ No ☐ **Above/Below** 1.5 ft.

Casing Diameter	Weight	Hole Diameter
4 in. To 161 ft.	11 lbs./ft.	4 in. To 246 ft.

Open Hole From 161 ft. To 246 ft.

Screen? ☐ **Type** **Make**

Static Water Level
20 ft. land surface Measure 01/24/1976

Pumping Level (below land surface)
42 ft. 2 hrs. Pumping at 50 g.p.m.

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

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

Material	Amount	From	To
bentonite		ft.	ft.

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

Pump ☐ Not Installed Date Installed 09/02/1976
Manufacturer's name STA-RITE
Model Number GP8C2 HP 0.5 Volt 230
Length of drop pipe 36 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 Tunnel City Group Aquifer Tunnel City
Last Strat Tunnel City Group Depth to Bedrock 149 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 461179 Y 5009493
Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Torgerson, Art & Son	02203	OTTEN, D.

Minnesota Unique Well Number

711529

County Anoka
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 01/11/2005
Update Date 07/29/2008
Received Date 08/13/2004

Well Name	Township	Range	Dir	Section	Subsection
MORAVETZ,	32	25	W	30	ADCAAC

Elevation 863 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14593 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND & GRAVEL	0	32	BROWN	SOFT
CLAY & GRAVEL	32	35	BROWN	SOFT
SAND	35	48	BROWN	SOFT
CLAY & GRAVEL	48	92	BROWN	HARD
SAND & SILT	92	102	BROWN	SOFT
SAND & CLAY	102	134	BROWN	SOFT
CLAY & GRAVEL	134	140	BROWN	SOFT
SAND	140	155	BROWN	SOFT

Remarks

SECTION MAP.

Well Depth 155 ft. **Depth Completed** 153 ft. **Date Well Completed** 07/12/2004

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 142 ft.	lbs./ft.	8.5 in. To 30 ft.
		6.5 in. To 155 ft.

Open Hole From ft. To ft.

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

Diameter	Slot/Gauze	Length	Set	
2 in.	10	8 ft.	142 ft.	153 ft.

Static Water Level

30 ft. land surface Measure 07/12/2004

Pumping Level (below land surface)

ft. 3 hrs. Pumping at 25 g.p.m.

Wellhead Completion

Pitless adapter manufacturer MONITOR 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
high solids bentonite	5 Sacks	0 ft.	30 ft.
cuttings		30 ft.	142 ft.

Nearest Known Source of Contamination

51 feet South Direction Other Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 07/19/2004

Manufacturer's name RED JACKET

Model Number 75F211 HP 0.75 Volt 230

Length of drop pipe 60 ft Capacity 15 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 sand-brown Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 461251 Y 5009233

Unique Number Verification Address verification Input Date 07/03/2008

Angled Drill Hole

Well Contractor

Mork Well Co., Inc. 02730 BECKWORTH, D.

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

Minnesota Well Index Report | **711529** | Printed on 10/13/2020

HE-01205-15

Minnesota Unique Well Number

516054

County Anoka
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 11/17/1992
Update Date 08/18/2014
Received Date 10/08/1992

Well Name	Township	Range	Dir	Section	Subsection
ANDERSON,	32	25	W	30	DADAAC

Elevation 864 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14440 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY FIRM	0	10	BROWN	
FINE SAND	10	50	BROWN	SOFT
CLAY & ROCKS FIRM	50	90	BROWN	
SANDY CLAY	90	130	BROWN	SOFT
SAND & GRAVEL	130	138	BROWN	SOFT
CLAY & ROCKS FIRM	138	145	BROWN	
FRANCONIA SS	145	147	TAN	SOFT
FRANCONIA SS FIRM	147	157	LT. GRN	
FRANCONIA SS FIRM	157	190	GREEN	

Remarks

SECTION MAP.

Well Depth 190 ft. **Depth Completed** 190 ft. **Date Well Completed** 09/18/1992

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 146 ft.	10.7 lbs./ft.	6.2 in. To 146 ft.
		4 in. To 190 ft.

Open Hole From 146 ft. To 190 ft.

Screen? ☐ **Type** **Make**

Static Water Level

30 ft. land surface Measure 09/18/1992

Pumping Level (below land surface)

55 ft. 3 hrs. Pumping at 35 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	0.9 Cubic yards	ft.	146 ft.

Nearest Known Source of Contamination

100 feet South Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 09/23/1992

Manufacturer's name GRUNDFOS

Model Number 16S07-8 HP 0.75 Volt 230

Length of drop pipe 63 ft Capacity 16 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 145 ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 461430 Y 5008845

Unique Number Verification Address verification Input Date 07/03/2008

Angled Drill Hole

Well Contractor

Renner E.H. Well 71015 PRAUGHT, V.

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

Minnesota Unique Well Number

133390

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
GANDRUD,	32	25	W	30	AABCBA

Elevation 875 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 14820 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GRAVEL	0	69	DARK	
CLAY & GRAVEL	69	138	RED	
SHALE & SANDSTONE	138	154	VARIED	
SHALE & SANDSTONE	154	190	VARIED	

Remarks

Well Depth 190 ft. **Depth Completed** 190 ft. **Date Well Completed** 03/17/1978

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

Use domestic **Status** Active

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

Casing Type Single casing **Joint** Threaded

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

Casing Diameter	Weight	Hole Diameter
4 in. To 162 ft.	10.7 lbs./ft.	4 in. To 190 ft.

Open Hole From 162 ft. To 190 ft.

Screen? ☐ **Type** **Make**

Static Water Level

39 ft. land surface Measure 03/17/1978

Pumping Level (below land surface)

ft. 3 hrs. Pumping at 30 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☒ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

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

Material	Amount	From	To
bentonite		ft.	ft.

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 03/17/1978

Manufacturer's name JACUZZI

Model Number 7S4M12-S/2 HP 0.75 Volt 230

Length of drop pipe 72 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 Tunnel City Group Aquifer Tunnel City

Last Strat Tunnel City Group Depth to Bedrock 138 ft

Located by Minnesota Geological Survey

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

System UTM - NAD83, Zone 15, Meters X 461103 Y 5009747

Unique Number Verification Name on mailbox Input Date 01/01/1990

Angled Drill Hole

Well Contractor

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

Minnesota Unique Well Number

193778

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
	32	25	W	30	ABADAD

Elevation 880 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14821 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	8	BROWN	SOFT
WATERSAND	8	18	BROWN	SOFT
ROCKS & GRAVEL	18	60	BROWN	HARD
CLAY	60	66	BROWN	HARD
ROCKS & GRAVEL	66	72	BROWN	HARD
SAND	72	80	BROWN	HARD
DRY GRAVEL	80	155	BROWN	HARD
SHALE	155	170	BLUE	HARD
SANDROCK	170	186	YELLOW	HARD

Remarks

Well Depth 186 ft. **Depth Completed** 186 ft. **Date Well Completed** 09/30/1983

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

Use domestic **Status** Active

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

Casing Type Single casing **Joint** Threaded
Drive Shoe? Yes ☒ No ☐ **Above/Below** 1.5 ft.

Casing Diameter	Weight	Hole Diameter
4 in. To 155 ft.	11 lbs./ft.	6 in. To 155 ft.
		4 in. To 186 ft.

Open Hole From 155 ft. To 186 ft.

Screen? ☐ **Type** **Make**

Static Water Level
18 ft. land surface Measure 09/30/1983

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

Wellhead Completion
Pitless adapter manufacturer WHITEWATER Model SU4X5.5
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

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

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

Pump ☐ Not Installed Date Installed 10/06/1983
Manufacturer's name STA-RITE
Model Number 8P4C025 HP 0.5 Volt 230
Length of drop pipe 54 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 Tunnel City Group Aquifer Tunnel City
Last Strat Tunnel City Group Depth to Bedrock 155 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 461269 Y 5009766
Unique Number Verification Information from Input Date 01/01/1990

Angled Drill Hole

Well Contractor
Torgerson, Art & Son 02203 TORGERSON, S.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

672386

County Anoka
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 12/30/2002
Update Date 07/29/2008
Received Date

Well Name	Township	Range	Dir	Section	Subsection
KLABOUGH,	32	25	W	30	ACAADD

Elevation 849 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14660 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	8	BROWN	SOFT
GRAVEL, ROCKS	8	52	BROWN	SOFT
CLAY	52	54	BROWN	MEDIUM
GRAVEL, ROCKS	54	70	BROWN	SOFT
CLAY	70	70	GRAY	MEDIUM

Remarks

SECTION MAP.

Well Depth 70 ft. **Depth Completed** 70 ft. **Date Well Completed** 05/20/2002

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**

Casing Diameter	Weight	Hole Diameter
4 in. To 65 ft.	1.9 lbs./ft.	6.5 in. To 70 ft.

Open Hole From ft. To ft.

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

Diameter	Slot/Gauze	Length	Set
2 in.	12	5 ft.	65 ft. 70 ft.

Static Water Level

14 ft. land surface Measure 05/20/2002

Pumping Level (below land surface)

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

Wellhead Completion

Pitless adapter manufacturer MONITOR Model

☐ Casing Protection ☒ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

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

Material	Amount	From	To
high solids bentonite	0.17 Cubic yards	0 ft.	30 ft.
cuttings		30 ft.	65 ft.

Nearest Known Source of Contamination

40 feet East Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 09/04/2002

Manufacturer's name AERMOTOR

Model Number T12-75 HP 0.75 Volt 230

Length of drop pipe 40 ft Capacity 15 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. Water

Last Strat clay-gray Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 461066 Y 5009376

Unique Number Verification Address verification Input Date 07/03/2008

Angled Drill Hole

Well Contractor

Mc Alpine Brothers 27636 MCALPINE, B.

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

Minnesota Unique Well Number

124138

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
HOLLAND	32	25	W	29	CCABBB

Elevation 862 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14350 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	50	BROWN	SOFT
CLAY	50	79	BROWN	SOFT
SAND	79	92	BROWN	HARD
ROCKS	92	111	BROWN	HARD
CLAY	111	136	BROWN	HARD
SAND	136	151	BROWN	HARD
SANDROCK	151	170	YELLOW	SOFT
SANDROCK	170	246	YELLOW	HARD

Remarks

FORMER OWNER ROBERT DREWS.

Well Depth 246 ft. **Depth Completed** 246 ft. **Date Well Completed** 01/23/1976

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

Use domestic **Status** Active

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

Casing Type Single casing **Joint** Threaded
Drive Shoe? Yes ☒ No ☐ **Above/Below** 1.5 ft.

Casing Diameter	Weight	Hole Diameter
4 in. To 170 ft.	11 lbs./ft.	4 in. To 246 ft.

Open Hole From 170 ft. To 246 ft.

Screen? ☐ **Type** **Make**

Static Water Level

20 ft. land surface Measure 01/23/1976

Pumping Level (below land surface)

60 ft. 2 hrs. Pumping at 50 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

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

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

Material	Amount	From	To
bentonite		ft.	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 01/23/1976

Manufacturer's name STA-RITE

Model Number GP8C2 HP 0.5 Volt 230

Length of drop pipe 54 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 Tunnel City Group Aquifer Tunnel City

Last Strat Tunnel City Group Depth to Bedrock 151 ft

Located by Minnesota Geological Survey

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

System UTM - NAD83, Zone 15, Meters X 461681 Y 5008639

Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Torgerson, Art & Son 02203 OTTEN, D.

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

Minnesota Unique Well Number

242411

County Anoka
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 12/10/1999
Update Date 01/06/2017
Received Date 12/09/1999

Well Name	Township	Range	Dir	Section	Subsection
WALDOWSKI,	32	25	W	30	AACDBA

Elevation 871 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14743 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	50		
CLAY	50	72		
CLAY & ROCKS	72	106		
CLAY	106	121		
SAND	121	149		
FRANCONIA	149	178		

Remarks

GEOLOGY TAKEN FROM NEIGHBOR'S WELL RECORD.
SECTION MAP.
WELL DRILLED BY WOODROW TORGERSON.
RECORD PREPARED BY RAYMOND T. RENNER.

Well Depth 178 ft. **Depth Completed** 178 ft. **Date Well Completed** 08/26/1969

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 ft.	10.7 lbs./ft.	4 in. To 178 ft.

Open Hole From 0 ft. To 178 ft.

Screen? ☐ **Type** **Make**

Static Water Level
14 ft. land surface Measure 11/17/1999

Pumping Level (below land surface)
40 ft. 3 hrs. Pumping at 10 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model WELL SEAL
☐ 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
50 feet West Direction Septic tank/drain field Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed 11/17/1999
Manufacturer's name GRUNDFOS
Model Number 10S05-9 HP 0.5 Volt 230
Length of drop pipe 52 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 Tunnel City Group Aquifer
Last Strat Tunnel City Group Depth to Bedrock 149 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 461217 Y 5009565
Unique Number Verification Address verification Input Date 07/03/2008

Angled Drill Hole

Well Contractor
TORGERSON, W.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

416682

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
GUY, HAROLD	32	25	W	30	AABCCA

Elevation 861 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 14760 BOWER DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	69		
HARDPAN	69	103		
SHALE	103	168		
SANDROCK	168	186		

Remarks

Well Depth	Depth Completed	Date Well Completed
186 ft.	186 ft.	12/12/1985

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

Use domestic **Status** Active

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

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

Casing Diameter	Weight
4 in. To 133 ft.	lbs./ft.

Open Hole From 133 ft. To 186 ft.

Screen? ☐ **Type** **Make**

Static Water Level
18 ft. land surface Measure 12/12/1985

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

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

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

Material	Amount	From	To
neat cement		ft.	ft.

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

Pump ☐ Not Installed Date Installed 12/13/1985
Manufacturer's name RED JACKET
Model Number HP 0.5 Volt
Length of drop pipe 21 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 St.Lawrence-Tunnel City Aquifer Tunnel City
Last Strat Tunnel City Group Depth to Bedrock 103 ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 461092 Y 5009712
Unique Number Verification Information from Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Torgerson Well Co.	27056	TORGERSON, R.

Minnesota Unique Well Number

179361

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
	32	25	W	30	AABBBA

Elevation 878 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14830 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
TOP SOIL	0	6	TAN	SOFT
SAND & GRAVEL	6	68	TAN	SOFT
CLAY	68	78	RED	HARD
CLAY & ROCKS	78	114	GRAY	HARD
SHALE	114	160	GREEN	MEDIUM
SHALE & SANDSTONE	160	170	GREEN	HARD
SANDSTONE	170	210	GRAY	HARD

Remarks

Well Depth 210 ft. **Depth Completed** 210 ft. **Date Well Completed** 03/05/1981

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

Use domestic **Status** Active

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

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

Casing Diameter		Weight		Hole Diameter	
4 in. To 170 ft.		10.7 lbs./ft.		4 in. To 210 ft.	

Open Hole From 170 ft. To 210 ft.

Screen? ☐ **Type** **Make**

Static Water Level
35 ft. land surface Measure 03/05/1981

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

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

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

Material	Amount	From	To
bentonite		0 ft.	20 ft.

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

Pump ☐ Not Installed Date Installed 03/10/1981
Manufacturer's name AERMOTOR
Model Number SD 12-50 HP 0.5 Volt 230
Length of drop pipe 54 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 St.Lawrence-Tunnel City Aquifer Tunnel City
Last Strat Tunnel City Group Depth to Bedrock 114 ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 461095 Y 5009858
Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor
Hadden Well Co. 02164 HADDEN, R.
Licensee Business Lic. or Reg. No. Name of Driller

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) (15 meters or

System UTM - NAD83, Zone 15, Meters X 461347 Y 5009793

Unique Number Verification Address verification Input Date 07/03/2008

Angled Drill Hole

Well Contractor

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

Minnesota Well Index Report | **541778** | Printed on 10/13/2020

HE-01205-15

Minnesota Unique Well Number

160047

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
BEBEAU, LYLE	32	25	W	30	ADDCAC

Elevation 865 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14543 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	10	BROWN	
COARSE GRAVEL	10	60	DARK	
CLAY & GRAVEL &	60	121	RED	
GRAVEL	121	143	DK. BRN	
LAYERED SHALE &	143	185	GREEN	HARD
LAYERED SHALE &	185	205	RED	SOFT
LAYERED SHALE &	205	260	GRN/RED	HARD

Remarks

Well Depth 260 ft. **Depth Completed** 260 ft. **Date Well Completed** 06/04/1979

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

Use domestic **Status** Active

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

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

Casing Diameter	Weight	Hole Diameter
4 in. To 215 ft.	10.7 lbs./ft.	4 in. To 260 ft.

Open Hole From 215 ft. To 260 ft.

Screen? ☐ **Type** **Make**

Static Water Level
18 ft. land surface Measure 06/04/1979

Pumping Level (below land surface)
ft. 3 hrs. Pumping at 45 g.p.m.

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

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

Material	Amount	From	To
bentonite		ft.	ft.

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

Pump ☐ Not Installed Date Installed 06/07/1979
Manufacturer's name JACUZZI
Model Number 7S4M12-S2 HP 0.75 Volt 230
Length of drop pipe 42 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 Tunnel City Group Aquifer Tunnel City
Last Strat Tunnel City Group Depth to Bedrock 143 ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 461305 Y 5009133
Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Renner E.H. & Sons	02015	SHIMMING, D.

Minnesota Unique Well Number

169236

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
PETERSON,	32	25	W	19	DCDDDC

Elevation 870 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 9002 10 HY W RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	82	BROWN	SOFT

Remarks

Well Depth	Depth Completed	Date Well Completed
82 ft.	82 ft.	12/29/1980

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

Use domestic **Status** Active

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

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

Casing Diameter	Weight	Hole Diameter
4 in. To 78 ft.	11 lbs./ft.	6.2 in. To 78 ft.
		4 in. To 82 ft.

Open Hole From ft. To ft.

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

Diameter	Slot/Gauze	Length	Set	
4 in.	15	4 ft.	78 ft.	82 ft.

Static Water Level

40 ft. land surface Measure 12/29/1980

Pumping Level (below land surface)

47 ft. 3 hrs. Pumping at 30 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

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

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

Material	Amount	From	To
cuttings		ft.	ft.
bentonite		ft. 78	ft.

Nearest Known Source of Contamination

50 feet East Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 01/02/1981

Manufacturer's name RED JACKET

Model Number 75V19BC HP 0.75 Volt 230

Length of drop pipe 54 ft Capacity 14 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. Water

Last Strat sand-brown Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 461023 Y 5009874

Unique Number Verification Information from Input Date 08/19/2008

Angled Drill Hole

Well Contractor

Ruppert & Son 27086 RUPPERT, G.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Well Index Report | **169236** | Printed on 10/13/2020 HE-01205-15

Minnesota Unique Well Number

155281

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
LUKE, TERRY	32	25	W	29	CCCDDD

Elevation 866 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14200 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	80		
GRAVEL	80	130		
CLAY	130	150		
SANDROCK	150	186		
ROCK	186	248		

Remarks

BOWERS MISS. ACRES BLK 1 LOT 8. SOUTH 0.5 SECT.

Well Depth	Depth Completed	Date Well Completed
248 ft.	248 ft.	10/24/1978

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

Use domestic **Status** Active

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

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

Casing Diameter	Weight	Hole Diameter
4 in. To 186 ft.	lbs./ft.	4 in. To 248 ft.

Open Hole From 186 ft. To 248 ft.

Screen? ☐ **Type** **Make**

Static Water Level

30 ft. land surface Measure 10/24/1978

Pumping Level (below land surface)

40 ft. 3 hrs. Pumping at 30 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

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

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

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 10/27/1978

Manufacturer's name AERMOTOR

Model Number HP 0.5 Volt

Length of drop pipe 54 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 150 ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 461846 Y 5008333

Unique Number Verification Address verification Input Date 06/02/2000

Angled Drill Hole

Well Contractor

Torgerson Well Co. 27056 OTTEN, D.

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

Minnesota Well Index Report | **155281** | Printed on 10/13/2020

HE-01205-15

Minnesota Unique Well Number

417963

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
	32	25	W	30	ADBBBC

Elevation 850 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14670 BOWERS DR NW ANOKA MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
TOP SOIL	0	6	BLK/BRN	SOFT
SAND & GRAVEL	6	40	BROWN	MEDIUM
SILTY SAND	40	58	BROWN	SOFT
CLAY & ROCK	58	96	BROWN	HARD
SHALE & SANDROCK	96	122	GRN/WHT	MEDIUM
SHALE & SANDROCK	122	147	GRN/RED	HARD
SANDROCK	147	170	WHITE	HARD

Remarks

Well Depth 170 ft. **Depth Completed** 170 ft. **Date Well Completed** 01/13/1986

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

Use domestic **Status** Active

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

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

Casing Diameter	Weight	Hole Diameter
4 in. To 124 ft.	12 lbs./ft.	6 in. To 124 ft.
		4 in. To 170 ft.

Open Hole From 124 ft. To 170 ft.

Screen? ☐ **Type** **Make**

Static Water Level
10 ft. land surface Measure 01/13/1986

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

Wellhead Completion
Pitless adapter manufacturer WHITEWATER Model SU6.5
☐ 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 ft.	124 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 01/15/1986
Manufacturer's name AERMOTOR
Model Number SD1250 HP 0.5 Volt 230
Length of drop pipe 40 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 St.Lawrence-Tunnel City Aquifer Tunnel City
Last Strat Tunnel City Group Depth to Bedrock 96 ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 461067 Y 5009429
Unique Number Verification Information from Input Date 01/01/1990

Angled Drill Hole

Well Contractor
Mc Alpine's Well Co. 27186 MCALPINE, T.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

162802

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
KUSS, GENE	32	25	W	30	AACCCA

Elevation 855 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 14710 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	15	BROWN	SOFT
CLAY & ROCK	15	70	BROWN	MEDIUM
CLAY	70	105	GRAY	HARD
FINE SAND	105	120	RED	SOFT
COARSE SAND	120	130	YELLOW	MEDIUM

Remarks

Well Depth 130 ft. **Depth Completed** 130 ft. **Date Well Completed** 08/03/1979

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

Use domestic **Status** Active

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

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

Casing Diameter	Weight	Hole Diameter
4 in. To 125 ft.	12 lbs./ft.	6 in. To 125 ft.

Open Hole From ft. To ft.

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

Diameter	Slot/Gauze	Length	Set
2 in.		5 ft.	125 ft. 130 ft.

Static Water Level
20 ft. land surface Measure 08/03/1979

Pumping Level (below land surface)
20 ft. 3 hrs. Pumping at 20 g.p.m.

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

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

Material	Amount	From	To
bentonite		0 ft.	125 ft.

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

Pump ☐ Not Installed Date Installed 08/06/1979
Manufacturer's name AERMOTOR
Model Number SD 1250 HP 0.5 Volt 230
Length of drop pipe 42 ft Capacity 20 g.p. Typ Submersible

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

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

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat sand-yellow Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 461097 Y 5009517
Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Mc Alpine's Well Co.	27186	MCALPINE, G.

Minnesota Unique Well Number

149458

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
LUKE, TERRY	32	25	W	29	CCCDBB

Elevation 865 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 14250 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	150	BLUE	
SAND	150	180	BROWN	
ROCK	180	211	WHITE	

Remarks

SOUTH 0.5 SECTION

Well Depth	Depth Completed	Date Well Completed
211 ft.	211 ft.	08/00/1976

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

Use domestic **Status** Active

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

Casing Type Single casing **Joint** Threaded

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

Casing Diameter	Weight	Hole Diameter
4 in. To 200 ft.	lbs./ft.	4 in. To 211 ft.

Open Hole From 200 ft. To 211 ft.

Screen? ☐ **Type** **Make**

Static Water Level

50 ft. land surface Measure 08/00/1976

Pumping Level (below land surface)

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

Wellhead Completion

Pitless adapter manufacturer Model

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

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

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

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 08/00/1976

Manufacturer's name AERMOTOR

Model Number HP 0.5 Volt

Length of drop pipe 54 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 180 ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 461771 Y 5008429

Unique Number Verification Address verification Input Date 06/02/2000

Angled Drill Hole

Well Contractor

Torgerson Well Co. 27056

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

Minnesota Unique Well Number

431401

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
	32	25	W	30	ACAADD

Elevation 852 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14650 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SANDY CLAY	0	21	BROWN	MEDIUM
SAND	21	52	TAN	SOFT
CLAY	52	108	BROWN	MEDIUM
SHALE & SOME	108	120	BLU/TAN	MEDIUM
SANDSTONE	120	127	TAN/WHT	M.SOFT

Remarks

Well Depth 127 ft. **Depth Completed** 127 ft. **Date Well Completed** 01/13/1987

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

Use domestic **Status** Active

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

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

Casing Diameter		Weight	
4	in. To 123 ft.	11	lbs./ft.

Open Hole From ft. To ft.

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

Diameter	Slot/Gauze	Length	Set	
4 in.	15	4 ft.	123 ft.	127 ft.

Static Water Level

15 ft. land surface Measure 01/13/1987

Pumping Level (below land surface)

25 ft. 4 hrs. Pumping at 30 g.p.m.

Wellhead Completion

Pitless adapter manufacturer WHITEWATER Model

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

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

Material	Amount	From	To
bentonite		0 ft.	123 ft.
cuttings		ft.	ft.

Nearest Known Source of Contamination

50 feet Northeas Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 01/22/1987

Manufacturer's name RED JACKET

Model Number 50UI9BC HP 0.5 Volt 230

Length of drop pipe 40 ft Capacity 14 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 Tunnel City
Last Strat Tunnel City Group Depth to Bedrock 108 ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 461035 Y 5009362
Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Ruppert & Son	27086	RUPPERT, G.

Minnesota Unique Well Number

656433

County Anoka
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 11/07/2001
Update Date 08/18/2014
Received Date 07/18/2001

Well Name	Township	Range	Dir	Section	Subsection
NASH, STEVE &	32	25	W	30	DBCDBD

Elevation 865 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 14500 BOWERS DR RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND/CLAY	0	30	BROWN	
SAND	30	50	BROWN	
ROCKS/GRAVEL	50	80	BROWN	HARD
CLAY/GRAVEL	80	137	BROWN	
SHALE	137	150	GREEN	MEDIUM
SANDSTONE	150	175	WHT/BRN	M.HARD

Remarks

Well Depth	Depth Completed	Date Well Completed
175 ft.	175 ft.	01/28/2001

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 147 ft.	11 lbs./ft.	8 in. To 136 ft.
		4 in. To 175 ft.

Open Hole From 136 ft. To 175 ft.

Screen? ☐ **Type** **Make**

Static Water Level
25 ft. land surface Measure 01/28/2001

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

Wellhead Completion
Pitless adapter manufacturer SNAPPY Model 1INCH
☐ 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
high solids bentonite	3 Sacks	0 ft.	40 ft.

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

Pump ☐ Not Installed Date Installed 02/07/2001
Manufacturer's name MYERS
Model Number 2 WIRE HP 0.75 Volt 230
Length of drop pipe 60 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 Tunnel City Group Aquifer Tunnel City
Last Strat Tunnel City Group Depth to Bedrock 137 ft
Located by Minnesota Department of Health
Locate Method GPS SA Off (averaged) (15 meters)
System UTM - NAD83, Zone 15, Meters X 461280 Y 5009048
Unique Number Verification Input Date 01/30/2001

Angled Drill Hole

Well Contractor
Barott B. Well Co. 02566 BAROTT, B.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Well Index Report | **656433** | Printed on 10/13/2020 HE-01205-15

Minnesota Unique Well Number

126498

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
JOHNSON, AL	32	25	W	29	CCBCBC

Elevation 865 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14330 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	68		
CLAY	68	108		
GRAVEL	108	146		
SOFT SANDROCK	146	186		
HARD SANDROCK	186	201		

Remarks

SOUTH 0.5 SECT.

Well Depth 201 ft. **Depth Completed** 201 ft. **Date Well Completed** 06/08/1976

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

Use domestic **Status** Active

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

Casing Type Single casing **Joint** Threaded

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

Casing Diameter **Weight**

4 in. To 188 ft. lbs./ft.

Open Hole From ft. To ft.

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

Static Water Level

15 ft. land surface Measure 06/08/1976

Pumping Level (below land surface)

25 ft. 3 hrs. Pumping at g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

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

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 06/12/1976

Manufacturer's name AERMOTOR

Model Number HP 0.75 Volt

Length of drop pipe 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 146 ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 461670 Y 5008605

Unique Number Verification Address verification Input Date 06/02/2000

Angled Drill Hole

Well Contractor

Torgerson Well Co. 27056 OTTEN, D.

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

Minnesota Unique Well Number

409591

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
MILLER, GARY	32	25	W	30	AABBDD

Elevation 881 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 14810 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	54	BROWN	
CLAY	54	58	GRAY	
CLAY & SANDSTONE	58	112	BROWN	
GRAVEL	112	119	VARIED	
SHALE & SANDSTONE	119	148	GRN/BRN	
SANDSTONE & SHALE	148	213		

Remarks

Well Depth	Depth Completed	Date Well Completed
213 ft.	213 ft.	05/21/1985

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

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 168 ft.	10.7 lbs./ft.	6.2 in. To 168 ft.
		4 in. To 213 ft.

Open Hole From 168 ft. To 213 ft.

Screen? ☐ **Type** **Make**

Static Water Level
32 ft. land surface Measure 05/21/1985

Pumping Level (below land surface)
38 ft. 3 hrs. Pumping at 60 g.p.m.

Wellhead Completion
Pitless adapter manufacturer SNAPPY Model PLASTIC
☐ 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 ft.	168 ft.

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

Pump ☐ Not Installed Date Installed 05/23/1985
Manufacturer's name GRUNDFOS
Model Number SP4-8 HP 0.75 Volt 230
Length of drop pipe 63 ft Capacity 20 g.p. Typ Submersible

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

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

Miscellaneous
First Bedrock St.Lawrence-Tunnel City Aquifer Tunnel City
Last Strat Tunnel City Group Depth to Bedrock 119 ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 461139 Y 5009785
Unique Number Verification Information from Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Renner E.H. & Sons	02015	SUTTON, G.

Minnesota Unique Well Number

146087

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
LUKE, MARVIN	32	25	W	29	CCABCC

Elevation 865 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 14235 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND & GRAVEL	0	48	YELLOW	SOFT
CLAY & ROCK	48	120	RED	HARD
GRAVEL	120	150	BLACK	HARD
SANDROCK	150	160	WHITE	HARD

Remarks

SOUTH 0.5 SECTION

Well Depth 160 ft. **Depth Completed** 160 ft. **Date Well Completed** 08/31/1977

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

Use domestic **Status** Active

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

Casing Type Single casing **Joint** Threaded

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

Casing Diameter	Weight	Hole Diameter
4 in. To 155 ft.	12 lbs./ft.	6 in. To 155 ft.

Open Hole From ft. To ft.

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

Diameter	Slot/Gauze	Length	Set	
2 in.	10	5 ft.	155 ft.	160 ft.

Static Water Level

20 ft. land surface Measure 08/31/1977

Pumping Level (below land surface)

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

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☒ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

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

Material	Amount	From	To
bentonite		0 ft.	155 ft.

Nearest Known Source of Contamination

50 feet Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 09/01/1977

Manufacturer's name AERMOTOR

Model Number SD1250 HP 0.5 Volt 230

Length of drop pipe 42 ft Capacity 20 g.p. Typ Submersible

Abandoned

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

Variance

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

Miscellaneous

First Bedrock Tunnel City Group Aquifer Tunnel City

Last Strat Tunnel City Group Depth to Bedrock 150 ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 461835 Y 5008627

Unique Number Verification Address verification Input Date 06/02/2000

Angled Drill Hole

Well Contractor

Mc Alpine's Well Co. 27186 MCALPINE, G.

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

Minnesota Unique Well Number

634427

County Anoka
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 04/29/2002
Update Date 08/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
BOYUM,	32	25	W	30	DCABDB

Elevation 862 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 14470 BOWERS DR ANOKA MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	30	BROWN	MEDIUM
CLAY & STONE	30	80	BROWN	MEDIUM
STONE & CLAY	80	100	BROWN	HARD
CLAY & ROCKS	100	110	BROWN	HARD
RUBBLE	110	120	WHT/BLK	HARD
SANDSTONE	120	120		

Remarks

Well Depth 120 ft. **Depth Completed** 120 ft. **Date Well Completed** 11/19/2001

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

Use domestic **Status** Active

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

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

Casing Diameter	Weight	Hole Diameter
4 in. To 110 ft.	lbs./ft.	8.7 in. To 30 ft.
		6.5 in. To 120 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** slotted pipe **Make** CERTAIN

Diameter	Slot/Gauze	Length	Set
4 in.	12	ft. 110 ft.	120 ft.

Static Water Level

25 ft. land surface Measure 11/19/2001

Pumping Level (below land surface)

ft. 4 hrs. Pumping at 20 g.p.m.

Wellhead Completion

Pitless adapter manufacturer SNAPPY Model

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

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

Material	Amount	From	To
well grouted, type unknown	4 Sacks	0 ft.	30 ft.

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed

Manufacturer's name STA RITE

Model Number 1/2 HP 0.5 Volt 220

Length of drop pipe 80 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 St.Lawrence-Tunnel City Aquifer Quat. buried

Last Strat St.Lawrence-Tunnel City Depth to Bedrock 120 ft

Located by Minnesota Department of Health

Locate Method GPS SA Off (averaged) (15 meters)

System UTM - NAD83, Zone 15, Meters X 461332 Y 5008940

Unique Number Verification Input Date 09/12/2001

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Rum River Drilling	27659	PRAUGHT, N.

Minnesota Unique Well Number

418904

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
BECHTOLD,	32	25	W	30	AABBBD

Elevation 881 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14826 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	18	TAN	SOFT
GRAVEL	18	47	TAN	SOFT
CLAY	47	85	RED/GRY	SOFT
CLAY	85	110	GRAY	SOFT
SHALE	110	137	RED	SOFT
SANDSTONE	137	148	YELLOW	SOFT
SANDSTONE	148	170	YEL/WHT	HARD

Remarks

SECTION MAP.

Well Depth 170 ft. **Depth Completed** 170 ft. **Date Well Completed** 11/06/1986

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

Use domestic **Status** Active

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

Casing Type Single casing **Joint** Threaded

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

Casing Diameter	Weight	Hole Diameter
4 in. To 148 ft.	11 lbs./ft.	6.2 in. To 148 ft.
		4 in. To 170 ft.

Open Hole From 148 ft. To 170 ft.

Screen? ☐ **Type** **Make**

Static Water Level

45 ft. land surface Measure 11/07/1986

Pumping Level (below land surface)

ft. hrs. Pumping at 35 g.p.m.

Wellhead Completion

Pitless adapter manufacturer MONITOR 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		ft.	ft.

Nearest Known Source of Contamination

55 feet South Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 11/06/1986

Manufacturer's name FLINT & WALLING

Model Number HP 0.5 Volt 230

Length of drop pipe 65 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 Formation Aquifer Tunnel City

Last Strat Tunnel City Group Depth to Bedrock 110 ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 461109 Y 5009818

Unique Number Verification Address verification Input Date 07/03/2008

Angled Drill Hole

Well Contractor

Bill's Well Co. 33087 JAPP, P.

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

Minnesota Unique Well Number

425746

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
LETOURNEAU	32	25	W	30	ADBDCD

Elevation 860 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 14607 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND GRAVEL	0	7	BROWN	SOFT
CLAY	7	14	BROWN	SOFT
CLAY GRAVEL	14	33	BROWN	SOFT
GRAVEL & SAND	33	43	BROWN	SOFT
BOULDERS, & CLAY	43	122	BROWN	HARD
GRAVEL & SAND	122	135	BROWN	SOFT

Remarks

Well Depth 135 ft. **Depth Completed** 135 ft. **Date Well Completed** 10/16/1986

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
4 in. To 120 ft.	lbs./ft.

Open Hole From ft. To ft.

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

Diameter	Slot/Gauze	Length	Set	
2 in.	15	12 ft.	120 ft.	135 ft.

Static Water Level
12 ft. land surface Measure 10/16/1986

Pumping Level (below land surface)
100 ft. 1.5 hrs. Pumping at 55 g.p.m.

Wellhead Completion
Pitless adapter manufacturer MONITOR Model 8PL41UC7
☐ 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		0 ft.	30 ft.
bentonite		30 ft.	120 ft.

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

Pump ☐ Not Installed Date Installed 10/18/1986
Manufacturer's name AERMOTOR
Model Number SD1250 HP 0.5 Volt 230
Length of drop pipe 40 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 Aquifer Quat. buried
Last Strat sand +larger-brown Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 461186 Y 5009277
Unique Number Verification Address verification Input 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

494213

County Anoka
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 12/23/1991
Update Date 08/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
GORHAM, GARY	32	25	W	30	ABADCB

Elevation 878 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 14801 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND & GRAVEL	0	14	TAN	SOFT
GRAVEL	14	40	TAN	MEDIUM
CLAY	40	45	BROWN	HARD
CLAY & GRAVEL	45	130	BROWN	HARD
SHALE & SANDSTONE	130	150	TAN	MEDIUM
SANDSTONE & SHALE	150	211	TAN/BRN	HARD

Remarks

Well Depth 211 ft. **Depth Completed** 211 ft. **Date Well Completed** 08/07/1991

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

Use domestic **Status** Active

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

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

Casing Diameter	Weight	Hole Diameter
4 in. To 151 ft.	11 lbs./ft.	4 in. To 211 ft.

Open Hole From 151 ft. To 211 ft.

Screen? ☐ **Type** **Make**

Static Water Level
33 ft. land surface Measure 08/05/1991

Pumping Level (below land surface)
43 ft. 3 hrs. Pumping at 49 g.p.m.

Wellhead Completion
Pitless adapter manufacturer MONITOR Model 5PS45BS4C1
☐ 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		ft.	ft.

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

Pump ☐ Not Installed Date Installed 08/07/1991
Manufacturer's name AERMOTOR
Model Number SD 20-75 HP 0.75 Volt 230
Length of drop pipe 60 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 St.Lawrence-Tunnel City Aquifer Tunnel City
Last Strat Tunnel City Group Depth to Bedrock 130 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 461244 Y 5009740
Unique Number Verification Information from Input Date 05/17/2006

Angled Drill Hole

Well Contractor
Hadden Well Co. 02164 HADDEN, M.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

722207

County Anoka
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 12/28/2005
Update Date 08/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
	32	25	W	30	AACBDC

Elevation 860 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14750 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GRAVEL	0	25	BROWN	SOFT
ROCKS, GRAVEL	25	30	BROWN	MEDIUM
CLAY, GRAVEL, ROCKS	30	111	BROWN	HARD
SHALE, SANDROCK	111	130	GRN/WHT	SOFT
SANDROCK, SHALE	130	200	WHT/GRN	HARD

Remarks

SECTION MAP.

Well Depth 200 ft. **Depth Completed** 200 ft. **Date Well Completed** 06/06/2005

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 135 ft.	lbs./ft.	8.5 in. To 135 ft.
		4.5 in. To 200 ft.

Open Hole From 135 ft. To 200 ft.

Screen? ☐ **Type** **Make**

Static Water Level

23 ft. land surface Measure 06/06/2005

Pumping Level (below land surface)

75 ft. 2 hrs. Pumping at 75 g.p.m.

Wellhead Completion

Pitless adapter manufacturer MONITOR 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
neat cement	3	Sacks	105 ft.	135 ft.
high solids bentonite	11	Sacks	ft.	105 ft.

Nearest Known Source of Contamination

36 feet South Direction Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 08/18/2005

Manufacturer's name RED JACKET

Model Number 75F211/12G HP 0.75 Volt 230

Length of drop pipe 60 ft Capacity 15 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 Tunnel City

Last Strat Tunnel City Group Depth to Bedrock 111 ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 461129 Y 5009593

Unique Number Verification Address verification Input Date 07/03/2008

Angled Drill Hole

Well Contractor

Mork Well Co., Inc. 02730 GOODIN, G.

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

Minnesota Well Index Report **722207**

Printed on 10/13/2020

HE-01205-15

Minnesota Unique Well Number

656104

County Anoka
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/01/2001
Update Date 07/29/2008
Received Date 03/30/2001

Well Name	Township	Range	Dir	Section	Subsection
HOWIE, JEFF &	32	25	W	30	ACDAAA

Elevation 853 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14630 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	57	BROWN	SOFT
CLAY & GRAVEL	57	67	BROWN	MEDIUM
GRAVEL	67	73	BROWN	SOFT
CLAY & GRAVEL	73	73	BROWN	MEDIUM

Remarks

MISSISSIPPI ACRES LOT 15.
SECTION MAP.

Well Depth 73 ft. **Depth Completed** 73 ft. **Date Well Completed** 03/01/2001

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**

Casing Diameter	Weight	Hole Diameter
4 in. To 68 ft.	1.9 lbs./ft.	6.5 in. To 73 ft.

Open Hole From ft. To ft.

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

Diameter	Slot/Gauze	Length	Set	
2 in.	12	5 ft.	68 ft.	73 ft.

Static Water Level

25 ft. land surface Measure 03/01/2001

Pumping Level (below land surface)

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

Wellhead Completion

Pitless adapter manufacturer MONITOR Model BULLDOG
☐ 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
high solids bentonite	0.17 Cubic yards	0 ft.	30 ft.
cuttings		30 ft.	68 ft.

Nearest Known Source of Contamination

35 feet West Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 03/02/2001
Manufacturer's name AERMOTOR
Model Number T12-50 HP 0.5 Volt 230
Length of drop pipe 50 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 Aquifer Quat. buried
Last Strat pebbly sand/silt/clay- Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 461066 Y 5009275
Unique Number Verification Address verification Input Date 07/03/2008

Angled Drill Hole

Well Contractor

McAlpine Bros., Inc. 27270 GOODIN, G.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Well Index Report | **656104** | Printed on 10/13/2020 HE-01205-15

Minnesota Unique Well Number

104707

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
MENTH, TOM &	32	25	W	29	CCBBBC

Elevation 863 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14370 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	7	BROWN	MEDIUM
CLAY	7	9	LT. GRY	MEDIUM
SAND & GRAVEL	9	53	BROWN	SOFT
FINE SAND	53	68	BROWN	SOFT
SANDY CLAY	68	79	RED/BRN	MEDIUM
CLAY & GRAVEL	79	126	BROWN	HARD
CLAY & GRAVEL	126	132	BROWN	MEDIUM
CLAY	132	136	BROWN	MEDIUM
CLAY & GRAVEL	136	160	BROWN	MEDIUM
HARDPAN & SHALE	160	190	GRAY	HARD
SANDROCK	190	225	WHT/GRY	M.HARD

Remarks

SOUTH 0.5 SECT.

Well Depth 225 ft. **Depth Completed** 225 ft. **Date Well Completed** 03/03/1975

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

Use domestic **Status** Active

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

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

Casing Diameter		Weight		Hole Diameter	
4 in. To 194 ft.		11 lbs./ft.		4 in. To 225 ft.	

Open Hole From 194 ft. To 225 ft.

Screen? ☐ **Type** **Make**

Static Water Level

26 ft. land surface Measure 03/03/1975

Pumping Level (below land surface)

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

Wellhead Completion

Pitless adapter manufacturer Model

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

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

Material	Amount	From	To
bentonite		0 ft.	194 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 04/16/1975

Manufacturer's name FLINT & WALLING

Model Number 5BA8 HP 0 Volt

Length of drop pipe 51 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 Tunnel City Group Aquifer Tunnel City

Last Strat Tunnel City Group Depth to Bedrock 160 ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 461570 Y 5008682

Unique Number Verification Other, note in Input Date 06/02/2000

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Ruppert & Son	27086	CLARK, F.

Minnesota Unique Well Number

454349

County Anoka
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 10/22/1992
Update Date 09/21/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
	32	25	W	30	ACDD

Elevation 850 ft. **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Well 14590 BOWER DR NW RAMSEY 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	35	BROWN	SOFT
CLAY	35	75	BROWN	SOFT
SAND	75	92	BROWN	SOFT

Remarks

SECTION MAP.
NEW BAKER SNAPPY PITLESS 9-13-2016.

Well Depth 92 ft. **Depth Completed** 92 ft. **Date Well Completed** 07/12/1989

Drill Method Non-specified Rotary **Drill Fluid** Additive (+ Bentonite)

Use domestic **Status** Active

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

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

Casing Diameter	Weight	Hole Diameter
4 in. To 87 ft.	11 lbs./ft.	6.2 in. To 92 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** COOK

Diameter	Slot/Gauze	Length	Set	
2 in.	15	7 ft.	87 ft.	92 ft.

Static Water Level

30 ft. land surface Measure 07/12/1989

Pumping Level (below land surface)

ft. hrs. Pumping at 20 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		ft.	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 09/13/2016
Manufacturer's name GRUNDFOS
Model Number SQ05-160 HP 0.5 Volt 230
Length of drop pipe 60 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 sand-brown Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 461107 Y 5009235
Unique Number Verification Info/GPS from data Input Date 07/03/2008

Angled Drill Hole

Well Contractor

Bill's Well Co. 33087 JAPP, P.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

768697

County Anoka
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 10/09/2009
Update Date 08/18/2014
Received Date 09/08/2009

Well Name	Township	Range	Dir	Section	Subsection
OLSON, BRYAN	32	25	W	30	DAAABC

Elevation 867 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 14513 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
BLACK DIRT	0	6	BLACK	SOFT
SANDY CLAY	6	38	BROWN	SOFT
ROCKS/CLAY/GRAVEL	38	128	GRAY	MEDIUM
CLAY/GRAVEL	128	130	GRAY	MEDIUM
GRAVEL/SHALE	130	138	BRN/GRY	MEDIUM
SANDSTONE/SHALE	138	185	TAN/GRY	HARD

Remarks

REPLACEMENT WELL.
NAMES OF DRILLER: LUCAS PRAUGHT AND ED RENNER

Well Depth 185 ft. **Depth Completed** 185 ft. **Date Well Completed** 07/10/2009

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 145 ft.	10.7 lbs./ft.	9 in. To 30 ft.
		7 in. To 143 ft.
		4 in. To 185 ft.

Open Hole From 143 ft. To 185 ft.

Screen? ☐ **Type** **Make**

Static Water Level
21 ft. top of casing Measure 07/14/2009

Pumping Level (below land surface)
ft. 5 hrs. Pumping at 20 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	5 Sacks	0 ft.	50 ft.

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

Pump ☐ Not Installed Date Installed 07/16/2009
Manufacturer's name GRUNDFOS
Model Number 16S10-10 HP 1 Volt 23
Length of drop pipe 63 ft Capacity 16 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 St.Lawrence-
Last Strat St.Lawrence-Tunnel City Depth to Bedrock 130 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 461390 Y 5009037
Unique Number Verification Address verification Input Date 01/04/2010

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
EH Renner and Sons, Inc.	1431	SEE REMARKS

Minnesota Unique Well Number

680275

County Anoka
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 03/27/2003
Update Date 08/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
	32	25	W	30	ADBABB

Elevation 853 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14713 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND	0	18	BROWN	SOFT
ROCKY CLAY FIRM	18	35	RED	
ROCKY SAND GRAVEL	35	55	BROWN	SOFT
ROCKY CLAY FIRM	55	105	BROWN	
ROCKY SAND	105	125	BROWN	SOFT
SANDSTONE SHALE	125	186	TAN/BLU	

Remarks

SECTION MAP.

Well Depth 186 ft. **Depth Completed** 186 ft. **Date Well Completed** 02/24/2003

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**

Casing Diameter	Weight	Hole Diameter
4 in. To 149 ft.	lbs./ft.	8 in. To 145 ft.
		4 in. To 186 ft.

Open Hole From 149 ft. To 186 ft.

Screen? ☐ **Type** **Make**

Static Water Level

30 ft. land surface Measure 02/19/2003

Pumping Level (below land surface)

70 ft. 1 hrs. Pumping at 40 g.p.m.

Wellhead Completion

Pitless adapter manufacturer MONITOR 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
high solids bentonite	2	Sacks	0 ft.	30 ft.
cuttings			30 ft.	125 ft.
neat cement	4	Sacks	125 ft.	145 ft.

Nearest Known Source of Contamination

60 feet Northwes Direction Sewer Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 02/24/2003

Manufacturer's name AERMOTOR

Model Number T12-50 HP 0.5 Volt 230

Length of drop pipe 60 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 Tunnel City Group Aquifer Tunnel City

Last Strat Tunnel City Group Depth to Bedrock 125 ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 461197 Y 5009455

Unique Number Verification Address verification Input Date 07/03/2008

Angled Drill Hole

Well Contractor

Praught M. Well Co. 86576 PRAUGHT, S.

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

Minnesota Unique Well Number

490097

County Anoka
Quad Anoka
Quad ID 120B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 06/16/1992
Update Date 08/18/2014
Received Date 11/26/1991

Well Name	Township	Range	Dir	Section	Subsection
DEHEN, JOHN	32	25	W	30	AACBAD

Elevation 866 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14806 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND & GRAVEL	0	34	BROWN	SOFT
SANDY CLAY & ROCKS	34	81	BROWN	HARD
CLAY & GRAVEL FIRM	81	121	RED	
ST. LAWRENCE S.S.	121	171	GREEN	
FRANCONIA S.S.	171	190	RED	SOFT
FRANCONIA S.S.	190	250	GRN/RED	

Remarks

SECTION MAP.

Well Depth	Depth Completed	Date Well Completed
250 ft.	250 ft.	11/11/1991

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

Use domestic **Status** Active

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

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

Casing Diameter	Weight	Hole Diameter
4 in. To 201 ft.	10.7 lbs./ft.	8.7 in. To 201 ft.
		4 in. To 250 ft.

Open Hole From 201 ft. To 250 ft.

Screen? ☐ **Type** **Make**

Static Water Level

22 ft. land surface Measure 11/16/1991

Pumping Level (below land surface)

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

Wellhead Completion

Pitless adapter manufacturer BAKER Model STANDARD

☐ 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		100 ft.	201 ft.
bentonite		ft.	ft.

Nearest Known Source of Contamination

160 feet Northwes Direction Septic tank/drain field Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed 11/16/1991

Manufacturer's name GRUNDFOS

Model Number 16S07-8 HP 0.75 Volt 230

Length of drop pipe 42 ft Capacity 16 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 Tunnel City

Last Strat Tunnel City Group Depth to Bedrock 121 ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 461154 Y 5009617

Unique Number Verification Address verification Input Date 07/03/2008

Angled Drill Hole

Well Contractor

Renner E.H. Well 71015 SCHAFER, R.

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

Minnesota Unique Well Number

146160

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
	32	25	W	29	CCBBBB

Elevation 863 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 14390 BOWERS DR NW RAMSEY MN 55303

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND-GRAVEL	0	50	BROWN	SOFT
CLAY-ROCK	50	140	BROWN	HARD
COARSE GRAVEL	140	156	BLACK	MEDIUM

Remarks

SOUTH 0.5 SECT.

Well Depth 156 ft. **Depth Completed** 156 ft. **Date Well Completed** 11/07/1977

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

Use domestic **Status** Active

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

Casing Type Single casing **Joint** Threaded

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

Casing Diameter		Weight		Hole Diameter	
4 in. To	151 ft.	12 lbs./ft.		6 in. To	151 ft.

Open Hole From ft. To ft.

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

Diameter	Slot/Gauze	Length	Set	
2 in.	18	5 ft.	151 ft.	150 ft.

Static Water Level

20 ft. land surface Measure 11/03/1977

Pumping Level (below land surface)

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

Wellhead Completion

Pitless adapter manufacturer Model

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

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

Material	Amount	From	To
bentonite		0 ft.	151 ft.

Nearest Known Source of Contamination

50 feet Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 11/04/1977

Manufacturer's name AERMOTOR

Model Number SD1250 HP 0.5 Volt 230

Length of drop pipe 42 ft Capacity 20 g.p. Typ Submersible

Abandoned

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

Variance

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

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat gravel (+larger)-black Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 461546 Y 5008707

Unique Number Verification Address verification Input Date 06/02/2000

Angled Drill Hole

Well Contractor

Mc Alpine's Well Co.	27186	MCALPINE, G.
Licensee Business	Lic. or Reg. No.	Name of Driller

Appendix D

Phase I Environmental Site Assessment Conclusions and Summary

Riverstone South EAW

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PHASE I ENVIRONMENTAL SITE ASSESSMENT

Riverstone South/Pearson Properties
Ramsey, Minnesota

Project # 8494-00

Prepared for:

Capstone Homes, Inc.
14015 Sunfish Lake Boulevard NW #400
Ramsey, Minnesota 55303

August 12, 2020

CARLSON McCAIN

3890 PHEASANT RIDGE DRIVE NE, SUITE 100
BLAINE, MN 55449

TEL 763.489.7900
FAX 763.489.7959

CARLSONMCAIN.COM

ENGINEERING \ LAND SURVEYING \ ENVIRONMENTAL

CONCLUSIONS

At the request of Mr. Tom Bakritges with Capstone Homes, Inc., Carlson McCain, Inc. (Carlson McCain) has performed a Phase I Environmental Site Assessment (ESA) in general conformance with the scope and limitations of American Society for Testing and Materials (ASTM) Standard Practice E 1527-13 for the Riverstone South/Pearson Properties, which includes portions of parcel identification numbers (PIN) 29-32-25-23-0004 and 29-32-25-22-0003, located southeast of the intersection of US Highway 10 and Bowers Drive Northwest in the City of Ramsey, Minnesota. Any exceptions to, or deletions from this practice are described in Section 9.0 of this report.

This Assessment has revealed no evidence of "recognized environmental conditions" (RECs) in connection with the Property.

Historical recognized environmental conditions (HRECs) are defined by ASTM as a past release of any hazardous substances or petroleum products that has occurred in connection with the Property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted use criteria established by a regulatory authority, without subjecting the Property to any required controls.

- There were no HRECs identified during the course of this assessment.

Controlled recognized environmental condition (CRECs) are defined by ASTM as a REC resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority.

- There were no CRECs identified during the course of this assessment.

PROJECT SUMMARY

This section of the report identifies known or suspected RECs, Controlled RECs, Historical RECs, and de minimis conditions. In addition, the table states the opinion of the environmental professional regarding the potential impact on the Property of conditions identified in the findings section.

Report Section		NFA	REC	CREC	HREC	Opinion
5.2.1	Standard Environmental Record Sources for the Subject Property	✔				No listings identified for the Property.
5.2.2	Standard Environmental Record Sources for Surrounding Sites	✔				None of the surrounding sites appear to be a REC for the Property due to site closure, their hydraulically

Report Section		NFA	REC	CREC	HREC	Opinion
						down-gradient position with respect to the Property, or their considerable distance away.
5.2.3	MPCA Institutional Controls	✔				The Property is not included on this list, which is current up to January 2018 (Appendix D).
5.3	File Review	✔				Local files did not identify any RECs for the Property.
6.0	HISTORICAL USE INFORMATION	✔				Cultivated agricultural land generally involves the application of pesticides and herbicides, some of which can be persistent in the environment. No evidence of bulk storage or improper application was identified. If properly applied, the use of these chemicals would not likely result in enforcement action if brought to the attention of a regulatory agency; therefore, this is not considered to be a REC.
7.0	SITE RECONNAISSANCE	✔				Site reconnaissance did not identify any RECs for the Property.
8.0	INTERVIEWS	✔				The fire department identified two aboveground storage tanks (ASTs) at the primary residence which is adjacent to the Property and is not considered a REC. Interviews did not identify any RECs for the Property.
10.0	DATA GAPS	✔				None identified.

1.0 SUMMARY

Carlson McCain has performed a Phase I ESA in general accordance with the scope of work and limitations of ASTM Standard Practice E1527-13, the U.S. Environmental Protection Agency (EPA) Standards and Practices for All Appropriate Inquiries (AAI) (40 CFR Part 312) for the Riverstone South/Pearson Properties which includes parcel identification (Parcel ID) numbers 29-32-25-23-0004 and 29-32-25-22-0003 (the "Property"). The Property is located south and east of 8846 Highway 10 Northwest in Ramsey, Anoka County, Minnesota. The Phase I ESA is designed to provide an assessment concerning environmental conditions (limited to those issues identified in the report) as they exist at the Property.

1.1 Property Description

The Property is located southeast of the intersection of U.S. Highway 10 and Bowers Drive Northwest within a mostly residential and agricultural area of Ramsey, Minnesota. The table below provides further information regarding the Property:

Address:	Riverstone South/Pearson Properties which includes parcel identification (Parcel ID) numbers 29-32-25-23-0004 and 29-32-25-22-0003, Ramsey, Anoka County, Minnesota 55303
Assessor's Parcel Number (APN):	29-32-25-23-0004, 29-32-25-22-0003
Site Zoning Classification:	Residential
Number of Buildings:	No buildings.
Construction Details:	Not applicable.
Land Acreage (Ac):	~75 Acres
Date of Construction:	Not applicable.
Current Owner/Current Use:	Pearson Properties of Ramsey LLC
Historical Property Uses:	Agricultural, Undeveloped.
Surrounding Property Characteristics:	Agricultural, Residential.
Assumed Groundwater Flow Direction and Depth:	Flow is assumed to be to the south-southeast, 0 to 10 feet below ground surface (bgs)

5.2.2 Standard Environmental Record Sources for Surrounding Sites

The following table(s) are a summary of select sites located in close proximity with an elevated risk for impacting the Property within the specified search radii for the databases searched that were determined to be located adjacent to, in an expected hydraulically up-gradient direction from the Property or likely to lead to contamination of the Property. There were numerous other surrounding sites in the database report that were reviewed and the details for those sites can be found in the database report included in Appendix B.

Facility Name:	Dave Nathe Farm
Address:	14750 Bowers Drive, Ramsey, Minnesota 55303
Distance (feet) & Direction:	422 feet west
Hydrologic Position to the Property:	Side-gradient
Databases Listed:	LUAST, LUAST2016, WIMN
Comments:	Leak ID# 6487 listed as closed on 04/24/1996 and reported on 06/30/1993. Contaminated soils remaining are listed as unknown, offsite contamination is listed as unknown, groundwater contamination is listed as not reported and product released is listed as diesel.
Opinion:	This site is not considered a REC due to it's considerable distance away and in a hydraulically side-gradient position in relation to the Property.

It should be noted that this is a limited file search and does not include a complete review of all records and reports. However, the database report does contain a comprehensive listing of most sites that are known to be or are suspected to have environmental concerns. For this Phase I ESA, the database file search appeared to provide sufficient and current information on potential or reported environmental impacts at or near the Property. A detailed map and description of the facilities identified in the State and Federal databases are included in Appendix B.

*Links to description of codes can be found in the References Section 12.0 and described in the database report. Waste codes of F001, F002, D039 and D040 are associated with chlorinated solvents.

5.2.3 MPCA Institutional Controls

A list of sites in Minnesota that contain Institutional Controls was obtained from the MPCA. The Property is not included on this list, which is current up to January 2018 (Appendix D).

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Appendix E

Tree Survey Memorandum

Riverstone South EAW

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KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Providing Sound, Balanced, Comprehensive Natural Resource Solutions

Memorandum

Date: May 7, 2020

To: Tom Bakritges – Capstone Homes

From: Kyle Uhler – Kjolhaug Environmental Services Company
Mark Kjolhaug – Kjolhaug Environmental Services Company

For: Riverstone South Development Tree Survey Ramsey, MN

Riverstone South Development is located at 8846 Highway 10 NW Ramsey, MN (**Figure 1**) More specifically the project area contained PIDs: 30-32-25-11-0031, 30-32-25-11-0032, 29-32-25-22-0003, and 29-32-25-23-0004. The site covered approximately 110 acres and consisted of roughly 27 acres of woodland. The purpose of the Riverstone South tree survey was to inventory all significant trees on site. The Ramsey, MN Municipal Code of Ordinances Sec. 117-327 (C)(2) defines *Significant Trees:*

a. All species of oak that have a DBH of four inches or greater;
b. All evergreen species that have a DBH of four inches or greater; and
c. All other trees that have a DBH of eight inches or more;

This inventory defined the sites resource composition including species, diameter at breast height (DBH or 4.5' from the ground), and health condition. All trees on site were assessed and only significant trees were given a unique tag number and recorded. A list of identified significant trees and associated attributes is included in **Appendix A**. The sampled trees were located with a Trimble® R1 GNSS Receiver utilizing real-time differential corrections to obtain sub-meter accuracies.

Tree Inventory Results

Kjolhaug Environmental Services inventoried all significant trees at the Riverstone South Development site in Ramsey, MN April 13th through the 16th, 2020. The survey inventoried 2,305 significant trees within the project boundaries. The tagged tree locations are included in **Figure 2A-2E**. This inventory recorded 28 different species. Elm and oak trees combined account for 71.9% for all significant trees on site. Three species of elm trees were identified (*Ulmus Americana*, *Ulmus pumila*, and *Ulmus rubra*). The overlapping presentation between different species vegetative structures present reduced identification confidence to Genus level identification therefore all elm species sampled were combined into Ulmus spp. group. Hackberry trees were subdominant to elm and oak accounting for 12.4% of trees. All other tree

species totaled 15.7% of individuals sampled. The average DBH across all trees sampled was 14" with measurements ranging from 4"- 52". **Table 1** shows the observed tree species in order of prevalence by DBH class.

Table 1. Observed tree species in order of prevalence by DBH class (in) at Riverstone South site.

Species	4-8	8-12	12-18	18-24	24-30	30-36	36-42	>42	Total	% Total
Elm spp.	N/A	578	219	41	12	3	2	-	855	37.1
Bur oak	12	120	285	173	79	34	16	8	727	31.5
Hackberry	N/A	152	81	37	9	5	1	-	285	12.4
Boxelder	N/A	75	34	10	4	6	1	1	131	5.7
White oak	4	19	32	14	5	1	-	-	75	3.3
Green ash	N/A	29	14	8	1	-	1	-	53	2.3
Ironwood	N/A	22	14	2	-	-	-	-	38	1.6
White cedar	20	7	2	-	-	1	-	-	30	1.3
Eastern red cedar	11	9	4	1	-	-	-	-	25	1.1
Black cherry	N/A	15	5	2	1	-	-	-	23	1
American basswood	N/A	10	3	1	2	-	-	-	16	0.69
Sugar maple	N/A	5	2	2	-	-	-	-	9	0.39
Norway spruce	-	1	3	2	-	-	-	-	6	0.26
Scots pine	-	3	3	-	-	-	-	-	6	0.26
Apple spp.	N/A	1	3	1	-	-	-	-	5	0.22
Colorado spruce	-	1	4	-	-	-	-	-	5	0.22
Northern catalpa	N/A	3	-	-	-	-	-	-	3	0.13
Red oak	-	2	-	1	-	-	-	-	3	0.13
Black walnut	N/A	1	1	-	-	-	-	-	2	0.08
Plains cottonwood*	N/A	-	-	-	-	-	-	2	2	0.08
Balsam fir		-	1	-	-	-	-	-	1	0.04
Red maple	N/A	-	1	-	-	-	-	-	1	0.04
Honey locust	N/A	1	-	-	-	-	-	-	1	0.04
White spruce	-	-	1	-	-	-	-	-	1	0.04
Red pine	-	-	1	-	-	-	-	-	1	0.04
White swamp oak	-	-	1	-	-	-	-	-	1	0.04
Total	47	1054	714	295	113	50	21	11	**2305**	100

*Largest DBH recorded was a Plains Cottonwood at 52"

DBH was mapped by density for the three most prevalent trees species (elm spp., bur oak, and hackberry) and is included in **Figure 3A-3C**. Although elm trees accounted for the greatest number of individuals sampled on site bur oaks accounted for ~50% of the total basal area. A list of observed species by total basal area is included in **Appendix B**.

Trees were overall healthy with approximately 94% of trees sampled had a health scored greater or equal to 75% or "Good" condition. **Table 2** below shows tree health condition of the three most common species.

Table 2 Health conditions for Elm spp., Bur Oak, and Hackberry trees at Riverstone South

Health Condition (%)	**Dead/Dying 0-25**	**Poor 25-50**	**Fair 50-75**	**Good 75-100**
Elm spp.	8	8	19	820
Bur Oak	8	10	38	671
Hackberry	0	1	1	283
Percent of Total	0.9	1	3.1	95

Health condition was mapped by density of "Good" specimens for all significant trees located and is included in **Figure 4**.

Conclusion

The Riverstone South tree survey inventoried 2,305 trees on site. Oaks trees accounted for approximately half of the basal area on site.

Thank You

Riverstone South

Tree Survey

FIGURES

1. Site Location
2. Tree Location
3. Tree Density
4. Healthy Tree Density

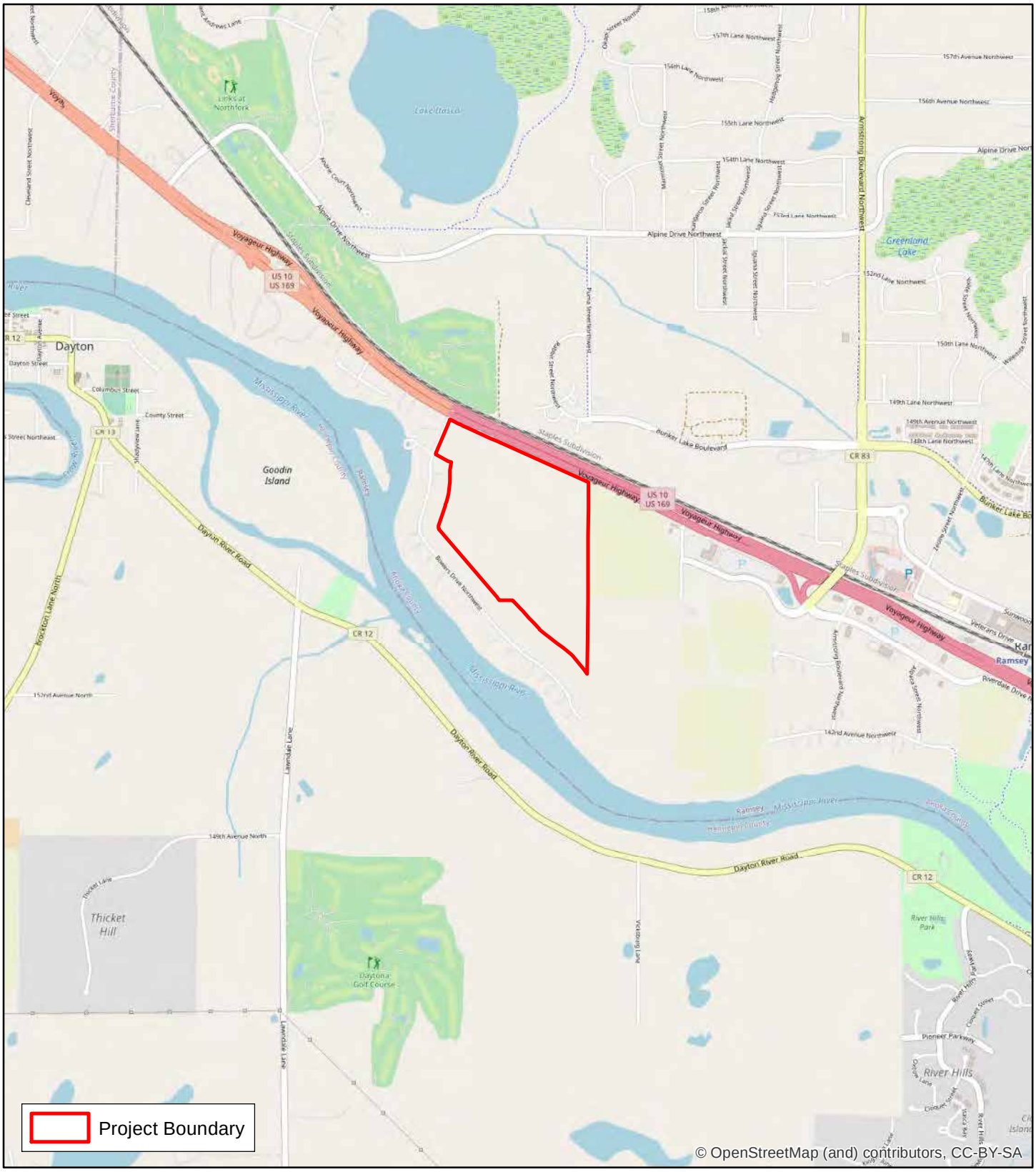


Figure 1 - Site Location

N

0 2,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: ESRI Open Street Map

Riverstone South Tree Survey (KES 2020-017)
Ramsey, Minnesota

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

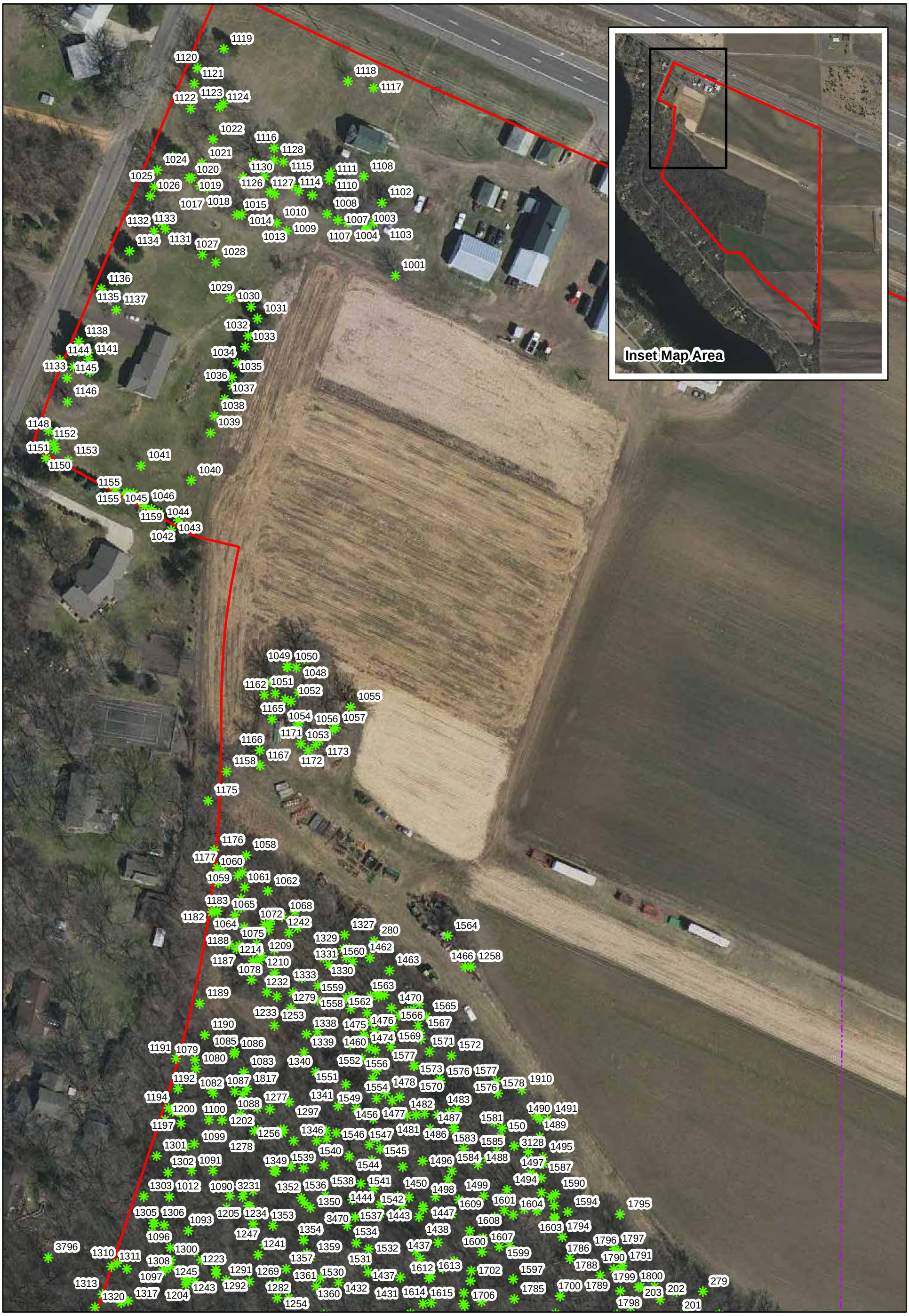


Figure 2A - Tree Location (2016 MnGeo Imagery)

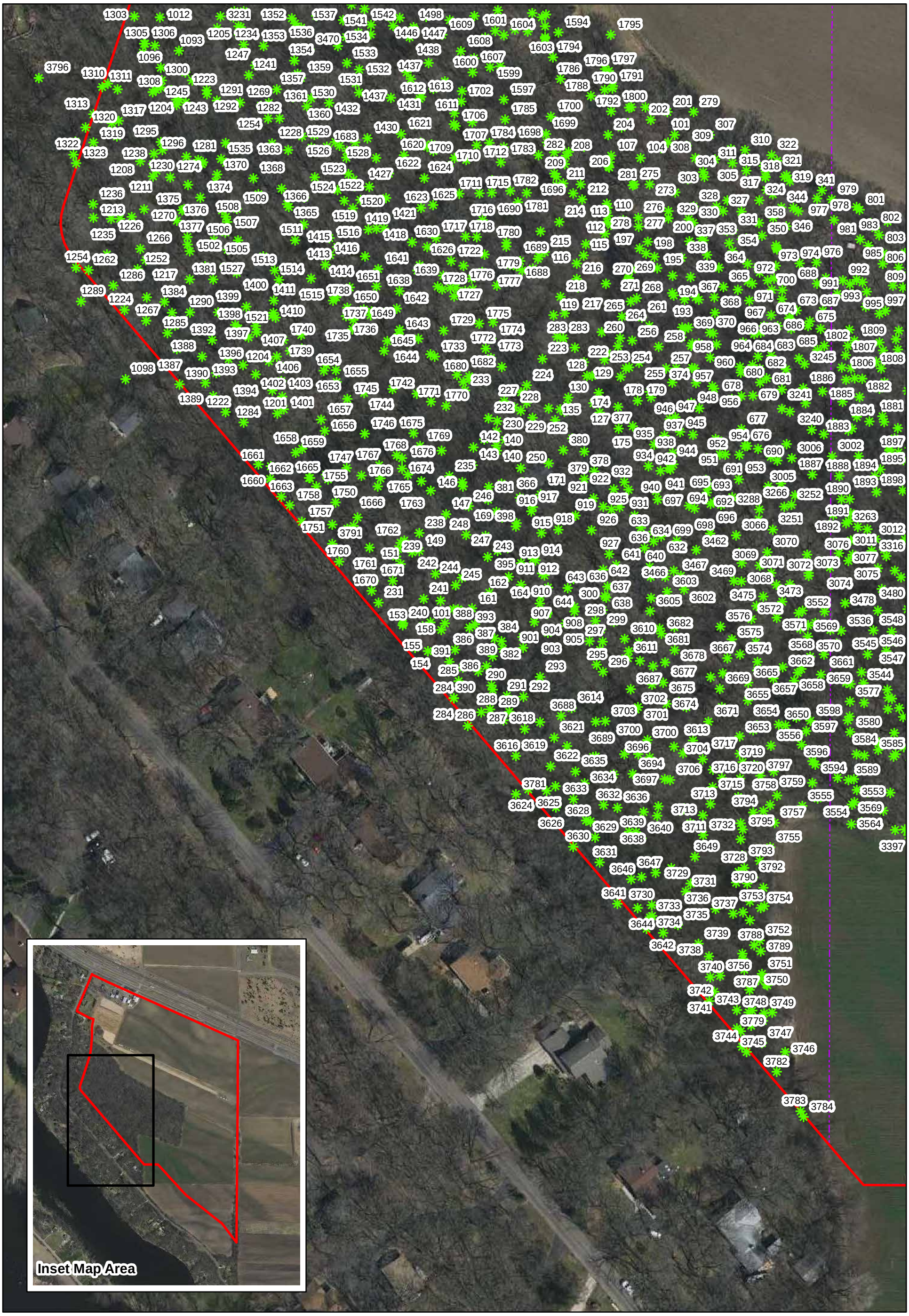


Figure 2B - Tree Location (2016 MnGeo Imagery)

N

0 100 Feet

Source: MNGEO Spatial Commons

Tree location

Project Boundary

Mississippi Critical Area

Riverstone South Tree Survey (KES 2020-017)
Ramsey, Minnesota

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

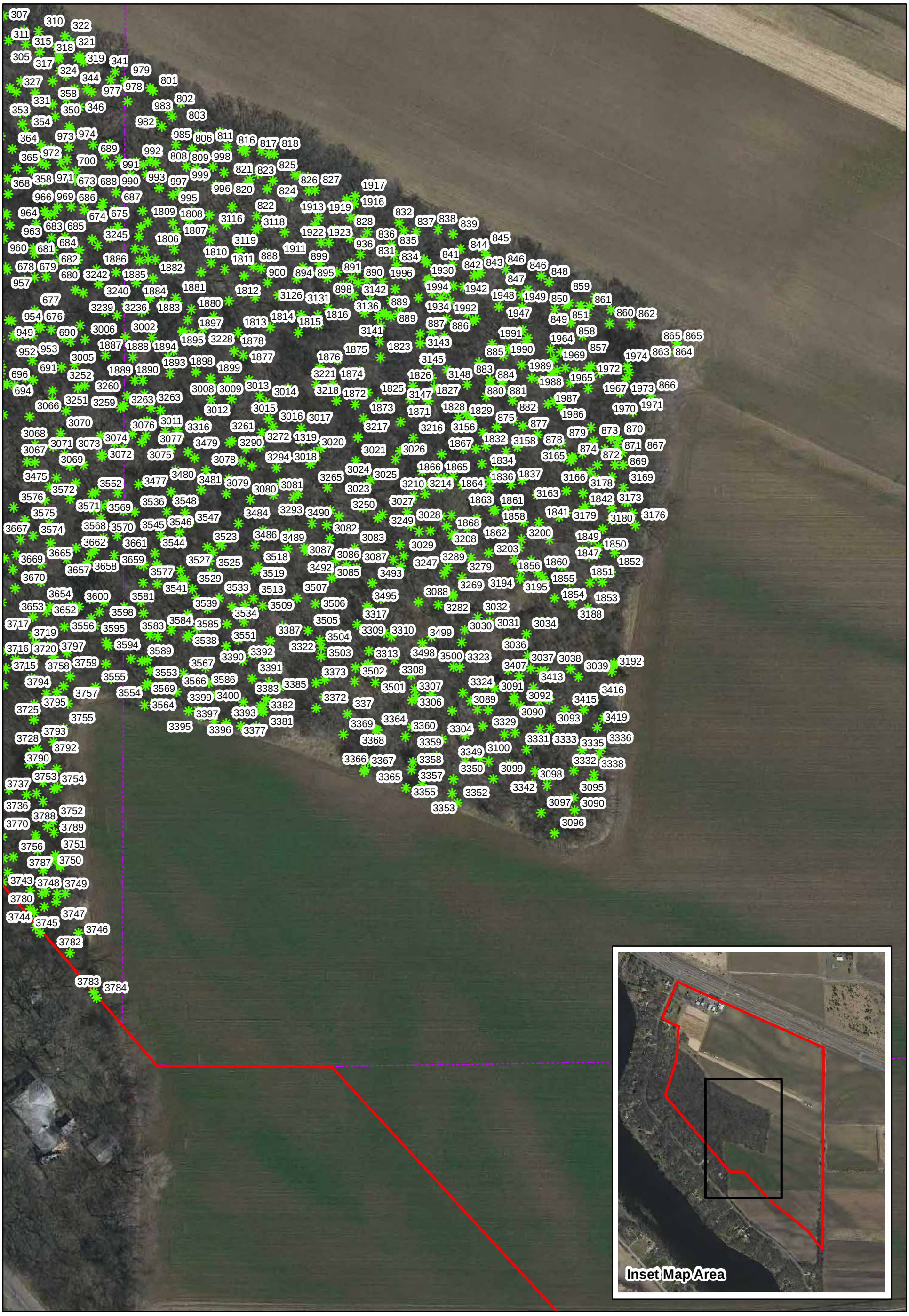


Figure 2C - Tree Location (2016 MnGeo Imagery)

N

0 100 Feet

Source: MNGEO Spatial Commons

Tree location

Project Boundary

Mississippi Critical Area

Riverstone South Tree Survey (KES 2020-017)
Ramsey, Minnesota

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

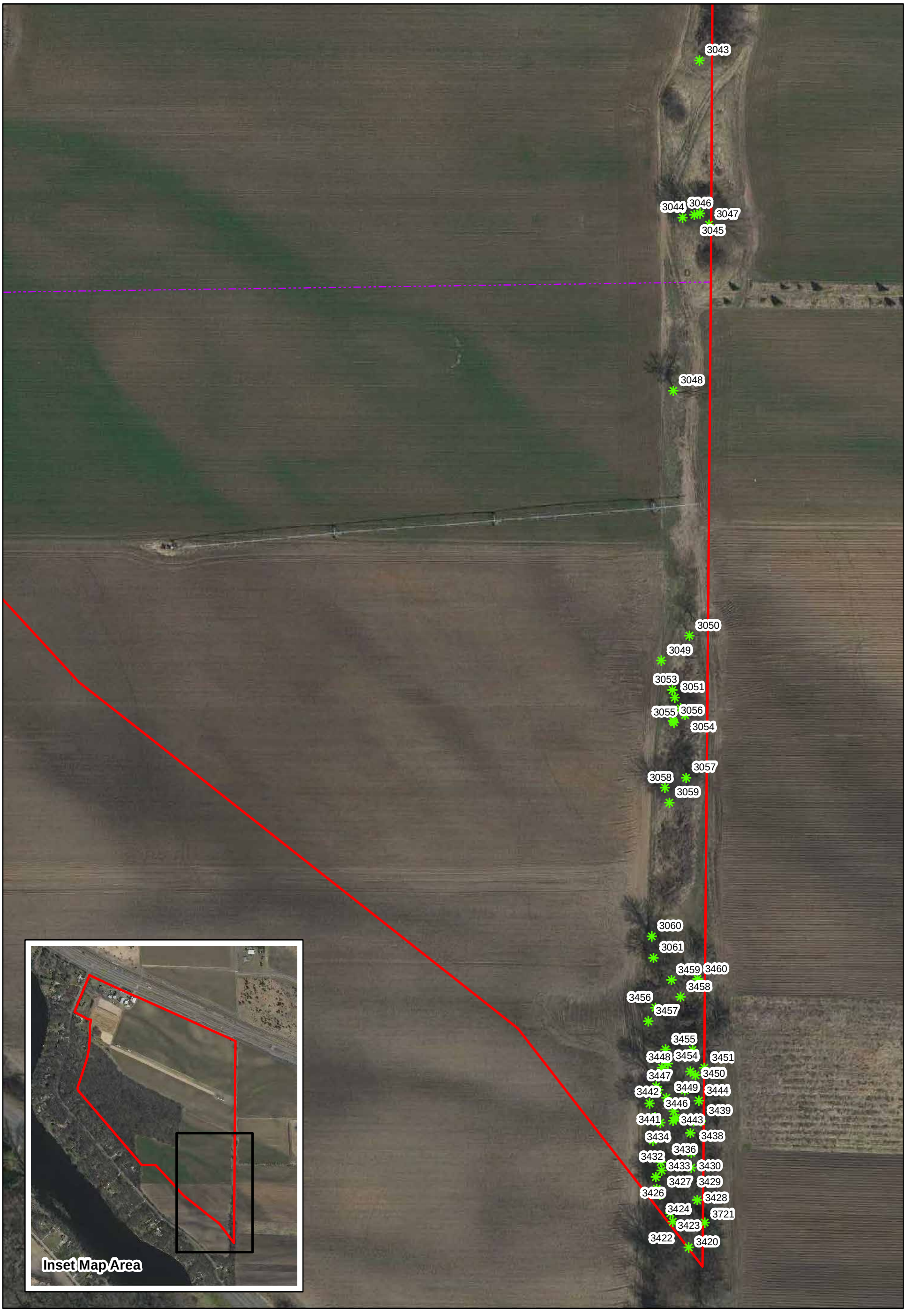


Figure 2D - Tree Location (2016 MnGeo Imagery)

N

0 100 Feet

Source: MNGEO Spatial Commons

Tree location

Project Boundary

Mississippi Critical Area

Riverstone South Tree Survey (KES 2020-017)
Ramsey, Minnesota

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

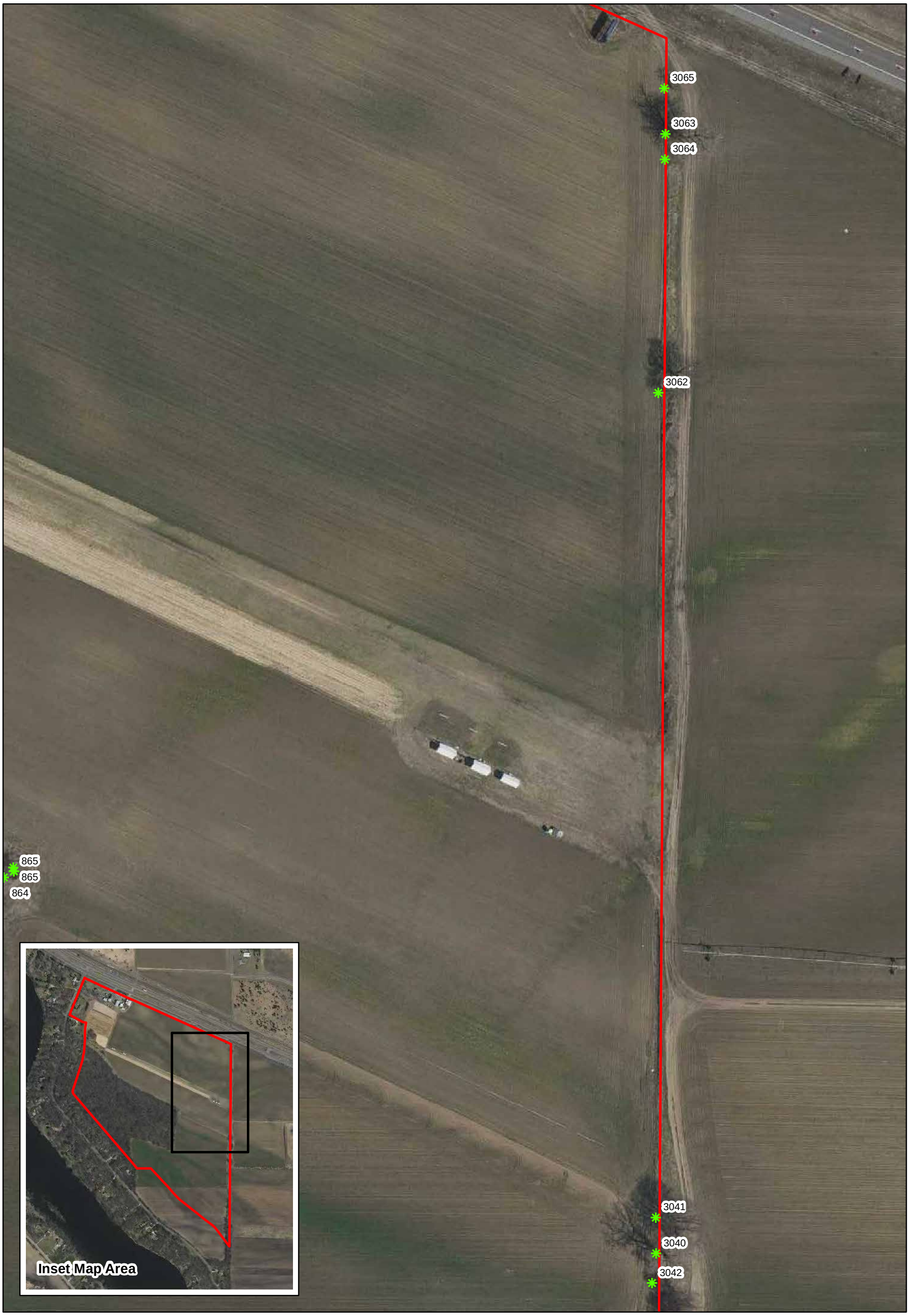


Figure 2E - Tree Location (2016 MnGeo Imagery)

N

0 100 Feet

Source: MNGEO Spatial Commons

Tree location

Project Boundary

Mississippi Critical Area

Riverstone South Tree Survey (KES 2020-017)
Ramsey, Minnesota

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

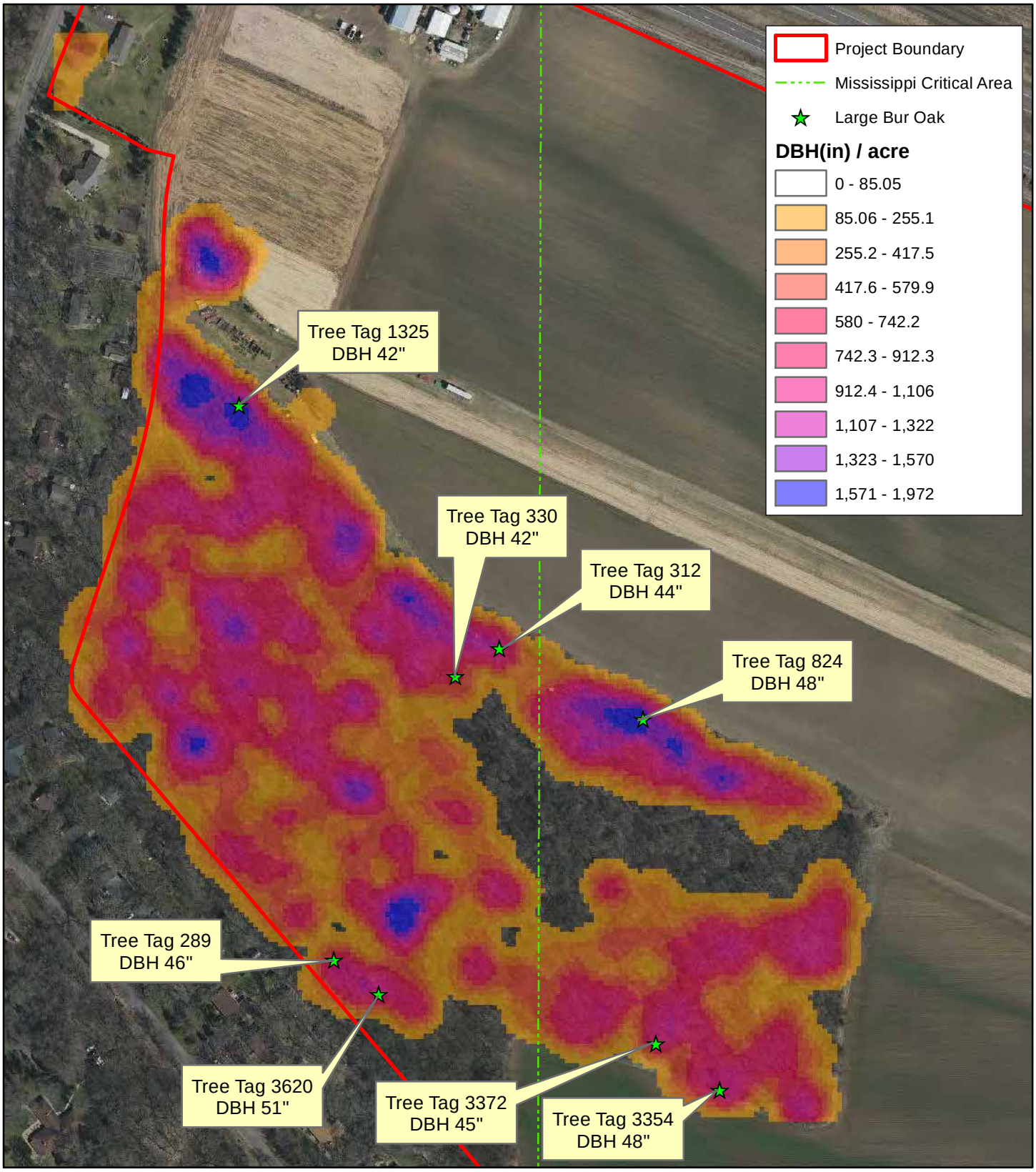


Figure 3A - Oak Density (2016 MnGeo Imagery)

N

0 250 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

Riverstone South Tree Survey (KES 2020-017)
Ramsey, Minnesota

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

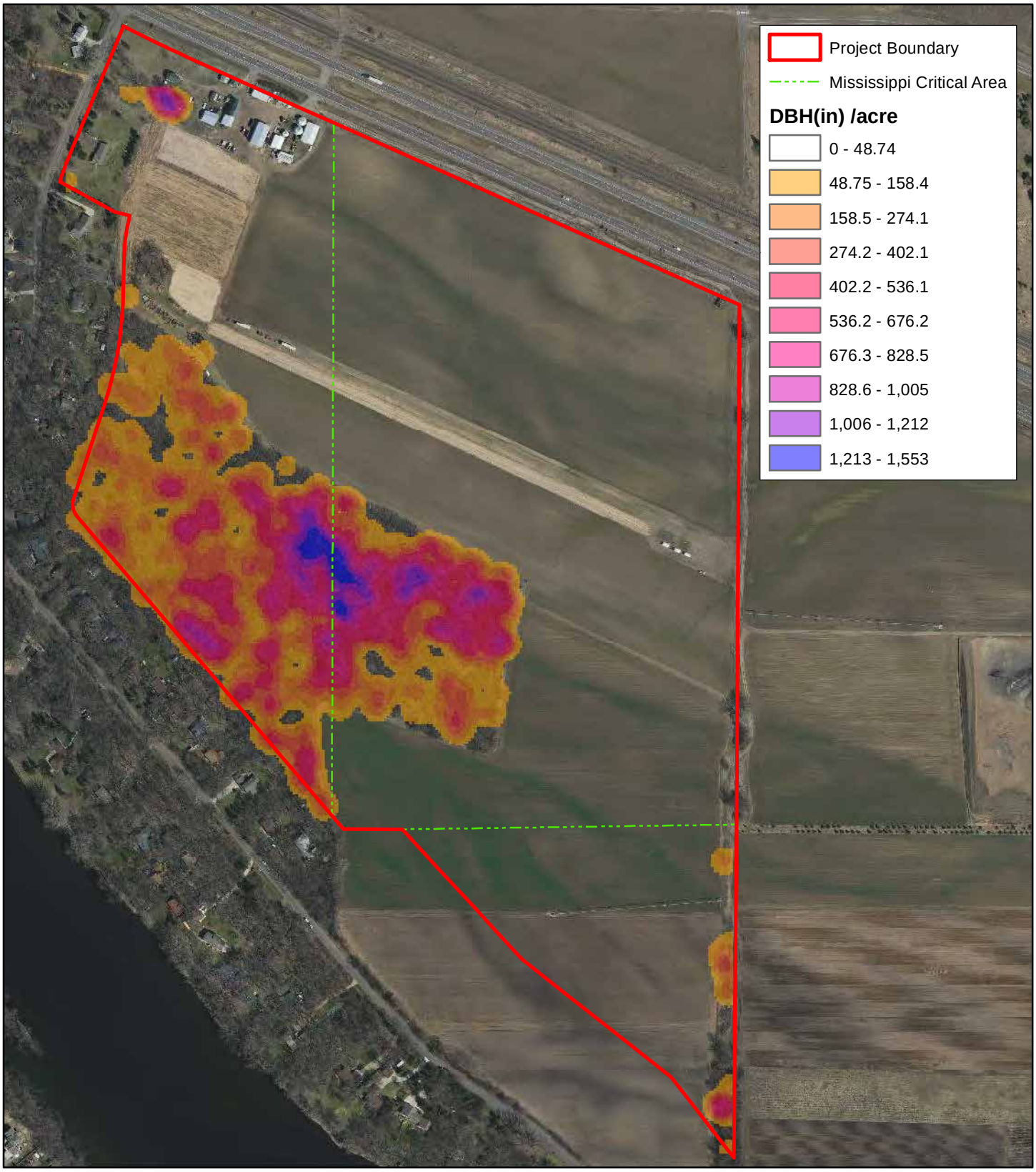


Figure 3B - Elm Density (2016 MnGeo Imagery)

N

0 450 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

Riverstone South Tree Survey (KES 2020-017)
Ramsey, Minnesota

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

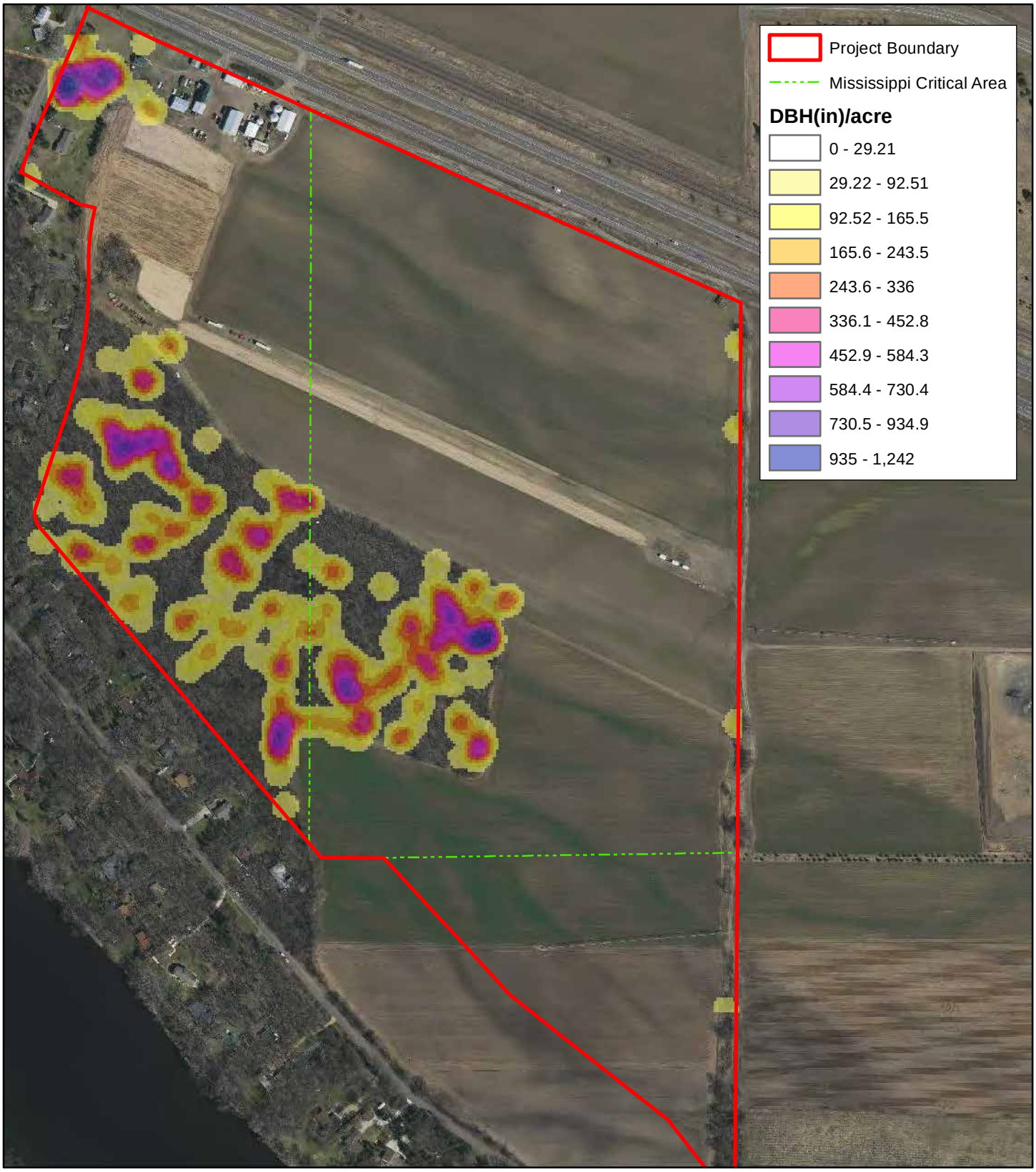


Figure 3C - Hackberry Density (2016 MnGeo Imagery)

N

0 425 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

Riverstone South Tree Survey (KES 2020-017)
Ramsey, Minnesota

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

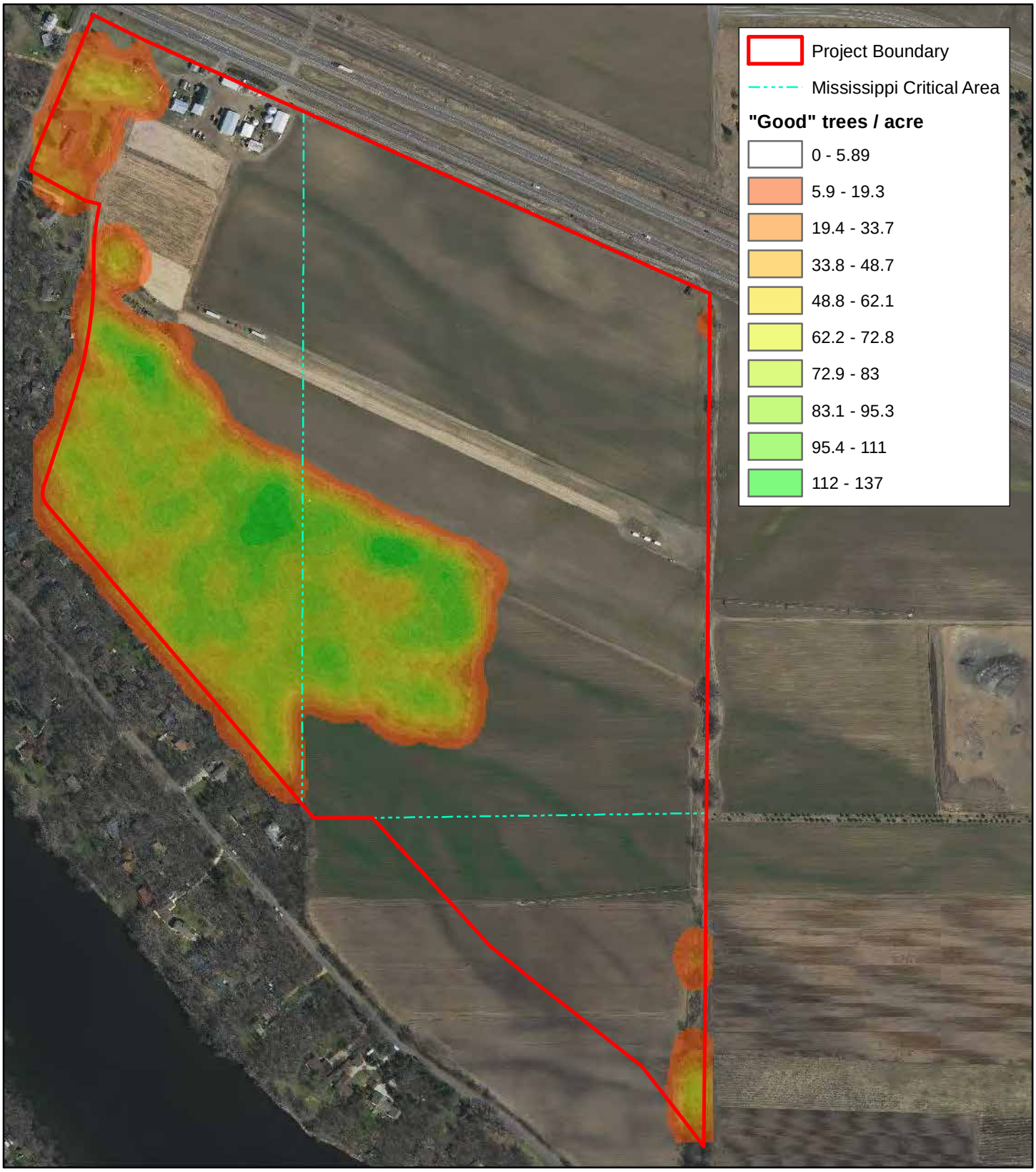


Figure 4 - Healthy Tree Density (2016 MnGeo Imagery)

N

0 450 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

Riverstone South Tree Survey (KES 2020-017)
Ramsey, Minnesota

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

Appendix F
Phase I Archaeological Survey Report

Riverstone South EAW

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Phase I Archaeological Survey of Proposed Housing Development in Ramsey, Anoka County, Minnesota



Principal Investigator:
Jeremy L. Nienow, Ph.D.
Nienow Cultural Consultants LLC
Registered Professional Archaeologist #12071

Report Author:
Laura Koski, MSc
Zooarchaeo Consulting, LLC
Registered Professional Archaeologist #18060

Final Report
October 27, 2020

Phase I Archaeological Survey of Proposed Capstone Homes Housing Development in Ramsey, Anoka County, Minnesota

Submitted To:

Capstone Homes
14015 Sunfish Lake Blvd, Suite 400
Ramsey, MN 55303

Submitted By:

Nienow Cultural Consultants LLC
200 Plato Blvd East
St. Paul, MN 55107

Principal Investigator:

Jeremy L. Nienow, Ph.D.
Nienow Cultural Consultants, LLC
Registered Professional Archaeologist #12071

Report Author:

Laura Koski, MSc
Zooarchaeo Consulting, LLC
Registered Professional Archaeologist #18060

Final Report
October 27, 2020

Management Summary

Capstone Homes is proposing to build a residential development in the City of Ramsey, Anoka County, Minnesota. The project area, approximately 78.63 acres in size, is located in the E ½ of Section 30 and W ¼ of Section 29 of Township 32N, Range 25W in Archaeological Region 4e: Central Lakes Deciduous East. Historically and recently the majority of the project area was cultivated with a long wooded patch along the southwestern edge. The project area is bordered by Highway 10 approximately 500 feet to the north, the Mississippi River approximately 600 to 700 feet to the south, Bowers Drive approximately 200 feet to the west, and a solar farm on the east. Planned development includes a tree preservation area within the existing stretch of woods, 243 detached residential units, residential streets, and single-acre public park at the center.

Nienow Cultural Consultants LLC (NCC) was contracted to complete a Phase I Archaeological Survey in October of 2020. NCC's Principal Investigators for this project were Jeremy Nienow, PhD., RPA, who is licensed for Phase I archaeological work in Minnesota (20-042, Appendix A), and Laura Koski, MSc, RPA. Work began with a literature review October 7 followed by fieldwork completed October 9, 14-15, 2020. Fieldwork consisted of surface survey of corn fields and a cabbage and pumpkin patch, and shovel testing of the wooded area. Surface visibility in the agricultural fields ranged between 0 and 80%. Surface survey transects were spaced on a maximum of a five-meter interval. Fifty-two shovel tests were excavated. Shovel tests were typically 35-40 centimeters (cm) wide and at least 80cm deep. All soils were screened through ¼" mesh screen, detailed profile notes completed, photographs taken, and GPS points collected for each shovel test. No prehistoric cultural materials were encountered. Recent historic materials (i.e. shotgun shells, whiteware sherds) and modern debris (i.e. plastics, aluminum cans) were encountered, but not collected.

Shovel test profiles documented consistent ancient floodplain soils. No prehistoric cultural material or archaeological features were identified during the field survey. Based on these results, Nienow Cultural Consultants recommends no further archaeological work be completed, and the project continues as planned. With any project there is the chance of unanticipated discovery. Should archaeological materials surface during any future construction, it is advised a professional archaeologist be consulted. Minnesota Statute 307.08 protects unplatted cemeteries (including burial mounds) and issues guidelines for dealing with unexpected finds. Should human remains be encountered during earth moving activity, all work must stop and local law enforcement must be called.

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1.0 INTRODUCTION

Capstone Homes is proposing to build a residential development in the City of Ramsey, Anoka County, Minnesota. The project area, approximately 78.63 acres in size, is located in the E ½ of Section 30 and W ¼ of Section 29 of Township 32N, Range 25W in Archaeological Region 4e: Central Lakes Deciduous East (Figure 1). Historically and recently the majority of the project area was cultivated with a long wooded patch along the southwestern edge. The project area is bordered by Highway 10 approximately 500 feet to the north, the Mississippi River approximately 600 to 700 feet to the south, Bowers Drive approximately 200 feet to the west, and a solar farm on the east. Planned development includes a tree preservation area within the existing stretch of woods, 243 detached residential units, residential streets, and single-acre public park at the center (Figure 2).

Nienow Cultural Consultants LLC (NCC) was contracted to complete a Phase I Archaeological Survey in October of 2020. NCC's Principal Investigators for this project were Jeremy Nienow, PhD., RPA who is licensed for Phase I archaeological work in Minnesota (20-042, Appendix A), and Laura Koski, MSc, RPA. NCC subcontracted six individuals to assist in completing research, fieldwork, and lab processing for the project: Alexandra Hedquist (Hedquist Archaeological Consulting, LLC), Anastasia Walhovd (Makoons Consulting, LLC), Chris Rico (Rico Cultural Resource Management Services, LLC), Fred Sutherland (Sutherland Relics and Rust LLC), John Strot (John's Archaeological Consulting), and Laura Koski (Zooarchaeo Consulting). The investigation was guided by the Secretary of Interior's Standards and Guidelines for Archaeology and Historic Preservation (48FR44716), the State Historic Preservation Office's (SHPO) Manual for Archaeological Projects in Minnesota (Anfinson 2005), and the State Archaeologist's Manual for Archaeological Projects in Minnesota (Minnesota Office of the State Archaeologist 2011). Research and report preparation were accomplished by professional archaeologists meeting the standards set forth in 35CFR61.

Work began with a literature review October 7 followed by fieldwork completed October 9, 14, and 15, 2020. Fieldwork consisted of surface surveying corn fields, a cabbage, and pumpkin patch, and shovel testing the wooded area. Surface visibility in the agricultural fields ranged between 0 and 80%. Surface survey transects were spaced on four to five-meter intervals. Fifty-two shovel tests were excavated. Shovel tests were typically 35-40 centimeters (cm) wide and at least 80cm deep. All soils were screened through ¼" mesh screen, detailed profile notes completed, photographs taken, and GPS points collected for each shovel test. No prehistoric cultural materials were encountered. Recent historic materials (i.e. shotgun shells, whiteware sherds) and modern debris (i.e. plastics, aluminum cans) were encountered, but not collected.

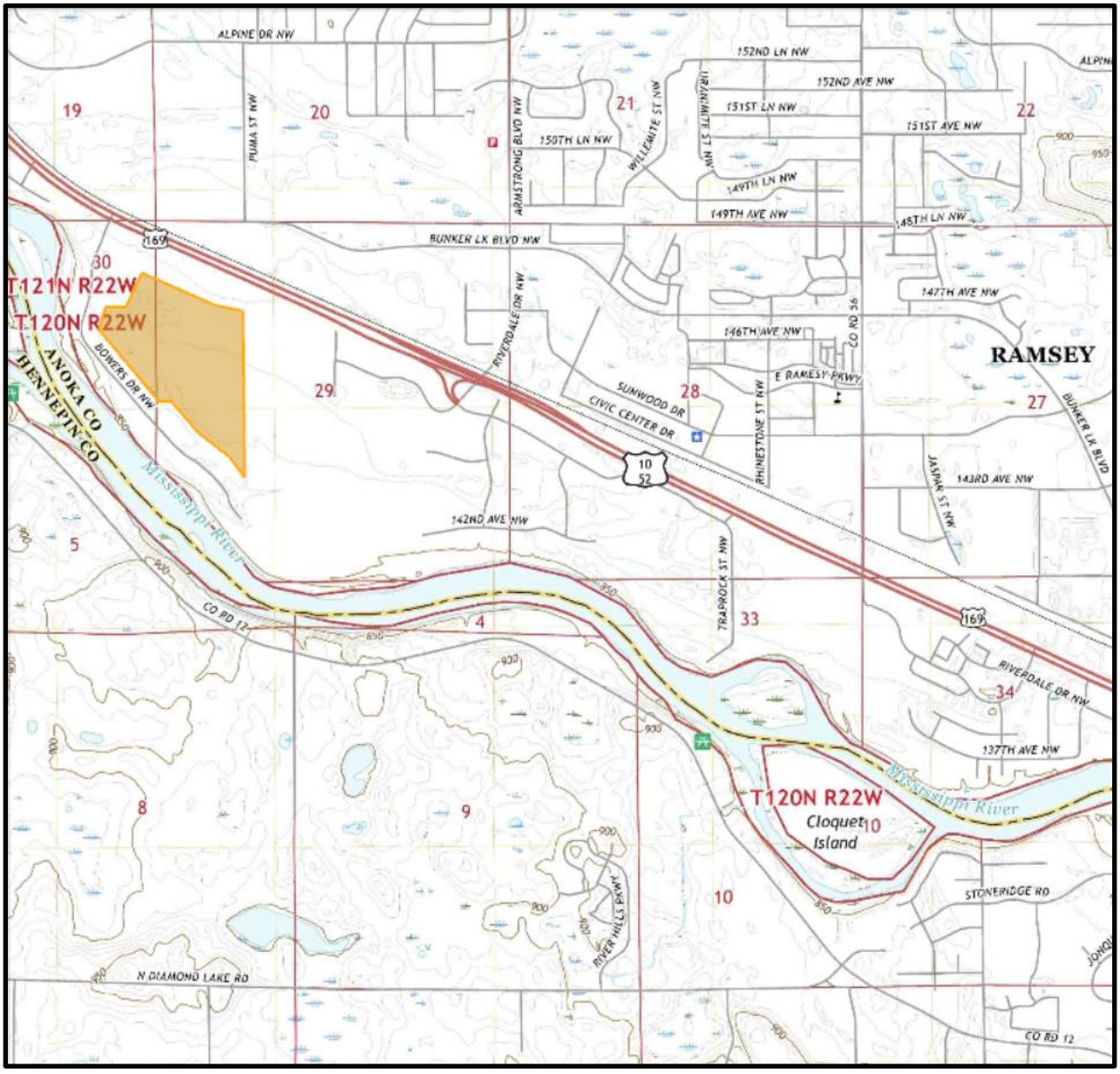


Figure 1: USGS Topographic Map Illustrating Project Area (orange polygon).
(USGS 7.5' Topographic Map, Anoka Quadrangle, 2019, 1:24,000)

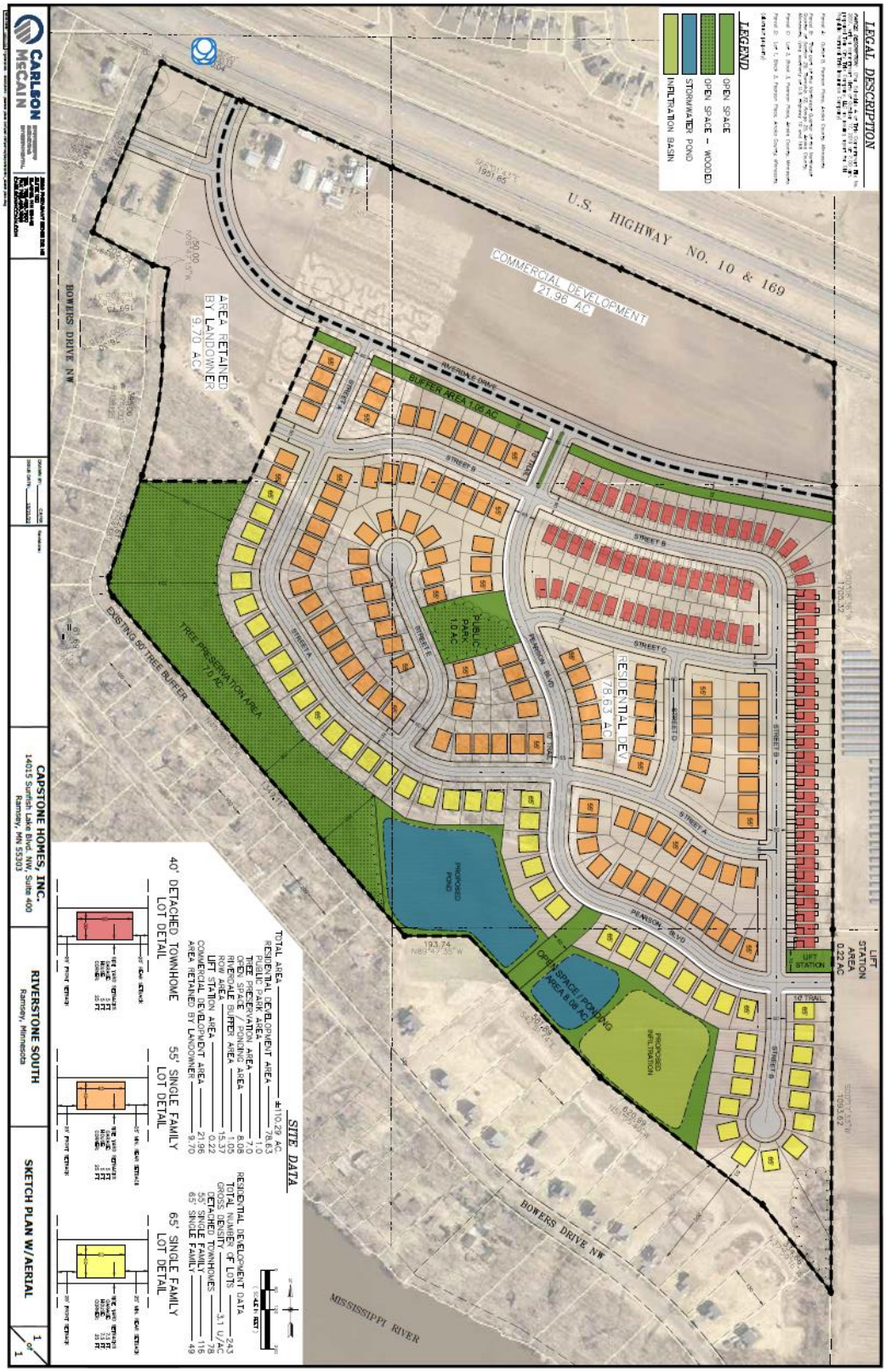


Figure 2: Engineering Sketch Plan of Project Area.
(Provided by Capstone Homes, Inc.)

2.0 RESEARCH DESIGN AND METHODOLOGY

2.1 Literature Review

A literature review was completed on October 7, 2020. Typically, the literature review would be completed by visiting the Office of the State Archaeologist and the State Historic Preservation Office. Unfortunately, both of these offices were closed due to safety precautions surrounding SARS-CoV-2 spread prevention. Instead, previously identified archaeological sites were noted for a two-mile radius surrounding the project area using the online Minnesota Office of the State Archaeologist archaeological sites portal (OSA Portal). In addition, the Township/Range/Sections within the two-mile radius were sent to the State Historic Preservation Office to generate an internal database search. The Township/Range/Section search did not yield any additional sites not included on the OSA Portal. Archaeological survey reports from nearby sites were also requested to determine whether survey had already been completed within the project area. All resulting previously identified sites and requested surveys were reviewed as a part of this project.

2.2 Fieldwork

Fieldwork was completed on October 9, 14, and 15, 2020. Fieldwork included surface survey and shovel testing within the project area (Figure 2). Surface surveyed areas consisted of cultivated corn fields, a cabbage patch, and a pumpkin patch. Ground visibility in all surface-surveyed areas ranged between 0 and 80% (see Appendix B for example surface visibility photographs). These areas were surface surveyed on a four to five-meter interval between cultivated rows. Considering the wooded area contained dense vegetation and fallen leaves preventing surface survey, along with the fact this area lies closest to the Mississippi and is therefore the most likely location within the project area to contain prehistoric cultural materials, the wooded area was tested in three shovel test transects. The first transect was laid in on a 15-meter interval, approximately 15-meters northeast and parallel to the southwestern project boundary. The second transect was laid in 30-meters northeast of and parallel to the first, but considering the negative tests in the first transect, and the clearly documented ancient floodplain soils, shovel tests in this transect were excavated on a 30-meter interval. A third transect was placed on a ridge along the northwestern edge of the wooded area with the intent of targeting what was in the past a high point along the historic Mississippi River's edge. Fifty-two shovel tests were excavated in total. Shovel tests were typically 35-40 centimeters (cm) wide and at least 100cm deep. All soils were screened through ¼" mesh screen, detailed profile notes completed, photographs taken, and GPS points collected for each shovel test.

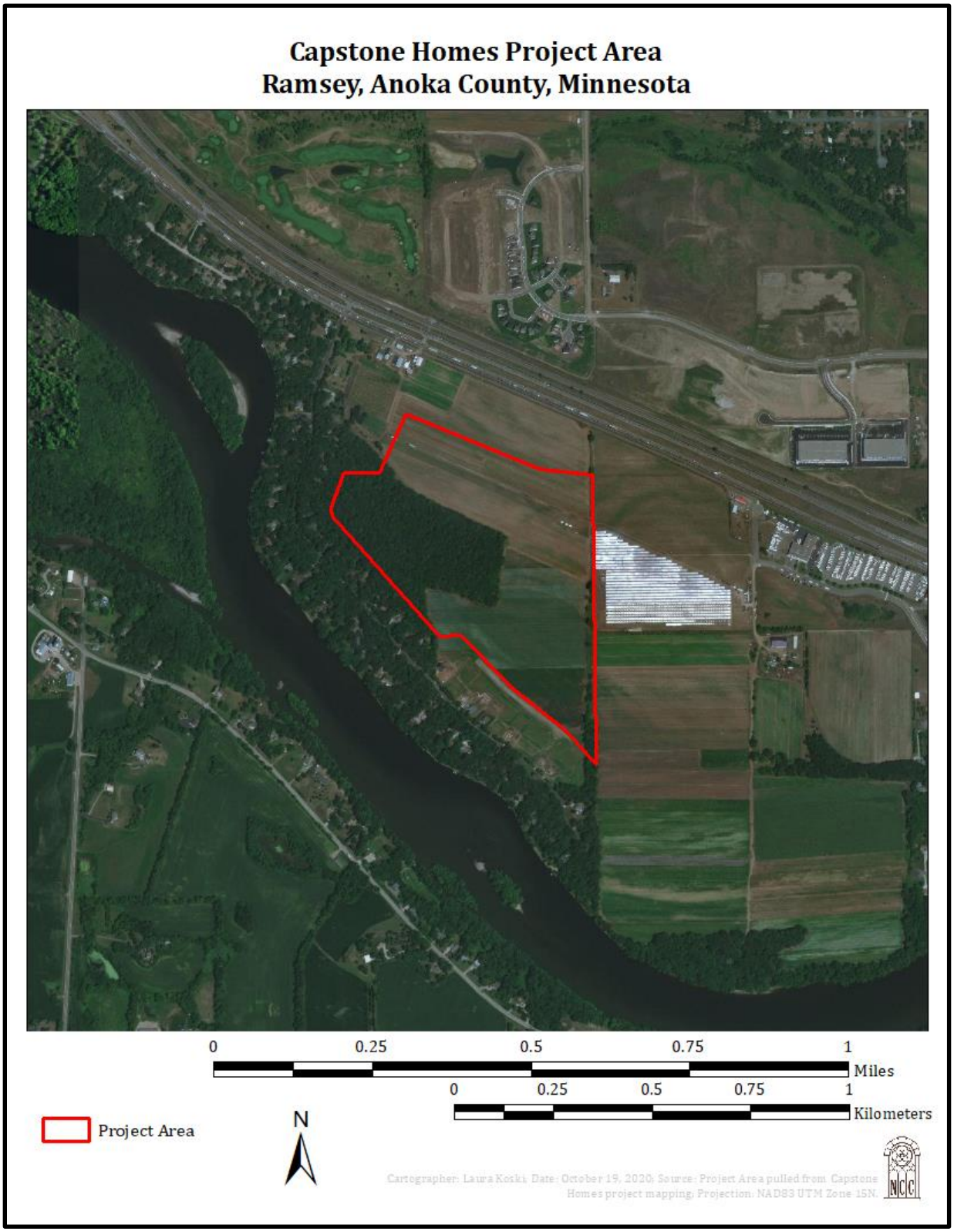


Figure 3: Illustration of Project Area Boundary (red border).
(Basemap provided by 2016 Google Satellite Imagery)

3.0 ENVIRONMENTAL SETTING

3.1 Geological Background and Soils

In his 1990 publication *Archaeological Regions in Minnesota and the Woodland Period,* former State Archaeologist Scott Anfinson divides the state of Minnesota into nine environmental-archaeological regions based on natural resources available within each region. This classification allows archaeologists to research and analyze prehistoric environments in the state, as well as predict where archaeological sites may be located.

The Capstone Homes Development project area falls within the southeastern portion of Anfinson's region 4e: Central Lakes Deciduous East Sub-Region. The region sits within east-central to central Minnesota, spanning Dakota to Becker Counties. Topographically, the region consists of a mixture of moraines, till plains, and outwash plains, and is heavily spotted with lakes, some over 30 meters (m) deep. Major rivers include the Mississippi and Minnesota Rivers flowing along the western boundary of the region, and the St. Croix River along the region's eastern boundary. Streams draining the western part of the region flow in a western direction to the Red River (Anfinson 1990). River formation was the result of a complex glacial history including several episodes of advancing and retreating glacial lobes.

The Central Lakes Deciduous East Sub-Region is located directly west of the Mississippi River, but could arguably incorporate portions of western Wisconsin. The regional topography consists of moraines, glacial till, and outwash plains, as well as a large variety of lakes, streams, and wetlands (Gibbon et al. 2002). Average precipitation ranges from 21 to 32 inches (Grimes 1968). Average high winter temperatures range from 12 to 24 degrees Fahrenheit (F) while average high summer temperatures range from 78 to 82 degrees F. The frost-free season ranges from 140 to 160 days (Gibbon et al. 2002).

Soils in the region reflect a diverse history of glacial and vegetation activity. Soil texture ranges from medium to course, with prairie soils more commonly found in the southern and western portions of the region and forest soils found mostly in the north and east portions (Anfinson 1990). Bedrock outcrops are mainly located along the region's central and eastern edge, and are comprised of mainly granite outcroppings along river banks (Gibbon et al. 2002).

All soil source material was deposited during the Wisconsin stage of the Pleistocene epoch. Two main types of glacial drift were deposited over the county when the Superior Lobe retreated from the area around 13,500 years ago. The Superior Lobe, which flowed into the area from the north, deposited coarse textured material, reddish brown in color, with pebbles of basalt, gabbro, and red sandstone. At a later date, the Grantsburg Sub-lobe, an extension of the Des Moines Lobe, advanced into Sherburne County. This lobe brought in what is commonly called "gray till" or "buff till." During the retreat of the Grantsburg Lobe around 12,500 years ago, the ice stagnated in the northern and eastern parts of the county and melt water left intermixed outwash gravel and sand from both of the previous lobes. Additionally, when the Grantsburg Lobe retreated westward, it uncovered the Mississippi Valley, and melt water from the wasting Des Moines Lobe filled the

valley throughout the county with coarse alluvium, which underlies two broad terraces parallel to the Mississippi River, an example of which is notable in the Capstone Homes project area. The sand in these areas are course in texture near the river and become increasingly finer in texture the further the distance from the river. In various places, it is underlain by strata of calcareous gravel, which was representative of what was found during the current archaeological survey (Grimes 1968).

The project area is comprised of Hubbard loamy sand ranging between 0 to 2 percent and 2 to 12 percent slopes, Dickman sandy loam ranging between 0 to 2 percent and 2 to 6 percent slopes, and Nymore loamy coarse sand on 12 to 25 percent slopes. The Hubbard loamy sand series consists of excessively drained sandy floodplain outwash found on stream terraces and hillslopes. The typical soil profile for the series consists of loamy sand from 0 to 20 centimeters, loamy sand from 20 to 50 centimeters, loamy sand from 50 to 82 centimeters, and sand from 82 to 200 centimeters. The Dickman sandy loam series consists of somewhat excessively drained floodplain outwash found on stream terraces. The typical soil profile for the series consists of sandy loam from 0 to 30 centimeters, sandy loam from 30 to 45 centimeters, and sand from 45 to 152 centimeters. The Nymore loamy coarse sand series consists of excessively drained floodplain outwash found on stream terraces. The typical soil profile for the series consists of loamy coarse sand from 0 to 18 centimeters, loamy sand from 18 to 66 centimeters, and sand from 66 to 152 centimeters (NRCS 2020).

3.2 Regional Flora and Fauna

Vegetation in the area at the time of Euro-American settlement consisted of Big Wood species in both the south and west portions of the region. Most specifically, the trees were deciduous hardwood species, primarily oak, mixed with deciduous-coniferous forest in the northern part of the region (Anfinson 1990) which also contained maple, basswood, and hickory. As Euro-American settlers moved through the area and cleared portions of forest, prairie land became more abundant. White-tailed deer, bison, elk, beaver, bear, prairie chickens, and a variety of fish and waterfowl would have been commonly available resources (Anfinson 1990). Specific to the site area, the majority of the trees on the sand plain consisted of bur oak and northern pin oak, as well as mixed hardwoods which grow in areas of glacial till, specifically in the areas where the Hayden soil series is prominent (Grimes 1968). Large areas of hardwoods invaded areas of native grasses in the outwash plains along the Mississippi River. The Hubbard series discussed above developed in these areas.

4.0 CULTURAL HISTORY

The Minnesota State Historic Preservation Office (SHPO) has developed statewide contexts examining Minnesota's Prehistoric through recent past. These contexts are laid out on the Minnesota Archaeological Site Form (Minnesota Office of the State Archaeologist 2016). Generally, they describe the history of the state and assist in predicting where specific types of sites may occur.

Native American contexts are commonly divided into three major traditions: Paleoindian, Archaic, and Woodland. Late Woodland is further subdivided into Plains Village, Mississippian, and Oneota Traditions. These divisions are based on significant changes in how these communities lived, with a special focus on subsistence strategies. Historic contexts are generally divided into Contact and Post-Contact periods. The Contact period begins with early European exploration and continues through the Post-Contact period including Euro-American settlement and Minnesota statehood. The following is a general summary of these traditions using the Author's general knowledge and various disseminated sources for information including the OSA's website, Elden Johnson's 1988 *The Prehistoric Peoples of Minnesota*, Gibbon and Anfinson's 2008 *Minnesota Archaeology: The First 13,000 Years*, and Gibbon's 2012 *Archaeology of Minnesota: The Prehistory of the Upper Mississippi River Region*.

4.1 Pre-Contact Period

4.1.1 Paleoindian Tradition (11,500 to 7,500 B.C.)

The Paleoindian Tradition in Minnesota is divided into two periods: Early Paleoindian and Late Paleoindian/Early Archaic (Gibbon and Anfinson 2008). Throughout the Paleoindian, Native American communities were small, mobile, and focused on hunting. However, between the early and late periods, the environment and available food resources changed dramatically. The beginning of the Early Paleoindian Tradition is characterized by retreat of glacial ice and the growth of spruce forests. During this time, now extinct megafauna like mastodon, mammoth, and large bison were available for hunting. The Early Paleoindian period is poorly understood in Minnesota because most evidence for Paleoindian lifeways comes from isolated finds of large fluted projectile points (Gibbon and Anfinson 2008). Based on more plentiful sites in the southeastern and southwestern portions of the United States, it is generally assumed Native American populations were small, consisting of highly-mobile hunters and foragers who followed large game throughout the landscape (Gibbon and Anfinson 2008).

By the Late Paleoindian period, modern vegetation zones had established themselves in Minnesota. Modern animal species like white tail deer, grouse, and fish were available for Native American communities to hunt and fish. Lithic tool evidence from Late Paleoindian sites in Minnesota take the form of stemmed rather than fluted points and a wider range of tool types including groundstone tools (Gibbon and Anfinson 2008). Again, lifeways during this time are poorly understood, but based on three well-documented sites found in Minnesota (Cedar Creek-21AK58, Bradbury Brook-21ML42, and Browns Valley-21TR5), communities are still small, highly-mobile and focused on hunting larger animals and foraging for wild plants. However, stone toolkits did diversify and communities began exploiting smaller territories. It is also likely populations started to increase (Gibbon and Anfinson 2008).

4.1.2 Archaic Tradition (7,500 to 800 B.C.)

The Archaic Tradition continues the trend of resource diversification started in the Late Paleoindian period. Native American communities developed broader toolkits, used a wider array of foods, and became less mobile over the course of the Archaic. Additionally, by the end of the Archaic, communities were using communal burial sites. Stemmed and notched points, groundstone tools, particularly those for woodworking, and cold-hammered copper tools are hallmarks of the Archaic Tradition in the archaeological record (Anfinson 1997; Gibbon and Anfinson 2008). By the end of this period the climate shifted to a cooler, wetter pattern up until the strong, human-driven, warmer climates of the modern era. Resource gathering technologies during the Archaic included the aforementioned hunting, as well as trapping, fishing, foraging, woodworking and plant processing. Many of the larger, documented sites in the central portion of the state likely began during the end of this period.

4.1.3 Woodland Tradition (800 B.C. to European Contact)

In the Midwest region, archaeologists tend to divide the Woodland Tradition into three periods: Early, Middle, and Late. However, Anfinson (1987) and Gibbon (2012) suggest in Minnesota it is more appropriate to divide the era into Initial and Terminal Woodland periods. This view is not as widespread as research would at first suggest, with work including Arzigian's *Statewide Multiple Property Documentation Form for the Woodland Tradition* (2008), and Buhta et. al. *On the Periphery?: Archaeological Investigations of the Woodland Tradition in West- Central Minnesota* (2014), retaining the more traditional use of Early, Middle, and Late designations. Beginning approximately 2,800 years ago, peoples in the region experienced increases in population with the advent of first horticultural and then agricultural subsistence strategies to augment already extant systems of hunting, gathering, etc. As populations increased, settlements near favorable transportation and resource corridors shifted from seasonal to year-round occupations as they made forays to collect necessary resources (Johnson 1988; Anfinson 1987:222).

The period also witnessed the technical transition from spear/atlatl to bow and arrow weaponry useful for both hunting and warfare. This change in technology lead to the use of smaller projectile points or arrow heads. Similarly, the period also saw the invention of ceramic vessels and it is these vessels and their change over time, from thick walled, grit tempered, conoidal vessels, to thinner walled, shell tempered, globular vessels, which has greatly assisted the archaeological community in further refining their understanding of group identity, cohesion, and integration throughout the region. Indeed, there are more than ten major recognized ceramic complexes for the state with many temporal overlaps, often based more on location than visual representation. A final example representing not only identity and permanence on the landscape, but also religious practices, was the use of earthen burial mounds. Although community size was likely similar between the Early Woodland and Late Archaic periods, by the Late Woodland period, populations were certainly on the rise.

4.2 Contact/Post-Contact Period (1630 A.D. to Present)

This period generally refers to the span of time extending from the first European explorations until intensive Euro-American settlement of the region. Minnesota's historic period began in 1673 when French explorers Marquette and Joliet discovered the upper portion of the Mississippi River. Ten years later, Catholic Missionary Father Louis Hennepin told his story of exploring Minnesota and being held captive by Dakota Indians in the first book written about Minnesota, *Description de la Louisiane* (Hennepin 1683).

The territory containing modern-day Minnesota was claimed at various periods of time by Spain, France, Great Britain, and the United States. Lieutenant Zebulon Montgomery Pike led the first United States expedition through the area in 1805, which would ultimately become Minnesota in 1858. Fort St. Anthony (later Ft. Snelling) was completed between 1819 and 1824, and in 1836 the Wisconsin Territory, including a portion of Minnesota, was formed. Just one year later, on September 29th, 1837, during treaty negotiations in Washington, D.C., Dakota leaders ceded their lands between the Mississippi and St. Croix Rivers.

The fur trade drove much of European exploration and settlement into Minnesota prior to territorial frontier settlement in the mid-1800s. While the fur trade impacted Native American communities throughout all of Minnesota, the heaviest impacts came with later Euro-American settlement. Intensive settlement and agriculture dramatically transformed the landscape, displacing large numbers of Native Americans and their communities. In 1862 tensions between white settlers and Native Americans resulted in the Dakota War. Ultimately, this war left 462 whites and "an unknown but substantial number" of Native Americans dead (Anderson and Woolworth 1988). The conflict concluded with the largest mass execution in United States history with the hanging of 38 Dakota on December 26, 1862 at Mankato and the deportation of remaining tribal members to Santee, Nebraska.

Native American archaeological site types associated with this period are generally consistent with those of earlier periods, but European and Euro-American traders, missionaries, settlers, and industries affected the locations of these sites. This period also includes Euro-American immigrant settlement patterns, subsistence activities, and economic strategies. Sites associated with Euro-American immigrants appear in the mid-nineteenth century. Associated archaeological and historic site types categorized in the Contact/Post-Contact period include standing structures as well as archaeological sites.

5.0 LITERATURE REVIEW

Fourteen previously identified archaeological sites and four alpha sites are located within two miles of the project area (Table 1). Alpha sites are versions of archaeological sites which have been reported as *potential* sites based on mentions in literature, historic mapping (i.e. the 1874 Andreas Atlas), or by individuals reporting casually finding cultural materials; these sites have yet to be field verified through systematic archaeological research and survey.

Table 1. Previously Identified Archaeological Sites Within Two Miles

Site Number	Site Name	Site Description	Cultural Affiliation	Miles from Project Area	TRS
21AN0044	Winnebago Enclosure	Enclosure and Earthworks	Historic: Native American	0.1 Miles	T32N, R25W, S30 NW ¼, NE ¼, NE ¼
21HE0090	Dayton Mounds	Six Burial Mounds	Pre-Contact: Woodland	0.73 Miles	T121N, R22W, S31 SE ¼, S ½ And SW ¼, S ½
21HE0326	Dayton A	Habitation, Lithic Workshop	Pre-Contact	1 Mile	T120N, R22W, S9 NE ¼, NW ¼, NE ¼
21AN0136	No Name	Lithic Scatter	Pre-Contact	1 Mile	T32N, R25W, S19 SW ¼, NW ¼, NE ¼
21AN0135	No Name	Lithic Scatter	Pre-Contact	1.23 Miles	T32N, R25W, S18 SW ¼, SW ¼, SE ¼
21HE0327	Dayton B	Single Artifact	Pre-Contact	1.24 Miles	T120N, R22W, S29 SE ¼, NE ¼, SW ¼
21HE0189	Cloquet Island Scenic Overlook	Artifact Scatter	Pre-Contact, Contact, Post-Contact	1.33 Miles	T120N, R22W, S10 NW ¼, W ½
21WR0043	Crow River Scenic Overlook	Habitation	Pre-Contact	1.47 Miles	T121N, R23W, S36 SW ¼, SE ¼, NE ¼
21HE0335	No Name	Habitation	Pre-Contact: Woodland	1.54 Miles	T120N, R22W, S10 NW ¼, SW ¼, NW ¼
21HE0328	Dayton D	Habitation	Lithic Workshop	1.6 Miles	T120N, R22W, S9 NE ¼, SE ¼, SE ¼
21AN0184	No Name	Habitation	Pre-Contact: Habitation	1.7 Miles	T32N, R25W, S33 NW ¼, SE ¼, NE ¼
21WR0027	No Name	Single Burial Mound	Pre-Contact: Woodland	1.98 Miles	T120N, R23W, S1 SE ¼, SE ¼, NW ¼
21WR0125	No Name	Artifact Scatter	Pre-Contact and Post-Contact: Euro-American	1.99 Miles	T120N, R23W, S1 NW ¼, SE ¼, NW ¼
21WR0130	Dayton Quarry Burial	Human Remains	Presumably Pre-Contact	1.99 Miles	T120N, R23W, S1 NE ¼, NW ¼, SE ¼
21ANu	Itasca Village	Ghost Town	Historic: Euro-American	0.63 Miles	T32N, R25W, S19 SE ¼, NE ¼, SW ¼
21WRbp	Dayton city	Historic Documentation	Historic: Euro-American	1.19 Miles	T121N, R23W, S36
21WRbo	Waterville	Ghost Town	Historic: Euro-American	1.19 Miles	T121N, R23W, S36
21WRo	Lahn	Artifact Scatter	Pre-Contact	1.2 Miles	T120N, R23W, S12

No previously identified archaeological sites are located within the project area. Sites located within two miles comprise a mixture of pre-contact and historic activities including pre-contact lithic and artifact scatters, habitations, and burial mounds; as well as historic ghost towns and an earthwork enclosure. Of the pre-contact sites, only a few could be attributed to a cultural tradition,

all of them being of the Woodland Tradition, due to either diagnostic artifacts or archaeological features (i.e. burial mounds).

The relatively high volume of pre-contact sites within two miles of the project area, as well as the project's proximity to the Mississippi River, indicate the project area exhibits reasonable potential to contain pre-contact cultural material. LiDAR data (provided by MNDNR) was examined in an attempt to identify any visible above-ground features with a potentially archaeological origin. These features were not identified, but viewing the LiDAR hillshade revealed the project area had been submerged in the Mississippi River floodplain in the past. The old river cut is distinct to the point at least two major previous river edges can be identified in the project area hillshade imagery, accompanied by clear sandbar deposits between the current river path and the previous flooded edge (Figure 3).

6.0 RESULTS

Fieldwork was completed on October 9, 14, and 15, 2020. This began with surface survey of the cornfields, cabbage patch, and pumpkin patch on a four to five-meter interval. Surface visibility within all surface-surveyed areas varied between 0 and 80% (see Appendix B for example surface visibility photographs). No cultural materials or archaeological features were identified during the surface survey.

Shovel testing was completed along three separate transects within the wooded portion of the project area. The first transect was located 15-meters northeast and parallel to the southwestern edge of the project area (the closest edge to the Mississippi River), and consisted of 25 shovel tests excavated at 15-meter intervals. All shovel tests were negative for cultural materials. Due to the non-cultural nature of the first transect, the second transect, placed 30-meters northeast and parallel to the first, contained 11 shovel tests excavated on a 30-meter interval. This transect was also negative for cultural material. Acknowledging this tested portion of the wooded area landed at times in the past floodplain, a third transect was placed on the highest ridge at the northeastern edge of the wooded area in an attempt to capture where the cultural activity may have been focused while this area was previously flooded (see the middle flooded river edge noted in the LiDAR Hillshade imagery in Figure 3). This transect consisted of sixteen shovel tests excavated on a 15-meter interval and was also negative for cultural material. See Figure 4 for an illustration of shovel tested and surface surveyed locations.

All shovel tests were excavated to at least 80 centimeters below surface (cmbs), well into subsoils. Soil profiles were notably consistent across the shovel tested areas with the average profile containing 10YR 3/2 silty sandy loam 0 to approximately 20-30cmbs, followed by 10YR 3/3 to 10YR 3/6 sand from 20-30cmbs through shovel test termination at 80cmbs. Soils typically became more compact beginning around 50cmbs continuing through 80cmbs. Recorded soils exhibited no signs of human-related disturbance, and reflect the sandy soils deposition expected of the ancient floodplain terrace on which this portion of the project area is located. Considering the depth

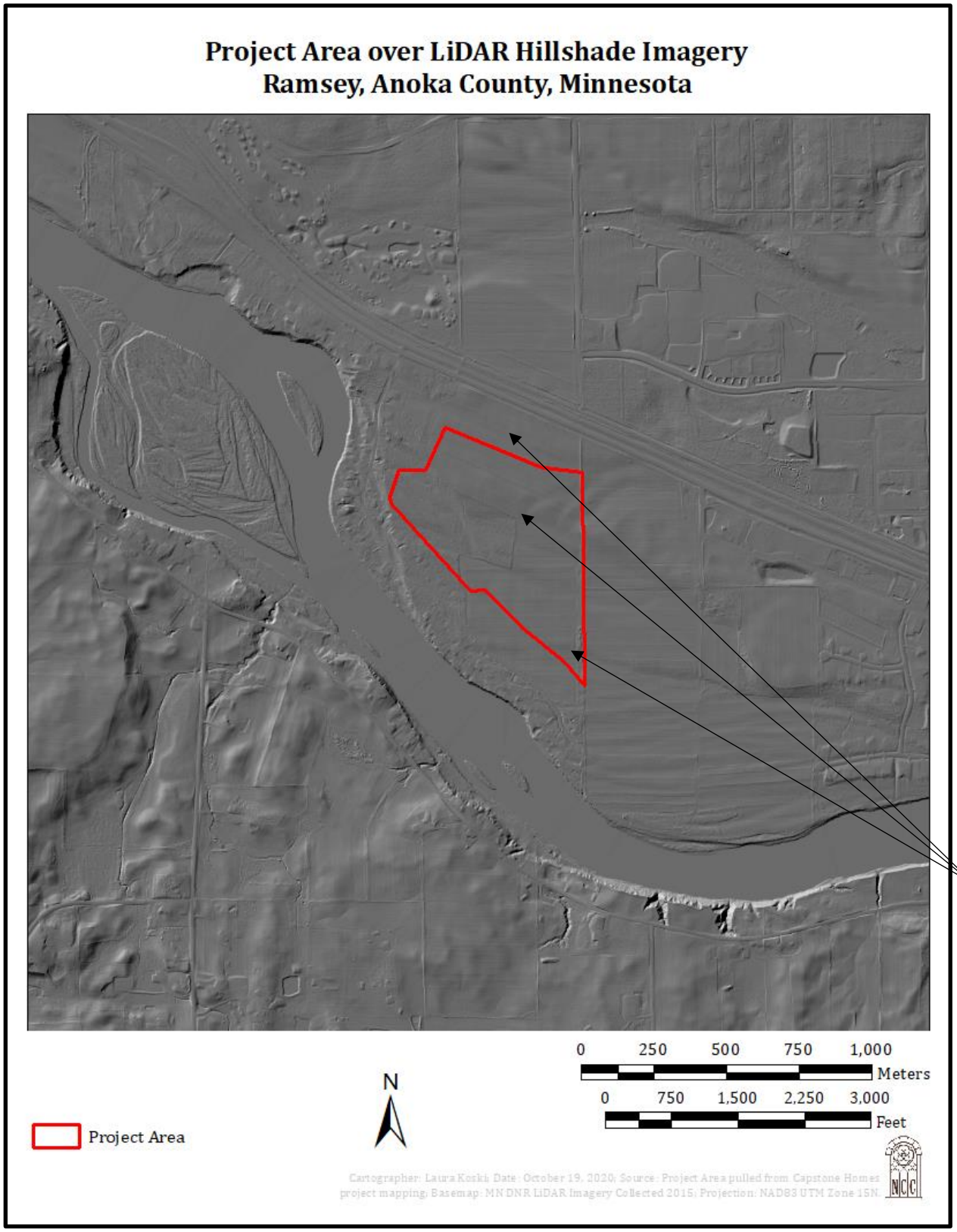


Figure 4: Map of Project Area over LiDAR Hillshade Imagery.

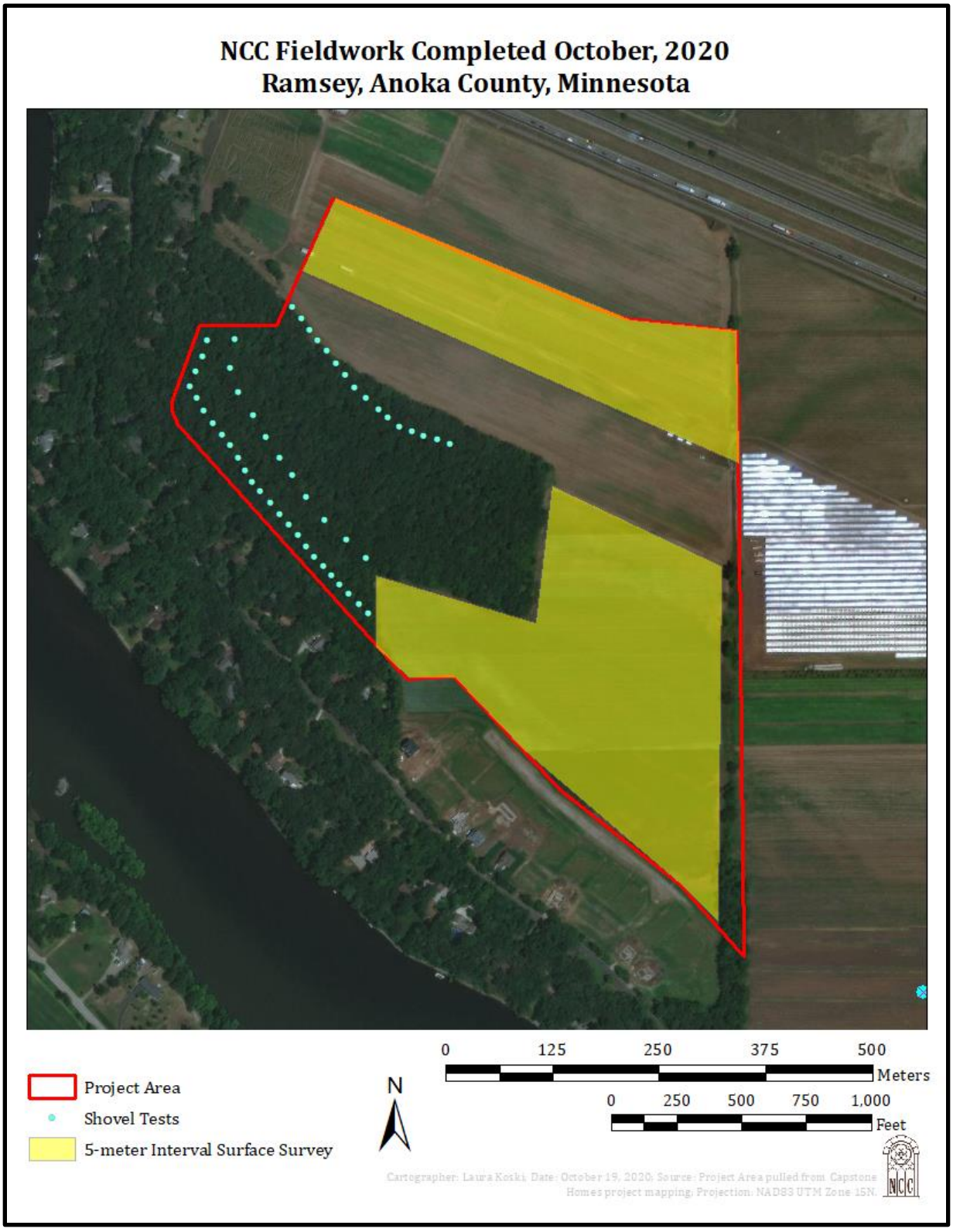


Figure 5: Map of surface surveyed areas and shovel test locations within greater project area. (Basemap provided by 2016 Google Satellite Imagery)

and compaction of these floodplain soils, it is likely this area was flooded consistently enough in the past it was not an attractive location for settlements or camps.

7.0 CONCLUSION AND RECOMMENDATIONS

Capstone Homes is proposing to build a residential development in the City of Ramsey, Anoka County, Minnesota. The project area, approximately 78.63 acres in size, is located in the E ½ of Section 30 and W ¼ of Section 29 of Township 32N, Range 25W in Archaeological Region 4e: Central Lakes Deciduous East. Historically and recently the majority of the project area was cultivated with a long wooded patch along the southwestern edge. The project area is bordered by Highway 10 approximately 500 feet to the north, the Mississippi River approximately 600 to 700 feet to the south, Bowers Drive approximately 200 feet to the west, and a solar farm on the east. Planned development includes a tree preservation area within the existing stretch of woods, 243 detached residential units, residential streets, and single-acre public park at the center.

Work began with a literature review October 7 followed by fieldwork completed October 9, 14, and 15, 2020. Fieldwork consisted of surface surveying corn fields, a cabbage, and pumpkin patch, and shovel testing the wooded area. Surface visibility in the agricultural fields ranged between 0 and 80%. Surface survey transects were spaced on a four to five-meter interval. Fifty-two shovel tests were excavated. Shovel tests were typically 35-40 centimeters (cm) wide and at least 80cm deep. All soils were screened through ¼" mesh screen, detailed profile notes completed, photographs taken, and GPS points collected for each shovel test. No prehistoric cultural materials were encountered. Recent historic materials (i.e. shotgun shells, whiteware sherds) and modern debris (i.e. plastics, aluminum cans) were encountered, but not collected.

Shovel test profiles documented consistent ancient floodplain soils. No prehistoric cultural material or archaeological features were identified during the field survey. Based on these results, Nienow Cultural Consultants recommends no further archaeological work be completed, and the project continues as planned. With any project there is the chance of unanticipated discovery. Should archaeological materials surface during any future construction, it is advised a professional archaeologist be consulted. Minnesota Statute 307.08 protects unplatted cemeteries (including burial mounds) and issues guidelines for dealing with unexpected finds. Should human remains be encountered during earth moving activity, all work must stop and local law enforcement must be called.

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APPENDIX A:

ARCHAEOLOGICAL LICENSE

APPLICATION FOR MINNESOTA ANNUAL ARCHAEOLOGICAL SURVEY LICENSE

This license only applies to reconnaissance (Phase I) surveys conducted under Minnesota Statutes 138.31-.42 during calendar year 2020. Separate licenses must be obtained for monitoring, evaluations/ Phase II and major investigation/Phase III work, and burial site work under Minnesota Statute. This license must be renewed annually. Only the individual indicated below is licensed as principal investigator. The licensed individual is required to comply with all the conditions attached to this license.

Name: Jeremy Loren Nienow

Institution/Agency/Company Affiliation: Nienow Cultural Consultants LLC

Title/Position: Owner / Principal

Address: 200 E. Plato Blvd. St. Paul, MN 55107

Work Phone: 651-295-3744 E-Mail: Jeremy.Nienow@gmail.com

Name of Advanced Degree Institution: U of Minnesota Year: 1997

Department Name: Anthropology Degree: ☐ MA/MS ☑ PhD

Type of Land: (check all that may apply)

☑ State Owned ☑ County Owned ☑ Township/City Owned

☑ Other non-federal public List:

Purpose: (check all that may apply)

☑ CRM ☑ Academic Research ☐ Institutional Field School

Required Documentation:

☑ 1) Curriculum Vita

☑ 2) Documentation of Appropriate Experience

Most Recent License Year 2019 Type I and II *(e.g. Annual, evaluation, mitigation)*

MHS Curation #: 896 Other Approved Facility: RCHS

Signed (applicant): Date: 3/4/20

Submit one copy of this form and attachments to:
Office of the State Archaeologist, 328 West Kellogg Blvd, St. Paul, MN 55102
651-201-2263 651.201.2264 email: mn.osa@state.mn.us

Minnesota Historical Society Approval: Date: 3-9-20

State Archaeologist Approval: Date: 3/5/20

License Number: 20-042

02/28/2019

APPENDIX B:

FIELDWORK PHOTOGRAPHS



Image 1: Of Typical Surface Visibility within Cabbage Patch.



Image 2: Of Field Crew Surveying Cabbage Patch (facing NE).



Image 3: Of Typical Surface Visibility within Corn Fields.



Image 4: Of Field Crew Surveying Pumpkin Patch (Facing SW).
Note Surface Visibility.

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Appendix G
Traffic Impact Study

Riverstone South EAW

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Spack SOLUTIONS

TRAFFIC IMPACT STUDY

Riverstone South 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: _____
Jonah Finkelstein, P.E.
License No. 56210

Date: 12/02/2020

Executive Summary

Background:

Riverstone Development, LLC and Capstone Homes, Inc are proposing the Riverstone South Residential development located South of Highway 10, between Bowers Drive and Llama Street in Ramsey, MN. The purpose of this study is to determine the traffic impacts associated with the build-out of the proposed development on the study roads and intersections where potential impact is anticipated. Mitigation measures will be analyzed and recommended if traffic operations are expected to be below traffic engineering standards. It should be noted that minor impacts are expected on corridors not analyzed in this study and improvements along those corridors may be needed in the future to accommodate incremental traffic growth from this and other area developments.

Results:

The principal findings of this study are:

- The proposed development is expected to generate 1,912 new trips during an average weekday, 140 new trips during the a.m. peak hour, and 186 new trips during the p.m. peak hour.
- All study corridors are projected to operate with volumes within their planning level capacity through the 2040 build scenario.
- All study intersections except for Highway 10/Riverdale Drive (currently Highway 10/Bowers Drive) are projected to operate with queues and delays within acceptable bounds through the 2040 build scenario.
- Highway 10/Riverdale Drive (currently Highway 10/Bowers Drive) experiences larger than preferred queueing with excessive delays in the 2022 and 2040 no-build scenarios. Restriction of this access to a ¾-access, where the northbound left-turning movement from Riverdale Drive to Highway 10 westbound is no longer allowed, reduces the queues and delays to acceptable levels for all analyzed scenarios.
- No external bicycle or pedestrian connections are shown in the provided site plan.

Recommendations:

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

- The future Highway 10/Riverdale Drive intersection should be constructed to a ¾-access, eliminating the northbound left turning movement.
- A trail with a 10-foot minimum cross-section should be constructed on the south side of Riverdale Drive connecting to Highway 10/Riverdale Drive and the existing trail on the south side of Highway 10 to the current trail system on the south side of Riverdale Drive to the east of Llama Street.

This study is based upon a concept development plan titled “Riverstone South” and dated October 21, 2020. 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.

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1. Introduction

a. Proposed Development

Riverstone Development, LLC and Capstone Homes, Inc are proposing the Riverstone South Residential development located South of Highway 10, between Bowers Drive and Llama Street in Ramsey, MN. Following are key attributes of the proposed development:

i. Access to the site will be provided via a Riverdale Drive extension stretching from Llama Street to Bowers Drive. This new roadway extension will provide two accesses for development traffic. As a part of this roadway extension, the existing intersection of Highway 10/Bowers Drive is proposed to be shifted east to become Highway10/Riverdale Drive. Bowers Drive will intersect this new Riverdale Drive extension south of the new connection with Highway 10. The most up-to-date concept plan is shown in the Appendix.
ii. The proposed development will include 78 detached townhomes and 165 single-family homes.
iii. For this report, the development is expected to be fully occupied by 2022.
iv. The site is currently zoned R-2: Medium-Density Residential.

b. Purpose of Study

The purpose of this study is to determine the traffic impacts associated with the build-out of the proposed development in two target years. The traffic impacts are studied on the roads and intersections where potential impacts are 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 2022 and 2040 target year scenarios with and without the proposed development.
iv. Recommend appropriate mitigation measures if poor operations are identified.

The roadways corridors studied in this document include those surrounding the proposed site, which are:

i. Highway 10 (Hwy 10)
ii. Bowers Drive
iii. Llama Street
iv. Armstrong Boulevard

v. Riverdale Drive

For this traffic study, the study intersections closest to the proposed development, and where the highest potential for impact is expected, were chosen for review and include:

i. Hwy 10/Bowers Drive
ii. Riverdale Drive/Llama Street
iii. Armstrong Boulevard/South Hwy 10 Ramps/Riverdale Drive
iv. Armstrong Boulevard/North Hwy 10 Ramps

It should be noted traffic expected from the proposed development will have minor impacts on other corridors and intersections beyond those studied here

Furthermore, this study does not account for the existing roadway conditions such as pavement quality or appropriate drainage.

2. Existing Conditions

a. Corridor Characteristics

As mentioned, the proposed site is located South of Hwy 10, between Bowers Drive and Llama Street. Table 1 shows the characteristics of the key roadway corridors around this site and within the study area.

Table 1 – Study Corridor Characteristics

Name	Designation[1]	Classification[2]	Speed Limit	Lanes	Transit[3]	Peds/ Bicycles
Hwy 10	US 10	Principal Arterial	65 mph	4 Divided	None	None
Bowers Drive	MSAS 115	Local	30 mph	2 Undivided	None	None
Llama Street	MSAS 122	Local	30 mph	2 Undivided	None	None
Armstrong Boulevard	CSAH 83	A-Minor Expander	35 mph	4 Divided	None	Trail on one side
Riverdale Drive	MSAS 115	Local	30 mph	2 Undivided	None	Sidewalk/ Trail on east side

[1] CSAH = County State Aid Highway, MSAS = Municipal State Aid Street.
[2] City of Ramsey 2040 Comprehensive Plan Update and Anoka County Comprehensive Plan
[3] Number of routes around the proposed site followed by the frequency of transit service during the peak periods.

b. Study Intersection Characteristics

All Study intersections are under side street stop control except for Armstrong Boulevard/North Hwy 10 Ramps, which utilizes traffic signal control. The existing traffic control and travel lanes are shown in Figure 1 in the Appendix for the study intersections.

c. Traffic Volumes

Intersection video was collected at the existing study intersections under normal weekday conditions in September/October 2020. Using these videos, 48-hour turning movement counts were obtained at the study intersections. The data from the two days was averaged to provide the base traffic for a "typical weekday" and compared against previously collected data to determine if COVID-19 was having meaningful impacts on the obtain traffic data. This review showed that at the Armstrong Boulevard/Hwy 10 ramps the collected counts were higher than those collected previously. Based on this result the collected turning movement counts were utilized in our analysis.

The average a.m. and p.m. peak hours were found to be from 7:00 to 8:00 a.m. and 4:00 to 5:00 p.m. The “typical day” 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 “typical day” turning movement volumes, the current daily traffic volumes on each study corridor are:

i. 38,200 vehicles per day on Hwy 10 east of Bowers Drive
ii. 38,000 vehicles per day on Hwy 10 west of Bowers Drive
iii. 500 vehicles per day on Bowers Drive
iv. 100 vehicles per day on Llama Street
v. 300 vehicles per day on Riverdale Drive between Llama Street and Hwy 10 south ramps
vi. 800 vehicles per day on Riverdale Drive east of Armstrong Boulevard
vii. 5,600 vehicles per day on Armstrong Boulevard south of Hwy 10 north ramps
viii. 9,700 vehicles per day on Armstrong Boulevard north of Hwy 10 north ramps

3. Forecasted Traffic

a. Site Traffic Forecasting

A trip generation analysis was performed for the development site based on the methods published in the *Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition*. Trip generation rates are also based on local data collected by Spack Solutions.

The ITE manual compiles studies from across the country to provide a national average traffic for various land uses. Spack Solutions collects current average traffic volumes for various land uses in the Twin Cities regional area for use in our studies. Local data is considered more relevant than the ITE national data as it is generally newer and accounts for our area's specific characteristics and driving habits. Per the procedure in the *Trip Generation Manual*, local trip generation data is used when possible and supplemented with national ITE data when local data is not available.

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[1]	Description & Size	Daily			AM Peak Hour			PM Peak Hour		
		In	Out	*Total*	In	Out	*Total*	In	Out	*Total*
210 - ITE	Single Family Detached Housing (165 units)	779	779	*1,558*	31	91	*122*	102	61	*163*
210 - ITE	Single Family Detached Housing (78 units)	368	368	*736*	14	43	*57*	50	29	*79*
Totals Using ITE Rates		**1,147**	**1,147**	***2,294***	**45**	**134**	***179***	**152**	**90**	***242***
Local	Single Family Detached Housing (165 units)	744	744	*1,488*	29	75	*104*	83	62	*145*
Local	Detached Townhomes (78 units)	212	212	*424*	9	27	*36*	26	15	*41*
Totals Using Local Rates		**956**	**956**	***1,912***	**38**	**102**	***140***	**109**	**77**	***186***

[1] Local = Trip generation data collected by Spack Solutions.

As shown in Table 2, the local and ITE daily trip generation rates are similar. However, the ITE rates produce higher trip generation results than local data when observing

peak hours. Based on ITE's recommendation to use local data when available, the trip generation based on local data was utilized in our analysis. Furthermore, the local data presents a more accurate representation of the proposed land uses as ITE no longer has detached townhome data while the local data does.

A trip distribution pattern was developed for the generated traffic going to and from the proposed development. This pattern is based on the existing traffic volumes, site access, and access to the regional transportation system. The general trip distribution pattern for this study is:

i. 44% of the generated traffic to/from the west on Highway 10.
ii. 11% of the generated traffic to/from the north on Armstrong Boulevard.
iii. 44% of the generated traffic to/from the east on Highway 10.
iv. 1% percent of the generated traffic to/from the south on Riverdale Drive.

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

b. Non-site Traffic Forecasting

The impacts of the proposed development are studied in 2022 and 2040. To forecast future traffic volumes in the study area outside of the proposed development's traffic, specific other developments around the site and the general growth in traffic are considered.

Several sources were considered to determine general background growth in the area, including:

- Historic traffic data on the study roadways.
- 2040 forecast volumes from the 2040 Comprehensive Plan.
- Generic growth factor for the County as developed by MnDOT's County Growth Projection Factors.
- Previous traffic studies in the surrounding area.

Based on this information, a growth rate of approximately 2.0% per year was calculated. This growth rate was applied to all movements in the study network except for those accessing the development, since those movements will only be increased with the development's forecast trip generation.

Applying this background growth rate to the existing traffic volumes established the 2022 and 2040 No-Build forecasts.

c. Total Traffic

Traffic forecasts were developed for the 2022 and 2040 scenarios by adding the traffic generated by the proposed development to the non-site forecast volumes. The resultant 2022 and 2040 peak hour forecasts are shown in Figures 2 through 4 in the Appendix.

d. Build Condition Roadway Changes

A few roadway configuration changes are proposed with construction of the new development. These changes include:

- The Bowers Drive intersection with Hwy 10 will be closed off and converted to a cul-de-sac.
- A new Hwy 10 intersection will be constructed roughly 250 feet east of the existing Bowers Drive intersection, effectively shifting the current intersection to the east.
- The southern leg of this new intersection will be the new Riverdale Drive roadway that extends to Llama Street where it will intercept the existing Riverdale Drive corridor.
- Bowers Drive will connect to Riverdale Drive through a T-intersection roughly 315 feet south of the new Hwy 10/Riverdale Drive intersection.

The proposed roadway geometry can be seen in the site plan provided in the Appendix.

4. Analyses

a. Corridor Vehicular Analysis

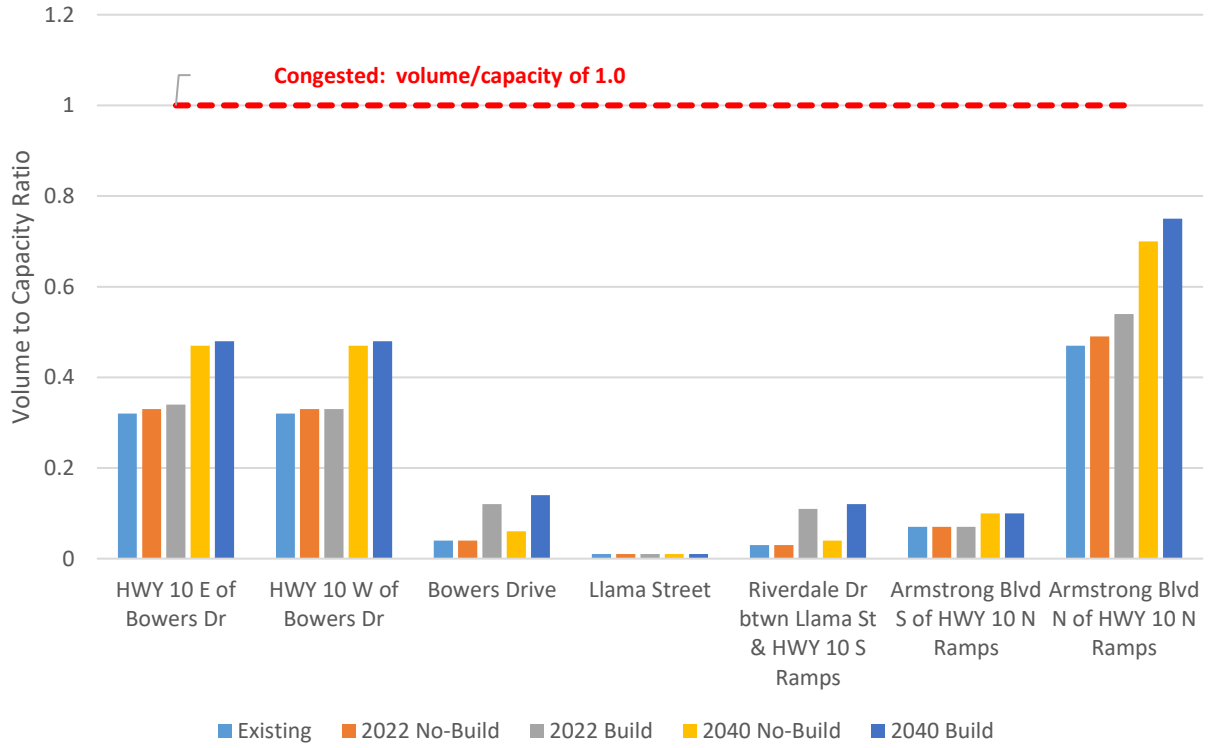
While many factors contribute to a road feeling congested, the two biggest factors are volume, how many vehicles are using the road, and capacity, how many vehicles the road can accommodate a day. Transportation professionals use these pieces of information to create a ratio of volume to capacity. For example, a road with a volume to capacity ratio of 1.0, where the traffic demand is nearly equal to the traffic supply, will feel congested to motorists.

Below is a rough guide of the daily traffic volumes different types of roads can accommodate based on The City of Ramsey's Comprehensive Plan. If the Average Daily Traffic (ADT) volume on a roadway is below the threshold, then it is considered un-congested. If the daily volume falls inside the range, the road is almost congested, and if the daily volume is over the threshold the road is congested.

- 2-Lane undivided streets are considered congested with a volume between 10,000 to 12,000 vehicles per day.
- 2-Lane divided streets are considered congested with a volume between 15,000 to 17,000 vehicles per day.
- 4-Lane divided streets - 28,000 to 32,000 vehicles per day.
- 6-Lane divided freeway – 90,000 to 120,000 vehicles per day.

To provide an initial planning level screening, Chart 1 provides volume to capacity ratios of the study corridors during each of the study years to determine if any of the roadway corridors are candidates for additional through lanes.

Chart 1 – Study Corridor Volume to Capacity



b. Intersection Vehicular Analysis

Individual intersections can perform poorly during peak periods while the overall roadway corridor is operating with an uncongested daily volume to capacity ratio lower than 1.0. Therefore, capacity analyses are performed for the study intersections to determine if they need improvements such as turn lanes or an upgrade in traffic control.

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 2 (a.m. peak hour) and Chart 3 (p.m. peak hour) show the average peak hour delay per traffic signal-controlled intersection for each study scenario. The LOS D/E boundary of 55 seconds of delay per vehicle is considered the threshold between acceptable and unacceptable traffic signal operation in Minnesota.

The initial signal timing for the existing conditions was provided by Anoka County.

Chart 2 – A.M. Peak Hour Delays: Signal Controlled Intersections

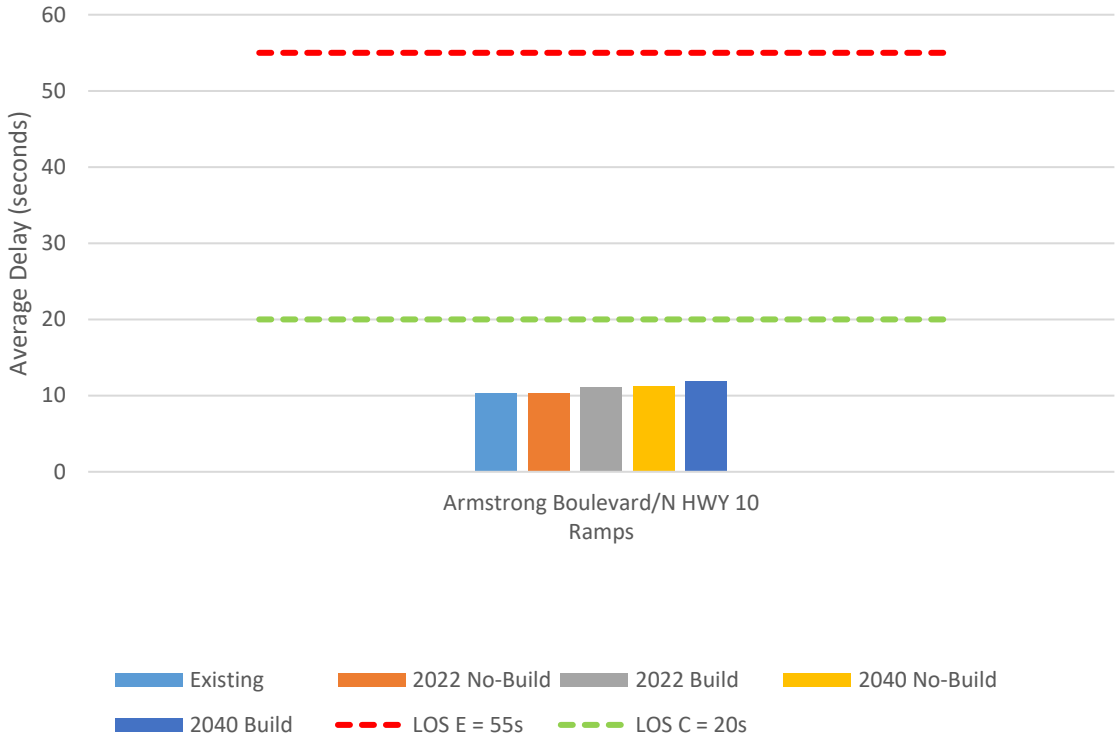


Chart 3 – P.M. Peak Hour Delays: Signal Controlled Intersections



Chart 4 (a.m. peak hour) and Chart 5 (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. Based on our experience, improvements are not warranted at these types of intersections until the 95th percentile queue at a stop sign is in the five to ten vehicle range.

Chart 6 – A.M. Peak Hour Queues: Side Street Stop Sign Controlled Intersections

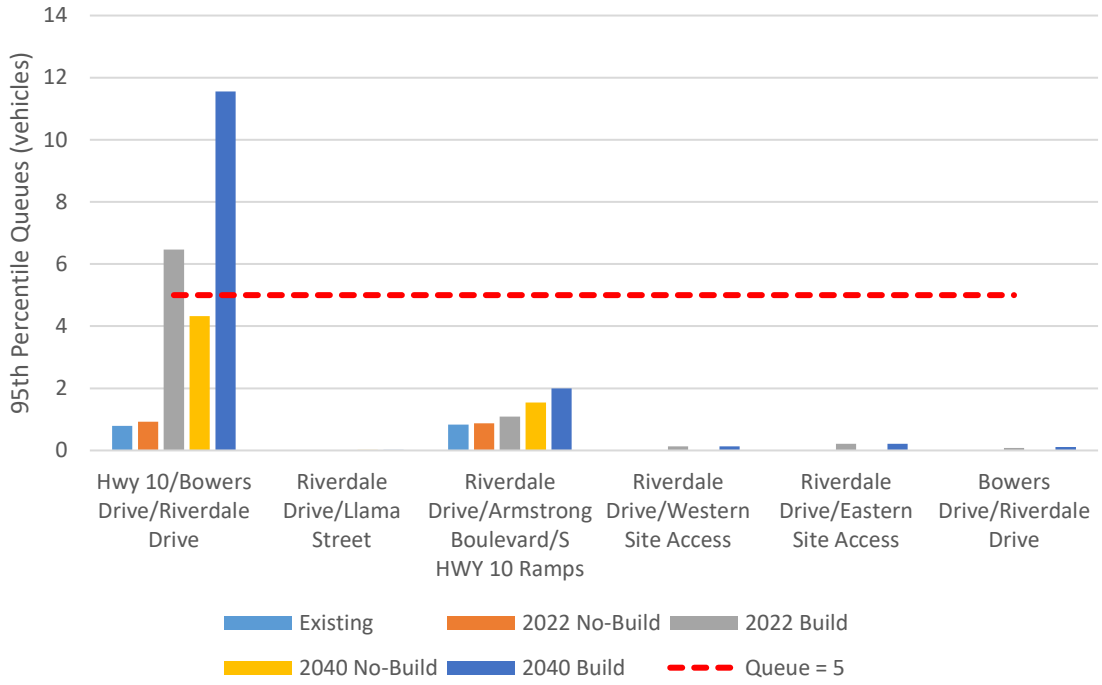
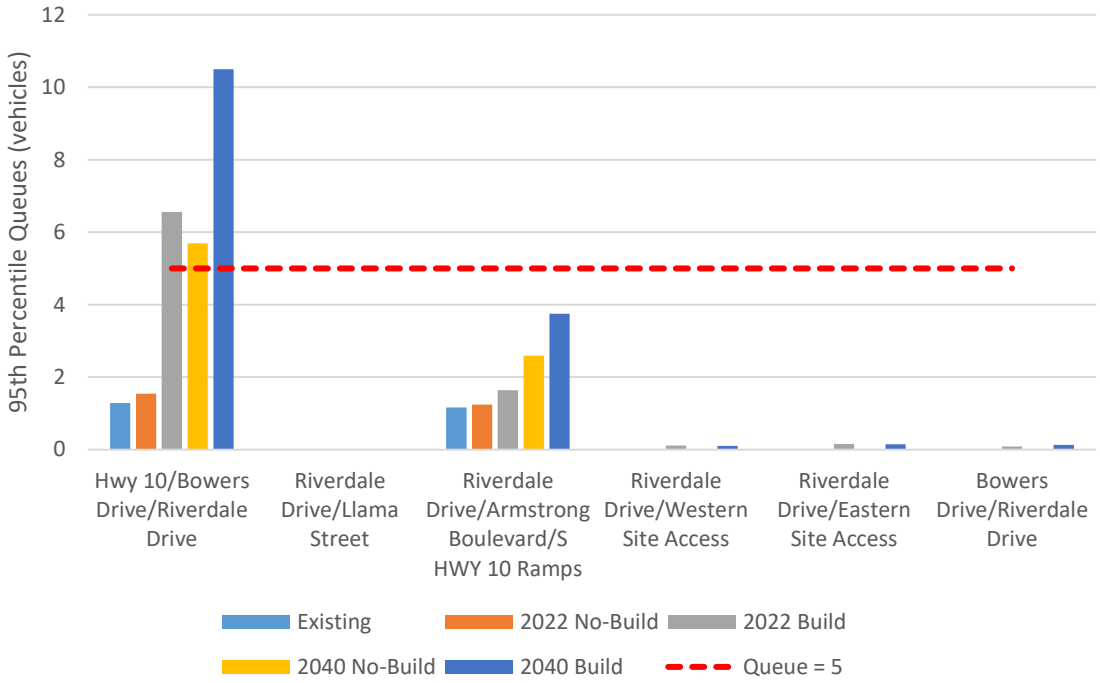


Chart 7 – P.M. Peak Hour Queues: Side Street Stop Sign Controlled Intersections



c. Vehicular Mitigation Analysis

Per the above analyses, most of the study intersections and all corridors will operate acceptably throughout the study scenarios. However, the proposed side street stop control intersection of Hwy 10/Riverdale Drive begins to see queues that extend above five vehicles.

Further investigation into the queues at this intersection revealed that in the no-build and build scenarios delays begin to reach excessive levels for the northbound left turning movements. This movement will experience delays up to:

- Four minutes in the 2022 no-build scenario
- 21 minutes in the 2040 no-build scenario
- 12 minutes in the 2022 build scenario
- Over an hour in the 2040 build scenarios

Alternatives were explored to provide appropriate mitigation at this location, improving the vehicle operations. Specially, mitigation was examined to help reduce delays associated with the northbound left turning vehicles. Generally, the least expensive alternative providing acceptable operations is recommended (i.e. stop signs over a traffic signal if stop signs will be sufficient). Based on these analyses, construction of the proposed Hwy 10/Riverdale Drive intersection as a ¾-access, eliminating the northbound left turning movement from the intersection is recommended.

This configuration removes the highest delayed movement, the cross street left-turning movement (northbound left) from the intersection. These vehicles will now need to route east along Riverdale Drive to the northern Highway 10 Ramps on Armstorng Boulevard, where they will then be able to proceed westbound on Highway 10. In total, roughly 2.25 miles will be added to these vehicles drive, however with projected delays of 21 mintues to more than one hour by the 2040 build scenario, this rerouting will take less time than if the vehicles were to wait to complete a northbound left at the Hwy 10/Riverdale Drive intersection.

The restricted access mitigation was run for the 2040 scenario to determine if it was an effective solution for the delay concerns. The results were improved to:

- 46 seconds of delay per vehicle for northbound vehicles with queueing of less than two vehicles in the 2040 a.m. build scenario.
- 26 seconds of delay per vehicle for northbound vehicles with queueing of less than one vehicle in the 2040 p.m. build scenario.

As previously mentioned, and based on our experience, improvements are not warranted at side-street stop-controlled intersections until the 95th percentile queue at a stop sign is in the five to ten vehicle range. This proposed mitigation reduces the queue to less than five vehicles and brings delays back to standard levels for side street movements at side-street stop-controlled intersections intersecting with busy roadways. The full capacity analysis results can be seen in the Appendix.

d. Concept Site Plan & Multi-Modal Review

The concept site plan contained in the Appendix was reviewed to determine if the plan meets city requirement's, provides appropriate circulation, and minimizes conflicts. Following are key transportation elements of the concept site plan:

i. Car Circulation: vehicle circulation is provided in the site with two proposed accesses on Riverdale Drive. These accesses both provide connections to the entire site, meaning if one access becomes blocked due to a crash or vehicle breakdown, drivers will still be able to navigate the site and enter/exit using the alternate access. Additional future connection stub-outs are provided on the east and west of the site providing further connections when/if the area is built out further.

ii. Truck Circulation: Heavy vehicle turning movements should be considered within the site. Specifically, the two internal cul-de-sacs should be designed in a way that garbage trucks can easily turn around without require any reversing movements.

iii. Bicycle/Walking Paths: No bicycle paths are currently shown on the site plan. At a minimum, a ten-foot wide trail connection on the south side of Riverdale Drive, from the future Highway 10/Riverdale Drive intersection trail system to the trail system that starts on the east side of Riverdale Drive/Llama Street, should be provided. This connection will provide both walking and bicycle

connections for the proposed development. Internally, the eastern most access will provide a sidewalk allowing for connections to the public park.

iv. Parking: Parking for each unit will be provided off-street. Five on-street parking stalls are provided next to the 1.0-acre public park for use by park visitors.

5. Conclusions and Recommendations

The traffic impacts of the proposed development were thoroughly studied, and the principal findings are:

- The proposed development is expected to generate 1,912 new trips during an average weekday, 140 new trips during the a.m. peak hour, and 186 new trips during the p.m. peak hour.
- All study corridors are projected to operate with volumes within their planning level capacity through the 2040 build scenario.
- All study intersections except for Highway 10/Riverdale Drive (currently Highway 10/Bowers Drive) are projected to operate with queues and delays within acceptable bounds through the 2040 build scenario.
- Highway 10/Riverdale Drive (currently Highway 10/Bowers Drive) experiences larger than preferred queueing with excessive delays in the 2022 and 2040 no-build scenarios. Restriction of this access to a ¾-access, where the northbound left turning movement from Riverdale Drive to Highway 10 westbound is no longer allowed, reduces the queues and delays to acceptable levels for all analyzed scenarios.
- No external bicycle or pedestrian connections are shown in the provided site plan.

The following recommendations are made based on the above findings:

- The future Highway 10/Riverdale Drive intersection should be constructed to a ¾-access, eliminating the northbound left turning movement.
- A trail with a 10-foot minimum cross section should be constructed on the south side of Riverdale Drive connecting to Highway 10/Riverdale Drive and the existing trail on the south side of Highway 10, to the current trail system on the south side of Riverdale Drive to the east of Llama Street.

6. Appendix

A. Site Plan

B. The Language of Traffic Engineering

C. Figures 1-4

D. Traffic Counts

E. Trip Generation Table

F. Level of Service (LOS)

G. Capacity Analysis Backup

- AM Existing
- PM Existing
- AM 2022 No-Build
- PM 2022 No-Build
- AM 2040 Build
- PM 2040 Build
- AM 2022 No-Build
- PM 2022 No-Build
- AM 2040 Build
- PM 2040 Build
- Mitigated AM 2040 Build
- Mitigated PM 2040 Build

LEGAL DESCRIPTION

PARCEL DESCRIPTION: (Per Schedule A of Title Commitment File No. 2651, with a commitment date of October 17, 2019 at 7:00 am, prepared Twin City Title Company, LLC as issuing agent for Old Republic National Title Insurance Company)

Parcel A: Outlot B, Pearson Place, Anoka County, Minnesota.

Parcel B: That part of the Northwest Quarter of the Northwest Quarter of Section 29, Township 32, Range 25, Anoka County, Minnesota, lying southerly of U.S. Highway 10 and 169.

Parcel C: Lot 2, Block 3, Pearson Place, Anoka County, Minnesota.

Parcel D: Lot 1, Block 3, Pearson Place, Anoka County, Minnesota.

(abstract property)

LEGEND

- OPEN SPACE
- OPEN SPACE – WOODED
- STORMWATER POND
- INFILTRATION BASIN

U.S. HIGHWAY NO. 10 & 169

COMMERCIAL DEVELOPMENT 21.96 AC

S66°01'47"E 1951.85

S00°08'36"W 1705.32

LIFT STATION AREA 0.22 AC

S00°17'33"W 1093.62

LIFT STATION

8' TRAIL

INF. BASIN

534.66 N37°59'16"W

STREET B

STREET A

STREET C

STREET D

STREET E

PEARSON BLVD

RESIDENTIAL DEV. 78.63 AC

PUBLIC PARK 1.0 AC

POND

INFILTRATION BENCH

LAKE

OPEN SPACE / PONDING AREA - 8.08 AC

581.89 S42°51'14"E

620.99 N51°55'40"W

193.74 N89°47'35"W

BOWERS DRIVE NW

MISSISSIPPI RIVER

RIVERDALE DRIVE

BUFFER AREA 1.05 AC

AREA RETAINED BY LANDOWNER 9.70 AC

TREE PRESERVATION AREA 7.0 AC

EXISTING 50' TREE BUFFER

1349.11 N40°39'13"W

322.61 N17°54'18"E

451.73 N22°50'18"E

205.79 N67°09'42"W

159.73 A=12°58'27" R=706.37

76.30 S00°14'18"W

395.06 A=17°40'00" R=128.25

100.41 A=06°01'20" R=955.30

270.04 A=07°17'00" R=2125.00

50.00 N76°47'15"W

61.69 A=58°33'37" R=60.36

SITE DATA

TOTAL AREA	±110.29 AC.
RESIDENTIAL DEVELOPMENT AREA	78.63
PUBLIC PARK AREA	1.0
TREE PRESERVATION AREA	7.0
OPEN SPACE / PONDING AREA	8.08
RIVERDALE BUFFER AREA	1.05
ROW AREA	15.37
LIFT STATION AREA	0.22
COMMERCIAL DEVELOPMENT AREA	21.96
AREA RETAINED BY LANDOWNER	9.70

N

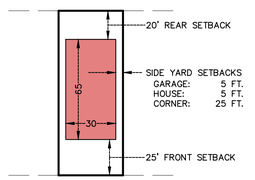
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(SCALE IN FEET)

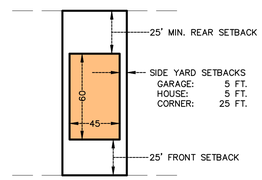
RESIDENTIAL DEVELOPMENT DATA

TOTAL NUMBER OF LOTS	243
GROSS DENSITY	3.1 U/AC
DETACHED TOWNHOMES	78
55' SINGLE FAMILY	116
65' SINGLE FAMILY	49

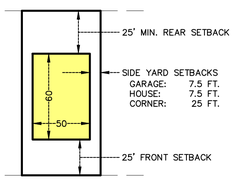
40' DETACHED TOWNHOME LOT DETAIL



55' SINGLE FAMILY LOT DETAIL



65' SINGLE FAMILY LOT DETAIL



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DRAWN BY: C#/RR
ISSUE DATE: 12/3/20
Revisions:

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Ramsey, MN 55303

RIVERSTONE SOUTH
Ramsey, Minnesota

SKETCH PLAN W/AERIAL

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.

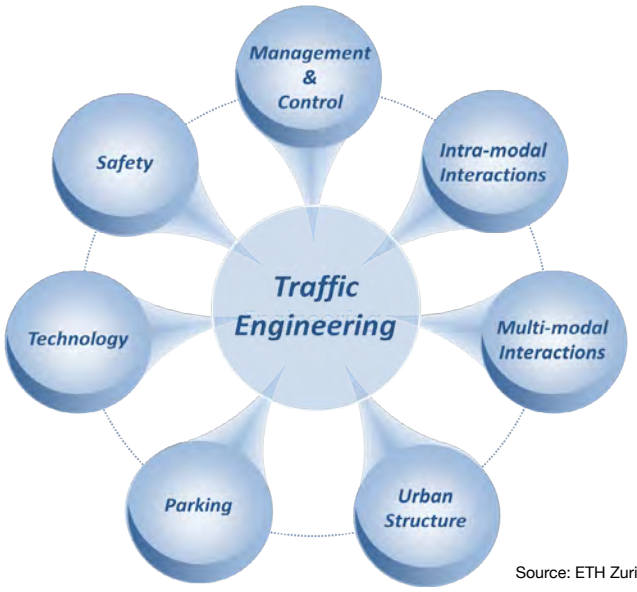
Speed Study – A review of existing travel speeds and the corridor characteristics to determine if speeding is an issue, the appropriate speed to post as the limit, and/or areas to provide reduced speed warnings.

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

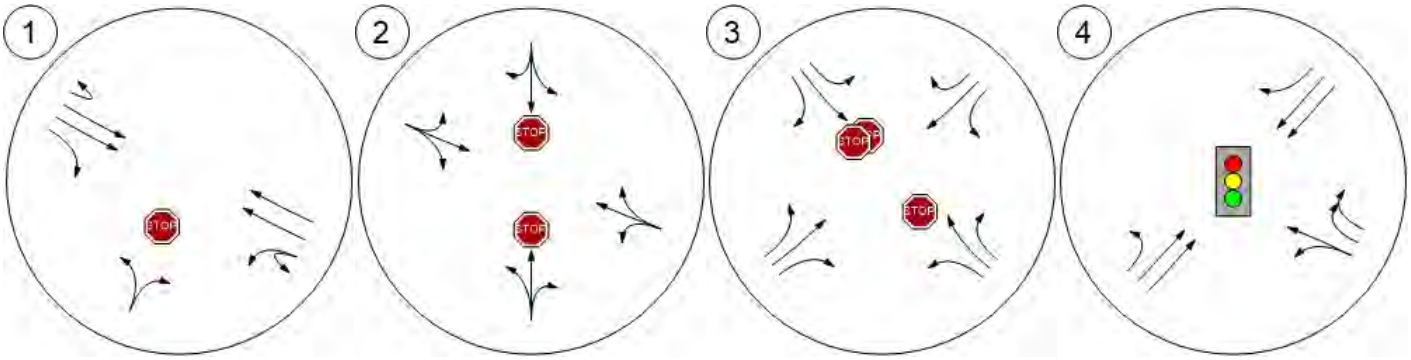
Highway Safety Manual, HSM

About This Brief

Spack Solutions 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@spacksolutions.com. And please reach out if you have any comments or questions related to this Design Brief.

Lane Configuration and Traffic Control





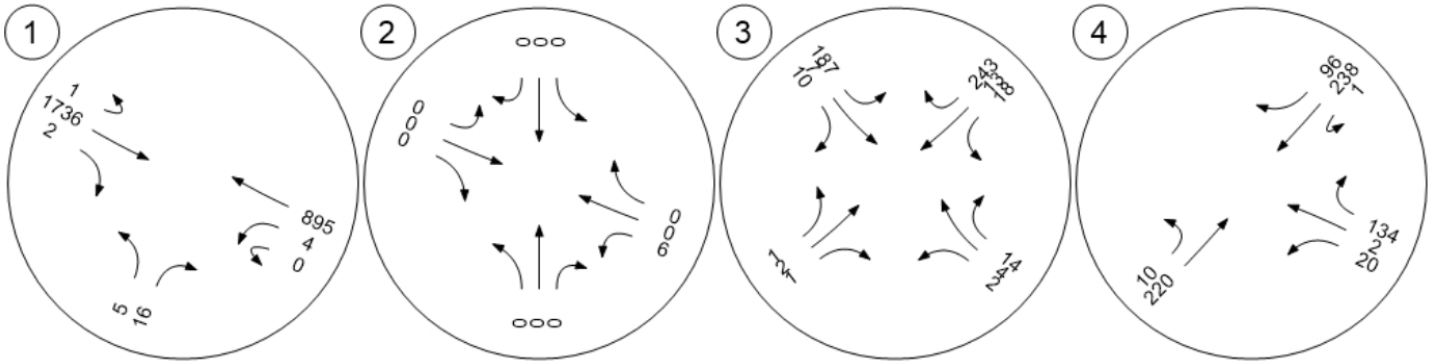
Appendix C - Figures 1 - 4

Figure 2 Through Figure 4

Figure 2 – Existing Scenario



Existing AM Peak



Existing PM Peak

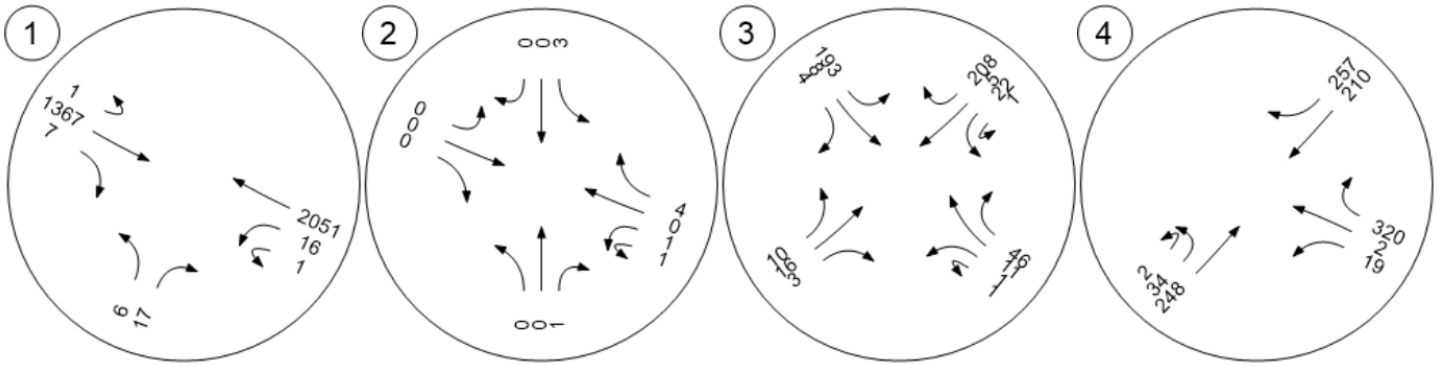
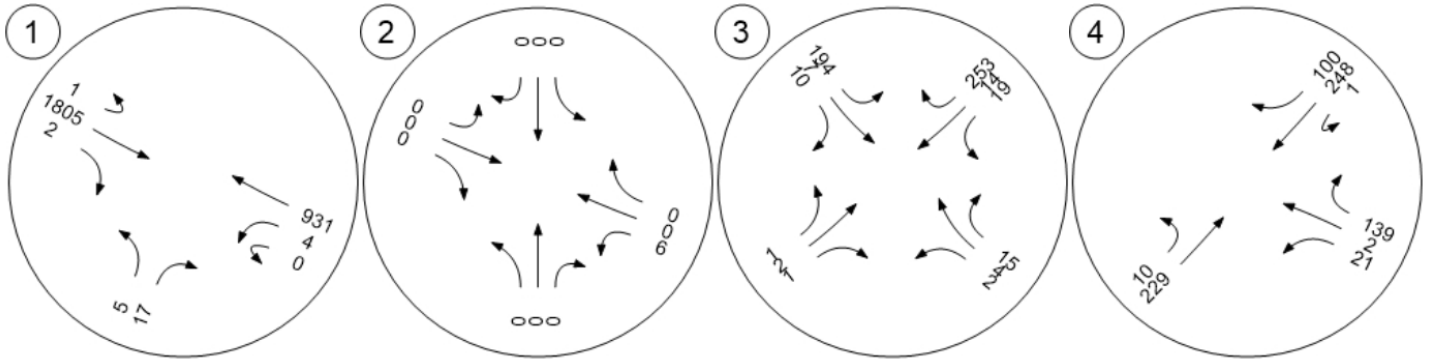


Figure 3 – No Build Scenario



2022 No-Build AM Peak



2022 No-Build PM Peak

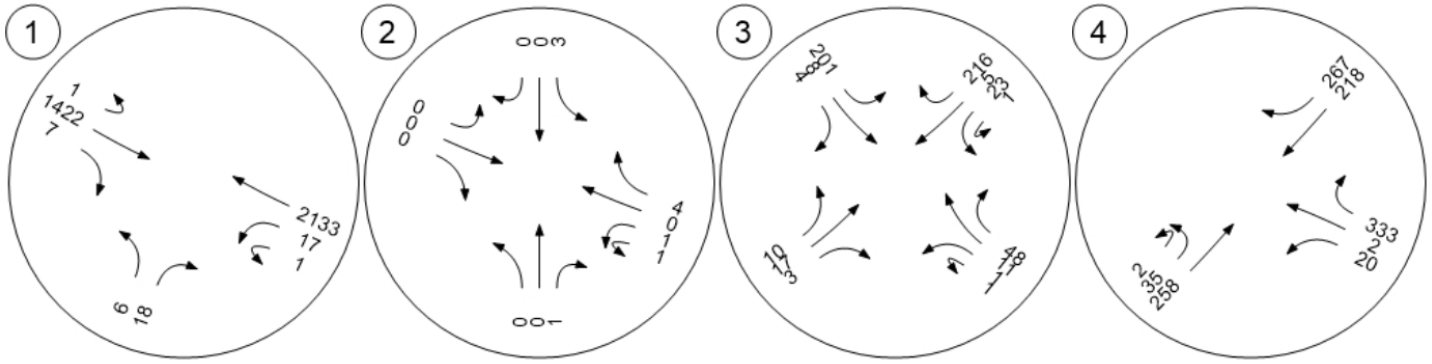
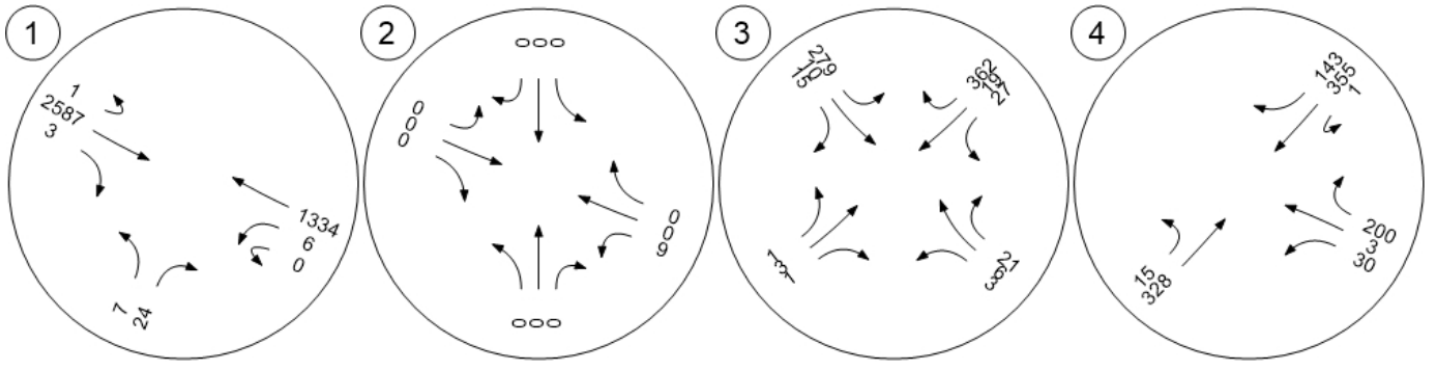


Figure 3 Cont. – No Build Scenario



2040 No-Build AM Peak



2040 No-Build PM Peak

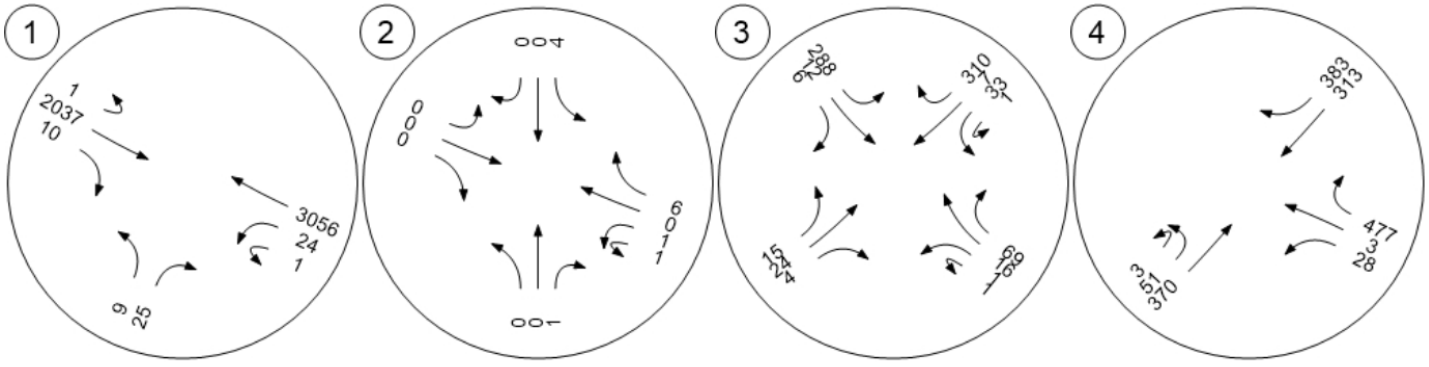
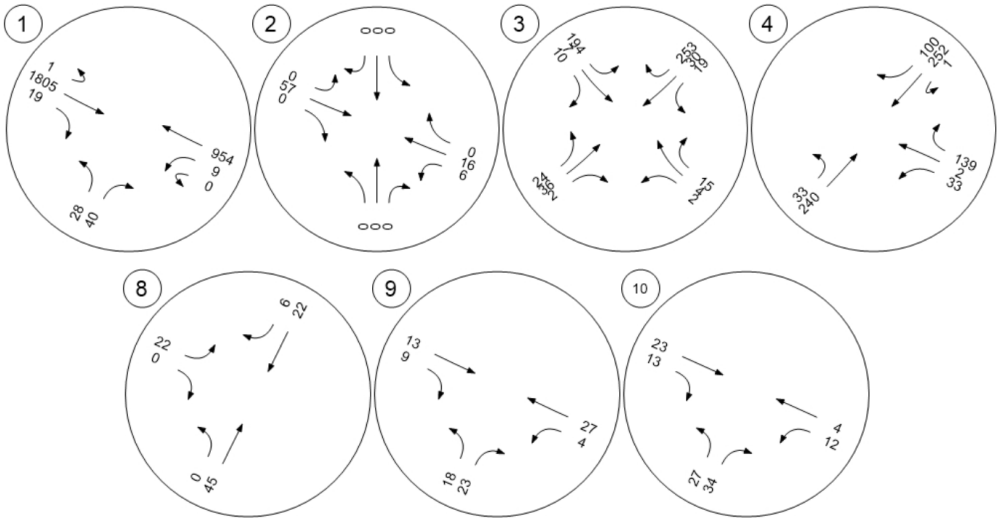


Figure 4 – Build Scenario



2022 Build AM Peak



2022 Build PM Peak

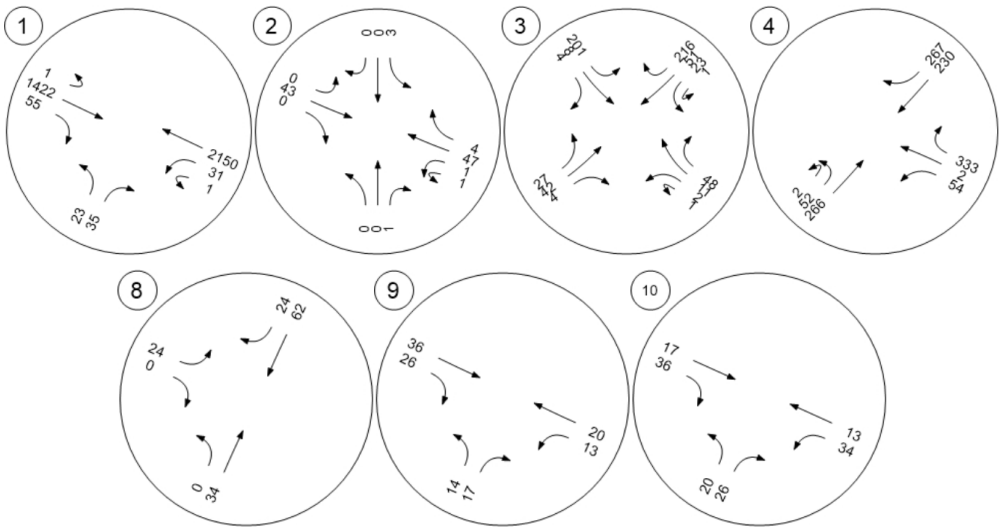
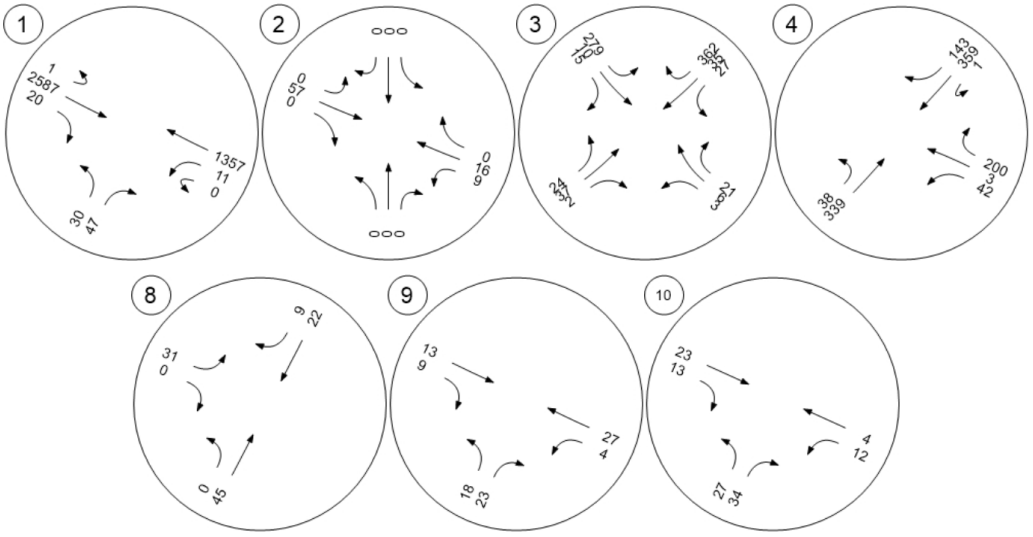


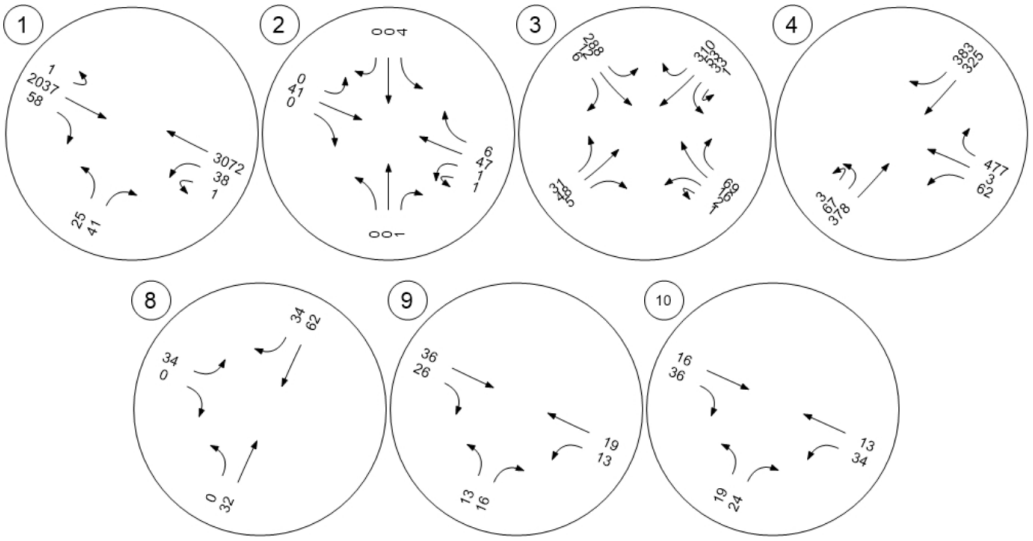
Figure 4 Cont. – Build Scenario



2040 Build AM Peak



2040 Build PM Peak



Appendix D - Traffic Counts

01 Hwy 10 and Bowers Dr
Ramsey MN
Tuesday, September 29, 2020

Time	Southbound NA						Westbound Hwy 10						Northbound Bowers Drive						Eastbound Hwy 10						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach 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**
Hourly 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**
1:00 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**
1:15 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**
1:30 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**
1:45 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**
Hourly 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**
2:00 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**
2:15 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**
2:30 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**
2:45 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**
Hourly 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**
3:00 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**
3:15 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**
3:30 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**
3:45 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**
Hourly 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**
4:00 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**
4:15 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**
4:30 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**
4:45 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**
Hourly 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**
5:00 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**
5:15 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**
5:30 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**
5:45 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**
Hourly 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**
6:00 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**
6:15 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**
6:30 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**
6:45 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**
Hourly 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**
7:00 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**
7:15 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**
7:30 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**
7:45 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**
Hourly 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**

Appendix D - Traffic Counts

01 Hwy 10 and Bowers Dr
Ramsey MN
Tuesday, September 29, 2020

Time	Southbound NA						Westbound Hwy 10						Northbound Bowers Drive						Eastbound Hwy 10						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
8:00 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**
8:15 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**
8:30 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**
8:45 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**
Hourly 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**
9:00 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**
9:15 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**
9:30 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**
9:45 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**
Hourly 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**
Hourly 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**
Hourly 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**
Hourly 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**
1:00 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**
1:15 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**
1:30 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**
1:45 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**
Hourly 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**
2:00 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**
2:15 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**
2:30 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**
2:45 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**
Hourly 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**
3:00 PM	0	0	0	0	0	*0*	0	2	466	0	0	*468*	0	1	0	3	0	*4*	1	0	295	1	0	*297*	**769**
3:15 PM	0	0	0	0	0	*0*	0	5	491	0	0	*496*	0	1	0	3	0	*4*	2	0	325	1	0	*328*	**828**
3:30 PM	0	0	0	0	0	*0*	0	2	453	0	0	*455*	0	1	0	1	0	*2*	0	0	287	1	0	*288*	**745**
3:45 PM	0	0	0	0	0	*0*	0	4	476	0	0	*480*	0	0	0	3	0	*3*	0	0	325	2	0	*327*	**810**
Hourly Total	0	0	0	0	0	*0*	0	13	1886	0	0	*1899*	0	3	0	10	0	*13*	3	0	1232	5	0	*1240*	**3152**

Appendix D - Traffic Counts

01 Hwy 10 and Bowers Dr
Ramsey MN
Tuesday, September 29, 2020

Time	Southbound NA						Westbound Hwy 10						Northbound Bowers Drive						Eastbound Hwy 10						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:00 PM	0	0	0	0	0	*0*	0	3	502	0	0	*505*	0	1	0	3	0	*4*	0	0	331	1	0	*332*	**841**
4:15 PM	0	0	0	0	0	*0*	0	2	537	0	0	*539*	0	1	0	3	0	*4*	0	0	321	2	0	*323*	**866**
4:30 PM	0	0	0	0	0	*0*	0	7	541	0	0	*548*	0	3	0	8	2	*11*	0	0	315	2	0	*317*	**876**
4:45 PM	0	0	0	0	0	*0*	0	4	525	0	0	*529*	0	1	0	3	2	*4*	1	0	385	0	0	*386*	**919**
Hourly Total	0	0	0	0	0	*0*	0	16	2105	0	0	*2121*	0	6	0	17	4	*23*	1	0	1352	5	0	*1358*	**3502**
5:00 PM	0	0	0	0	0	*0*	0	7	464	0	0	*471*	0	1	0	3	0	*4*	0	0	302	0	0	*302*	**777**
5:15 PM	0	0	0	0	0	*0*	1	5	435	0	0	*441*	0	2	0	3	0	*5*	1	0	332	1	0	*334*	**780**
5:30 PM	0	0	0	0	0	*0*	0	3	391	0	0	*394*	0	2	0	1	0	*3*	0	0	329	3	0	*332*	**729**
5:45 PM	0	0	0	0	0	*0*	0	3	327	0	0	*330*	0	0	0	2	3	*2*	2	0	242	3	0	*247*	**579**
Hourly Total	0	0	0	0	0	*0*	1	18	1617	0	0	*1636*	0	5	0	9	3	*14*	3	0	1205	7	0	*1215*	**2865**
6:00 PM	0	0	0	0	0	*0*	0	0	312	0	0	*312*	0	2	0	1	0	*3*	0	0	248	3	0	*251*	**566**
6:15 PM	0	0	0	0	0	*0*	0	6	261	0	0	*267*	0	0	0	3	1	*3*	0	0	295	0	0	*295*	**565**
6:30 PM	0	0	0	0	0	*0*	0	2	264	0	0	*266*	0	1	0	1	0	*2*	1	0	183	0	0	*184*	**452**
6:45 PM	0	0	0	0	0	*0*	0	6	231	0	0	*237*	0	0	0	2	0	*2*	0	0	204	1	0	*205*	**444**
Hourly Total	0	0	0	0	0	*0*	0	14	1068	0	0	*1082*	0	3	0	7	1	*10*	1	0	930	4	0	*935*	**2027**
7:00 PM	0	0	0	0	0	*0*	0	3	231	0	0	*234*	0	1	0	4	3	*5*	0	0	196	1	0	*197*	**436**
7:15 PM	0	0	0	0	0	*0*	0	9	279	0	0	*288*	0	1	0	1	1	*2*	0	0	190	3	0	*193*	**483**
7:30 PM	0	0	0	0	0	*0*	0	2	188	0	0	*190*	0	1	0	0	0	*1*	0	0	145	0	0	*145*	**336**
7:45 PM	0	0	0	0	0	*0*	0	3	181	0	0	*184*	0	0	0	1	0	*1*	0	0	140	4	0	*144*	**329**
Hourly Total	0	0	0	0	0	*0*	0	17	879	0	0	*896*	0	3	0	6	4	*9*	0	0	671	8	0	*679*	**1584**
8:00 PM	0	0	0	0	0	*0*	0	5	172	0	0	*177*	0	1	0	4	0	*5*	0	0	129	2	0	*131*	**313**
8:15 PM	0	0	0	0	0	*0*	0	3	139	0	0	*142*	0	0	0	1	0	*1*	0	0	96	0	0	*96*	**239**
8:30 PM	0	0	0	0	0	*0*	0	3	112	0	0	*115*	0	1	0	0	0	*1*	0	0	104	0	0	*104*	**220**
8:45 PM	0	0	0	0	0	*0*	0	0	123	0	0	*123*	0	1	0	1	0	*2*	0	0	174	1	0	*175*	**300**
Hourly Total	0	0	0	0	0	*0*	0	11	546	0	0	*557*	0	3	0	6	0	*9*	0	0	503	3	0	*506*	**1072**
9:00 PM	0	0	0	0	0	*0*	0	1	93	0	0	*94*	0	0	0	1	0	*1*	0	0	69	0	0	*69*	**164**
9:15 PM	0	0	0	0	0	*0*	0	0	100	0	0	*100*	0	0	0	0	0	*0*	1	0	67	1	0	*69*	**169**
9:30 PM	0	0	0	0	0	*0*	0	2	82	0	0	*84*	0	0	0	0	0	*0*	0	0	55	1	0	*56*	**140**
9:45 PM	0	0	0	0	0	*0*	0	0	63	0	0	*63*	0	0	0	2	0	*2*	0	0	61	0	0	*61*	**126**
Hourly Total	0	0	0	0	0	*0*	0	3	338	0	0	*341*	0	0	0	3	0	*3*	1	0	252	2	0	*255*	**599**
10:00 PM	0	0	0	0	0	*0*	0	1	73	0	0	*74*	0	0	0	0	0	*0*	0	0	62	0	0	*62*	**136**
10:15 PM	0	0	0	0	0	*0*	0	1	60	0	0	*61*	0	0	0	0	0	*0*	0	0	62	0	0	*62*	**123**
10:30 PM	0	0	0	0	0	*0*	0	0	72	0	0	*72*	0	0	0	0	0	*0*	0	0	45	0	0	*45*	**117**
10:45 PM	0	0	0	0	0	*0*	0	0	63	0	0	*63*	0	0	0	0	0	*0*	0	0	40	0	0	*40*	**103**
Hourly Total	0	0	0	0	0	*0*	0	2	268	0	0	*270*	0	0	0	0	0	*0*	0	0	209	0	0	*209*	**479**
11:00 PM	0	0	0	0	0	*0*	0	1	51	0	0	*52*	0	0	0	0	0	*0*	0	0	33	0	0	*33*	**85**
11:15 PM	0	0	0	0	0	*0*	0	0	63	0	0	*63*	0	0	0	0	0	*0*	0	0	36	1	0	*37*	**100**
11:30 PM	0	0	0	0	0	*0*	0	0	41	0	0	*41*	0	0	0	0	0	*0*	0	0	19	0	0	*19*	**60**
11:45 PM	0	0	0	0	0	*0*	0	1	43	0	0	*44*	0	0	0	0	0	*0*	0	0	20	1	0	*21*	**65**
Hourly Total	0	0	0	0	0	*0*	0	2	198	0	0	*200*	0	0	0	0	0	*0*	0	0	108	2	0	*110*	**310**
DAILY TOTAL	**0**	**0**	**0**	**0**	**0**	***0***	**1**	**96**	**8905**	**0**	**0**	***9002***	**0**	**23**	**0**	**58**	**12**	***81***	**9**	**0**	**6462**	**36**	**0**	***6507***	**15590**
Cars	0	0	0	0	0	*0*	1	95	8731	0	0	*8827*	0	23	0	55	3	*78*	8	0	6256	35	0	*6299*	**15204**
Heavy Vehicles	0	0	0	0	0	*0*	0	1	174	0	0	*175*	0	0	0	3	9	*3*	1	0	206	1	0	*208*	**386**
Heavy Vehicle %	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*	0.00%	1.04%	1.95%	0.00%	0.00%	*1.94%*	0.00%	0.00%	0.00%	5.17%	75.00%	*3.70%*	11.11%	0.00%	3.19%	2.78%	0.00%	*3.20%*	**2.48%**

01 Hwy 10 and Bowers Dr
Ramsey MN
Tuesday, September 29, 2020

AM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach 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**
Peak Hour 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**
PHF	0.000	0.000	0.000	0.000	0.000	*0.000*	0.000	0.000	0.000	0.000	0.000	*0.000*	0.000	0.000	0.000	0.000	0.000	*0.000*	0.000	0.000	0.000	0.000	0.000	*0.000*	**0.000**

PM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:00 PM	0	0	0	0	0	*0*	0	3	502	0	0	*505*	0	1	0	3	0	*4*	0	0	331	1	0	*332*	**841**
4:15 PM	0	0	0	0	0	*0*	0	2	537	0	0	*539*	0	1	0	3	0	*4*	0	0	321	2	0	*323*	**866**
4:30 PM	0	0	0	0	0	*0*	0	7	541	0	0	*548*	0	3	0	8	2	*11*	0	0	315	2	0	*317*	**876**
4:45 PM	0	0	0	0	0	*0*	0	4	525	0	0	*529*	0	1	0	3	2	*4*	1	0	385	0	0	*386*	**919**
Peak Hour Total	0	0	0	0	0	*0*	0	16	2105	0	0	*2121*	0	6	0	17	4	*23*	1	0	1352	5	0	*1358*	**3502**
PHF	0.000	0.000	0.000	0.000	0.000	*0.000*	0.000	0.571	0.973	0.000	0.000	*0.968*	0.000	0.500	0.000	0.531	0.500	*0.523*	0.250	0.000	0.878	0.625	0.000	*0.880*	**0.953**

Total Vehicles On Leg					0
Vehicles Entering Intersection	0		Vehicles Exiting Intersection		0
Southbound					
Cars	0	0	0	0	0
Heavy	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**

Total Vehicles on Leg 15444	Vehicles Entering Intersection 6507	Vehicles Exiting Intersection 8937	**Eastbound**	Cars	Heavy	**Total**
				0	0	**0**
				8	1	**9**
				0	0	**0**
				6256	206	**6462**
				35	1	**36**

Daily Volumes

Cars	Heavy	**Total**	**Westbound**	Vehicles Entering Intersection 9002	Total Vehicles on Leg 15523
0	0	**0**			
8731	174	**8905**			
95	1	**96**		Vehicles Exiting Intersection 6521	
1	0	**1**			
0	0	**0**			

Cars	3	0	23	0	55
Heavy	9	0	0	0	3
Total	**12**	**0**	**23**	**0**	**58**
Northbound					
Vehicles Entering Intersection	81		Vehicles Exiting Intersection		132
Total Vehicles On Leg			213		

Appendix D - Traffic Counts

01 Hwy 10 and Bowers Dr
Ramsey MN
Wednesday, September 30, 2020

Time	Southbound NA						Westbound Hwy 10						Northbound Bowers Drive						Eastbound Hwy 10						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
12:00 AM	0	0	0	0	0	*0*	0	0	35	0	0	*35*	0	0	0	0	0	*0*	0	0	17	0	0	*17*	**52**
12:15 AM	0	0	0	0	0	*0*	0	0	25	0	0	*25*	0	0	0	0	0	*0*	0	0	18	0	0	*18*	**43**
12:30 AM	0	0	0	0	0	*0*	0	0	23	0	0	*23*	0	0	0	1	0	*1*	0	0	18	0	0	*18*	**42**
12:45 AM	0	0	0	0	0	*0*	0	0	28	0	0	*28*	0	0	0	0	0	*0*	0	0	12	0	0	*12*	**40**
Hourly Total	0	0	0	0	0	*0*	0	0	111	0	0	*111*	0	0	0	1	0	*1*	0	0	65	0	0	*65*	**177**
1:00 AM	0	0	0	0	0	*0*	0	1	22	0	0	*23*	0	0	0	0	0	*0*	0	0	19	0	0	*19*	**42**
1:15 AM	0	0	0	0	0	*0*	0	1	16	0	0	*17*	0	0	0	0	0	*0*	0	0	20	0	0	*20*	**37**
1:30 AM	0	0	0	0	0	*0*	0	0	27	0	0	*27*	0	0	0	0	0	*0*	0	0	15	0	0	*15*	**42**
1:45 AM	0	0	0	0	0	*0*	0	0	19	0	0	*19*	0	0	0	0	0	*0*	0	0	16	0	0	*16*	**35**
Hourly Total	0	0	0	0	0	*0*	0	2	84	0	0	*86*	0	0	0	0	0	*0*	0	0	70	0	0	*70*	**156**
2:00 AM	0	0	0	0	0	*0*	0	0	13	0	0	*13*	0	0	0	0	0	*0*	0	0	13	0	0	*13*	**26**
2:15 AM	0	0	0	0	0	*0*	0	0	21	0	0	*21*	0	0	0	0	0	*0*	0	0	19	1	0	*20*	**41**
2:30 AM	0	0	0	0	0	*0*	0	1	14	0	0	*15*	0	0	0	0	0	*0*	0	0	19	0	0	*19*	**34**
2:45 AM	0	0	0	0	0	*0*	0	0	10	0	0	*10*	0	0	0	0	0	*0*	0	0	16	0	0	*16*	**26**
Hourly Total	0	0	0	0	0	*0*	0	1	58	0	0	*59*	0	0	0	0	0	*0*	0	0	67	1	0	*68*	**127**
3:00 AM	0	0	0	0	0	*0*	0	0	22	0	0	*22*	0	0	0	0	0	*0*	0	0	21	0	0	*21*	**43**
3:15 AM	0	0	0	0	0	*0*	0	0	16	0	0	*16*	0	0	0	0	0	*0*	0	0	27	0	0	*27*	**43**
3:30 AM	0	0	0	0	0	*0*	0	0	14	0	0	*14*	0	0	0	0	0	*0*	0	0	43	0	0	*43*	**57**
3:45 AM	0	0	0	0	0	*0*	0	0	17	0	0	*17*	0	0	0	0	0	*0*	0	0	39	0	0	*39*	**56**
Hourly Total	0	0	0	0	0	*0*	0	0	69	0	0	*69*	0	0	0	0	0	*0*	0	0	130	0	0	*130*	**199**
4:00 AM	0	0	0	0	0	*0*	0	0	19	0	0	*19*	0	0	0	0	0	*0*	0	0	54	0	0	*54*	**73**
4:15 AM	0	0	0	0	0	*0*	0	0	18	0	0	*18*	0	0	0	1	0	*1*	0	0	99	0	0	*99*	**118**
4:30 AM	0	0	0	0	0	*0*	0	0	47	0	0	*47*	0	0	0	0	0	*0*	0	0	137	0	0	*137*	**184**
4:45 AM	0	0	0	0	0	*0*	0	0	46	0	0	*46*	0	0	0	0	0	*0*	0	0	162	0	0	*162*	**208**
Hourly Total	0	0	0	0	0	*0*	0	0	130	0	0	*130*	0	0	0	1	0	*1*	0	0	452	0	0	*452*	**583**
5:00 AM	0	0	0	0	0	*0*	0	0	50	0	0	*50*	0	0	0	0	0	*0*	0	0	205	0	0	*205*	**255**
5:15 AM	0	0	0	0	0	*0*	0	1	69	0	0	*70*	0	0	0	0	0	*0*	0	0	295	0	0	*295*	**365**
5:30 AM	0	0	0	0	0	*0*	0	0	96	0	0	*96*	0	0	0	2	0	*2*	0	0	384	0	0	*384*	**482**
5:45 AM	0	0	0	0	0	*0*	0	0	113	0	0	*113*	0	0	0	0	0	*0*	0	0	348	0	0	*348*	**461**
Hourly Total	0	0	0	0	0	*0*	0	1	328	0	0	*329*	0	0	0	2	0	*2*	0	0	1232	0	0	*1232*	**1563**
6:00 AM	0	0	0	0	0	*0*	0	0	109	0	0	*109*	0	1	0	2	0	*3*	0	0	475	0	0	*475*	**587**
6:15 AM	0	0	0	0	0	*0*	0	0	161	0	0	*161*	0	0	0	2	0	*2*	0	0	451	1	0	*452*	**615**
6:30 AM	0	0	0	0	0	*0*	0	0	204	0	0	*204*	0	0	0	8	0	*8*	0	0	466	1	0	*467*	**679**
6:45 AM	0	0	0	0	0	*0*	0	0	196	0	0	*196*	0	0	0	2	0	*2*	0	0	423	0	0	*423*	**621**
Hourly Total	0	0	0	0	0	*0*	0	0	670	0	0	*670*	0	1	0	14	0	*15*	0	0	1815	2	0	*1817*	**2502**
7:00 AM	0	0	0	0	0	*0*	0	0	177	0	0	*177*	0	1	0	3	0	*4*	0	0	449	1	0	*450*	**631**
7:15 AM	0	0	0	0	0	*0*	0	1	242	0	0	*243*	0	4	0	2	0	*6*	0	0	410	1	0	*411*	**660**
7:30 AM	0	0	0	0	0	*0*	0	3	249	0	0	*252*	0	1	0	9	0	*10*	0	0	436	0	0	*436*	**698**
7:45 AM	0	0	0	0	0	*0*	0	0	218	0	0	*218*	0	1	0	4	0	*5*	1	0	426	1	0	*428*	**651**
Hourly Total	0	0	0	0	0	*0*	0	4	886	0	0	*890*	0	7	0	18	0	*25*	1	0	1721	3	0	*1725*	**2640**

Appendix D - Traffic Counts

01 Hwy 10 and Bowers Dr
Ramsey MN
Wednesday, September 30, 2020

Time	Southbound NA						Westbound Hwy 10						Northbound Bowers Drive						Eastbound Hwy 10						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
8:00 AM	0	0	0	0	0	*0*	0	2	179	0	0	*181*	0	0	0	4	0	*4*	0	0	273	0	0	*273*	**458**
8:15 AM	0	0	0	0	0	*0*	0	1	191	0	0	*192*	0	1	0	1	0	*2*	0	0	303	0	0	*303*	**497**
8:30 AM	0	0	0	0	0	*0*	0	1	168	0	0	*169*	0	0	0	2	0	*2*	0	0	304	1	0	*305*	**476**
8:45 AM	0	0	0	0	0	*0*	0	2	227	0	0	*229*	0	0	0	4	0	*4*	2	0	236	1	0	*239*	**472**
Hourly Total	0	0	0	0	0	*0*	0	6	765	0	0	*771*	0	1	0	11	0	*12*	2	0	1116	2	0	*1120*	**1903**
9:00 AM	0	0	0	0	0	*0*	0	0	197	0	0	*197*	0	1	0	5	0	*6*	0	0	253	2	0	*255*	**458**
9:15 AM	0	0	0	0	0	*0*	0	1	174	0	0	*175*	0	1	0	2	0	*3*	0	0	253	0	0	*253*	**431**
9:30 AM	0	0	0	0	0	*0*	0	2	231	0	0	*233*	0	0	0	4	0	*4*	0	0	261	0	0	*261*	**498**
9:45 AM	0	0	0	0	0	*0*	1	1	215	0	0	*217*	0	2	0	2	0	*4*	0	0	234	0	0	*234*	**455**
Hourly Total	0	0	0	0	0	*0*	1	4	817	0	0	*822*	0	4	0	13	0	*17*	0	0	1001	2	0	*1003*	**1842**
10:00 AM	0	0	0	0	0	*0*	0	1	204	0	0	*205*	0	0	0	1	1	*1*	1	0	199	0	0	*200*	**406**
10:15 AM	0	0	0	0	0	*0*	1	0	188	0	0	*189*	0	0	0	1	0	*1*	0	0	229	1	0	*230*	**420**
10:30 AM	0	0	0	0	0	*0*	1	3	231	0	0	*235*	0	2	0	6	0	*8*	0	0	237	0	0	*237*	**480**
10:45 AM	0	0	0	0	0	*0*	1	2	228	0	0	*231*	0	1	#REF!	5	0	*#REF!*	0	0	248	1	0	*249*	**#REF!**
Hourly Total	0	0	0	0	0	*0*	3	6	851	0	0	*860*	0	3	#REF!	13	1	*#REF!*	1	0	913	2	0	*916*	**#REF!**
11:00 AM	0	0	0	0	0	*0*	0	3	239	0	0	*242*	0	1	0	7	0	*8*	0	0	210	1	0	*211*	**461**
11:15 AM	0	0	0	0	0	*0*	0	5	237	0	0	*242*	0	1	0	4	0	*5*	0	0	281	1	0	*282*	**529**
11:30 AM	0	0	0	0	0	*0*	0	4	252	0	0	*256*	0	0	0	1	0	*1*	0	0	249	0	0	*249*	**506**
11:45 AM	0	0	0	0	0	*0*	0	2	232	0	0	*234*	0	1	0	3	0	*4*	0	0	257	0	0	*257*	**495**
Hourly Total	0	0	0	0	0	*0*	0	14	960	0	0	*974*	0	3	0	15	0	*18*	0	0	997	2	0	*999*	**1991**
12:00 PM	0	0	0	0	0	*0*	0	1	242	0	0	*243*	0	1	0	2	1	*3*	0	0	239	1	0	*240*	**486**
12:15 PM	0	0	0	0	0	*0*	0	2	248	0	0	*250*	0	2	0	4	1	*6*	0	0	258	1	0	*259*	**515**
12:30 PM	0	0	0	0	0	*0*	0	0	239	0	0	*239*	0	0	0	2	1	*2*	0	0	238	1	0	*239*	**480**
12:45 PM	0	0	0	0	0	*0*	0	3	242	0	0	*245*	0	0	0	1	0	*1*	0	0	244	1	0	*245*	**491**
Hourly Total	0	0	0	0	0	*0*	0	6	971	0	0	*977*	0	3	0	9	3	*12*	0	0	979	4	0	*983*	**1972**
1:00 PM	0	0	0	0	0	*0*	0	2	249	0	0	*251*	0	1	0	0	0	*1*	0	0	275	2	0	*277*	**529**
1:15 PM	0	0	0	0	0	*0*	0	5	299	0	0	*304*	0	2	0	6	0	*8*	0	0	261	1	0	*262*	**574**
1:30 PM	0	0	0	0	0	*0*	1	4	284	0	0	*289*	0	0	0	6	1	*6*	0	0	264	0	0	*264*	**559**
1:45 PM	0	0	0	0	0	*0*	0	4	267	0	0	*271*	0	0	0	2	1	*2*	0	0	240	2	0	*242*	**515**
Hourly Total	0	0	0	0	0	*0*	1	15	1099	0	0	*1115*	0	3	0	14	2	*17*	0	0	1040	5	0	*1045*	**2177**
2:00 PM	0	0	0	0	0	*0*	0	5	322	0	0	*327*	0	4	0	4	0	*8*	0	0	276	2	0	*278*	**613**
2:15 PM	0	0	0	0	0	*0*	0	1	354	0	0	*355*	0	0	0	3	0	*3*	0	0	332	3	0	*335*	**693**
2:30 PM	0	0	0	0	0	*0*	0	3	463	0	0	*466*	0	1	0	0	0	*1*	1	0	303	2	0	*306*	**773**
2:45 PM	0	0	0	0	0	*0*	0	7	404	0	0	*411*	0	1	0	6	0	*7*	0	0	309	3	0	*312*	**730**
Hourly Total	0	0	0	0	0	*0*	0	16	1543	0	0	*1559*	0	6	0	13	0	*19*	1	0	1220	10	0	*1231*	**2809**
3:00 PM	0	0	0	0	0	*0*	0	5	431	0	0	*436*	0	0	0	3	0	*3*	0	0	310	0	0	*310*	**749**
3:15 PM	0	0	0	0	0	*0*	1	5	445	0	0	*451*	0	1	0	3	2	*4*	0	0	318	1	0	*319*	**774**
3:30 PM	0	0	0	0	0	*0*	0	6	490	0	0	*496*	0	3	0	2	0	*5*	0	0	297	1	0	*298*	**799**
3:45 PM	0	0	0	0	0	*0*	0	3	495	0	0	*498*	0	2	0	5	0	*7*	0	0	341	1	0	*342*	**847**
Hourly Total	0	0	0	0	0	*0*	1	19	1861	0	0	*1881*	0	6	0	13	2	*19*	0	0	1266	3	0	*1269*	**3169**

01 Hwy 10 and Bowers Dr
Ramsey MN
Wednesday, September 30, 2020

Time	Southbound NA						Westbound Hwy 10						Northbound Bowers Drive						Eastbound Hwy 10						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:00 PM	0	0	0	0	0	*0*	1	4	455	0	0	*460*	0	0	0	4	0	*4*	0	0	320	3	0	*323*	**787**
4:15 PM	0	0	0	0	0	*0*	0	6	445	0	0	*451*	0	1	0	2	0	*3*	0	0	334	3	0	*337*	**791**
4:30 PM	0	0	0	0	0	*0*	0	2	572	0	0	*574*	0	3	0	7	0	*10*	1	0	356	2	0	*359*	**943**
4:45 PM	0	0	0	0	0	*0*	0	4	524	0	0	*528*	0	1	0	3	0	*4*	0	0	372	1	0	*373*	**905**
Hourly Total	0	0	0	0	0	*0*	1	16	1996	0	0	*2013*	0	5	0	16	0	*21*	1	0	1382	9	0	*1392*	**3426**
5:00 PM	0	0	0	0	0	*0*	0	4	466	0	0	*470*	0	3	0	4	0	*7*	0	0	291	1	0	*292*	**769**
5:15 PM	0	0	0	0	0	*0*	0	5	440	0	0	*445*	0	1	0	3	0	*4*	0	0	315	1	0	*316*	**765**
5:30 PM	0	0	0	0	0	*0*	0	7	405	0	0	*412*	0	0	0	0	0	*0*	0	0	323	1	0	*324*	**736**
5:45 PM	0	0	0	0	0	*0*	0	4	378	0	0	*382*	0	1	0	4	1	*5*	0	0	297	1	0	*298*	**685**
Hourly Total	0	0	0	0	0	*0*	0	20	1689	0	0	*1709*	0	5	0	11	1	*16*	0	0	1226	4	0	*1230*	**2955**
6:00 PM	0	0	0	0	0	*0*	0	7	331	0	0	*338*	0	0	0	4	1	*4*	0	0	225	3	0	*228*	**570**
6:15 PM	0	0	0	0	0	*0*	0	3	340	0	0	*343*	0	1	0	4	0	*5*	0	0	251	1	0	*252*	**600**
6:30 PM	0	0	0	0	0	*0*	0	7	303	0	0	*310*	0	1	0	2	0	*3*	0	0	199	1	0	*200*	**513**
6:45 PM	0	0	0	0	0	*0*	0	3	204	0	0	*207*	0	0	0	3	0	*3*	0	0	212	2	0	*214*	**424**
Hourly Total	0	0	0	0	0	*0*	0	20	1178	0	0	*1198*	0	2	0	13	1	*15*	0	0	887	7	0	*894*	**2107**
7:00 PM	0	0	0	0	0	*0*	0	4	248	0	0	*252*	0	0	0	4	0	*4*	2	0	171	2	0	*175*	**431**
7:15 PM	0	0	0	0	0	*0*	0	1	200	0	0	*201*	0	2	0	3	0	*5*	1	0	171	2	0	*174*	**380**
7:30 PM	0	0	0	0	0	*0*	0	6	187	0	0	*193*	0	1	0	2	0	*3*	0	0	139	0	0	*139*	**335**
7:45 PM	0	0	0	0	0	*0*	0	5	190	0	0	*195*	0	0	0	0	0	*0*	0	0	148	2	0	*150*	**345**
Hourly Total	0	0	0	0	0	*0*	0	16	825	0	0	*841*	0	3	0	9	0	*12*	3	0	629	6	0	*638*	**1491**
8:00 PM	0	0	0	0	0	*0*	0	7	146	0	0	*153*	0	1	0	0	0	*1*	0	0	127	1	0	*128*	**282**
8:15 PM	0	0	0	0	0	*0*	0	3	127	0	0	*130*	0	1	0	1	0	*2*	0	0	130	1	0	*131*	**263**
8:30 PM	0	0	0	0	0	*0*	0	2	123	0	0	*125*	0	0	0	0	0	*0*	0	0	97	1	0	*98*	**223**
8:45 PM	0	0	0	0	0	*0*	0	2	128	0	0	*130*	0	1	0	1	0	*2*	1	0	108	1	0	*110*	**242**
Hourly Total	0	0	0	0	0	*0*	0	14	524	0	0	*538*	0	3	0	2	0	*5*	1	0	462	4	0	*467*	**1010**
9:00 PM	0	0	0	0	0	*0*	0	4	114	0	0	*118*	0	0	0	0	0	*0*	0	0	79	0	0	*79*	**197**
9:15 PM	0	0	0	0	0	*0*	0	1	103	0	0	*104*	0	0	0	0	0	*0*	0	0	71	0	0	*71*	**175**
9:30 PM	0	0	0	0	0	*0*	0	2	111	0	0	*113*	0	0	0	2	0	*2*	0	0	81	0	0	*81*	**196**
9:45 PM	0	0	0	0	0	*0*	0	1	90	0	0	*91*	0	0	0	1	0	*1*	0	0	60	0	0	*60*	**152**
Hourly Total	0	0	0	0	0	*0*	0	8	418	0	0	*426*	0	0	0	3	0	*3*	0	0	291	0	0	*291*	**720**
10:00 PM	0	0	0	0	0	*0*	0	2	58	0	0	*60*	0	0	0	1	0	*1*	0	0	69	0	0	*69*	**130**
10:15 PM	0	0	0	0	0	*0*	0	1	71	0	0	*72*	0	0	0	1	0	*1*	0	0	50	0	0	*50*	**123**
10:30 PM	0	0	0	0	0	*0*	0	0	62	0	0	*62*	0	0	0	1	0	*1*	0	0	43	1	0	*44*	**107**
10:45 PM	0	0	0	0	0	*0*	0	0	46	0	0	*46*	0	0	0	3	0	*3*	0	0	45	0	0	*45*	**94**
Hourly Total	0	0	0	0	0	*0*	0	3	237	0	0	*240*	0	0	0	6	0	*6*	0	0	207	1	0	*208*	**454**
11:00 PM	0	0	0	0	0	*0*	0	0	45	0	0	*45*	0	0	0	0	0	*0*	0	0	27	0	0	*27*	**72**
11:15 PM	0	0	0	0	0	*0*	0	1	58	0	0	*59*	0	0	0	0	0	*0*	0	0	38	1	0	*39*	**98**
11:30 PM	0	0	0	0	0	*0*	0	0	60	0	0	*60*	0	0	0	0	0	*0*	0	0	34	0	0	*34*	**94**
11:45 PM	0	0	0	0	0	*0*	0	0	48	0	0	*48*	0	0	0	1	0	*1*	0	0	23	0	0	*23*	**72**
Hourly Total	0	0	0	0	0	*0*	0	1	211	0	0	*212*	0	0	0	1	0	*1*	0	0	122	1	0	*123*	**336**
DAILY TOTAL	**0**	**0**	**0**	**0**	**0**	***0***	**7**	**192**	**18281**	**0**	**0**	***18480***	**0**	**55**	**#REF!**	**198**	**10**	***#REF!***	**10**	**0**	**19290**	**68**	**0**	***19368***	**#REF!**
Cars	0	0	0	0	0	*0*	7	189	17624	0	0	*17820*	0	55	0	192	4	*247*	10	0	18461	63	0	*18534*	**36601**
Heavy Vehicles	0	0	0	0	0	*0*	0	3	657	0	0	*660*	0	0	0	6	6	*6*	0	0	829	5	0	*834*	**1500**
Heavy Vehicle %	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*	0.00%	1.56%	3.59%	0.00%	0.00%	*3.57%*	0.00%	0.00%	#REF!	3.03%	60.00%	*#REF!*	0.00%	0.00%	4.30%	7.35%	0.00%	*4.31%*	**#REF!**

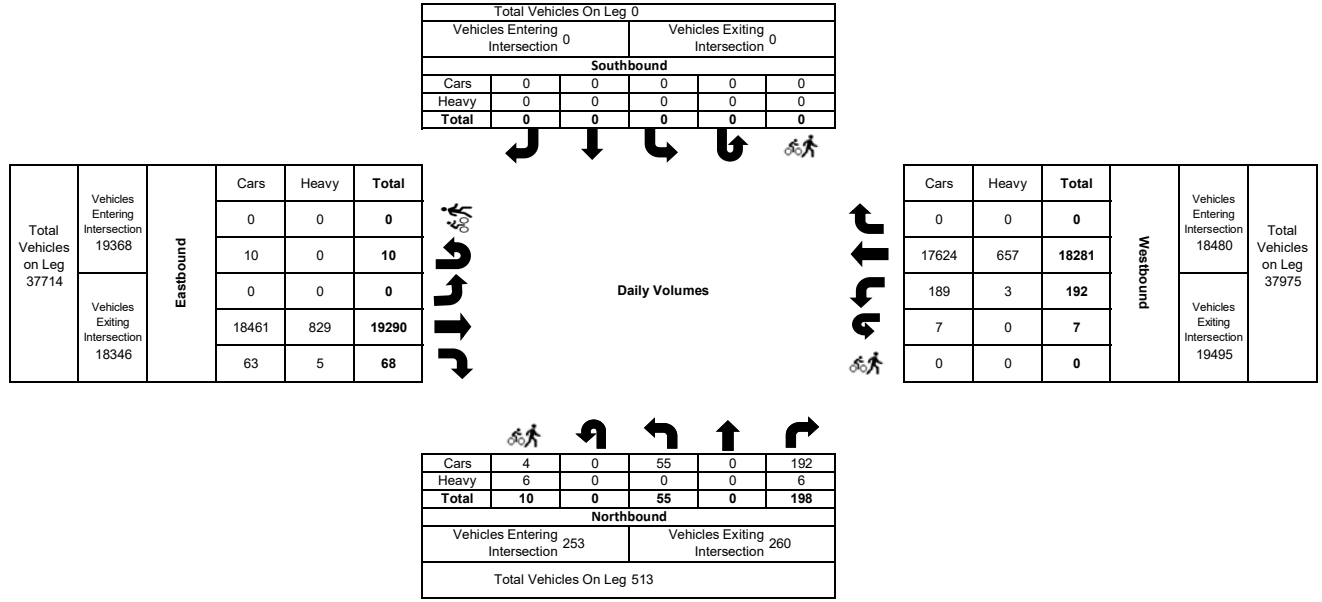
01 Hwy 10 and Bowers Dr
Ramsey MN
Wednesday, September 30, 2020

AM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	**#REF!**
#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	**#REF!**
#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	**#REF!**
#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	**#REF!**
Peak Hour Total	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	**#REF!**
PHF	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	#REF!	#REF!	#REF!	#REF!	#REF!	*#REF!*	**#REF!**

PM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:00 PM	0	0	0	0	0	*0*	1	4	455	0	0	*460*	0	0	0	4	0	*4*	0	0	320	3	0	*323*	**787**
4:15 PM	0	0	0	0	0	*0*	0	6	445	0	0	*451*	0	1	0	2	0	*3*	0	0	334	3	0	*337*	**791**
4:30 PM	0	0	0	0	0	*0*	0	2	572	0	0	*574*	0	3	0	7	0	*10*	1	0	356	2	0	*359*	**943**
4:45 PM	0	0	0	0	0	*0*	0	4	524	0	0	*528*	0	1	0	3	0	*4*	0	0	372	1	0	*373*	**905**
Peak Hour Total	0	0	0	0	0	*0*	1	16	1996	0	0	*2013*	0	5	0	16	0	*21*	1	0	1382	9	0	*1392*	**3426**
PHF	0.000	0.000	0.000	0.000	0.000	*0.000*	0.250	0.667	0.872	0.000	0.000	*0.877*	0.000	0.417	0.000	0.571	0.000	*0.525*	0.250	0.000	0.929	0.750	0.000	*0.933*	**0.908**



02 Riverdale Dr and Llama St
Ramsey MN
Tuesday, September 29, 2020

Time	Southbound Llama St						Westbound Riverdale Dr						Northbound Llama St						Eastbound NA						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach 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**
Hourly 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**
1:00 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**
1:15 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**
1:30 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**
1:45 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**
Hourly 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**
2:00 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**
2:15 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**
2:30 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**
2:45 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**
Hourly 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**
3:00 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**
3:15 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**
3:30 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**
3:45 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**
Hourly 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**
4:00 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**
4:15 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**
4:30 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**
4:45 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**
Hourly 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**
5:00 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**
5:15 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**
5:30 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**
5:45 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**
Hourly 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**
6:00 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**
6:15 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**
6:30 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**
6:45 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**
Hourly 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**
7:00 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**
7:15 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**
7:30 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**
7:45 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**
Hourly 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 Riverdale Dr and Llama St
Ramsey MN
Tuesday, September 29, 2020

Time	Southbound Llama St						Westbound Riverdale Dr						Northbound Llama St						Eastbound NA						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
8:00 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**
8:15 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**
8:30 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**
8:45 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**
Hourly 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**
9:00 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**
9:15 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**
9:30 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**
9:45 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**
Hourly 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**
Hourly 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**
Hourly 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**
Hourly 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**
1:00 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**
1:15 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**
1:30 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**
1:45 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**
Hourly 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**
2:00 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**
2:15 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**
2:30 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**
2:45 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**
Hourly 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**
3:00 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**
3:15 PM	0	1	0	0	0	*1*	1	0	0	2	0	*3*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**4**
3:30 PM	0	1	0	0	0	*1*	0	0	0	1	0	*1*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**3**
3:45 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**
Hourly Total	0	3	0	0	0	*3*	1	0	0	3	0	*4*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**8**

02 Riverdale Dr and Llama St
Ramsey MN
Tuesday, September 29, 2020

Time	Southbound Llama St						Westbound Riverdale Dr						Northbound Llama St						Eastbound NA						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:00 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**
4:15 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**
4:30 PM	0	1	0	0	0	*1*	0	0	0	5	0	*5*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**6**
4:45 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**
Hourly Total	0	4	0	0	0	*4*	0	0	0	6	0	*6*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**10**
5:00 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**
5:15 PM	0	0	0	0	0	*0*	0	1	0	0	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**1**
5:30 PM	0	0	0	0	0	*0*	0	1	0	0	0	*1*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	**3**
5:45 PM	0	0	0	0	0	*0*	1	1	0	0	0	*2*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**2**
Hourly Total	0	1	0	0	0	*1*	1	3	0	1	0	*5*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	**8**
6:00 PM	0	2	0	0	0	*2*	0	0	0	0	1	*0*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**3**
6:15 PM	0	0	0	0	0	*0*	0	1	0	0	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**1**
6:30 PM	0	1	0	0	0	*1*	0	0	0	1	0	*1*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**3**
6:45 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**
Hourly Total	0	3	0	0	0	*3*	0	1	0	1	1	*2*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	**7**
7:00 PM	0	0	0	0	0	*0*	0	0	0	0	1	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
7:15 PM	0	0	0	0	0	*0*	0	1	0	0	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**1**
7:30 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**1**
7:45 PM	0	0	0	0	0	*0*	0	1	0	0	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**1**
Hourly Total	0	0	0	0	0	*0*	0	2	0	0	1	*2*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**3**
8:00 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**
8:15 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**
8:30 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**
8:45 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**
Hourly 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**
9:00 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**
9:15 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**
9:30 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**
9:45 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**
Hourly 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**
Hourly 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**
Hourly 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**
DAILY TOTAL	**0**	**11**	**0**	**0**	**0**	***11***	**2**	**6**	**0**	**11**	**2**	***19***	**0**	**0**	**0**	**6**	**0**	***6***	**0**	**0**	**0**	**0**	**0**	***0***	**36**
Cars	0	11	0	0	0	*11*	2	5	0	10	2	*17*	0	0	0	4	0	*4*	0	0	0	0	0	*0*	**32**
Heavy Vehicles	0	0	0	0	0	*0*	0	1	0	1	0	*2*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	**4**
Heavy Vehicle %	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*	0.00%	16.67%	0.00%	9.09%	0.00%	*10.53%*	0.00%	0.00%	0.00%	33.33%	0.00%	*33.33%*	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*	**11.11%**

02 Riverdale Dr and Llama St
Ramsey MN
Tuesday, September 29, 2020

AM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach 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**
Peak Hour 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**
PHF	0.000	0.000	0.000	0.000	0.000	*0.000*	0.000	0.000	0.000	0.000	0.000	*0.000*	0.000	0.000	0.000	0.000	0.000	*0.000*	0.000	0.000	0.000	0.000	0.000	*0.000*	**0.000**

PM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:15 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**
4:30 PM	0	1	0	0	0	*1*	0	0	0	5	0	*5*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**6**
4:45 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**
5:00 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**
Peak Hour Total	0	5	0	0	0	*5*	0	0	0	7	0	*7*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**12**
PHF	0.000	0.625	0.000	0.000	0.000	*0.625*	0.000	0.000	0.000	0.350	0.000	*0.350*	0.000	0.000	0.000	0.000	0.000	*0.000*	0.000	0.000	0.000	0.000	0.000	*0.000*	**0.500**

Total Vehicles On Leg			22		
Vehicles Entering Intersection	11		Vehicles Exiting Intersection	11	
Southbound					
Cars	0	0	11	0	0
Heavy	0	0	0	0	0
Total	**0**	**0**	**11**	**0**	**0**

Total Vehicles on Leg 0	Vehicles Entering Intersection 0	**Eastbound**	Cars	Heavy	**Total**
			0	0	**0**
			0	0	**0**
	Vehicles Exiting Intersection 0		0	0	**0**
			0	0	**0**
			0	0	**0**

Daily Volumes

Cars	Heavy	**Total**	**Westbound**	Vehicles Entering Intersection 19	Total Vehicles on Leg 38
10	1	**11**			
0	0	**0**			
5	1	**6**		Vehicles Exiting Intersection 19	
2	0	**2**			
2	0	**2**			

Cars	0	0	0	0	4
Heavy	0	0	0	0	2
Total	**0**	**0**	**0**	**0**	**6**
Northbound					
Vehicles Entering Intersection	6		Vehicles Exiting Intersection	6	
Total Vehicles On Leg			12		

02 Riverdale Dr and Llama St
Ramsey MN
Wednesday, September 30, 2020

Time	Southbound Llama St						Westbound Riverdale Dr						Northbound Llama St						Eastbound NA						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach 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**
Hourly 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**
1:00 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**
1:15 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**
1:30 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**
1:45 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**
Hourly 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**
2:00 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**
2:15 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**
2:30 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**
2:45 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**
Hourly 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**
3:00 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**
3:15 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**
3:30 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**
3:45 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**
Hourly 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**
4:00 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**
4:15 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**
4:30 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**
4:45 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**
Hourly 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**
5:00 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**
5:15 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**
5:30 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**
5:45 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**
Hourly 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**
6:00 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**
6:15 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**
6:30 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**1**
6:45 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**1**
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	**2**
7:00 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**
7:15 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**
7:30 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**
7:45 AM	0	0	0	0	0	*0*	0	5	0	0	0	*5*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**5**
Hourly Total	0	0	0	0	0	*0*	0	5	0	0	0	*5*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**5**

02 Riverdale Dr and Llama St
Ramsey MN
Wednesday, September 30, 2020

Time	Southbound Llama St						Westbound Riverdale Dr						Northbound Llama St						Eastbound NA						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
8:00 AM	0	0	0	0	0	*0*	0	1	0	0	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**1**
8:15 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**
8:30 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**
8:45 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**
Hourly Total	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**
9:00 AM	0	2	0	0	0	*2*	1	0	0	1	0	*2*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**4**
9:15 AM	0	0	0	0	0	*0*	0	1	0	0	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**1**
9:30 AM	0	1	0	0	0	*1*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**3**
9:45 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**
Hourly Total	0	3	0	0	0	*3*	1	1	0	3	0	*5*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**8**
10:00 AM	0	0	0	0	1	*0*	0	1	0	0	0	*1*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	**3**
10:15 AM	0	0	0	0	0	*0*	0	1	0	1	0	*2*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**3**
10:30 AM	0	0	0	0	0	*0*	0	1	0	0	0	*1*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**2**
10:45 AM	0	0	0	0	0	*0*	1	1	0	0	0	*2*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**3**
Hourly Total	0	0	0	0	1	*0*	1	4	0	1	0	*6*	0	0	0	5	0	*5*	0	0	0	0	0	*0*	**11**
11:00 AM	0	1	0	0	0	*1*	1	0	0	1	0	*2*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**3**
11:15 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**
11:30 AM	0	0	0	0	0	*0*	0	1	0	2	0	*3*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**3**
11:45 AM	0	1	0	0	0	*1*	0	1	0	1	1	*2*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**4**
Hourly Total	0	3	0	0	0	*3*	1	2	0	5	1	*8*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**12**
12:00 PM	0	0	0	0	0	*0*	0	1	0	1	0	*2*	0	0	0	3	0	*3*	0	0	0	0	0	*0*	**5**
12:15 PM	0	1	0	0	0	*1*	2	1	0	2	0	*5*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**6**
12:30 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**
12:45 PM	0	0	0	0	0	*0*	0	2	0	0	0	*2*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	**4**
Hourly Total	0	2	0	0	0	*2*	2	4	0	3	0	*9*	0	0	0	5	0	*5*	0	0	0	0	0	*0*	**16**
1:00 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**
1:15 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**
1:30 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**
1:45 PM	0	1	0	0	0	*1*	1	1	0	0	0	*2*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**3**
Hourly Total	0	3	0	0	0	*3*	1	1	0	2	0	*4*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**7**
2:00 PM	0	1	0	0	0	*1*	0	0	0	1	0	*1*	0	0	0	4	0	*4*	0	0	0	0	0	*0*	**6**
2:15 PM	0	1	0	0	0	*1*	0	0	0	1	0	*1*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	**4**
2:30 PM	0	1	0	0	0	*1*	0	0	0	0	0	*0*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**2**
2:45 PM	0	2	0	0	0	*2*	0	1	0	1	0	*2*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	**6**
Hourly Total	0	5	0	0	0	*5*	0	1	0	3	0	*4*	0	0	0	9	0	*9*	0	0	0	0	0	*0*	**18**
3:00 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**
3:15 PM	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**
3:30 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**
3:45 PM	0	3	0	0	0	*3*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**5**
Hourly Total	0	6	0	0	0	*6*	1	0	0	5	0	*6*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**12**

02 Riverdale Dr and Llama St
Ramsey MN
Wednesday, September 30, 2020

Time	Southbound Llama St						Westbound Riverdale Dr						Northbound Llama St						Eastbound NA						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:00 PM	0	0	0	0	0	*0*	1	0	0	1	0	*2*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**2**
4:15 PM	0	1	0	0	0	*1*	0	1	0	0	0	*1*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**3**
4:30 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**
4:45 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**
Hourly Total	0	2	0	0	0	*2*	1	1	0	2	0	*4*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**7**
5:00 PM	0	0	0	0	0	*0*	0	2	0	0	0	*2*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**2**
5:15 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**1**
5:30 PM	0	1	0	0	0	*1*	0	0	0	0	0	*0*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**2**
5:45 PM	0	1	0	0	1	*1*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**2**
Hourly Total	0	2	0	0	1	*2*	0	2	0	1	0	*3*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	**7**
6:00 PM	0	0	0	0	0	*0*	0	0	0	0	1	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
6:15 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**
6:30 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**
6:45 PM	0	1	0	0	0	*1*	1	0	0	0	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**2**
Hourly Total	0	1	0	0	0	*1*	1	0	0	0	1	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**2**
7:00 PM	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**
7:15 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**
7:30 PM	0	0	0	0	0	*0*	0	1	0	0	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**1**
7:45 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**
Hourly Total	0	0	0	0	0	*0*	1	1	0	0	0	*2*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**2**
8:00 PM	0	0	0	0	0	*0*	0	1	0	0	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**1**
8:15 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**1**
8:30 PM	0	0	0	0	0	*0*	0	1	0	0	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**1**
8:45 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**
Hourly Total	0	0	0	0	0	*0*	0	2	0	0	0	*2*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**3**
9:00 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**
9:15 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**
9:30 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**
9:45 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**
Hourly 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	1	0	0	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**1**
Hourly Total	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**
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	1	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**1**
Hourly Total	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**
DAILY TOTAL	**0**	**28**	**0**	**0**	**2**	***28***	**10**	**25**	**0**	**27**	**2**	***62***	**0**	**0**	**0**	**26**	**0**	***26***	**0**	**0**	**0**	**0**	**0**	***0***	**116**
Cars	0	28	0	0	2	*28*	8	23	0	26	2	*57*	0	0	0	24	0	*24*	0	0	0	0	0	*0*	**109**
Heavy Vehicles	0	0	0	0	0	*0*	2	2	0	1	0	*5*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	**7**
Heavy Vehicle %	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*	20.00%	8.00%	0.00%	3.70%	0.00%	*8.06%*	0.00%	0.00%	0.00%	7.69%	0.00%	*7.69%*	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*	**6.03%**

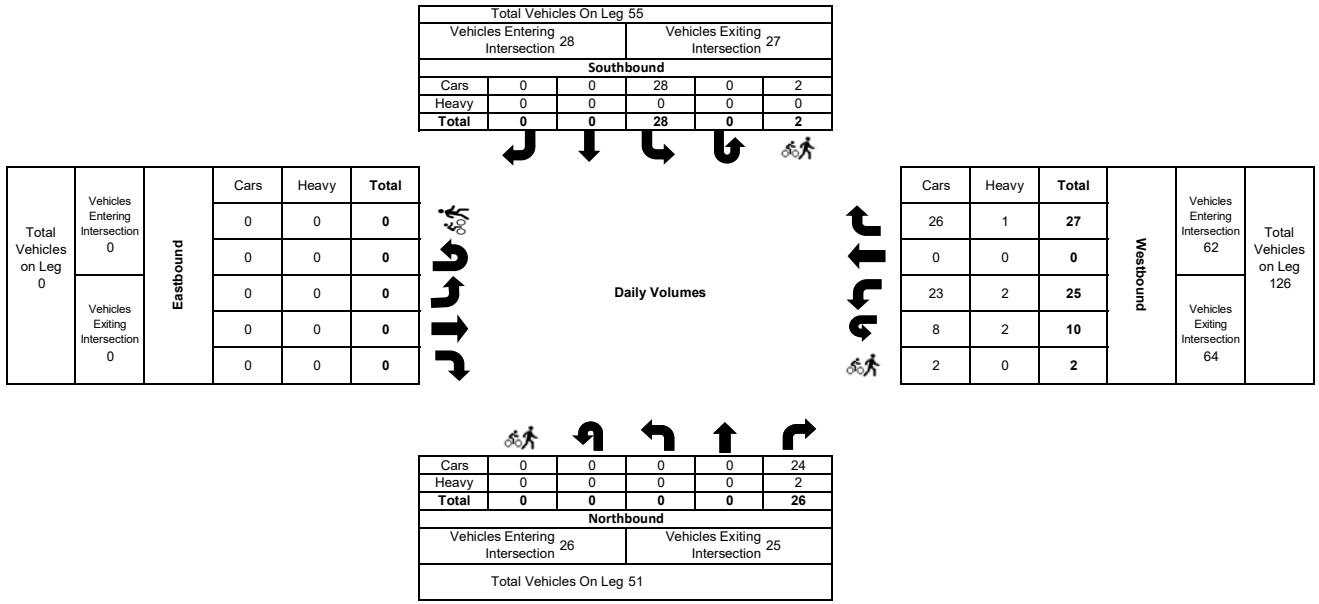
02 Riverdale Dr and Llama St
Ramsey MN
Wednesday, September 30, 2020

AM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
11:00 AM	0	1	0	0	0	*1*	1	0	0	1	0	*2*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**3**
11:15 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**
11:30 AM	0	0	0	0	0	*0*	0	1	0	2	0	*3*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**3**
11:45 AM	0	1	0	0	0	*1*	0	1	0	1	1	*2*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**4**
Peak Hour Total	0	3	0	0	0	*3*	1	2	0	5	1	*8*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**12**
PHF	0.000	0.750	0.000	0.000	0.000	*0.750*	0.250	0.500	0.000	0.625	0.250	*0.667*	0.000	0.000	0.000	0.250	0.000	*0.250*	0.000	0.000	0.000	0.000	0.000	*0.000*	**0.750**

PM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
2:00 PM	0	1	0	0	0	*1*	0	0	0	1	0	*1*	0	0	0	4	0	*4*	0	0	0	0	0	*0*	**6**
2:15 PM	0	1	0	0	0	*1*	0	0	0	1	0	*1*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	**4**
2:30 PM	0	1	0	0	0	*1*	0	0	0	0	0	*0*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	**2**
2:45 PM	0	2	0	0	0	*2*	0	1	0	1	0	*2*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	**6**
Peak Hour Total	0	5	0	0	0	*5*	0	1	0	3	0	*4*	0	0	0	9	0	*9*	0	0	0	0	0	*0*	**18**
PHF	0.000	0.625	0.000	0.000	0.000	*0.625*	0.000	0.250	0.000	0.750	0.000	*0.500*	0.000	0.000	0.000	0.563	0.000	*0.563*	0.000	0.000	0.000	0.000	0.000	*0.000*	**0.750**



Appendix D - Traffic Counts

Riverdale Dr and Southern Ramps
Ramsey MN
Wednesday, October 21, 2020

Time	Southbound Armstorng Blvd						Westbound Riverdale Drive						Northbound Riverdale Dr						Eastbound HWY 10 S Ramp						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
12:00 AM	0	0	0	3	0	*3*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	1	0	0	0	*1*	**5**
12:15 AM	0	0	0	1	0	*1*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	0	2	1	0	0	*3*	**6**
12:30 AM	0	0	0	2	0	*2*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	1	1	0	0	*2*	**5**
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**
Hourly Total	0	0	0	6	0	*6*	0	0	0	4	0	*4*	0	0	0	0	0	*0*	0	4	2	0	0	*6*	**16**
1:00 AM	0	0	0	3	0	*3*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	2	0	0	0	*2*	**5**
1:15 AM	0	0	0	4	0	*4*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	2	0	0	0	*2*	**6**
1:30 AM	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	1	0	0	0	*1*	**2**
1:45 AM	0	1	0	3	0	*4*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**4**
Hourly Total	0	1	0	11	0	*12*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	5	0	0	0	*5*	**17**
2:00 AM	0	0	0	3	0	*3*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	1	1	0	0	*2*	**5**
2:15 AM	0	0	0	0	0	*0*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	0	0	1	0	0	*1*	**3**
2:30 AM	0	0	0	3	0	*3*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	4	0	0	0	*4*	**7**
2:45 AM	1	0	0	5	0	*6*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	1	0	0	0	*1*	**7**
Hourly Total	1	0	0	11	0	*12*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	0	6	2	0	0	*8*	**22**
3:00 AM	0	0	0	3	0	*3*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**4**
3:15 AM	0	0	0	8	0	*8*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	1	0	0	0	*1*	**9**
3:30 AM	0	0	0	7	0	*7*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	3	1	0	0	*4*	**12**
3:45 AM	0	0	0	6	0	*6*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**6**
Hourly Total	0	0	0	24	0	*24*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	0	4	1	0	0	*5*	**31**
4:00 AM	0	0	0	15	0	*15*	0	1	0	0	0	*1*	0	0	0	0	0	*0*	0	1	0	0	0	*1*	**17**
4:15 AM	0	1	1	20	0	*22*	0	0	0	0	0	*0*	0	0	1	1	0	*2*	0	2	0	0	0	*2*	**26**
4:30 AM	0	0	1	15	0	*16*	0	0	0	2	0	*2*	0	0	1	0	0	*1*	0	7	0	0	0	*7*	**26**
4:45 AM	0	1	0	21	0	*22*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	0	9	0	0	0	*9*	**33**
Hourly Total	0	2	2	71	0	*75*	0	1	0	4	0	*5*	0	0	2	1	0	*3*	0	19	0	0	0	*19*	**102**
5:00 AM	0	0	0	30	0	*30*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	8	1	0	0	*9*	**39**
5:15 AM	0	0	1	35	0	*36*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	17	0	0	0	*17*	**53**
5:30 AM	0	1	0	58	0	*59*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	28	0	0	0	*28*	**88**
5:45 AM	0	1	0	37	0	*38*	0	1	1	3	0	*5*	0	0	0	0	0	*0*	0	38	0	0	0	*38*	**81**
Hourly Total	0	2	1	160	0	*163*	0	1	1	4	0	*6*	0	0	0	0	0	*0*	0	91	1	0	0	*92*	**261**
6:00 AM	0	3	1	45	0	*49*	0	0	1	1	0	*2*	0	0	0	1	0	*1*	0	20	0	0	0	*20*	**72**
6:15 AM	0	1	2	55	0	*58*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	28	0	0	0	*28*	**86**
6:30 AM	0	4	0	63	0	*67*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	31	2	1	0	*34*	**101**
6:45 AM	0	2	7	60	0	*69*	0	1	1	1	0	*3*	0	0	1	0	0	*1*	0	49	2	7	0	*58*	**131**
Hourly Total	0	10	10	223	0	*243*	0	1	2	2	0	*5*	0	0	1	1	0	*2*	0	128	4	8	0	*140*	**390**
7:00 AM	0	2	3	60	0	*65*	0	0	1	2	0	*3*	0	1	2	0	0	*3*	0	34	2	1	0	*37*	**108**
7:15 AM	0	5	0	60	0	*65*	0	0	1	5	0	*6*	0	0	0	0	0	*0*	0	47	0	2	0	*49*	**120**
7:30 AM	0	9	2	54	0	*65*	0	1	1	0	0	*2*	0	0	0	0	0	*0*	0	53	2	0	0	*55*	**122**
7:45 AM	0	5	6	36	0	*47*	0	0	1	3	0	*4*	0	0	1	0	0	*1*	0	48	6	1	0	*55*	**107**
Hourly Total	0	21	11	210	0	*242*	0	1	4	10	0	*15*	0	1	3	0	0	*4*	0	182	10	4	0	*196*	**457**

Riverdale Dr and Southern Ramps
Ramsey MN
Wednesday, October 21, 2020

Time	Southbound Armstorng Blvd						Westbound Riverdale Drive						Northbound Riverdale Dr						Eastbound HWY 10 S Ramp						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
8:00 AM	0	6	1	60	0	*67*	0	0	1	5	0	*6*	0	1	0	0	0	*1*	0	22	4	0	0	*26*	**100**
8:15 AM	0	4	1	43	0	*48*	0	0	1	5	0	*6*	0	1	1	0	0	*2*	0	27	2	0	0	*29*	**85**
8:30 AM	0	3	3	34	0	*40*	0	0	1	2	0	*3*	0	1	0	0	0	*1*	0	18	2	3	0	*23*	**67**
8:45 AM	0	5	0	43	0	*48*	0	0	0	2	0	*2*	0	0	0	2	0	*2*	0	19	1	1	0	*21*	**73**
Hourly Total	0	18	5	180	0	*203*	0	0	3	14	0	*17*	0	3	1	2	0	*6*	0	86	9	4	0	*99*	**325**
9:00 AM	0	3	1	41	0	*45*	0	1	0	10	0	*11*	0	0	3	0	0	*3*	0	8	3	0	0	*11*	**70**
9:15 AM	0	7	2	30	0	*39*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	0	18	2	1	0	*21*	**62**
9:30 AM	0	5	2	43	0	*50*	0	0	2	3	0	*5*	0	0	1	1	0	*2*	0	20	4	0	0	*24*	**81**
9:45 AM	0	4	1	28	0	*33*	0	0	2	3	0	*5*	0	2	1	0	0	*3*	0	18	2	1	0	*21*	**62**
Hourly Total	0	19	6	142	0	*167*	0	1	4	18	0	*23*	0	2	5	1	0	*8*	0	64	11	2	0	*77*	**275**
10:00 AM	0	9	1	33	0	*43*	0	1	3	4	0	*8*	0	0	2	0	0	*2*	0	13	3	1	0	*17*	**70**
10:15 AM	0	5	2	30	0	*37*	0	1	1	3	0	*5*	0	0	2	2	0	*4*	0	14	1	1	0	*16*	**62**
10:30 AM	0	5	5	37	0	*47*	0	1	2	5	0	*8*	0	2	5	0	0	*7*	0	20	0	2	0	*22*	**84**
10:45 AM	0	9	3	23	0	*35*	0	0	0	8	0	*8*	0	2	0	2	0	*4*	0	15	0	3	0	*18*	**65**
Hourly Total	0	28	11	123	0	*162*	0	3	6	20	0	*29*	0	4	9	4	0	*17*	0	62	4	7	0	*73*	**281**
11:00 AM	0	9	1	40	0	*50*	0	0	2	3	0	*5*	0	0	3	1	0	*4*	0	16	1	2	0	*19*	**78**
11:15 AM	1	5	0	37	0	*43*	0	0	2	4	0	*6*	0	1	2	0	0	*3*	0	24	3	2	0	*29*	**81**
11:30 AM	0	5	2	41	0	*48*	0	0	0	6	0	*6*	0	1	2	0	0	*3*	0	21	0	1	0	*22*	**79**
11:45 AM	0	5	6	26	0	*37*	0	0	1	10	0	*11*	0	1	2	1	0	*4*	0	23	1	0	0	*24*	**76**
Hourly Total	1	24	9	144	0	*178*	0	0	5	23	0	*28*	0	3	9	2	0	*14*	0	84	5	5	0	*94*	**314**
12:00 PM	1	12	6	30	0	*49*	0	1	1	7	0	*9*	0	4	3	2	0	*9*	0	13	0	2	0	*15*	**82**
12:15 PM	0	7	7	32	0	*46*	0	1	1	8	0	*10*	0	0	6	1	0	*7*	0	29	4	1	0	*34*	**97**
12:30 PM	0	4	2	49	0	*55*	0	0	6	4	0	*10*	0	0	2	0	0	*2*	0	23	1	2	0	*26*	**93**
12:45 PM	0	5	2	31	0	*38*	0	0	1	7	0	*8*	0	2	6	1	0	*9*	0	19	3	2	0	*24*	**79**
Hourly Total	1	28	17	142	0	*188*	0	2	9	26	0	*37*	0	6	17	4	0	*27*	0	84	8	7	0	*99*	**351**
1:00 PM	0	4	1	34	0	*39*	0	0	3	9	0	*12*	0	3	0	0	0	*3*	0	16	2	0	0	*18*	**72**
1:15 PM	0	7	5	39	0	*51*	0	0	0	2	0	*2*	0	0	0	1	0	*1*	0	27	1	0	0	*28*	**82**
1:30 PM	1	4	2	37	0	*44*	0	0	1	6	0	*7*	0	2	2	1	0	*5*	0	20	0	1	0	*21*	**77**
1:45 PM	0	7	1	44	0	*52*	0	0	2	4	0	*6*	0	3	1	1	0	*5*	0	25	1	3	0	*29*	**92**
Hourly Total	1	22	9	154	0	*186*	0	0	6	21	0	*27*	0	8	3	3	0	*14*	0	88	4	4	0	*96*	**323**
2:00 PM	0	7	3	25	0	*35*	0	0	3	3	0	*6*	0	1	1	0	0	*2*	0	25	2	5	0	*32*	**75**
2:15 PM	0	10	3	33	0	*46*	0	0	1	3	0	*4*	0	2	3	1	0	*6*	0	31	1	1	0	*33*	**89**
2:30 PM	0	9	1	28	0	*38*	0	0	2	5	0	*7*	0	1	4	1	0	*6*	0	24	1	1	0	*26*	**77**
2:45 PM	1	3	2	26	0	*32*	0	0	2	7	0	*9*	0	0	1	1	0	*2*	0	29	3	1	0	*33*	**76**
Hourly Total	1	29	9	112	0	*151*	0	0	8	18	0	*26*	0	4	9	3	0	*16*	0	109	7	8	0	*124*	**317**
3:00 PM	0	7	2	32	0	*41*	0	0	2	6	0	*8*	0	0	2	0	0	*2*	0	30	1	1	0	*32*	**83**
3:15 PM	0	7	2	28	0	*37*	0	0	2	8	0	*10*	0	0	2	0	0	*2*	0	46	3	1	0	*50*	**99**
3:30 PM	0	9	0	47	0	*56*	0	0	1	7	0	*8*	0	3	3	0	0	*6*	0	48	3	2	0	*53*	**123**
3:45 PM	0	2	0	44	0	*46*	0	0	1	9	0	*10*	0	0	3	2	0	*5*	0	42	1	3	0	*46*	**107**
Hourly Total	0	25	4	151	0	*180*	0	0	6	30	0	*36*	0	3	10	2	0	*15*	0	166	8	7	0	*181*	**412**

Riverdale Dr and Southern Ramps
Ramsey MN
Wednesday, October 21, 2020

Time	Southbound Armstorng Blvd						Westbound Riverdale Drive						Northbound Riverdale Dr						Eastbound HWY 10 S Ramp						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:00 PM	0	6	0	37	0	*43*	0	0	1	9	0	*10*	0	3	2	0	0	*5*	0	41	1	1	0	*43*	**101**
4:15 PM	0	1	2	41	0	*44*	0	0	1	6	0	*7*	0	1	3	0	0	*4*	0	44	2	1	0	*47*	**102**
4:30 PM	0	3	2	78	0	*83*	0	0	3	12	0	*15*	0	4	8	1	0	*13*	0	52	3	1	0	*56*	**167**
4:45 PM	0	11	3	51	0	*65*	0	1	0	9	1	*10*	0	2	2	1	0	*5*	0	67	3	0	0	*70*	**150**
Hourly Total	0	21	7	207	0	*235*	0	1	5	36	1	*42*	0	10	15	2	0	*27*	0	204	9	3	0	*216*	**520**
5:00 PM	0	3	1	42	0	*46*	0	0	5	17	0	*22*	0	3	1	1	0	*5*	0	46	2	1	0	*49*	**122**
5:15 PM	0	8	1	45	0	*54*	0	0	0	8	0	*8*	0	1	3	0	0	*4*	0	64	3	2	0	*69*	**135**
5:30 PM	0	7	2	52	0	*61*	0	0	2	4	0	*6*	0	1	3	0	0	*4*	0	29	3	0	0	*32*	**103**
5:45 PM	0	4	1	40	0	*45*	0	0	3	8	0	*11*	0	3	2	0	0	*5*	0	40	0	0	0	*40*	**101**
Hourly Total	0	22	5	179	0	*206*	0	0	10	37	0	*47*	0	8	9	1	0	*18*	0	179	8	3	0	*190*	**461**
6:00 PM	0	4	0	39	0	*43*	0	1	3	5	0	*9*	0	1	2	0	0	*3*	0	24	1	0	0	*25*	**80**
6:15 PM	0	3	1	42	0	*46*	0	0	0	4	0	*4*	0	2	3	0	0	*5*	0	31	1	1	0	*33*	**88**
6:30 PM	0	4	0	31	0	*35*	0	0	1	3	0	*4*	0	0	1	0	0	*1*	0	27	0	0	0	*27*	**67**
6:45 PM	0	3	0	29	0	*32*	0	0	2	3	0	*5*	0	2	0	0	0	*2*	0	32	1	0	0	*33*	**72**
Hourly Total	0	14	1	141	0	*156*	0	1	6	15	0	*22*	0	5	6	0	0	*11*	0	114	3	1	0	*118*	**307**
7:00 PM	0	3	0	25	0	*28*	0	0	3	5	0	*8*	0	0	0	0	0	*0*	0	26	1	0	0	*27*	**63**
7:15 PM	0	2	0	17	0	*19*	0	0	4	1	0	*5*	0	0	0	0	0	*0*	0	23	0	0	0	*23*	**47**
7:30 PM	0	4	0	32	0	*36*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	21	0	0	0	*21*	**57**
7:45 PM	0	1	0	7	0	*8*	0	0	1	2	0	*3*	0	0	0	0	0	*0*	0	23	0	0	0	*23*	**34**
Hourly Total	0	10	0	81	0	*91*	0	0	8	8	0	*16*	0	0	0	0	0	*0*	0	93	1	0	0	*94*	**201**
8:00 PM	0	1	0	16	0	*17*	0	0	0	3	0	*3*	0	0	0	0	0	*0*	0	10	0	0	0	*10*	**30**
8:15 PM	0	2	0	15	0	*17*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	10	0	0	0	*10*	**28**
8:30 PM	0	1	0	7	0	*8*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	11	0	0	0	*11*	**19**
8:45 PM	0	1	0	12	0	*13*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	0	10	3	0	0	*13*	**28**
Hourly Total	0	5	0	50	0	*55*	0	0	0	6	0	*6*	0	0	0	0	0	*0*	0	41	3	0	0	*44*	**105**
9:00 PM	0	0	2	14	0	*16*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	0	5	0	0	0	*5*	**22**
9:15 PM	1	1	0	9	0	*11*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	4	0	0	0	*4*	**15**
9:30 PM	0	3	0	6	0	*9*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	0	6	0	0	0	*6*	**16**
9:45 PM	0	0	0	4	0	*4*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	10	0	0	0	*10*	**15**
Hourly Total	1	4	2	33	0	*40*	0	0	2	1	0	*3*	0	0	0	0	0	*0*	0	25	0	0	0	*25*	**68**
10:00 PM	0	0	0	5	0	*5*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	4	2	0	0	*6*	**11**
10:15 PM	1	1	0	5	0	*7*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	6	0	0	0	*6*	**13**
10:30 PM	0	0	0	10	0	*10*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	4	0	0	0	*4*	**14**
10:45 PM	0	1	0	14	0	*15*	0	0	0	0	0	*0*	0	0	1	0	0	*1*	0	1	0	0	0	*1*	**17**
Hourly Total	1	2	0	34	0	*37*	0	0	0	0	0	*0*	0	0	1	0	0	*1*	0	15	2	0	0	*17*	**55**
11:00 PM	0	0	0	8	0	*8*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**9**
11:15 PM	0	1	1	8	0	*10*	0	0	0	0	0	*0*	0	0	1	0	0	*1*	0	5	0	0	0	*5*	**16**
11:30 PM	0	0	0	0	0	*0*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	4	0	0	0	*4*	**5**
11:45 PM	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**1**
Hourly Total	0	1	1	17	0	*19*	0	0	0	2	0	*2*	0	0	1	0	0	*1*	0	9	0	0	0	*9*	**31**
DAILY TOTAL	**7**	**308**	**110**	**2606**	**0**	***3031***	**0**	**12**	**85**	**303**	**1**	***400***	**0**	**57**	**101**	**26**	**0**	***184***	**0**	**1862**	**102**	**63**	**0**	***2027***	**5642**
Cars	6	302	100	2515	0	*2923*	0	10	83	301	1	*394*	0	52	92	24	0	*168*	0	1830	98	60	0	*1988*	**5473**
Heavy Vehicles	1	6	10	91	0	*108*	0	2	2	2	0	*6*	0	5	9	2	0	*16*	0	32	4	3	0	*39*	**169**
Heavy Vehicle %	14.29%	1.95%	9.09%	3.49%	0.00%	*3.56%*	0.00%	16.67%	2.35%	0.66%	0.00%	*1.50%*	0.00%	8.77%	8.91%	7.69%	0.00%	*8.70%*	0.00%	1.72%	3.92%	4.76%	0.00%	*1.92%*	**3.00%**

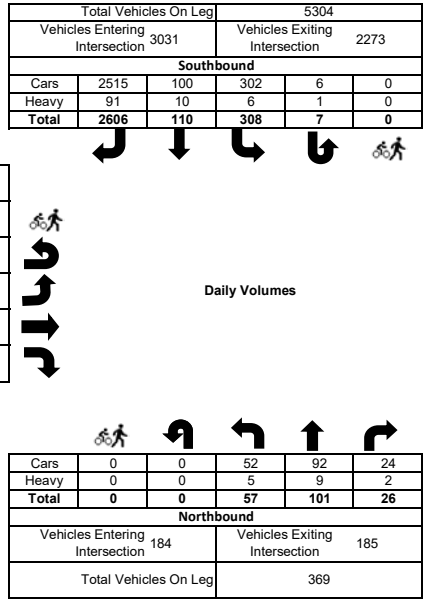
Riverdale Dr and Southern Ramps
Ramsey MN
Wednesday, October 21, 2020

AM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
6:45 AM	0	2	7	60	0	*69*	0	1	1	1	0	*3*	0	0	1	0	0	*1*	0	49	2	7	0	*58*	**131**
7:00 AM	0	2	3	60	0	*65*	0	0	1	2	0	*3*	0	1	2	0	0	*3*	0	34	2	1	0	*37*	**108**
7:15 AM	0	5	0	60	0	*65*	0	0	1	5	0	*6*	0	0	0	0	0	*0*	0	47	0	2	0	*49*	**120**
7:30 AM	0	9	2	54	0	*65*	0	1	1	0	0	*2*	0	0	0	0	0	*0*	0	53	2	0	0	*55*	**122**
Peak Hour Total	0	18	12	234	0	*264*	0	2	4	8	0	*14*	0	1	3	0	0	*4*	0	183	6	10	0	*199*	**481**
PHF	0.000	0.500	0.429	0.975	0.000	*0.957*	0.000	0.500	1.000	0.400	0.000	*0.583*	0.000	0.250	0.375	0.000	0.000	*0.333*	0.000	0.863	0.750	0.357	0.000	*0.858*	**0.918**

PM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:30 PM	0	3	2	78	0	*83*	0	0	3	12	0	*15*	0	4	8	1	0	*13*	0	52	3	1	0	*56*	**167**
4:45 PM	0	11	3	51	0	*65*	0	1	0	9	1	*10*	0	2	2	1	0	*5*	0	67	3	0	0	*70*	**150**
5:00 PM	0	3	1	42	0	*46*	0	0	5	17	0	*22*	0	3	1	1	0	*5*	0	46	2	1	0	*49*	**122**
5:15 PM	0	8	1	45	0	*54*	0	0	0	8	0	*8*	0	1	3	0	0	*4*	0	64	3	2	0	*69*	**135**
Peak Hour Total	0	25	7	216	0	*248*	0	1	8	46	1	*55*	0	10	14	3	0	*27*	0	229	11	4	0	*244*	**574**
PHF	0.000	0.568	0.583	0.692	0.000	*0.747*	0.000	0.250	0.400	0.676	0.250	*0.625*	0.000	0.625	0.438	0.750	0.000	*0.519*	0.000	0.854	0.917	0.500	0.000	*0.871*	**0.859**



Appendix D - Traffic Counts

Riverdale Dr and Southern Ramps
Ramsey MN
Thursday, October 22, 2020

Time	Southbound Armstorng Blvd						Westbound Riverdale Drive						Northbound Riverdale Dr						Eastbound HWY 10 S Ramp						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
12:00 AM	0	0	0	2	0	*2*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	1	0	0	0	*1*	**3**
12:15 AM	0	1	0	2	0	*3*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**3**
12:30 AM	0	0	0	4	0	*4*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	2	0	0	0	*2*	**7**
12:45 AM	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	3	0	0	0	*3*	**4**
Hourly Total	0	1	0	9	0	*10*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	6	0	0	0	*6*	**17**
1:00 AM	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**1**
1:15 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**
1:30 AM	0	2	0	3	0	*5*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	2	0	0	0	*2*	**8**
1:45 AM	0	1	0	3	0	*4*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	2	0	0	0	*2*	**6**
Hourly Total	0	3	0	7	0	*10*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	4	0	0	0	*4*	**15**
2:00 AM	0	0	0	4	0	*4*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**4**
2:15 AM	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	2	0	0	0	*2*	**3**
2:30 AM	0	0	0	4	0	*4*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	2	0	0	0	*2*	**6**
2:45 AM	0	0	0	4	0	*4*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**4**
Hourly Total	0	0	0	13	0	*13*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	4	0	0	0	*4*	**17**
3:00 AM	0	0	0	3	0	*3*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	1	0	0	0	*1*	**5**
3:15 AM	0	0	0	4	0	*4*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	1	0	0	0	*1*	**5**
3:30 AM	0	0	0	7	0	*7*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	2	0	0	0	*2*	**9**
3:45 AM	0	0	0	13	0	*13*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**14**
Hourly Total	0	0	0	27	0	*27*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	0	4	0	0	0	*4*	**33**
4:00 AM	0	1	0	10	0	*11*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	1	0	0	0	*1*	**12**
4:15 AM	0	0	0	14	0	*14*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**14**
4:30 AM	0	0	0	25	0	*25*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	0	5	0	0	0	*5*	**32**
4:45 AM	0	0	0	12	0	*12*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	11	0	0	0	*11*	**23**
Hourly Total	0	1	0	61	0	*62*	0	0	0	2	0	2	0	0	0	0	0	*0*	0	17	0	0	0	*17*	**81**
5:00 AM	0	1	0	29	0	*30*	0	0	0	3	0	*3*	0	0	0	0	0	*0*	0	8	1	0	0	*9*	**42**
5:15 AM	0	0	0	29	0	*29*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	14	0	0	0	*14*	**44**
5:30 AM	0	2	0	55	0	*57*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	24	0	0	0	*24*	**82**
5:45 AM	0	0	0	32	0	*32*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	44	0	0	0	*44*	**77**
Hourly Total	0	3	0	145	0	*148*	0	0	0	6	0	*6*	0	0	0	0	0	*0*	0	90	1	0	0	*91*	**245**
6:00 AM	0	1	0	55	0	*56*	0	1	1	1	0	*3*	0	0	0	0	0	*0*	0	17	1	0	0	*18*	**77**
6:15 AM	0	2	1	60	0	*63*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	22	0	0	0	*22*	**85**
6:30 AM	0	1	1	61	0	*63*	0	0	0	1	0	*1*	0	0	1	0	0	*1*	0	30	2	2	0	*34*	**99**
6:45 AM	0	3	6	57	0	*66*	0	0	2	5	0	*7*	0	0	0	0	0	*0*	0	53	3	4	0	*60*	**133**
Hourly Total	0	7	8	233	0	*248*	0	1	3	7	0	*11*	0	0	1	0	0	*1*	0	122	6	6	0	*134*	**394**
7:00 AM	0	3	3	66	0	*72*	0	1	1	8	0	*10*	0	0	0	1	0	*1*	0	39	2	2	0	*43*	**126**
7:15 AM	0	4	1	73	0	*78*	0	1	0	0	0	*1*	0	0	0	0	0	*0*	0	47	1	3	0	*51*	**130**
7:30 AM	0	8	3	56	0	*67*	0	0	0	6	0	*6*	0	0	0	0	0	*0*	0	51	1	1	0	*53*	**126**
7:45 AM	0	5	0	55	0	*60*	0	0	1	5	0	*6*	0	0	2	0	0	*2*	1	48	9	2	0	*60*	**128**
Hourly Total	0	20	7	250	0	*277*	0	2	2	19	0	23	0	0	2	1	0	3	1	185	13	8	0	*207*	**510**

Appendix D - Traffic Counts

Riverdale Dr and Southern Ramps
Ramsey MN
Thursday, October 22, 2020

Time	Southbound Armstorng Blvd						Westbound Riverdale Drive						Northbound Riverdale Dr						Eastbound HWY 10 S Ramp						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
8:00 AM	0	5	3	63	0	*71*	0	0	2	4	0	*6*	0	0	2	0	0	*2*	0	30	0	2	0	*32*	**111**
8:15 AM	0	4	1	44	0	*49*	0	0	1	4	0	*5*	0	0	0	2	0	*2*	0	21	3	0	0	*24*	**80**
8:30 AM	0	6	1	43	0	*50*	0	0	1	5	0	*6*	0	1	0	0	0	*1*	0	22	0	3	0	*25*	**82**
8:45 AM	0	2	3	39	0	*44*	0	0	1	1	0	*2*	0	1	0	0	0	*1*	0	22	2	1	0	*25*	**72**
Hourly Total	0	17	8	189	0	*214*	0	0	5	14	0	*19*	0	2	2	2	0	*6*	0	95	5	6	0	*106*	**345**
9:00 AM	0	2	2	37	0	*41*	0	1	2	4	0	*7*	0	1	1	0	0	*2*	0	21	5	1	0	*27*	**77**
9:15 AM	0	5	1	39	0	*45*	0	1	1	3	0	*5*	0	1	4	0	0	*5*	0	13	2	2	0	*17*	**72**
9:30 AM	0	5	0	40	0	*45*	0	1	0	1	0	*2*	0	1	0	1	0	*2*	0	11	2	1	0	*14*	**63**
9:45 AM	0	6	1	41	0	*48*	0	0	2	4	0	*6*	0	0	1	1	0	*2*	0	18	5	0	0	*23*	**79**
Hourly Total	0	18	4	157	0	*179*	0	3	5	12	0	*20*	0	3	6	2	0	*11*	0	63	14	4	0	*81*	**291**
10:00 AM	0	5	4	31	0	*40*	0	1	4	8	0	*13*	0	0	0	2	0	*2*	0	18	0	2	0	*20*	**75**
10:15 AM	0	8	0	32	0	*40*	0	0	4	1	0	*5*	0	1	2	2	0	*5*	0	21	1	2	0	*24*	**74**
10:30 AM	1	3	5	39	0	*48*	0	1	2	5	0	*8*	0	0	6	0	0	*6*	0	16	2	0	0	*18*	**80**
10:45 AM	0	3	2	32	0	*37*	0	0	1	5	0	*6*	0	0	0	0	0	*0*	0	19	3	0	0	*22*	**65**
Hourly Total	1	19	11	134	0	*165*	0	2	11	19	0	*32*	0	1	8	4	0	*13*	0	74	6	4	0	*84*	**294**
11:00 AM	0	11	4	36	0	*51*	0	0	0	4	0	*4*	0	1	2	1	0	*4*	0	14	3	2	0	*19*	**78**
11:15 AM	0	8	3	30	0	*41*	0	0	1	6	0	*7*	0	2	1	0	0	*3*	0	16	1	0	0	*17*	**68**
11:30 AM	1	1	4	24	0	*30*	0	0	3	5	0	*8*	0	0	0	2	0	*2*	0	17	3	1	0	*21*	**61**
11:45 AM	0	3	0	28	0	*31*	0	1	3	7	0	*11*	0	0	1	0	0	*1*	0	20	0	0	0	*20*	**63**
Hourly Total	1	23	11	118	0	*153*	0	1	7	22	0	*30*	0	3	4	3	0	*10*	0	67	7	3	0	*77*	**270**
12:00 PM	0	6	0	34	0	*40*	0	0	1	7	0	*8*	0	0	3	0	0	*3*	0	18	3	2	0	*23*	**74**
12:15 PM	0	7	6	23	0	*36*	0	0	0	9	0	*9*	0	0	3	0	0	*3*	0	16	4	0	0	*20*	**68**
12:30 PM	0	8	2	25	0	*35*	0	0	4	4	0	*8*	0	0	7	0	0	*7*	0	15	1	1	0	*17*	**67**
12:45 PM	0	8	2	25	0	*35*	0	0	0	2	0	*2*	0	1	1	0	0	*2*	1	21	3	0	0	*25*	**64**
Hourly Total	0	29	10	107	0	*146*	0	0	5	22	0	*27*	0	1	14	0	0	*15*	1	70	11	3	0	*85*	**273**
1:00 PM	0	7	2	33	0	*42*	0	0	0	5	0	*5*	0	0	4	0	0	*4*	0	20	2	0	0	*22*	**73**
1:15 PM	0	3	5	31	0	*39*	0	0	0	11	0	*11*	0	1	3	1	0	*5*	0	16	1	0	0	*17*	**72**
1:30 PM	0	7	3	30	0	*40*	0	0	2	0	0	*2*	0	1	2	0	0	*3*	0	25	1	0	0	*26*	**71**
1:45 PM	0	6	2	27	0	*35*	0	1	1	2	0	*4*	0	1	0	0	0	*1*	0	16	5	1	0	*22*	**62**
Hourly Total	0	23	12	121	0	*156*	0	1	3	18	0	*22*	0	3	9	1	0	*13*	0	77	9	1	0	*87*	**278**
2:00 PM	0	3	0	27	0	*30*	0	0	1	7	0	*8*	0	0	1	0	0	*1*	0	20	1	1	0	*22*	**61**
2:15 PM	0	3	3	23	0	*29*	0	0	1	4	0	*5*	0	1	3	0	0	*4*	0	17	3	3	0	*23*	**61**
2:30 PM	0	2	0	23	0	*25*	0	0	2	6	0	*8*	0	2	2	1	0	*5*	1	20	1	3	0	*25*	**63**
2:45 PM	0	4	1	26	0	*31*	0	0	2	3	0	*5*	0	0	0	1	0	*1*	0	30	3	1	0	*34*	**71**
Hourly Total	0	12	4	99	0	*115*	0	0	6	20	0	*26*	0	3	6	2	0	*11*	1	87	8	8	0	*104*	**256**
3:00 PM	0	11	2	40	0	*53*	0	0	1	8	0	*9*	0	1	2	1	0	*4*	0	29	2	1	0	*32*	**98**
3:15 PM	0	8	1	20	0	*29*	0	0	3	6	0	*9*	0	1	1	1	0	*3*	0	34	2	1	0	*37*	**78**
3:30 PM	0	7	1	37	0	*45*	0	0	0	9	0	*9*	0	0	4	1	0	*5*	0	25	0	1	0	*26*	**85**
3:45 PM	0	2	1	28	0	*31*	0	0	1	4	0	*5*	0	0	3	1	0	*4*	0	37	6	1	0	*44*	**84**
Hourly Total	0	28	5	125	0	*158*	0	0	5	27	0	*32*	0	2	10	4	0	*16*	0	125	10	4	0	*139*	**345**

Riverdale Dr and Southern Ramps
Ramsey MN
Thursday, October 22, 2020

Time	Southbound Armstorng Blvd						Westbound Riverdale Drive						Northbound Riverdale Dr						Eastbound HWY 10 S Ramp						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:00 PM	0	4	0	44	0	*48*	0	0	0	10	0	*10*	0	2	2	0	0	*4*	0	45	1	2	0	*48*	**110**
4:15 PM	0	7	0	33	0	*40*	0	0	0	9	0	*9*	0	1	0	0	0	*1*	0	38	3	2	0	*43*	**93**
4:30 PM	0	2	2	69	0	*73*	0	0	5	13	0	*18*	0	3	8	0	0	*11*	0	32	1	3	0	*36*	**138**
4:45 PM	1	3	1	44	0	*49*	1	0	2	6	0	*9*	0	2	5	1	0	*8*	0	39	1	1	0	*41*	**107**
Hourly Total	1	16	3	190	0	*210*	1	0	7	38	0	*46*	0	8	15	1	0	*24*	0	154	6	8	0	*168*	**448**
5:00 PM	0	7	0	53	0	*60*	0	1	5	18	0	*24*	0	2	3	1	0	*6*	0	53	1	0	0	*54*	**144**
5:15 PM	1	6	0	33	0	*40*	0	0	1	8	0	*9*	0	3	1	0	0	*4*	0	33	1	0	0	*34*	**87**
5:30 PM	0	3	0	46	0	*49*	0	0	1	4	0	*5*	0	1	1	0	0	*2*	0	35	3	1	0	*39*	**95**
5:45 PM	0	1	0	19	0	*20*	0	0	1	5	0	*6*	0	0	1	0	0	*1*	0	31	2	0	0	*33*	**60**
Hourly Total	1	17	0	151	0	*169*	0	1	8	35	0	*44*	0	6	6	1	0	*13*	0	152	7	1	0	*160*	**386**
6:00 PM	0	3	2	27	0	*32*	0	0	2	6	0	*8*	0	2	5	2	0	*9*	0	19	0	1	0	*20*	**69**
6:15 PM	0	4	0	28	0	*32*	0	0	0	4	0	*4*	0	0	0	0	0	*0*	0	25	0	0	0	*25*	**61**
6:30 PM	0	0	2	25	0	*27*	0	0	2	1	0	*3*	0	0	1	0	0	*1*	0	18	0	0	0	*18*	**49**
6:45 PM	0	5	0	21	0	*26*	0	0	1	3	0	*4*	0	0	0	0	0	*0*	0	12	1	0	0	*13*	**43**
Hourly Total	0	12	4	101	0	*117*	0	0	5	14	0	*19*	0	2	6	2	0	*10*	0	74	1	1	0	*76*	**222**
7:00 PM	0	3	0	23	0	*26*	0	0	0	2	0	*2*	0	0	1	0	0	*1*	0	17	0	0	0	*17*	**46**
7:15 PM	0	1	0	28	0	*29*	0	0	0	4	0	*4*	0	0	0	0	0	*0*	0	16	0	0	0	*16*	**49**
7:30 PM	0	4	1	16	0	*21*	0	0	1	3	0	*4*	0	1	1	0	0	*2*	0	13	0	0	0	*13*	**40**
7:45 PM	0	1	0	7	0	*8*	0	0	0	4	0	*4*	0	0	0	0	0	*0*	0	16	1	0	0	*17*	**29**
Hourly Total	0	9	1	74	0	*84*	0	0	1	13	0	*14*	0	1	2	0	0	*3*	0	62	1	0	0	*63*	**164**
8:00 PM	0	6	0	13	0	*19*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	0	14	0	0	0	*14*	**35**
8:15 PM	0	2	0	10	0	*12*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	0	11	0	0	0	*11*	**24**
8:30 PM	1	1	1	26	0	*29*	0	0	0	4	0	*4*	0	1	0	1	0	*2*	1	6	2	1	0	*10*	**45**
8:45 PM	0	0	1	7	0	*8*	0	0	0	0	0	*0*	0	2	0	0	0	*2*	0	6	0	0	0	*6*	**16**
Hourly Total	1	9	2	56	0	*68*	0	0	1	6	0	*7*	0	3	0	1	0	*4*	1	37	2	1	0	*41*	**120**
9:00 PM	0	1	1	9	0	*11*	0	0	0	2	0	*2*	0	0	1	0	0	*1*	0	9	1	0	0	*10*	**24**
9:15 PM	0	0	0	7	0	*7*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	9	1	0	0	*10*	**17**
9:30 PM	0	0	1	5	0	*6*	0	0	0	0	0	*0*	0	1	0	0	0	*1*	0	7	0	0	0	*7*	**14**
9:45 PM	2	1	0	3	0	*6*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	5	0	0	0	*5*	**11**
Hourly Total	2	2	2	24	0	*30*	0	0	0	2	0	*2*	0	1	1	0	0	*2*	0	30	2	0	0	*32*	**66**
10:00 PM	1	0	0	12	0	*13*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	4	0	0	0	*4*	**17**
10:15 PM	0	0	0	4	0	*4*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	4	0	0	0	*4*	**9**
10:30 PM	0	1	0	4	0	*5*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	1	1	0	0	*2*	**8**
10:45 PM	0	0	0	3	0	*3*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	5	1	0	0	*6*	**9**
Hourly Total	1	1	0	23	0	*25*	0	0	0	2	0	*2*	0	0	0	0	0	*0*	0	14	2	0	0	*16*	**43**
11:00 PM	0	0	0	6	0	*6*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	6	0	0	0	*6*	**12**
11:15 PM	0	0	0	5	0	*5*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	2	0	0	0	*2*	**7**
11:30 PM	0	1	0	3	0	*4*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	4	0	0	0	*4*	**8**
11:45 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	2	0	0	0	*2*	**2**
Hourly Total	0	1	0	14	0	*15*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	14	0	0	0	*14*	**29**
DAILY TOTAL	**8**	**271**	**92**	**2428**	**0**	***2799***	**1**	**11**	**74**	**302**	**0**	***388***	**0**	**39**	**92**	**24**	**0**	***155***	**4**	**1627**	**111**	**58**	**0**	***1800***	**5142**
Cars	7	265	80	2345	0	*2697*	1	10	69	296	0	*376*	0	34	79	20	0	*133*	1	1598	106	48	0	*1753*	**4959**
Heavy Vehicles	1	6	12	83	0	*102*	0	1	5	6	0	*12*	0	5	13	4	0	*22*	3	29	5	10	0	*47*	**183**
Heavy Vehicle %	12.50%	2.21%	13.04%	3.42%	0.00%	*3.64%*	0.00%	9.09%	6.76%	1.99%	0.00%	*3.09%*	0.00%	12.82%	14.13%	16.67%	0.00%	*14.19%*	75.00%	1.78%	4.50%	17.24%	0.00%	*2.61%*	**3.56%**

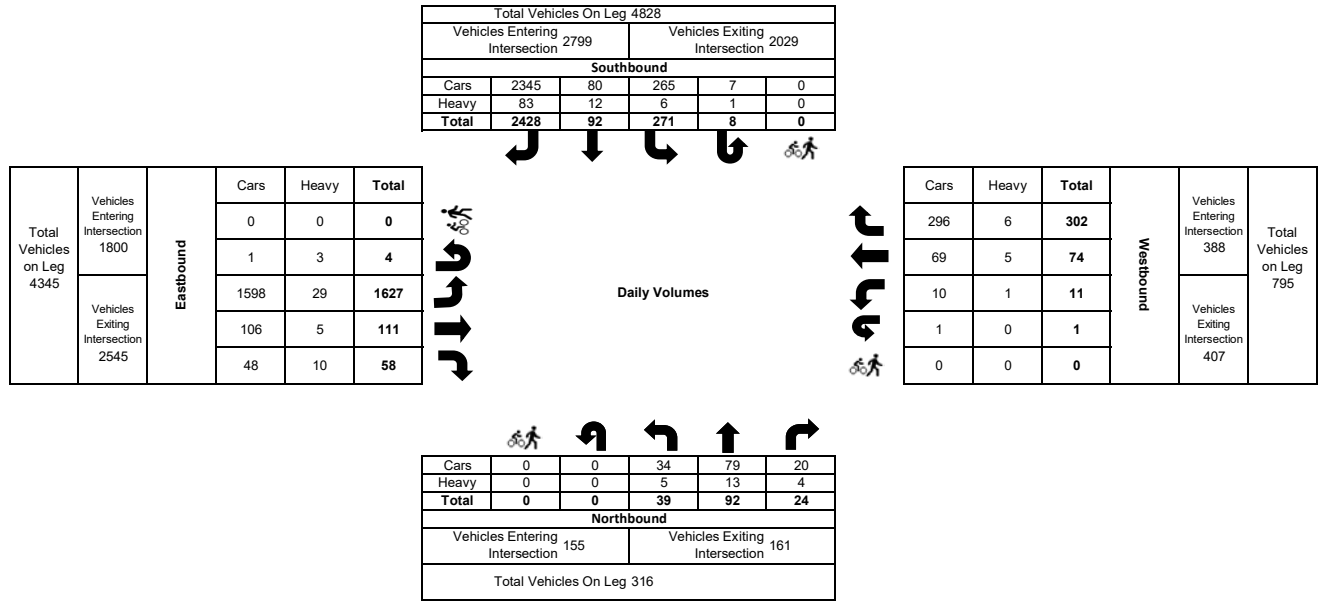
Riverdale Dr and Southern Ramps
Ramsey MN
Thursday, October 22, 2020

AM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
6:45 AM	0	3	6	57	0	*66*	0	0	2	5	0	*7*	0	0	0	0	0	*0*	0	53	3	4	0	*60*	**133**
7:00 AM	0	3	3	66	0	*72*	0	1	1	8	0	*10*	0	0	0	1	0	*1*	0	39	2	2	0	*43*	**126**
7:15 AM	0	4	1	73	0	*78*	0	1	0	0	0	*1*	0	0	0	0	0	*0*	0	47	1	3	0	*51*	**130**
7:30 AM	0	8	3	56	0	*67*	0	0	0	6	0	*6*	0	0	0	0	0	*0*	0	51	1	1	0	*53*	**126**
Peak Hour Total	0	18	13	252	0	*283*	0	2	3	19	0	*24*	0	0	0	1	0	*1*	0	190	7	10	0	*207*	**515**
PHF	0.000	0.563	0.542	0.863	0.000	*0.907*	0.000	0.500	0.375	0.594	0.000	*0.600*	0.000	0.000	0.000	0.250	0.000	*0.250*	0.000	0.896	0.583	0.625	0.000	*0.863*	**0.968**

PM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:15 PM	0	7	0	33	0	*40*	0	0	0	9	0	*9*	0	1	0	0	0	*1*	0	38	3	2	0	*43*	**93**
4:30 PM	0	2	2	69	0	*73*	0	0	5	13	0	*18*	0	3	8	0	0	*11*	0	32	1	3	0	*36*	**138**
4:45 PM	1	3	1	44	0	*49*	1	0	2	6	0	*9*	0	2	5	1	0	*8*	0	39	1	1	0	*41*	**107**
5:00 PM	0	7	0	53	0	*60*	0	1	5	18	0	*24*	0	2	3	1	0	*6*	0	53	1	0	0	*54*	**144**
Peak Hour Total	1	19	3	199	0	*222*	1	1	12	46	0	*60*	0	8	16	2	0	*26*	0	162	6	6	0	*174*	**482**
PHF	0.250	0.679	0.375	0.721	0.000	*0.760*	0.250	0.250	0.600	0.639	0.000	*0.625*	0.000	0.667	0.500	0.500	0.000	*0.591*	0.000	0.764	0.500	0.500	0.000	*0.806*	**0.837**



04 HWY 10 North Ramps and Armstorng Blvd
Ramsey MN
Tuesday, October 13, 2020

Time	Southbound Armstrong Blvd						Westbound HWY 10 Off Ramp						Northbound Armstrong Blvd						Eastbound HWY 10 On Ramp						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach 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**
Hourly 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**
1:00 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**
1:15 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**
1:30 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**
1:45 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**
Hourly 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**
2:00 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**
2:15 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**
2:30 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**
2:45 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**
Hourly 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**
3:00 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**
3:15 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**
3:30 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**
3:45 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**
Hourly 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**
4:00 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**
4:15 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**
4:30 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**
4:45 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**
Hourly 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**
5:00 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**
5:15 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**
5:30 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**
5:45 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**
Hourly 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**
6:00 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**
6:15 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**
6:30 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**
6:45 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**
Hourly 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**
7:00 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**
7:15 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**
7:30 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**
7:45 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**
Hourly 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 HWY 10 North Ramps and Armstorng Blvd
Ramsey MN
Tuesday, October 13, 2020

Time	Southbound Armstrong Blvd						Westbound HWY 10 Off Ramp						Northbound Armstrong Blvd						Eastbound HWY 10 On Ramp						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
8:00 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**
8:15 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**
8:30 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**
8:45 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**
Hourly 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**
9:00 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**
9:15 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**
9:30 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**
9:45 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**
Hourly 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**
Hourly 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**
Hourly 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**
Hourly 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**
1:00 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**
1:15 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**
1:30 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**
1:45 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**
Hourly 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**
2:00 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**
2:15 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**
2:30 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**
2:45 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**
Hourly 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**
3:00 PM	0	0	42	49	0	*91*	0	3	0	67	0	*70*	0	2	43	0	0	*45*	0	0	0	0	0	*0*	**206**
3:15 PM	0	0	35	33	0	*68*	0	0	1	68	0	*69*	0	5	43	0	0	*48*	0	0	0	0	0	*0*	**185**
3:30 PM	0	0	46	70	0	*116*	0	4	0	61	0	*65*	0	3	42	0	0	*45*	0	0	0	0	0	*0*	**226**
3:45 PM	0	0	36	49	0	*85*	0	7	0	76	0	*83*	0	7	44	0	0	*51*	0	0	0	0	0	*0*	**219**
Hourly Total	0	0	159	201	0	*360*	0	14	1	272	0	*287*	0	17	172	0	0	*189*	0	0	0	0	0	*0*	**836**

04 HWY 10 North Ramps and Armstorng Blvd
Ramsey MN
Tuesday, October 13, 2020

Time	Southbound Armstrong Blvd						Westbound HWY 10 Off Ramp						Northbound Armstrong Blvd						Eastbound HWY 10 On Ramp						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:00 PM	0	0	28	40	0	*68*	0	6	1	70	0	*77*	0	3	55	0	0	*58*	0	0	0	0	0	*0*	**203**
4:15 PM	0	0	47	60	0	*107*	0	2	0	94	1	*96*	1	5	48	0	0	*54*	0	0	0	0	0	*0*	**257**
4:30 PM	0	0	72	83	0	*155*	0	9	0	74	1	*83*	0	6	53	0	0	*59*	0	0	0	0	0	*0*	**297**
4:45 PM	0	0	48	67	0	*115*	0	8	1	81	0	*90*	1	5	61	0	0	*67*	0	0	0	0	0	*0*	**272**
Hourly Total	0	0	195	250	0	*445*	0	25	2	319	2	*346*	2	19	217	0	0	*238*	0	0	0	0	0	*0*	**1029**
5:00 PM	0	0	43	61	0	*104*	0	2	1	74	0	*77*	0	17	60	0	0	*77*	0	0	0	0	0	*0*	**258**
5:15 PM	0	0	29	65	0	*94*	0	2	0	80	1	*82*	0	9	61	0	0	*70*	0	0	0	0	0	*0*	**246**
5:30 PM	0	0	52	46	0	*98*	0	2	0	68	0	*70*	0	5	52	0	0	*57*	0	0	0	0	0	*0*	**225**
5:45 PM	0	0	35	31	0	*66*	0	5	0	76	0	*81*	0	3	36	0	0	*39*	0	0	0	0	0	*0*	**186**
Hourly Total	0	0	159	203	0	*362*	0	11	1	298	1	*310*	0	34	209	0	0	*243*	0	0	0	0	0	*0*	**915**
6:00 PM	1	0	35	36	0	*72*	0	7	0	52	1	*59*	0	5	36	0	0	*41*	0	0	0	0	0	*0*	**172**
6:15 PM	0	0	38	36	0	*74*	0	5	0	55	0	*60*	0	8	40	0	0	*48*	0	0	0	0	0	*0*	**182**
6:30 PM	0	0	31	45	0	*76*	0	3	0	39	0	*42*	0	1	29	0	0	*30*	0	0	0	0	0	*0*	**148**
6:45 PM	0	0	23	29	0	*52*	0	2	0	58	0	*60*	0	1	25	0	0	*26*	0	0	0	0	0	*0*	**138**
Hourly Total	1	0	127	146	0	*274*	0	17	0	204	1	*221*	0	15	130	0	0	*145*	0	0	0	0	0	*0*	**640**
7:00 PM	0	0	27	17	0	*44*	0	0	0	48	0	*48*	0	1	23	0	0	*24*	0	0	0	0	0	*0*	**116**
7:15 PM	0	0	12	19	0	*31*	0	1	0	36	0	*37*	0	2	24	0	0	*26*	0	0	0	0	0	*0*	**94**
7:30 PM	0	0	22	13	0	*35*	0	0	0	33	0	*33*	0	0	23	0	0	*23*	0	0	0	0	0	*0*	**91**
7:45 PM	0	0	27	13	0	*40*	0	0	0	38	0	*38*	0	1	15	0	0	*16*	0	0	0	0	0	*0*	**94**
Hourly Total	0	0	88	62	0	*150*	0	1	0	155	0	*156*	0	4	85	0	0	*89*	0	0	0	0	0	*0*	**395**
8:00 PM	0	0	19	11	0	*30*	0	0	0	21	0	*21*	0	2	22	0	0	*24*	0	0	0	0	0	*0*	**75**
8:15 PM	0	0	16	16	0	*32*	0	4	0	27	0	*31*	0	0	6	0	0	*6*	0	0	0	0	0	*0*	**69**
8:30 PM	0	0	10	7	0	*17*	0	0	0	28	0	*28*	0	1	15	0	0	*16*	0	0	0	0	0	*0*	**61**
8:45 PM	0	0	9	10	0	*19*	0	1	0	20	0	*21*	0	0	9	0	0	*9*	0	0	0	0	0	*0*	**49**
Hourly Total	0	0	54	44	0	*98*	0	5	0	96	0	*101*	0	3	52	0	0	*55*	0	0	0	0	0	*0*	**254**
9:00 PM	0	0	19	7	0	*26*	0	2	0	4	0	*6*	0	0	11	0	0	*11*	0	0	0	0	0	*0*	**43**
9:15 PM	0	0	16	17	0	*33*	0	0	0	16	0	*16*	0	0	9	0	0	*9*	0	0	0	0	0	*0*	**58**
9:30 PM	0	0	7	8	0	*15*	0	0	0	12	0	*12*	0	0	6	0	0	*6*	0	0	0	0	0	*0*	**33**
9:45 PM	0	0	5	3	0	*8*	0	0	0	21	0	*21*	0	0	8	0	0	*8*	0	0	0	0	0	*0*	**37**
Hourly Total	0	0	47	35	0	*82*	0	2	0	53	0	*55*	0	0	34	0	0	*34*	0	0	0	0	0	*0*	**171**
10:00 PM	0	0	8	4	0	*12*	0	0	0	16	0	*16*	0	0	3	0	0	*3*	0	0	0	0	0	*0*	**31**
10:15 PM	0	0	7	3	0	*10*	0	1	0	15	0	*16*	0	0	8	0	0	*8*	0	0	0	0	0	*0*	**34**
10:30 PM	0	0	7	2	0	*9*	0	3	0	12	0	*15*	0	0	3	0	0	*3*	0	0	0	0	0	*0*	**27**
10:45 PM	0	0	5	2	0	*7*	0	0	0	16	0	*16*	0	0	4	0	0	*4*	0	0	0	0	0	*0*	**27**
Hourly Total	0	0	27	11	0	*38*	0	4	0	59	0	*63*	0	0	18	0	0	*18*	0	0	0	0	0	*0*	**119**
11:00 PM	0	0	5	1	0	*6*	0	0	0	4	0	*4*	0	0	2	0	0	*2*	0	0	0	0	0	*0*	**12**
11:15 PM	0	0	8	3	0	*11*	0	1	0	11	0	*12*	0	0	6	0	0	*6*	0	0	0	0	0	*0*	**29**
11:30 PM	0	0	1	0	0	*1*	0	0	0	13	0	*13*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**15**
11:45 PM	0	0	3	1	0	*4*	0	1	0	6	0	*7*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**12**
Hourly Total	0	0	17	5	0	*22*	0	2	0	34	0	*36*	0	0	10	0	0	*10*	0	0	0	0	0	*0*	**68**
DAILY TOTAL	**1**	**0**	**873**	**957**	**0**	***1831***	**0**	**81**	**4**	**1490**	**4**	***1575***	**2**	**92**	**927**	**0**	**0**	***1021***	**0**	**0**	**0**	**0**	**0**	***0***	**4427**
Cars	1	0	855	949	0	*1805*	0	80	3	1459	3	*1542*	2	89	913	0	0	*1004*	0	0	0	0	0	*0*	**4351**
Heavy Vehicles	0	0	18	8	0	*26*	0	1	1	31	1	*33*	0	3	14	0	0	*17*	0	0	0	0	0	*0*	**76**
Heavy Vehicle %	0.00%	0.00%	2.06%	0.84%	0.00%	*1.42%*	0.00%	1.23%	25.00%	2.08%	25.00%	*2.10%*	0.00%	3.26%	1.51%	0.00%	0.00%	*1.67%*	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*	**1.72%**

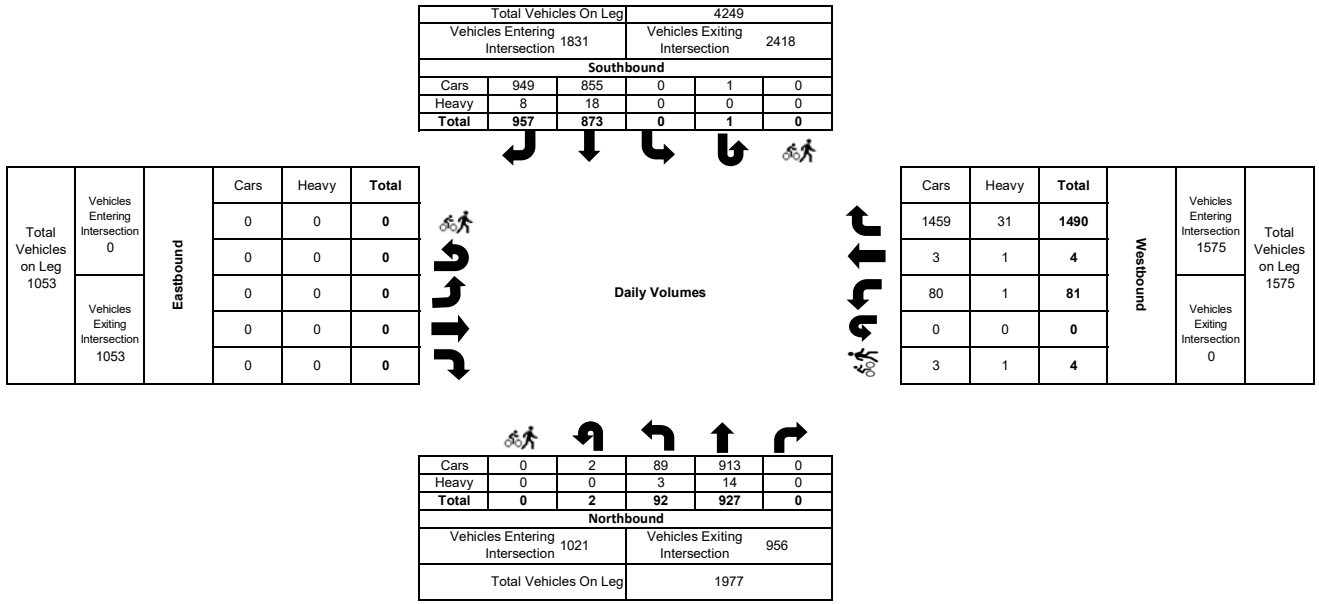
04 HWY 10 North Ramps and Armstorng Blvd
Ramsey MN
Tuesday, October 13, 2020

AM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach 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**
Peak Hour 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**
PHF	0.000	0.000	0.000	0.000	0.000	*0.000*	0.000	0.000	0.000	0.000	0.000	*0.000*	0.000	0.000	0.000	0.000	0.000	*0.000*	0.000	0.000	0.000	0.000	0.000	*0.000*	**0.000**

PM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:15 PM	0	0	47	60	0	*107*	0	2	0	94	1	*96*	1	5	48	0	0	*54*	0	0	0	0	0	*0*	**257**
4:30 PM	0	0	72	83	0	*155*	0	9	0	74	1	*83*	0	6	53	0	0	*59*	0	0	0	0	0	*0*	**297**
4:45 PM	0	0	48	67	0	*115*	0	8	1	81	0	*90*	1	5	61	0	0	*67*	0	0	0	0	0	*0*	**272**
5:00 PM	0	0	43	61	0	*104*	0	2	1	74	0	*77*	0	17	60	0	0	*77*	0	0	0	0	0	*0*	**258**
Peak Hour Total	0	0	210	271	0	*481*	0	21	2	323	2	*346*	2	33	222	0	0	*257*	0	0	0	0	0	*0*	**1084**
PHF	0.000	0.000	0.729	0.816	0.000	*0.776*	0.000	0.583	0.500	0.859	0.500	*0.901*	0.500	0.485	0.910	0.000	0.000	*0.834*	0.000	0.000	0.000	0.000	0.000	*0.000*	**0.912**



04 HWY 10 North Ramps and Armstorng Blvd
Ramsey MN
Wednesday, October 14, 2020

Time	Southbound Armstrong Blvd						Westbound HWY 10 Off Ramp						Northbound Armstrong Blvd						Eastbound HWY 10 On Ramp						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
12:00 AM	0	0	3	0	0	*3*	0	0	0	5	0	*5*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**8**
12:15 AM	0	0	2	1	0	*3*	0	0	0	4	0	*4*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**8**
12:30 AM	0	0	1	0	0	*1*	0	0	0	5	0	*5*	0	0	2	0	0	*2*	0	0	0	0	0	*0*	**8**
12:45 AM	0	0	1	1	0	*2*	0	0	0	5	0	*5*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**7**
Hourly Total	0	0	7	2	0	*9*	0	0	0	19	0	*19*	0	0	3	0	0	*3*	0	0	0	0	0	*0*	**31**
1:00 AM	0	0	1	0	0	*1*	0	0	0	1	0	*1*	0	1	3	0	0	*4*	0	0	0	0	0	*0*	**6**
1:15 AM	0	0	0	0	0	*0*	0	0	0	1	0	*1*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**2**
1:30 AM	0	0	1	0	0	*1*	0	0	0	1	0	*1*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**3**
1:45 AM	0	0	6	0	0	*6*	0	2	0	4	0	*6*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**13**
Hourly Total	0	0	8	0	0	*8*	0	2	0	7	0	*9*	0	1	6	0	0	*7*	0	0	0	0	0	*0*	**24**
2:00 AM	0	0	0	2	0	*2*	0	1	0	2	0	*3*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**5**
2:15 AM	0	0	0	0	0	*0*	0	0	0	3	0	*3*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**4**
2:30 AM	0	0	0	2	0	*2*	0	0	0	2	0	*2*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**5**
2:45 AM	0	0	3	0	0	*3*	0	0	0	1	0	*1*	0	1	0	0	0	*1*	0	0	0	0	0	*0*	**5**
Hourly Total	0	0	3	4	0	*7*	0	1	0	8	0	*9*	0	1	2	0	0	*3*	0	0	0	0	0	*0*	**19**
3:00 AM	0	0	4	0	0	*4*	0	0	0	0	0	*0*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**5**
3:15 AM	0	0	3	1	0	*4*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**5**
3:30 AM	0	0	8	2	0	*10*	0	0	0	1	0	*1*	0	0	2	0	0	*2*	0	0	0	0	0	*0*	**13**
3:45 AM	0	0	3	0	0	*3*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**3**
Hourly Total	0	0	18	3	0	*21*	0	0	0	2	0	*2*	0	0	3	0	0	*3*	0	0	0	0	0	*0*	**26**
4:00 AM	0	0	15	1	0	*16*	0	0	0	1	0	*1*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**18**
4:15 AM	0	0	20	4	0	*24*	0	0	0	2	0	*2*	0	1	1	0	0	*2*	0	0	0	0	0	*0*	**28**
4:30 AM	0	0	20	8	0	*28*	0	0	0	1	0	*1*	0	2	7	0	0	*9*	0	0	0	0	0	*0*	**38**
4:45 AM	0	0	24	0	0	*24*	0	0	0	1	0	*1*	0	0	8	0	0	*8*	0	0	0	0	0	*0*	**33**
Hourly Total	0	0	79	13	0	*92*	0	0	0	5	0	*5*	0	3	17	0	0	*20*	0	0	0	0	0	*0*	**117**
5:00 AM	0	0	33	2	0	*35*	0	0	0	4	0	*4*	0	0	8	0	0	*8*	0	0	0	0	0	*0*	**47**
5:15 AM	0	0	43	19	0	*62*	0	0	0	7	0	*7*	0	0	20	0	0	*20*	0	0	0	0	0	*0*	**89**
5:30 AM	0	0	56	14	0	*70*	0	1	0	5	0	*6*	0	2	28	0	0	*30*	0	0	0	0	0	*0*	**106**
5:45 AM	0	0	35	10	0	*45*	0	1	0	11	0	*12*	0	0	41	0	0	*41*	0	0	0	0	0	*0*	**98**
Hourly Total	0	0	167	45	0	*212*	0	2	0	27	0	*29*	0	2	97	0	0	*99*	0	0	0	0	0	*0*	**340**
6:00 AM	0	0	62	15	0	*77*	0	1	0	10	0	*11*	0	1	28	0	0	*29*	0	0	0	0	0	*0*	**117**
6:15 AM	0	0	76	21	0	*97*	0	3	1	19	0	*23*	0	0	27	0	0	*27*	0	0	0	0	0	*0*	**147**
6:30 AM	0	0	73	24	0	*97*	0	0	0	24	0	*24*	0	2	36	0	0	*38*	0	0	0	0	0	*0*	**159**
6:45 AM	0	0	66	19	0	*85*	0	1	0	30	0	*31*	0	2	50	0	0	*52*	0	0	0	0	0	*0*	**168**
Hourly Total	0	0	277	79	0	*356*	0	5	1	83	0	*89*	0	5	141	0	0	*146*	0	0	0	0	0	*0*	**591**
7:00 AM	0	0	71	18	0	*89*	0	2	0	16	0	*18*	0	2	46	0	0	*48*	0	0	0	0	0	*0*	**155**
7:15 AM	0	0	62	21	0	*83*	0	3	0	27	0	*30*	0	2	79	0	0	*81*	0	0	0	0	0	*0*	**194**
7:30 AM	1	0	71	30	0	*102*	0	6	1	30	0	*37*	0	6	81	0	0	*87*	0	0	0	0	0	*0*	**226**
7:45 AM	0	0	64	19	0	*83*	0	8	0	53	0	*61*	0	1	86	0	0	*87*	0	0	0	0	0	*0*	**231**
Hourly Total	1	0	268	88	0	*357*	0	19	1	126	0	*146*	0	11	292	0	0	*303*	0	0	0	0	0	*0*	**806**

04 HWY 10 North Ramps and Armstorng Blvd
Ramsey MN
Wednesday, October 14, 2020

Time	Southbound Armstrong Blvd						Westbound HWY 10 Off Ramp						Northbound Armstrong Blvd						Eastbound HWY 10 On Ramp						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
8:00 AM	0	0	51	27	0	*78*	0	8	1	35	0	*44*	0	2	34	0	0	*36*	0	0	0	0	0	*0*	**158**
8:15 AM	0	0	47	16	0	*63*	0	3	0	33	0	*36*	0	2	26	0	0	*28*	0	0	0	0	0	*0*	**127**
8:30 AM	0	0	41	29	0	*70*	0	4	0	25	0	*29*	0	1	20	0	0	*21*	0	0	0	0	0	*0*	**120**
8:45 AM	0	0	43	19	0	*62*	0	9	0	25	0	*34*	0	2	17	0	0	*19*	0	0	0	0	0	*0*	**115**
Hourly Total	0	0	182	91	0	*273*	0	24	1	118	0	*143*	0	7	97	0	0	*104*	0	0	0	0	0	*0*	**520**
9:00 AM	0	0	44	16	0	*60*	0	2	0	18	0	*20*	0	2	24	0	0	*26*	0	0	0	0	0	*0*	**106**
9:15 AM	0	0	29	23	0	*52*	0	4	1	26	0	*31*	0	1	29	0	0	*30*	0	0	0	0	0	*0*	**113**
9:30 AM	0	0	48	21	0	*69*	0	6	0	24	0	*30*	0	2	21	0	0	*23*	0	0	0	0	0	*0*	**122**
9:45 AM	0	0	25	24	0	*49*	0	8	0	21	0	*29*	0	7	29	0	0	*36*	0	0	0	0	0	*0*	**114**
Hourly Total	0	0	146	84	0	*230*	0	20	1	89	0	*110*	0	12	103	0	0	*115*	0	0	0	0	0	*0*	**455**
10:00 AM	0	0	44	26	0	*70*	0	2	0	27	0	*29*	0	3	27	0	0	*30*	0	0	0	0	0	*0*	**129**
10:15 AM	0	0	56	18	0	*74*	0	7	0	23	0	*30*	0	2	18	0	0	*20*	0	0	0	0	0	*0*	**124**
10:30 AM	0	0	31	30	0	*61*	0	3	0	33	0	*36*	0	1	12	0	0	*13*	0	0	0	0	0	*0*	**110**
10:45 AM	0	0	30	19	0	*49*	0	8	1	20	0	*29*	0	1	16	0	0	*17*	0	0	0	0	0	*0*	**95**
Hourly Total	0	0	161	93	0	*254*	0	20	1	103	0	*124*	0	7	73	0	0	*80*	0	0	0	0	0	*0*	**458**
11:00 AM	0	0	44	31	0	*75*	0	7	0	23	0	*30*	0	2	26	0	0	*28*	0	0	0	0	0	*0*	**133**
11:15 AM	0	0	46	16	0	*62*	0	9	1	35	0	*45*	0	2	33	0	0	*35*	0	0	0	0	0	*0*	**142**
11:30 AM	0	0	42	24	0	*66*	0	9	0	34	0	*43*	1	5	30	0	0	*36*	0	0	0	0	0	*0*	**145**
11:45 AM	0	0	39	31	0	*70*	0	11	0	35	0	*46*	0	5	33	0	0	*38*	0	0	0	0	0	*0*	**154**
Hourly Total	0	0	171	102	0	*273*	0	36	1	127	0	*164*	1	14	122	0	0	*137*	0	0	0	0	0	*0*	**574**
12:00 PM	0	0	44	23	0	*67*	0	8	0	28	0	*36*	0	6	36	0	0	*42*	0	0	0	0	0	*0*	**145**
12:15 PM	0	0	54	30	0	*84*	0	8	0	44	0	*52*	0	3	34	0	0	*37*	0	0	0	0	0	*0*	**173**
12:30 PM	0	0	46	33	0	*79*	0	16	0	39	0	*55*	0	3	34	0	0	*37*	0	0	0	0	0	*0*	**171**
12:45 PM	0	0	37	13	0	*50*	0	11	0	36	0	*47*	0	2	22	0	0	*24*	0	0	0	0	0	*0*	**121**
Hourly Total	0	0	181	99	0	*280*	0	43	0	147	0	*190*	0	14	126	0	0	*140*	0	0	0	0	0	*0*	**610**
1:00 PM	0	0	40	23	0	*63*	0	5	0	42	0	*47*	0	8	23	0	0	*31*	0	0	0	0	0	*0*	**141**
1:15 PM	0	0	53	20	0	*73*	0	9	1	35	0	*45*	0	5	36	0	0	*41*	0	0	0	0	0	*0*	**159**
1:30 PM	0	0	50	24	0	*74*	0	9	0	47	0	*56*	0	4	37	0	0	*41*	0	0	0	0	0	*0*	**171**
1:45 PM	0	0	43	27	0	*70*	0	9	0	38	0	*47*	0	5	48	0	0	*53*	0	0	0	0	0	*0*	**170**
Hourly Total	0	0	186	94	0	*280*	0	32	1	162	0	*195*	0	22	144	0	0	*166*	0	0	0	0	0	*0*	**641**
2:00 PM	0	0	40	27	0	*67*	0	5	0	40	0	*45*	0	3	15	0	0	*18*	0	0	0	0	0	*0*	**130**
2:15 PM	0	0	36	29	0	*65*	0	7	0	41	0	*48*	0	4	31	0	0	*35*	0	0	0	0	0	*0*	**148**
2:30 PM	0	0	45	50	0	*95*	0	1	1	56	0	*58*	0	4	34	0	0	*38*	0	0	0	0	0	*0*	**191**
2:45 PM	0	0	30	32	0	*62*	0	7	0	48	0	*55*	2	2	45	0	0	*49*	0	0	0	0	0	*0*	**166**
Hourly Total	0	0	151	138	0	*289*	0	20	1	185	0	*206*	2	13	125	0	0	*140*	0	0	0	0	0	*0*	**635**
3:00 PM	0	0	26	42	0	*68*	0	7	0	63	0	*70*	0	5	39	0	0	*44*	0	0	0	0	0	*0*	**182**
3:15 PM	0	0	38	48	0	*86*	0	9	0	63	0	*72*	0	5	51	0	0	*56*	0	0	0	0	0	*0*	**214**
3:30 PM	0	0	63	58	0	*121*	0	3	0	61	0	*64*	1	7	47	0	0	*55*	0	0	0	0	0	*0*	**240**
3:45 PM	0	0	53	47	0	*100*	0	7	2	78	0	*87*	0	1	51	0	0	*52*	0	0	0	0	0	*0*	**239**
Hourly Total	0	0	180	195	0	*375*	0	26	2	265	0	*293*	1	18	188	0	0	*207*	0	0	0	0	0	*0*	**875**

04 HWY 10 North Ramps and Armstorng Blvd
Ramsey MN
Wednesday, October 14, 2020

Time	Southbound Armstrong Blvd						Westbound HWY 10 Off Ramp						Northbound Armstrong Blvd						Eastbound HWY 10 On Ramp						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:00 PM	0	0	38	70	0	*108*	0	5	0	51	0	*56*	0	6	48	0	0	*54*	0	0	0	0	0	*0*	**218**
4:15 PM	0	0	32	60	0	*92*	0	6	0	66	0	*72*	0	7	56	0	0	*63*	0	0	0	0	0	*0*	**227**
4:30 PM	0	0	76	73	0	*149*	0	6	0	77	0	*83*	1	11	54	0	0	*66*	0	0	0	0	0	*0*	**298**
4:45 PM	0	0	55	66	0	*121*	0	3	0	94	0	*97*	0	4	80	0	0	*84*	0	0	0	0	0	*0*	**302**
Hourly Total	0	0	201	269	0	*470*	0	20	0	288	0	*308*	1	28	238	0	0	*267*	0	0	0	0	0	*0*	**1045**
5:00 PM	0	0	50	62	0	*112*	0	4	0	74	0	*78*	0	11	57	0	0	*68*	0	0	0	0	0	*0*	**258**
5:15 PM	0	0	47	36	0	*83*	0	3	1	86	0	*90*	1	5	69	0	0	*75*	0	0	0	0	0	*0*	**248**
5:30 PM	0	0	46	47	0	*93*	0	5	2	83	0	*90*	0	5	63	0	0	*68*	0	0	0	0	0	*0*	**251**
5:45 PM	0	0	56	38	0	*94*	0	3	0	57	0	*60*	0	4	58	0	0	*62*	0	0	0	0	0	*0*	**216**
Hourly Total	0	0	199	183	0	*382*	0	15	3	300	0	*318*	1	25	247	0	0	*273*	0	0	0	0	0	*0*	**973**
6:00 PM	0	0	58	43	0	*101*	0	10	0	57	0	*67*	0	5	31	0	0	*36*	0	0	0	0	0	*0*	**204**
6:15 PM	0	0	34	44	0	*78*	0	3	0	53	0	*56*	0	1	41	0	0	*42*	0	0	0	0	0	*0*	**176**
6:30 PM	0	0	28	22	0	*50*	0	3	0	55	0	*58*	0	2	31	0	0	*33*	0	0	0	0	0	*0*	**141**
6:45 PM	0	0	22	24	0	*46*	0	4	1	33	0	*38*	0	0	30	0	0	*30*	0	0	0	0	0	*0*	**114**
Hourly Total	0	0	142	133	0	*275*	0	20	1	198	0	*219*	0	8	133	0	0	*141*	0	0	0	0	0	*0*	**635**
7:00 PM	0	0	12	29	0	*41*	0	2	0	43	0	*45*	0	2	37	0	0	*39*	0	0	0	0	0	*0*	**125**
7:15 PM	0	0	32	13	0	*45*	0	2	0	39	0	*41*	0	2	17	0	0	*19*	0	0	0	0	0	*0*	**105**
7:30 PM	0	0	27	21	0	*48*	0	2	0	35	0	*37*	0	0	19	0	0	*19*	0	0	0	0	0	*0*	**104**
7:45 PM	0	0	20	8	0	*28*	0	2	0	32	0	*34*	0	1	26	0	0	*27*	0	0	0	0	0	*0*	**89**
Hourly Total	0	0	91	71	0	*162*	0	8	0	149	0	*157*	0	5	99	0	0	*104*	0	0	0	0	0	*0*	**423**
8:00 PM	0	0	14	28	0	*42*	0	2	1	23	0	*26*	0	1	18	0	0	*19*	0	0	0	0	0	*0*	**87**
8:15 PM	0	0	12	13	0	*25*	0	3	1	19	0	*23*	0	0	10	0	0	*10*	0	0	0	0	0	*0*	**58**
8:30 PM	0	0	11	10	0	*21*	0	1	0	22	0	*23*	0	0	12	0	0	*12*	0	0	0	0	0	*0*	**56**
8:45 PM	0	0	10	5	0	*15*	0	0	0	22	0	*22*	0	2	12	0	0	*14*	0	0	0	0	0	*0*	**51**
Hourly Total	0	0	47	56	0	*103*	0	6	2	86	0	*94*	0	3	52	0	0	*55*	0	0	0	0	0	*0*	**252**
9:00 PM	0	0	9	4	0	*13*	0	0	1	26	0	*27*	0	3	7	0	0	*10*	0	0	0	0	0	*0*	**50**
9:15 PM	0	0	2	4	0	*6*	0	0	0	21	0	*21*	0	0	9	0	0	*9*	0	0	0	0	0	*0*	**36**
9:30 PM	0	0	12	9	0	*21*	0	1	0	13	0	*14*	0	0	6	0	0	*6*	0	0	0	0	0	*0*	**41**
9:45 PM	0	0	13	3	0	*16*	0	0	0	19	0	*19*	0	0	7	0	0	*7*	0	0	0	0	0	*0*	**42**
Hourly Total	0	0	36	20	0	*56*	0	1	1	79	0	*81*	0	3	29	0	0	*32*	0	0	0	0	0	*0*	**169**
10:00 PM	0	0	5	4	0	*9*	0	0	0	10	0	*10*	0	0	5	0	0	*5*	0	0	0	0	0	*0*	**24**
10:15 PM	0	0	8	0	0	*8*	0	0	0	9	0	*9*	0	1	5	0	0	*6*	0	0	0	0	0	*0*	**23**
10:30 PM	0	0	3	3	0	*6*	0	0	0	13	0	*13*	0	0	4	0	0	*4*	0	0	0	0	0	*0*	**23**
10:45 PM	0	0	4	2	0	*6*	0	0	0	8	0	*8*	0	0	4	0	0	*4*	0	0	0	0	0	*0*	**18**
Hourly Total	0	0	20	9	0	*29*	0	0	0	40	0	*40*	0	1	18	0	0	*19*	0	0	0	0	0	*0*	**88**
11:00 PM	0	0	5	1	0	*6*	0	0	0	4	0	*4*	0	0	2	0	0	*2*	0	0	0	0	0	*0*	**12**
11:15 PM	0	0	5	1	0	*6*	0	1	0	5	0	*6*	0	0	7	0	0	*7*	0	0	0	0	0	*0*	**19**
11:30 PM	0	0	3	1	0	*4*	0	0	0	10	0	*10*	0	0	2	0	0	*2*	0	0	0	0	0	*0*	**16**
11:45 PM	0	0	4	2	0	*6*	0	0	0	2	0	*2*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**9**
Hourly Total	0	0	17	5	0	*22*	0	1	0	21	0	*22*	0	0	12	0	0	*12*	0	0	0	0	0	*0*	**56**
DAILY TOTAL	**1**	**0**	**2938**	**1876**	**0**	***4815***	**0**	**321**	**17**	**2634**	**0**	***2972***	**6**	**203**	**2367**	**0**	**0**	***2576***	**0**	**0**	**0**	**0**	**0**	***0***	**10363**
Cars	1	0	2846	1843	0	*4690*	0	300	12	2531	0	*2843*	6	199	2321	0	0	*2526*	0	0	0	0	0	*0*	**10059**
Heavy Vehicles	0	0	92	33	0	*125*	0	21	5	103	0	*129*	0	4	46	0	0	*50*	0	0	0	0	0	*0*	**304**
Heavy Vehicle %	0.00%	0.00%	3.13%	1.76%	0.00%	*2.60%*	0.00%	6.54%	29.41%	3.91%	0.00%	*4.34%*	0.00%	1.97%	1.94%	0.00%	0.00%	*1.94%*	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*	**2.93%**

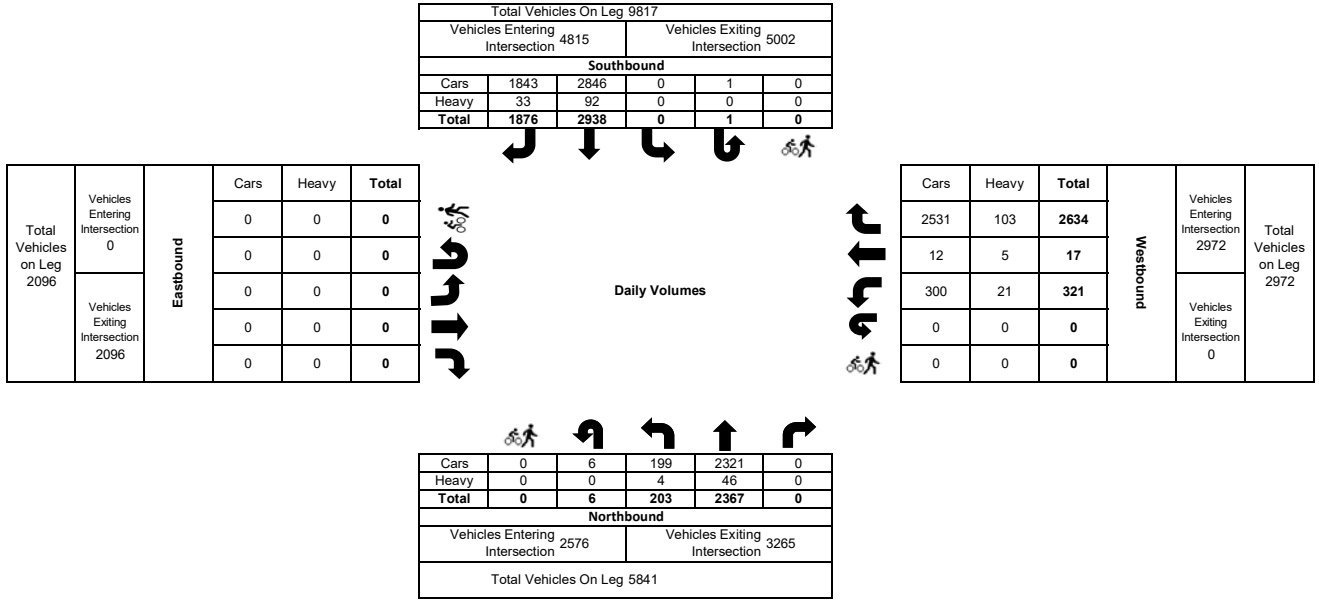
04 HWY 10 North Ramps and Armstorng Blvd
Ramsey MN
Wednesday, October 14, 2020

AM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
7:15 AM	0	0	62	21	0	*83*	0	3	0	27	0	*30*	0	2	79	0	0	*81*	0	0	0	0	0	*0*	**194**
7:30 AM	1	0	71	30	0	*102*	0	6	1	30	0	*37*	0	6	81	0	0	*87*	0	0	0	0	0	*0*	**226**
7:45 AM	0	0	64	19	0	*83*	0	8	0	53	0	*61*	0	1	86	0	0	*87*	0	0	0	0	0	*0*	**231**
8:00 AM	0	0	51	27	0	*78*	0	8	1	35	0	*44*	0	2	34	0	0	*36*	0	0	0	0	0	*0*	**158**
Peak Hour Total	1	0	248	97	0	*346*	0	25	2	145	0	*172*	0	11	280	0	0	*291*	0	0	0	0	0	*0*	**809**
PHF	0.250	0.000	0.873	0.808	0.000	*0.848*	0.000	0.781	0.500	0.684	0.000	*0.705*	0.000	0.458	0.814	0.000	0.000	*0.836*	0.000	0.000	0.000	0.000	0.000	*0.000*	**0.876**

PM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:30 PM	0	0	76	73	0	*149*	0	6	0	77	0	*83*	1	11	54	0	0	*66*	0	0	0	0	0	*0*	**298**
4:45 PM	0	0	55	66	0	*121*	0	3	0	94	0	*97*	0	4	80	0	0	*84*	0	0	0	0	0	*0*	**302**
5:00 PM	0	0	50	62	0	*112*	0	4	0	74	0	*78*	0	11	57	0	0	*68*	0	0	0	0	0	*0*	**258**
5:15 PM	0	0	47	36	0	*83*	0	3	1	86	0	*90*	1	5	69	0	0	*75*	0	0	0	0	0	*0*	**248**
Peak Hour Total	0	0	228	237	0	*465*	0	16	1	331	0	*348*	2	31	260	0	0	*293*	0	0	0	0	0	*0*	**1106**
PHF	0.000	0.000	0.750	0.812	0.000	*0.780*	0.000	0.667	0.250	0.880	0.000	*0.897*	0.500	0.705	0.813	0.000	0.000	*0.872*	0.000	0.000	0.000	0.000	0.000	*0.000*	**0.916**



04 HWY 10 North Ramps and Armstorng Blvd
Ramsey MN
Thursday, October 15, 2020

Time	Southbound Armstrong Blvd						Westbound HWY 10 Off Ramp						Northbound Armstrong Blvd						Eastbound HWY 10 On Ramp						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
12:00 AM	0	0	0	0	0	*0*	0	0	0	4	0	*4*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**5**
12:15 AM	0	0	3	1	0	*4*	0	0	0	9	0	*9*	1	0	3	0	0	*4*	0	0	0	0	0	*0*	**17**
12:30 AM	0	0	3	2	0	*5*	0	0	0	5	0	*5*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**11**
12:45 AM	0	0	3	0	0	*3*	0	0	0	6	0	*6*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**10**
Hourly Total	0	0	9	3	0	*12*	0	0	0	24	0	*24*	1	0	6	0	0	*7*	0	0	0	0	0	*0*	**43**
1:00 AM	0	0	3	0	0	*3*	0	0	0	3	0	*3*	0	0	2	0	0	*2*	0	0	0	0	0	*0*	**8**
1:15 AM	0	0	1	0	0	*1*	0	0	0	4	0	*4*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**6**
1:30 AM	0	0	0	2	0	*2*	0	1	0	2	0	*3*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**5**
1:45 AM	0	0	5	0	0	*5*	0	0	0	1	0	*1*	0	0	3	0	0	*3*	0	0	0	0	0	*0*	**9**
Hourly Total	0	0	9	2	0	*11*	0	1	0	10	0	*11*	0	0	6	0	0	*6*	0	0	0	0	0	*0*	**28**
2:00 AM	0	0	1	0	0	*1*	0	0	0	2	0	*2*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**4**
2:15 AM	0	0	1	0	0	*1*	0	1	0	5	0	*6*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**8**
2:30 AM	0	0	0	1	0	*1*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**2**
2:45 AM	0	0	1	0	0	*1*	0	0	0	3	0	*3*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**5**
Hourly Total	0	0	3	1	0	*4*	0	1	0	11	0	*12*	0	0	3	0	0	*3*	0	0	0	0	0	*0*	**19**
3:00 AM	0	0	5	2	0	*7*	0	0	0	1	0	*1*	0	1	0	0	0	*1*	0	0	0	0	0	*0*	**9**
3:15 AM	0	0	4	3	0	*7*	0	0	0	2	0	*2*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**10**
3:30 AM	0	0	7	4	0	*11*	0	1	0	2	0	*3*	0	0	1	0	0	*1*	0	0	0	0	0	*0*	**15**
3:45 AM	0	0	9	0	0	*9*	0	0	0	1	0	*1*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**10**
Hourly Total	0	0	25	9	0	*34*	0	1	0	6	0	*7*	0	1	2	0	0	*3*	0	0	0	0	0	*0*	**44**
4:00 AM	0	0	10	3	0	*13*	0	1	0	1	0	*2*	0	0	3	0	0	*3*	0	0	0	0	0	*0*	**18**
4:15 AM	0	0	14	1	0	*15*	0	0	0	0	0	*0*	0	1	3	0	0	*4*	0	0	0	0	0	*0*	**19**
4:30 AM	0	0	25	6	0	*31*	0	0	0	1	0	*1*	0	2	4	0	0	*6*	0	0	0	0	0	*0*	**38**
4:45 AM	0	0	19	1	0	*20*	0	0	0	1	0	*1*	0	0	6	0	0	*6*	0	0	0	0	0	*0*	**27**
Hourly Total	0	0	68	11	0	*79*	0	1	0	3	0	*4*	0	3	16	0	0	*19*	0	0	0	0	0	*0*	**102**
5:00 AM	0	0	23	7	0	*30*	0	0	0	3	0	*3*	0	1	10	0	0	*11*	0	0	0	0	0	*0*	**44**
5:15 AM	0	0	34	9	0	*43*	0	1	0	3	0	*4*	0	0	16	0	0	*16*	0	0	0	0	0	*0*	**63**
5:30 AM	0	0	51	18	0	*69*	0	1	0	7	0	*8*	0	1	29	0	0	*30*	0	0	0	0	0	*0*	**107**
5:45 AM	0	0	38	5	0	*43*	0	0	0	10	0	*10*	0	0	37	0	0	*37*	0	0	0	0	0	*0*	**90**
Hourly Total	0	0	146	39	0	*185*	0	2	0	23	0	*25*	0	2	92	0	0	*94*	0	0	0	0	0	*0*	**304**
6:00 AM	0	0	52	13	0	*65*	0	3	0	16	0	*19*	0	1	20	0	0	*21*	0	0	0	0	0	*0*	**105**
6:15 AM	0	0	67	17	0	*84*	0	3	0	17	0	*20*	0	0	27	0	0	*27*	0	0	0	0	0	*0*	**131**
6:30 AM	0	0	81	20	0	*101*	0	1	0	19	0	*20*	0	1	35	0	0	*36*	0	0	0	0	0	*0*	**157**
6:45 AM	0	0	45	22	0	*67*	0	1	1	32	0	*34*	0	2	57	0	0	*59*	0	0	0	0	0	*0*	**160**
Hourly Total	0	0	245	72	0	*317*	0	8	1	84	0	*93*	0	4	139	0	0	*143*	0	0	0	0	0	*0*	**553**
7:00 AM	0	0	63	24	0	*87*	0	4	0	12	0	*16*	0	0	43	0	0	*43*	0	0	0	0	0	*0*	**146**
7:15 AM	0	0	55	26	0	*81*	0	2	0	23	1	*25*	0	2	40	0	0	*42*	0	0	0	0	0	*0*	**148**
7:30 AM	0	0	65	25	0	*90*	0	4	1	22	0	*27*	0	2	41	0	0	*43*	0	0	0	0	0	*0*	**160**
7:45 AM	0	0	44	19	0	*63*	0	5	0	35	0	*40*	0	1	48	0	0	*49*	0	0	0	0	0	*0*	**152**
Hourly Total	0	0	227	94	0	*321*	0	15	1	92	1	*108*	0	5	172	0	0	*177*	0	0	0	0	0	*0*	**606**

04 HWY 10 North Ramps and Armstorng Blvd
Ramsey MN
Thursday, October 15, 2020

Time	Southbound Armstrong Blvd						Westbound HWY 10 Off Ramp						Northbound Armstrong Blvd						Eastbound HWY 10 On Ramp						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
8:00 AM	0	0	63	25	0	*88*	0	4	1	43	0	*48*	0	3	30	0	0	*33*	0	0	0	0	0	*0*	**169**
8:15 AM	0	0	50	18	0	*68*	0	9	0	22	0	*31*	1	6	24	0	0	*31*	0	0	0	0	0	*0*	**130**
8:30 AM	0	0	40	17	0	*57*	0	8	0	21	0	*29*	0	4	22	0	0	*26*	0	0	0	0	0	*0*	**112**
8:45 AM	0	0	36	20	0	*56*	0	8	0	29	1	*37*	0	2	27	0	0	*29*	0	0	0	0	0	*0*	**122**
Hourly Total	0	0	189	80	0	*269*	0	29	1	115	1	*145*	1	15	103	0	0	*119*	0	0	0	0	0	*0*	**533**
9:00 AM	0	0	37	22	0	*59*	0	6	0	22	0	*28*	0	2	13	0	0	*15*	0	0	0	0	0	*0*	**102**
9:15 AM	0	0	44	28	0	*72*	0	7	0	24	0	*31*	0	7	23	0	0	*30*	0	0	0	0	0	*0*	**133**
9:30 AM	0	0	34	26	0	*60*	0	6	0	21	0	*27*	0	5	15	0	0	*20*	0	0	0	0	0	*0*	**107**
9:45 AM	0	0	56	26	0	*82*	0	7	0	27	0	*34*	0	3	30	0	0	*33*	0	0	0	0	0	*0*	**149**
Hourly Total	0	0	171	102	0	*273*	0	26	0	94	0	*120*	0	17	81	0	0	*98*	0	0	0	0	0	*0*	**491**
10:00 AM	0	0	35	18	0	*53*	0	6	0	25	1	*31*	0	3	20	0	0	*23*	0	0	0	0	0	*0*	**107**
10:15 AM	0	0	43	31	0	*74*	0	9	1	30	0	*40*	0	7	27	0	0	*34*	0	0	0	0	0	*0*	**148**
10:30 AM	0	0	41	31	0	*72*	0	7	1	24	0	*32*	0	5	25	0	0	*30*	0	0	0	0	0	*0*	**134**
10:45 AM	0	0	35	24	0	*59*	0	7	0	30	0	*37*	0	2	34	0	0	*36*	0	0	0	0	0	*0*	**132**
Hourly Total	0	0	154	104	0	*258*	0	29	2	109	1	*140*	0	17	106	0	0	*123*	0	0	0	0	0	*0*	**521**
11:00 AM	0	0	46	32	0	*78*	0	12	0	42	0	*54*	1	5	25	0	0	*31*	0	0	0	0	0	*0*	**163**
11:15 AM	0	0	35	26	0	*61*	0	4	0	38	0	*42*	0	0	29	0	0	*29*	0	0	0	0	0	*0*	**132**
11:30 AM	0	0	32	25	0	*57*	0	5	0	51	0	*56*	0	10	33	0	0	*43*	0	0	0	0	0	*0*	**156**
11:45 AM	0	0	32	29	0	*61*	0	7	0	36	0	*43*	0	5	23	0	0	*28*	0	0	0	0	0	*0*	**132**
Hourly Total	0	0	145	112	0	*257*	0	28	0	167	0	*195*	1	20	110	0	0	*131*	0	0	0	0	0	*0*	**583**
12:00 PM	0	0	52	30	0	*82*	0	10	0	42	0	*52*	0	5	31	0	0	*36*	0	0	0	0	0	*0*	**170**
12:15 PM	0	0	41	31	0	*72*	0	9	0	51	1	*60*	0	2	34	0	0	*36*	0	0	0	0	0	*0*	**168**
12:30 PM	0	0	47	34	0	*81*	0	15	0	39	0	*54*	0	5	35	0	0	*40*	0	0	0	0	0	*0*	**175**
12:45 PM	0	0	41	28	0	*69*	0	8	0	46	0	*54*	0	10	34	0	0	*44*	0	0	0	0	0	*0*	**167**
Hourly Total	0	0	181	123	0	*304*	0	42	0	178	1	*220*	0	22	134	0	0	*156*	0	0	0	0	0	*0*	**680**
1:00 PM	0	0	40	36	0	*76*	0	10	0	38	0	*48*	0	2	25	0	0	*27*	0	0	0	0	0	*0*	**151**
1:15 PM	0	0	36	20	0	*56*	0	7	0	46	0	*53*	0	1	27	0	0	*28*	0	0	0	0	0	*0*	**137**
1:30 PM	0	0	30	23	0	*53*	0	3	0	45	0	*48*	0	5	28	0	0	*33*	0	0	0	0	0	*0*	**134**
1:45 PM	0	0	48	34	0	*82*	0	9	0	63	0	*72*	0	3	28	0	0	*31*	0	0	0	0	0	*0*	**185**
Hourly Total	0	0	154	113	0	*267*	0	29	0	192	0	*221*	0	11	108	0	0	*119*	0	0	0	0	0	*0*	**607**
2:00 PM	0	0	45	23	0	*68*	0	9	1	47	0	*57*	0	8	28	0	0	*36*	0	0	0	0	0	*0*	**161**
2:15 PM	0	0	36	32	0	*68*	0	7	0	50	0	*57*	0	5	38	0	0	*43*	0	0	0	0	0	*0*	**168**
2:30 PM	1	0	26	44	0	*71*	0	7	0	44	0	*51*	0	4	41	0	0	*45*	0	0	0	0	0	*0*	**167**
2:45 PM	0	0	35	46	0	*81*	0	12	0	66	0	*78*	0	2	37	0	0	*39*	0	0	0	0	0	*0*	**198**
Hourly Total	1	0	142	145	0	*288*	0	35	1	207	0	*243*	0	19	144	0	0	*163*	0	0	0	0	0	*0*	**694**
3:00 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**
3:15 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**
3:30 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**
3:45 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**
Hourly 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 HWY 10 North Ramps and Armstorng Blvd
Ramsey MN
Thursday, October 15, 2020

Time	Southbound Armstrong Blvd						Westbound HWY 10 Off Ramp						Northbound Armstrong Blvd						Eastbound HWY 10 On Ramp						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:00 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**
4:15 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**
4:30 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**
4:45 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**
Hourly 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**
5:00 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**
5:15 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**
5:30 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**
5:45 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**
Hourly 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**
6:00 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**
6:15 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**
6:30 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**
6:45 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**
Hourly 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**
7:00 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**
7:15 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**
7:30 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**
7:45 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**
Hourly 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**
8:00 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**
8:15 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**
8:30 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**
8:45 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**
Hourly 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**
9:00 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**
9:15 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**
9:30 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**
9:45 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**
Hourly 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**
Hourly 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**
Hourly 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**
DAILY TOTAL	**1**	**0**	**1868**	**1010**	**0**	***2879***	**0**	**247**	**6**	**1315**	**4**	***1568***	**3**	**136**	**1222**	**0**	**0**	***1361***	**0**	**0**	**0**	**0**	**0**	***0***	**5808**
Cars	1	0	1797	979	0	*2777*	0	222	3	1240	3	*1465*	3	128	1193	0	0	*1324*	0	0	0	0	0	*0*	**5566**
Heavy Vehicles	0	0	71	31	0	*102*	0	25	3	75	1	*103*	0	8	29	0	0	*37*	0	0	0	0	0	*0*	**242**
Heavy Vehicle %	0.00%	0.00%	3.80%	3.07%	0.00%	*3.54%*	0.00%	10.12%	50.00%	5.70%	25.00%	*6.57%*	0.00%	5.88%	2.37%	0.00%	0.00%	*2.72%*	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*	**4.17%**

04 HWY 10 North Ramps and Armstorng Blvd
Ramsey MN
Thursday, October 15, 2020

AM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
7:15 AM	0	0	55	26	0	*81*	0	2	0	23	1	*25*	0	2	40	0	0	*42*	0	0	0	0	0	*0*	**148**
7:30 AM	0	0	65	25	0	*90*	0	4	1	22	0	*27*	0	2	41	0	0	*43*	0	0	0	0	0	*0*	**160**
7:45 AM	0	0	44	19	0	*63*	0	5	0	35	0	*40*	0	1	48	0	0	*49*	0	0	0	0	0	*0*	**152**
8:00 AM	0	0	63	25	0	*88*	0	4	1	43	0	*48*	0	3	30	0	0	*33*	0	0	0	0	0	*0*	**169**
Peak Hour Total	0	0	227	95	0	*322*	0	15	2	123	1	*140*	0	8	159	0	0	*167*	0	0	0	0	0	*0*	**629**
PHF	0.000	0.000	0.873	0.913	0.000	*0.894*	0.000	0.750	0.500	0.715	0.250	*0.729*	0.000	0.667	0.828	0.000	0.000	*0.852*	0.000	0.000	0.000	0.000	0.000	*0.000*	**0.930**

PM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
2:00 PM	0	0	45	23	0	*68*	0	9	1	47	0	*57*	0	8	28	0	0	*36*	0	0	0	0	0	*0*	**161**
2:15 PM	0	0	36	32	0	*68*	0	7	0	50	0	*57*	0	5	38	0	0	*43*	0	0	0	0	0	*0*	**168**
2:30 PM	1	0	26	44	0	*71*	0	7	0	44	0	*51*	0	4	41	0	0	*45*	0	0	0	0	0	*0*	**167**
2:45 PM	0	0	35	46	0	*81*	0	12	0	66	0	*78*	0	2	37	0	0	*39*	0	0	0	0	0	*0*	**198**
Peak Hour Total	1	0	142	145	0	*288*	0	35	1	207	0	*243*	0	19	144	0	0	*163*	0	0	0	0	0	*0*	**694**
PHF	0.250	0.000	0.789	0.788	0.000	*0.889*	0.000	0.729	0.250	0.784	0.000	*0.779*	0.000	0.594	0.878	0.000	0.000	*0.906*	0.000	0.000	0.000	0.000	0.000	*0.000*	**0.876**

Total Vehicles On Leg 5417					
Vehicles Entering Intersection 2879			Vehicles Exiting Intersection 2538		
Southbound					
Cars	979	1797	0	1	0
Heavy	31	71	0	0	0
Total	**1010**	**1868**	**0**	**1**	**0**

Total Vehicles on Leg 1152	Vehicles Entering Intersection 0	**Eastbound**	Cars	Heavy	**Total**
			0	0	**0**
			0	0	**0**
	Vehicles Exiting Intersection 1152		0	0	**0**
			0	0	**0**
			0	0	**0**

Daily Volumes

Cars	Heavy	**Total**	**Westbound**	Vehicles Entering Intersection 1568	Total Vehicles on Leg 1568
1240	75	**1315**			
3	3	**6**			
222	25	**247**		Vehicles Exiting Intersection 0	
0	0	**0**			
3	1	**4**			

Cars	0	3	128	1193	0
Heavy	0	0	8	29	0
Total	**0**	**3**	**136**	**1222**	**0**
Northbound					
Vehicles Entering Intersection 1361			Vehicles Exiting Intersection 2118		
Total Vehicles On Leg 3479					

Spack SOLUTIONS

Forecast Trip Generation - ITE

Gross Volumes

LAND USE	ITE CODE #	DEVELOPMENT UNITS	QUANTITY	DAILY			AM PEAK HOUR			PM PEAK HOUR		
				TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT
Single Family Detached Housing	210	DU	165.0	1,558	779	779	122	31	92	163	103	60
Single Family Detached Housing	210	DU	78.0	736	368	368	58	14	43	77	49	29
TOTAL				2294	1147	1147	180	45	135	241	152	89

Trips After Internal Reductions

LAND USE	ITE CODE #	DEVELOPMENT UNITS	QUANTITY	DAILY			AM PEAK HOUR			PM PEAK HOUR		
				TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT
Single Family Detached Housing	210	DU	165.0	1,558	779	779	122	31	92	163	103	60
Single Family Detached Housing	210	DU	78.0	736	368	368	58	14	43	77	49	29
TOTAL				2294	1147	1147	180	45	135	241	152	89

Internal Reduction
0.00%
0.00%
0.00%
0.00%
0.00%
0.00%
0.00%

Trips After Internal & Pass-By Reductions (Net New)

LAND USE	ITE CODE #	DEVELOPMENT UNITS	QUANTITY	DAILY			AM PEAK HOUR			PM PEAK HOUR		
				TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT
Single Family Detached Housing	210	DU	165.0	1,558	779	779	122	31	92	163	103	60
Single Family Detached Housing	210	DU	78.0	736	368	368	58	14	43	77	49	29
TOTAL				2294	1147	1147	180	45	135	241	152	89

NOTES:

1. KSF2 = 1,000 square feet. DU = dwelling units. VFP = Vehicle Fueling Positions, the number of vehicles able to fill at one time.
2. All trip generation rates based on "Trip Generation", Institute of Transportation Engineers, 10th Edition unless otherwise noted.
3. Reduction for pass-by and internal trips are based on "Trip Generation Handbook", Institute of Transportation Engineers, 3rd Edition.
4. A.M. Trip Generation is for the peak hour of adjacent street traffic (one hour between 7 and 9 a.m.).
5. P.M. Trip Generation is for the peak hour of adjacent street traffic (one hour between 4 and 6 p.m.).

Spack SOLUTIONS

Forecast Trip Generation - Local

Gross Volumes

LAND USE	DEVELOPMENT UNITS	QUANTITY	DAILY			AM PEAK HOUR			PM PEAK HOUR		
			TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT
Single Family Detached Housing	Units	165.0	1,487	744	744	104	29	75	145	83	62
Townhomes	Units	78.0	423	212	212	36	9	27	41	26	15
TOTAL			1910	956	956	140	38	102	186	109	77

Trips After Internal Reductions

LAND USE	DEVELOPMENT UNITS	QUANTITY	DAILY			AM PEAK HOUR			PM PEAK HOUR		
			TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT
Single Family Detached Housing	Units	165.0	1,487	744	744	104	29	75	145	83	62
Townhomes	Units	78.0	423	212	212	36	9	27	41	26	15
TOTAL			1910	956	956	140	38	102	186	109	77

Internal Reduction
0.00%
0.00%
0.00%
0.00%
0.00%
0.00%
0.00%

Trips After Internal & Pass-By Reductions (Net New)

LAND USE	DEVELOPMENT UNITS	QUANTITY	DAILY			AM PEAK HOUR			PM PEAK HOUR		
			TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT
Single Family Detached Housing	Units	165.0	1,487	744	744	104	29	75	145	83	62
Townhomes	Units	78.0	423	212	212	36	9	27	41	26	15
TOTAL			1910	956	956	140	38	102	186	109	77

NOTES:

1. KSF2 = 1,000 square feet. DU = dwelling units. VFP = Vehicle Fueling Positions, the number of vehicles able to fill at one time.
2. All trip generation rates based on data collected by Spack Solutions unless otherwise noted.
3. Reduction for pass-by and internal trips are based on "Trip Generation Handbook", Institute of Transportation Engineers, 3rd Edition.
4. A.M. Trip Generation is for the peak hour of adjacent street traffic (one hour between 7 and 9 a.m.).
5. P.M. Trip Generation is for the peak hour of adjacent street traffic (one hour between 4 and 6 p.m.).

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

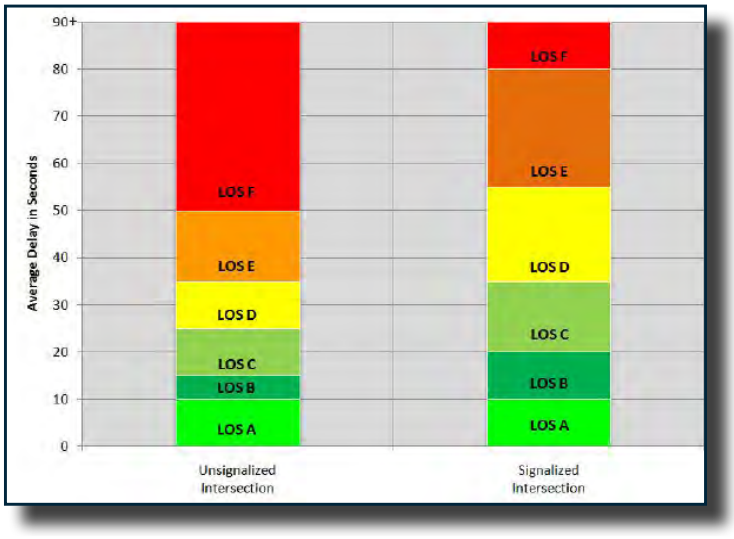
- **Number of Lanes.**
- **Traffic Volumes.**
- **Intersection Control (stop sign, signal, roundabout, interchange.)**
- **Amount of access on a corridor.**
- **Percentage of turning traffic.**
- **Traffic signal cycle length (green time devoted to each approach) and phasing (one green for all approach 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



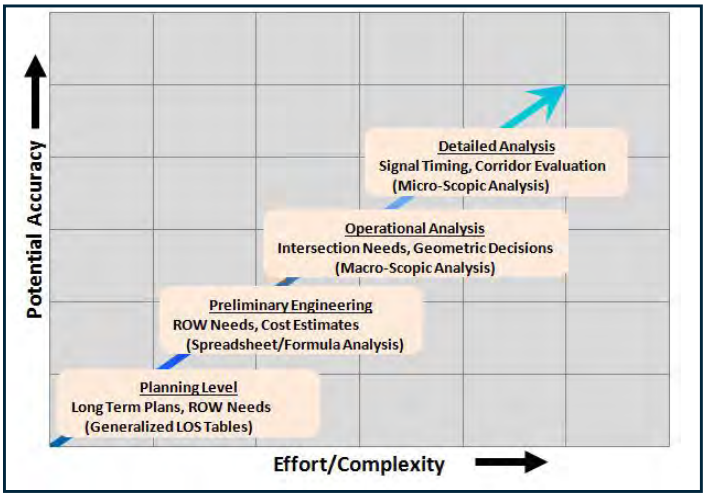
LOS F = Unacceptable

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 Solutions 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@spacksolutions.com. And please reach out if you have any comments or questions related to this Design Brief.

Vistro File: C:\...\Ramsey Model.vistro
Report File: C:\...\Exist AM.pdf

Scenario 1 AM Exist
11/9/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	HWY 10 and Bowers Drive	Two-way stop	HCM 6th Edition	NB Left	0.160	130.3	F
2	Riverdale Drive and Llama Street	Two-way stop	HCM 6th Edition	WB Left	0.004	7.2	A
3	Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp	Two-way stop	HCM 6th Edition	NWB Thru	0.007	11.1	B
4	Armstrong Boulevard and WB Hwy 10 Ramp	Signalized	HCM 6th Edition	NB Left	0.144	10.3	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 1: HWY 10 and Bowers Drive

Control Type:	Two-way stop	Delay (sec / veh):	130.3
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.160

Intersection Setup

Name								
Approach	Northbound		Eastbound			Westbound		
Lane Configuration								
Turning Movement	Left	Right	U-turn	Thru	Right	U-turn	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	1	1	0	0
Entry Pocket Length [ft]	100.00	100.00	325.00	100.00	225.00	360.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		65.00			65.00		
Grade [%]	0.00		0.00			0.00		
Crosswalk	Yes		Yes			Yes		

Volumes

Name								
Base Volume Input [veh/h]	5	16	1	1736	2	0	4	895
Base Volume Adjustment Factor	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
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	16	1	1736	2	0	4	895
Peak Hour Factor	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	4	0	458	1	0	1	236
Total Analysis Volume [veh/h]	5	17	1	1833	2	0	4	945
Pedestrian Volume [ped/h]	0		0			0		

Appendix F - 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	0.16	0.06	0.00	0.02	0.00	0.00	0.01	0.01
d_M, Delay for Movement [s/veh]	130.31	28.19	18.22	0.00	0.00	62.20	16.10	0.00
Movement LOS	F	D	C	A	A	F	C	A
95th-Percentile Queue Length [veh/ln]	0.79	0.79	0.01	0.00	0.00	0.04	0.04	0.00
95th-Percentile Queue Length [ft/ln]	19.78	19.78	0.28	0.00	0.00	0.92	0.92	0.00
d_A, Approach Delay [s/veh]	51.40		0.01			0.07		
Approach LOS	F		A			A		
d_I, Intersection Delay [s/veh]	0.43							
Intersection LOS	F							

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Intersection Level Of Service Report
Intersection 2: Riverdale Drive and Llama Street

Control Type:	Two-way stop	Delay (sec / veh):	7.2
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

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 Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry 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
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	0	0	0	0	0	0	6	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 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
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	0	0	0	0	0	0	6	0	0
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	0	0	0	0	0	2	0	0
Total Analysis Volume [veh/h]	0	0	0	0	0	0	0	0	0	7	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

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]	8.60	9.11	8.32	8.60	9.11	8.32	7.22	0.00	0.00	7.23	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.32	0.32
d_A, Approach Delay [s/veh]	8.68			8.68			2.41			7.23		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	7.23											
Intersection LOS	A											

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Intersection Level Of Service Report
Intersection 3: Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp

Control Type:	Two-way stop	Delay (sec / veh):	11.1
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.007

Intersection Setup

Name												
Approach	Southbound				Northeastbound				Southwestbound			
Lane Configuration												
Turning Movement	Left	Thru	Right	Right	Left	Left	Thru	Right	Left	Thru	Right	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 Entry Pocket	0	0	0	0	1	0	0	1	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	300.00	100.00	100.00	300.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00				35.00				35.00			
Grade [%]	0.00				0.00				0.00			
Crosswalk	Yes				Yes				Yes			

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	0	1	0	2	1	18	13	0	243
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 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
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	0	1	0	2	1	18	13	0	243
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	0.9430	1.0000	0.9430	0.9430	0.9430	0.9430	1.0000	0.9430
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	0	0	1	0	5	3	0	64
Total Analysis Volume [veh/h]	0	0	0	0	1	0	2	1	19	14	0	258
Pedestrian Volume [ped/h]	0				0				0			

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			
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	0.00	0.00	0.01	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	7.79	0.00	0.00	0.00	7.25	0.00	0.00	0.00
Movement LOS					A		A	A	A	A		A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.89	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00				1.95				0.47			
Approach LOS	A				A				A			
d_I, Intersection Delay [s/veh]	4.67											
Intersection LOS	B											

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Intersection Setup

Name								
Approach	Northwestbound				Southeastbound			
Lane Configuration								
Turning Movement	Left	Thru	Thru	Right	Left	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	1	0	0	1
Entry Pocket Length [ft]	225.00	100.00	100.00	290.00	280.00	100.00	100.00	280.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00				30.00			
Grade [%]	0.00				0.00			
Crosswalk	Yes				Yes			

Volumes

Name								
Base Volume Input [veh/h]	2	4	0	14	187	0	7	10
Base Volume Adjustment Factor	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
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2	4	0	14	187	0	7	10
Peak Hour Factor	0.9430	0.9430	1.0000	0.9430	0.9430	1.0000	0.9430	0.9430
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	0	4	50	0	2	3
Total Analysis Volume [veh/h]	2	4	0	15	198	0	7	11
Pedestrian Volume [ped/h]	0				0			

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Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.01	0.00	0.01	0.22	0.00	0.01	0.01
d_M, Delay for Movement [s/veh]	9.84	11.10	0.00	8.37	10.04	0.00	9.41	8.41
Movement LOS	A	B		A	B		A	A
95th-Percentile Queue Length [veh/ln]	0.01	0.02	0.00	0.04	0.83	0.00	0.03	0.03
95th-Percentile Queue Length [ft/ln]	0.20	0.51	0.00	1.05	20.63	0.00	0.64	0.78
d_A, Approach Delay [s/veh]	9.03				9.94			
Approach LOS	A				A			
d_I, Intersection Delay [s/veh]	4.67							
Intersection LOS	B							

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Intersection Level Of Service Report
Intersection 4: Armstrong Boulevard and WB Hwy 10 Ramp

Control Type:	Signalized	Delay (sec / veh):	10.3
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.144

Intersection Setup

Name													
Approach	Northbound			Southbound				Eastbound			Westbound		
Lane Configuration													
Turning Movement	Left	Thru	Right	U-tu	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	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	395.00	100.00	100.00	100.0	100.0	100.0	315.0	100.00	100.00	100.00	685.00	100.00	685.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00			35.00				30.00			30.00		
Grade [%]	0.00			0.00				0.00			0.00		
Curb Present	No			No							No		
Crosswalk	No			No				No			Yes		

Volumes

Name													
Base Volume Input [veh/h]	10	220	0	1	0	238	96	0	0	0	20	2	134
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	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	2.00
Growth Factor	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	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	0
Diverted Trips [veh/h]	0	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	10	220	0	1	0	238	96	0	0	0	20	2	134
Peak Hour Factor	0.9310	0.9310	1.0000	0.931	1.000	0.931	0.931	1.0000	1.0000	1.0000	0.9310	0.9310	0.9310
Other Adjustment Factor	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	59	0	0	0	64	26	0	0	0	5	1	36
Total Analysis Volume [veh/h]	11	236	0	1	0	256	103	0	0	0	21	2	144
Presence of On-Street Parking	No		No	No			No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0				0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0				0			0		
v_co, Outbound Pedestrian Volume crossing	0			0				0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0				0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0				0			0		
Bicycle Volume [bicycles/h]	0			0				0			0		

Appendix F - Capacity Analysis Backup

Generated with PTV VISTRO
Version 2020 (SP 0-3)

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Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Permi	Permi	Permi	Permi	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	5	2	0	0	0	6	0	0	0	0	0	8	0
Auxiliary Signal Groups													
Lead / Lag	Lead	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	7	10	0	0	0	10	0	0	0	0	0	10	0
Maximum Green [s]	20	35	0	0	0	35	0	0	0	0	0	30	0
Amber [s]	3.0	5.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
All red [s]	2.5	1.5	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	3.5	0.0
Split [s]	0	0	0	0	0	0	0	0	0	0	0	0	0
Vehicle Extension [s]	3.0	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
Walk [s]	0	7	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	20	0	0	0	0	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No				No						No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	3.5	4.5	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	4.5	0.0
Minimum Recall	No	Yes				Yes						No	
Maximum Recall	No	No				No						No	
Pedestrian Recall	No	No				No						No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	R		C	R
C, Cycle Length [s]	38	38	38	38	38		38	38
L, Total Lost Time per Cycle [s]	5.50	6.50	6.50	6.50	6.50		6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	2.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	3.50	4.50	4.50	4.50	4.50		4.50	4.50
g_i, Effective Green Time [s]	1	16	10	10	10		8	8
g / C, Green / Cycle	0.02	0.43	0.27	0.27	0.27		0.22	0.22
(v / s)_i Volume / Saturation Flow Rate	0.01	0.07	0.08	0.08	0.07		0.01	0.06
s, saturation flow rate [veh/h]	1603	3204	1656	1532	1431		1610	2532
c, Capacity [veh/h]	35	1393	532	410	383		357	562
d1, Uniform Delay [s]	18.24	6.53	11.03	11.04	10.94		11.63	12.15
k, delay calibration	0.11	0.11	0.11	0.11	0.11		0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	5.00	0.06	0.24	0.41	0.37		0.07	0.24
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.31	0.17	0.25	0.30	0.27		0.06	0.26
d, Delay for Lane Group [s/veh]	23.24	6.59	11.28	11.45	11.32		11.70	12.39
Lane Group LOS	C	A	B	B	B		B	B
Critical Lane Group	Yes	No	No	Yes	No		No	Yes
50th-Percentile Queue Length [veh/ln]	0.13	0.37	0.70	0.66	0.55		0.13	0.42
50th-Percentile Queue Length [ft/ln]	3.20	9.24	17.47	16.47	13.66		3.27	10.54
95th-Percentile Queue Length [veh/ln]	0.23	0.67	1.26	1.19	0.98		0.24	0.76
95th-Percentile Queue Length [ft/ln]	5.75	16.64	31.45	29.65	24.59		5.88	18.98

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	23.24	6.59	0.00	11.28	0.00	11.36	11.32	0.00	0.00	0.00	11.70	11.70	12.39
Movement LOS	C	A		B		B	B				B	B	B
d_A, Approach Delay [s/veh]	7.33			11.35				0.00			12.30		
Approach LOS	A			B				A			B		
d_I, Intersection Delay [s/veh]	10.27												
Intersection LOS	B												
Intersection V/C	0.144												

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	34.67
l_p,int, Pedestrian LOS Score for Intersection	0.000	0.000	0.000	1.994
Crosswalk LOS	F	F	F	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	778	778	0	667
d_b, Bicycle Delay [s]	16.81	16.81	45.00	20.00
l_b,int, Bicycle LOS Score for Intersection	1.763	1.857	4.132	1.835
Bicycle LOS	A	A	D	A

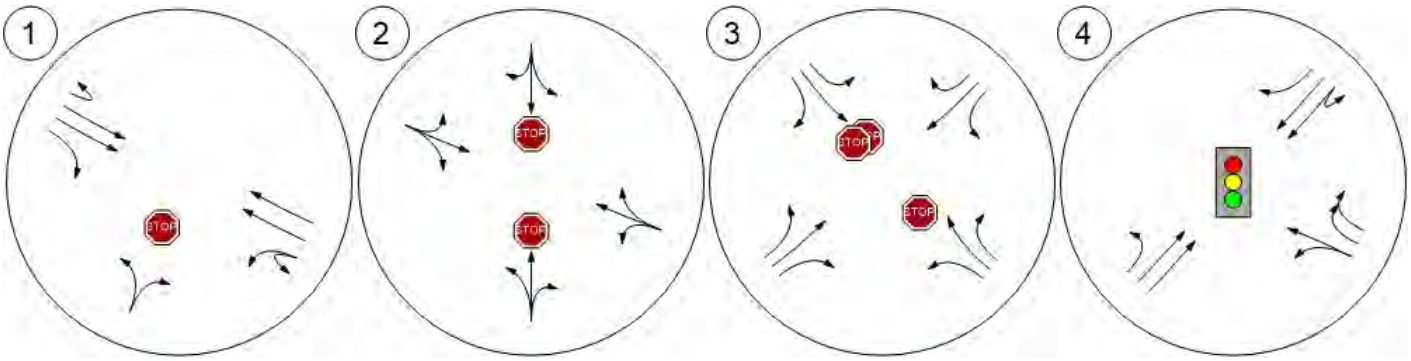
Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



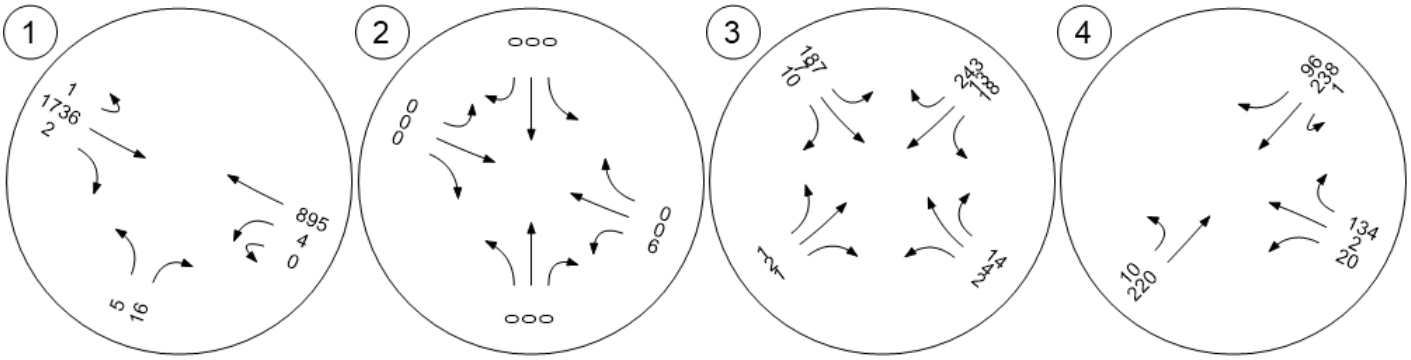
Lane Configuration and Traffic Control





Traffic Volume - Base Volume





Vistro File: C:\...\Ramsey Model.vistro
Report File: C:\...\Exist PM.pdf

Scenario 2 PM Exist
11/9/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	HWY 10 and Bowers Drive	Two-way stop	HCM 6th Edition	NB Left	0.298	208.9	F
2	Riverdale Drive and Llama Street	Two-way stop	HCM 6th Edition	SB Left	0.003	8.6	A
3	Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp	Two-way stop	HCM 6th Edition	NWB Thru	0.023	11.5	B
4	Armstrong Boulevard and WB Hwy 10 Ramp	Signalized	HCM 6th Edition	NB Left	0.359	13.4	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 1: HWY 10 and Bowers Drive

Control Type:	Two-way stop	Delay (sec / veh):	208.9
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.298

Intersection Setup

Name								
Approach	Northbound		Eastbound			Westbound		
Lane Configuration								
Turning Movement	Left	Right	U-turn	Thru	Right	U-turn	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	1	1	0	0
Entry Pocket Length [ft]	100.00	100.00	325.00	100.00	225.00	360.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		65.00			65.00		
Grade [%]	0.00		0.00			0.00		
Crosswalk	Yes		Yes			Yes		

Volumes

Name								
Base Volume Input [veh/h]	6	17	1	1367	7	1	16	2051
Base Volume Adjustment Factor	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
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	6	17	1	1367	7	1	16	2051
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	4	0	360	2	0	4	540
Total Analysis Volume [veh/h]	6	18	1	1439	7	1	17	2159
Pedestrian Volume [ped/h]	0		0			0		

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	0.30	0.05	0.03	0.01	0.00	0.01	0.04	0.02
d_M, Delay for Movement [s/veh]	208.91	40.04	97.90	0.00	0.00	35.45	13.17	0.00
Movement LOS	F	E	F	A	A	E	B	A
95th-Percentile Queue Length [veh/ln]	1.29	1.29	0.08	0.00	0.00	0.14	0.14	0.00
95th-Percentile Queue Length [ft/ln]	32.33	32.33	1.91	0.00	0.00	3.52	3.52	0.00
d_A, Approach Delay [s/veh]	82.26		0.07			0.12		
Approach LOS	F		A			A		
d_I, Intersection Delay [s/veh]	0.64							
Intersection LOS	F							

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Intersection Level Of Service Report
Intersection 2: Riverdale Drive and Llama Street

Control Type:	Two-way stop	Delay (sec / veh):	8.6
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.003

Intersection Setup

Name													
Approach	Northbound			Southbound			Eastbound			Westbound			
Lane Configuration													
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	U-tu	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	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.0	100.0	100.0	100.0
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			35.00			
Grade [%]	0.00			0.00			0.00			0.00			
Crosswalk	Yes			Yes			Yes			Yes			

Volumes

Name													
Base Volume Input [veh/h]	0	0	1	3	0	0	0	0	0	1	1	0	4
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000
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	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000
In-Process Volume [veh/h]	0	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	0
Diverted Trips [veh/h]	0	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Total Hourly Volume [veh/h]	0	0	1	3	0	0	0	0	0	1	1	0	4
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.900	0.900	0.900	0.900
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000
Total 15-Minute Volume [veh/h]	0	0	0	1	0	0	0	0	0	0	0	0	1
Total Analysis Volume [veh/h]	0	0	1	3	0	0	0	0	0	1	1	0	4
Pedestrian Volume [ped/h]	0			0			0			0			

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Version 2020 (SP 0-3)

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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	0.00
d_M, Delay for Movement [s/veh]	8.55	9.07	8.32	8.56	9.06	8.34	7.23	0.00	0.00	8.12	7.22	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.07	0.07	0.07	0.22	0.22	0.22	0.00	0.00	0.00	0.11	0.11	0.11	0.11
d_A, Approach Delay [s/veh]	8.32			8.56			2.41			2.56			
Approach LOS	A			A			A			A			
d_I, Intersection Delay [s/veh]	4.93												
Intersection LOS	A												

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Intersection Level Of Service Report
Intersection 3: Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp

Control Type:	Two-way stop	Delay (sec / veh):	11.5
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.023

Intersection Setup

Name													
Approach	Southbound				Northeastbound				Southwestbound				
Lane Configuration													
Turning Movement	Left	Thru	Right	Right	Left	Left	Thru	Right	U-turn	Left	Thru	Right	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	12.00
No. of Lanes in Entry Pocket	0	0	0	0	1	0	0	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	300.00	100.00	100.00	300.00	100.0	100.0	100.0	100.0	100.0
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00				35.00				35.00				
Grade [%]	0.00				0.00				0.00				
Crosswalk	Yes				Yes				Yes				

Volumes

Name													
Base Volume Input [veh/h]	0	0	0	0	10	0	16	3	1	22	5	0	208
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.000
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	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.000
In-Process Volume [veh/h]	0	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	0
Diverted Trips [veh/h]	0	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Total Hourly Volume [veh/h]	0	0	0	0	10	0	16	3	1	22	5	0	208
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	0.8610	1.0000	0.8610	0.8610	0.861	0.861	0.861	1.000	0.861
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.000
Total 15-Minute Volume [veh/h]	0	0	0	0	3	0	5	1	0	6	1	0	60
Total Analysis Volume [veh/h]	0	0	0	0	12	0	19	3	1	26	6	0	242
Pedestrian Volume [ped/h]	0				0				0				

Generated with PTV VISTRO
Version 2020 (SP 0-3)

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			
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	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	7.76	0.00	0.00	0.00	8.42	7.30	0.00	0.00	0.00
Movement LOS					A		A	A	A	A	A		A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.05	0.05	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.69	0.00	0.00	0.00	1.32	1.32	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00				2.74				0.72				
Approach LOS	A				A				A				
d_I, Intersection Delay [s/veh]	5.81												
Intersection LOS	B												

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Version 2020 (SP 0-3)

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Intersection Setup

Name									
Approach	Northwestbound					Southeastbound			
Lane Configuration									
Turning Movement	U-turn	Left	Thru	Thru	Right	Left	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	1	0	0	1
Entry Pocket Length [ft]	225.00	100.00	100.00	100.00	290.00	280.00	100.00	100.00	280.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00					30.00			
Grade [%]	0.00					0.00			
Crosswalk	Yes					Yes			

Volumes

Name									
Base Volume Input [veh/h]	1	1	11	0	46	193	0	8	4
Base Volume Adjustment Factor	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
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1	1	11	0	46	193	0	8	4
Peak Hour Factor	0.8610	0.8610	0.8610	1.0000	0.8610	0.8610	1.0000	0.8610	0.8610
Other Adjustment Factor	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	3	0	13	56	0	2	1
Total Analysis Volume [veh/h]	1	1	13	0	53	224	0	9	5
Pedestrian Volume [ped/h]	0					0			

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Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.02	0.00	0.05	0.28	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	10.14	10.14	11.55	0.00	8.58	11.29	0.00	9.77	8.36
Movement LOS	B	B	B		A	B		A	A
95th-Percentile Queue Length [veh/ln]	0.01	0.01	0.07	0.00	0.16	1.16	0.00	0.04	0.01
95th-Percentile Queue Length [ft/ln]	0.21	0.21	1.77	0.00	3.95	28.94	0.00	0.89	0.35
d_A, Approach Delay [s/veh]	9.19					11.17			
Approach LOS	A					B			
d_I, Intersection Delay [s/veh]	5.81								
Intersection LOS	B								

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Intersection Level Of Service Report
Intersection 4: Armstrong Boulevard and WB Hwy 10 Ramp

Control Type:	Signalized	Delay (sec / veh):	13.4
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.359

Intersection Setup

Name													
Approach	Northbound				Southbound			Eastbound			Westbound		
Lane Configuration													
Turning Movement	U-tu	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	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	395.0	100.0	100.0	100.0	100.00	100.00	315.00	100.00	100.00	100.00	685.00	100.00	685.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00				35.00			30.00			30.00		
Grade [%]	0.00				0.00			0.00			0.00		
Curb Present	No				No						No		
Crosswalk	No				No			No			Yes		

Volumes

Name													
Base Volume Input [veh/h]	2	34	248	0	0	210	257	0	0	0	19	2	320
Base Volume Adjustment Factor	1.000	1.000	1.000	1.000	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	2.00
Growth Factor	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	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	0
Diverted Trips [veh/h]	0	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2	34	248	0	0	210	257	0	0	0	19	2	320
Peak Hour Factor	0.916	0.916	0.916	1.000	1.0000	0.9160	0.9160	1.0000	1.0000	1.0000	0.9160	0.9160	0.9160
Other Adjustment Factor	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	9	68	0	0	57	70	0	0	0	5	1	87
Total Analysis Volume [veh/h]	2	37	271	0	0	229	281	0	0	0	21	2	349
Presence of On-Street Parking	No			No	No		No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0				0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0				0			0			0		
v_co, Outbound Pedestrian Volume crossing	0				0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0				0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0				0			0			0		
Bicycle Volume [bicycles/h]	0				0			0			0		

Appendix F - Capacity Analysis Backup

Generated with PTV VISTRO
Version 2020 (SP 0-3)

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Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permi	Prote	Permi	Permi	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	0	5	2	0	0	6	0	0	0	0	0	8	0
Auxiliary Signal Groups													
Lead / Lag	-	Lead	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	7	10	0	0	10	0	0	0	0	0	10	0
Maximum Green [s]	0	20	35	0	0	35	0	0	0	0	0	30	0
Amber [s]	0.0	3.0	5.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
All red [s]	0.0	2.5	1.5	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	3.5	0.0
Split [s]	0	0	0	0	0	0	0	0	0	0	0	0	0
Vehicle Extension [s]	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
Walk [s]	0	0	7	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	20	0	0	0	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk			No			No						No	
I1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.5	4.5	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	4.5	0.0
Minimum Recall		No	Yes			Yes						No	
Maximum Recall		No	No			No						No	
Pedestrian Recall		No	No			No						No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	R		C	R
C, Cycle Length [s]	42	42	42	42		42	42
L, Total Lost Time per Cycle [s]	5.50	6.50	6.50	6.50		6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	3.50	4.50	4.50	4.50		4.50	4.50
g_i, Effective Green Time [s]	3	19	11	11		10	10
g / C, Green / Cycle	0.06	0.45	0.26	0.26		0.24	0.24
(v / s)_i Volume / Saturation Flow Rate	0.02	0.08	0.07	0.20		0.01	0.14
s, saturation flow rate [veh/h]	1603	3204	3204	1431		1610	2532
c, Capacity [veh/h]	99	1452	832	371		380	598
d1, Uniform Delay [s]	18.87	6.84	12.35	14.28		12.38	14.15
k, delay calibration	0.11	0.11	0.11	0.11		0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	2.50	0.06	0.18	3.16		0.07	0.90
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.39	0.19	0.28	0.76		0.06	0.58
d, Delay for Lane Group [s/veh]	21.37	6.90	12.53	17.44		12.45	15.06
Lane Group LOS	C	A	B	B		B	B
Critical Lane Group	Yes	No	No	Yes		No	Yes
50th-Percentile Queue Length [veh/ln]	0.38	0.49	0.70	2.25		0.15	1.28
50th-Percentile Queue Length [ft/ln]	9.50	12.32	17.43	56.13		3.66	32.11
95th-Percentile Queue Length [veh/ln]	0.68	0.89	1.25	4.04		0.26	2.31
95th-Percentile Queue Length [ft/ln]	17.10	22.17	31.37	101.04		6.59	57.79

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	21.37	21.37	6.90	0.00	0.00	12.53	17.44	0.00	0.00	0.00	12.45	12.45	15.06
Movement LOS	C	C	A			B	B				B	B	B
d_A, Approach Delay [s/veh]	8.72				15.24			0.00			14.90		
Approach LOS	A				B			A			B		
d_I, Intersection Delay [s/veh]	13.44												
Intersection LOS	B												
Intersection V/C	0.359												

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	34.67
I_p,int, Pedestrian LOS Score for Intersection	0.000	0.000	0.000	2.061
Crosswalk LOS	F	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	778	778	0	667
d_b, Bicycle Delay [s]	16.81	16.81	45.00	20.00
I_b,int, Bicycle LOS Score for Intersection	1.785	1.980	4.132	2.173
Bicycle LOS	A	A	D	B

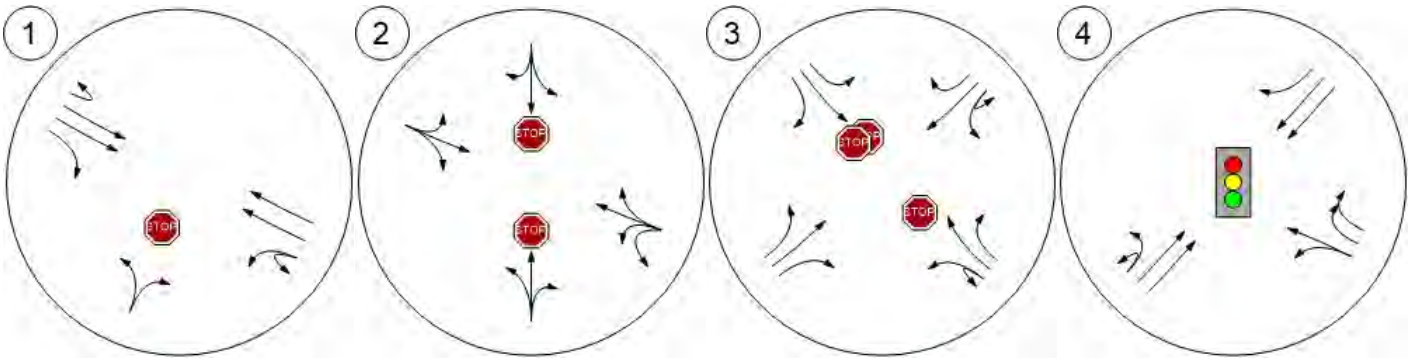
Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



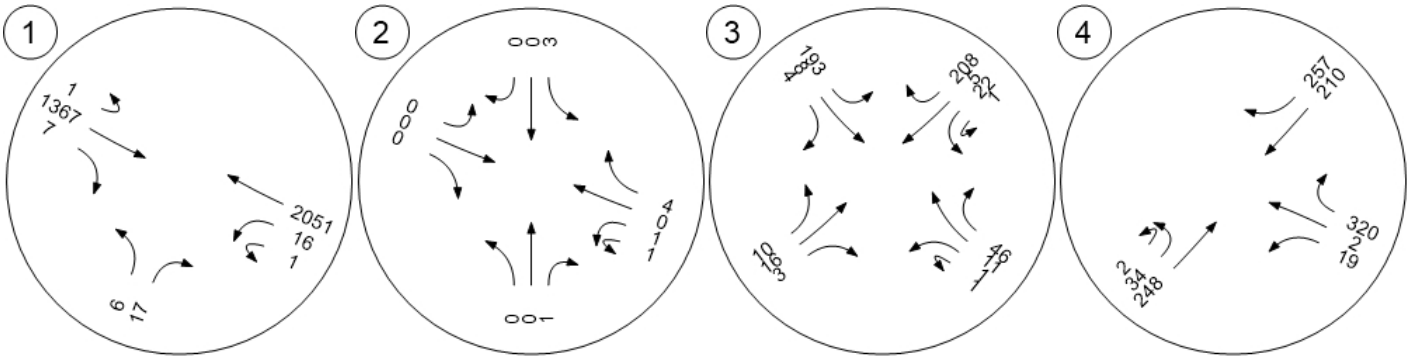
Lane Configuration and Traffic Control





Traffic Volume - Base Volume





Vistro File: C:\...\Ramsey Model.vistro
Report File: C:\...\2022 AM nobuild.pdf

Scenario 3 2022 AM No-Build
11/9/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	HWY 10 and Bowers Drive	Two-way stop	HCM 6th Edition	NB Left	0.185	151.6	F
2	Riverdale Drive and Llama Street	Two-way stop	HCM 6th Edition	WB Left	0.004	7.2	A
3	Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp	Two-way stop	HCM 6th Edition	NWB Thru	0.007	11.2	B
4	Armstrong Boulevard and WB Hwy 10 Ramp	Signalized	HCM 6th Edition	NB Left	0.149	10.3	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 1: HWY 10 and Bowers Drive

Control Type:	Two-way stop	Delay (sec / veh):	151.6
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.185

Intersection Setup

Name								
Approach	Northbound		Eastbound			Westbound		
Lane Configuration								
Turning Movement	Left	Right	U-turn	Thru	Right	U-turn	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	1	1	0	0
Entry Pocket Length [ft]	100.00	100.00	325.00	100.00	225.00	360.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		65.00			65.00		
Grade [%]	0.00		0.00			0.00		
Crosswalk	Yes		Yes			Yes		

Volumes

Name								
Base Volume Input [veh/h]	5	16	1	1736	2	0	4	895
Base Volume Adjustment Factor	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
Growth Factor	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	17	1	1805	2	0	4	931
Peak Hour Factor	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	4	0	477	1	0	1	246
Total Analysis Volume [veh/h]	5	18	1	1906	2	0	4	983
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	0.19	0.07	0.00	0.02	0.00	0.00	0.01	0.01
d_M, Delay for Movement [s/veh]	151.57	31.98	19.02	0.00	0.00	69.83	16.86	0.00
Movement LOS	F	D	C	A	A	F	C	A
95th-Percentile Queue Length [veh/ln]	0.92	0.92	0.01	0.00	0.00	0.04	0.04	0.00
95th-Percentile Queue Length [ft/ln]	23.09	23.09	0.29	0.00	0.00	0.99	0.99	0.00
d_A, Approach Delay [s/veh]	57.98		0.01			0.07		
Approach LOS	F		A			A		
d_I, Intersection Delay [s/veh]	0.49							
Intersection LOS	F							

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Intersection Level Of Service Report
Intersection 2: Riverdale Drive and Llama Street

Control Type:	Two-way stop	Delay (sec / veh):	7.2
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

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 Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry 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
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	0	0	0	0	0	0	6	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 Factor	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400
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	0	0	0	0	0	0	6	0	0
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	0	0	0	0	0	2	0	0
Total Analysis Volume [veh/h]	0	0	0	0	0	0	0	0	0	7	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Version 2020 (SP 0-3)

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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]	8.60	9.11	8.32	8.60	9.11	8.32	7.22	0.00	0.00	7.23	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.32	0.32
d_A, Approach Delay [s/veh]	8.68			8.68			2.41			7.23		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	7.23											
Intersection LOS	A											

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Intersection Level Of Service Report
Intersection 3: Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp

Control Type:	Two-way stop	Delay (sec / veh):	11.2
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.007

Intersection Setup

Name												
Approach	Southbound				Northeastbound				Southwestbound			
Lane Configuration												
Turning Movement	Left	Thru	Right	Right	Left	Left	Thru	Right	Left	Thru	Right	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 Entry Pocket	0	0	0	0	1	0	0	1	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	300.00	100.00	100.00	300.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00				35.00				35.00			
Grade [%]	0.00				0.00				0.00			
Crosswalk	Yes				Yes				Yes			

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	0	1	0	2	1	18	13	0	243
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 Factor	1.0000	1.0000	1.0000	1.0000	1.0400	1.0000	1.0400	1.0400	1.0400	1.0400	1.0000	1.0400
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	0	1	0	2	1	19	14	0	253
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	0.9430	1.0000	0.9430	0.9430	0.9430	0.9430	1.0000	0.9430
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	0	0	1	0	5	4	0	67
Total Analysis Volume [veh/h]	0	0	0	0	1	0	2	1	20	15	0	268
Pedestrian Volume [ped/h]	0				0				0			

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			
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	0.00	0.00	0.01	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	7.82	0.00	0.00	0.00	7.25	0.00	0.00	0.00
Movement LOS					A		A	A	A	A		A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.94	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00				1.95				0.48			
Approach LOS	A				A				A			
d_I, Intersection Delay [s/veh]	4.70											
Intersection LOS	B											

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Intersection Setup

Name								
Approach	Northwestbound				Southeastbound			
Lane Configuration								
Turning Movement	Left	Thru	Thru	Right	Left	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	1	0	0	1
Entry Pocket Length [ft]	225.00	100.00	100.00	290.00	280.00	100.00	100.00	280.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00				30.00			
Grade [%]	0.00				0.00			
Crosswalk	Yes				Yes			

Volumes

Name								
Base Volume Input [veh/h]	2	4	0	14	187	0	7	10
Base Volume Adjustment Factor	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
Growth Factor	1.0400	1.0400	1.0000	1.0400	1.0400	1.0000	1.0400	1.0400
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2	4	0	15	194	0	7	10
Peak Hour Factor	0.9430	0.9430	1.0000	0.9430	0.9430	1.0000	0.9430	0.9430
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	0	4	51	0	2	3
Total Analysis Volume [veh/h]	2	4	0	16	206	0	7	11
Pedestrian Volume [ped/h]	0				0			

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Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.01	0.00	0.01	0.23	0.00	0.01	0.01
d_M, Delay for Movement [s/veh]	9.90	11.21	0.00	8.38	10.14	0.00	9.43	8.42
Movement LOS	A	B		A	B		A	A
95th-Percentile Queue Length [veh/ln]	0.01	0.02	0.00	0.05	0.87	0.00	0.03	0.03
95th-Percentile Queue Length [ft/ln]	0.20	0.52	0.00	1.13	21.86	0.00	0.65	0.78
d_A, Approach Delay [s/veh]	9.03				10.03			
Approach LOS	A				B			
d_I, Intersection Delay [s/veh]	4.70							
Intersection LOS	B							

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Intersection Level Of Service Report
Intersection 4: Armstrong Boulevard and WB Hwy 10 Ramp

Control Type:	Signalized	Delay (sec / veh):	10.3
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.149

Intersection Setup

Name													
Approach	Northbound			Southbound				Eastbound			Westbound		
Lane Configuration													
Turning Movement	Left	Thru	Right	U-tu	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	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	395.00	100.00	100.00	100.0	100.0	100.0	315.0	100.00	100.00	100.00	685.00	100.00	685.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00			35.00				30.00			30.00		
Grade [%]	0.00			0.00				0.00			0.00		
Curb Present	No			No							No		
Crosswalk	No			No				No			Yes		

Volumes

Name													
Base Volume Input [veh/h]	10	220	0	1	0	238	96	0	0	0	20	2	134
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	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	2.00
Growth Factor	1.0400	1.0400	1.0000	1.040	1.000	1.040	1.040	1.0000	1.0000	1.0000	1.0400	1.0400	1.0400
In-Process Volume [veh/h]	0	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	0
Diverted Trips [veh/h]	0	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	10	229	0	1	0	248	100	0	0	0	21	2	139
Peak Hour Factor	0.9310	0.9310	1.0000	0.931	1.000	0.931	0.931	1.0000	1.0000	1.0000	0.9310	0.9310	0.9310
Other Adjustment Factor	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	61	0	0	0	67	27	0	0	0	6	1	37
Total Analysis Volume [veh/h]	11	246	0	1	0	266	107	0	0	0	23	2	149
Presence of On-Street Parking	No		No	No			No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing		0			0			0			0		
v_di, Inbound Pedestrian Volume crossing m		0			0			0			0		
v_co, Outbound Pedestrian Volume crossing		0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi		0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]		0			0			0			0		
Bicycle Volume [bicycles/h]		0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Permi	Permi	Permi	Permi	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	5	2	0	0	0	6	0	0	0	0	0	8	0
Auxiliary Signal Groups													
Lead / Lag	Lead	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	7	10	0	0	0	10	0	0	0	0	0	10	0
Maximum Green [s]	20	35	0	0	0	35	0	0	0	0	0	30	0
Amber [s]	3.0	5.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
All red [s]	2.5	1.5	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	3.5	0.0
Split [s]	0	0	0	0	0	0	0	0	0	0	0	0	0
Vehicle Extension [s]	3.0	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
Walk [s]	0	7	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	20	0	0	0	0	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No				No						No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	3.5	4.5	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	4.5	0.0
Minimum Recall	No	Yes				Yes						No	
Maximum Recall	No	No				No						No	
Pedestrian Recall	No	No				No						No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	R		C	R
C, Cycle Length [s]	38	38	38	38	38		38	38
L, Total Lost Time per Cycle [s]	5.50	6.50	6.50	6.50	6.50		6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	2.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	3.50	4.50	4.50	4.50	4.50		4.50	4.50
g_i, Effective Green Time [s]	1	16	10	10	10		8	8
g / C, Green / Cycle	0.02	0.43	0.27	0.27	0.27		0.22	0.22
(v / s)_i Volume / Saturation Flow Rate	0.01	0.08	0.08	0.08	0.07		0.02	0.06
s, saturation flow rate [veh/h]	1603	3204	1656	1532	1431		1609	2532
c, Capacity [veh/h]	35	1391	532	410	383		361	568
d1, Uniform Delay [s]	18.33	6.60	11.12	11.13	11.02		11.63	12.17
k, delay calibration	0.11	0.11	0.11	0.11	0.11		0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	5.02	0.06	0.26	0.43	0.39		0.08	0.24
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.31	0.18	0.26	0.31	0.28		0.07	0.26
d, Delay for Lane Group [s/veh]	23.35	6.66	11.37	11.56	11.42		11.71	12.41
Lane Group LOS	C	A	B	B	B		B	B
Critical Lane Group	Yes	No	No	Yes	No		No	Yes
50th-Percentile Queue Length [veh/ln]	0.13	0.39	0.73	0.69	0.57		0.14	0.44
50th-Percentile Queue Length [ft/ln]	3.21	9.80	18.37	17.32	14.36		3.57	10.97
95th-Percentile Queue Length [veh/ln]	0.23	0.71	1.32	1.25	1.03		0.26	0.79
95th-Percentile Queue Length [ft/ln]	5.79	17.63	33.07	31.18	25.84		6.42	19.74

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	23.35	6.66	0.00	11.37	0.00	11.46	11.42	0.00	0.00	0.00	11.71	11.71	12.41
Movement LOS	C	A		B		B	B				B	B	B
d_A, Approach Delay [s/veh]	7.37			11.45				0.00			12.31		
Approach LOS	A			B				A			B		
d_I, Intersection Delay [s/veh]	10.34												
Intersection LOS	B												
Intersection V/C	0.149												

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	34.67
l_p,int, Pedestrian LOS Score for Intersection	0.000	0.000	0.000	1.996
Crosswalk LOS	F	F	F	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	778	778	0	667
d_b, Bicycle Delay [s]	16.81	16.81	45.00	20.00
l_b,int, Bicycle LOS Score for Intersection	1.772	1.868	4.132	1.847
Bicycle LOS	A	A	D	A

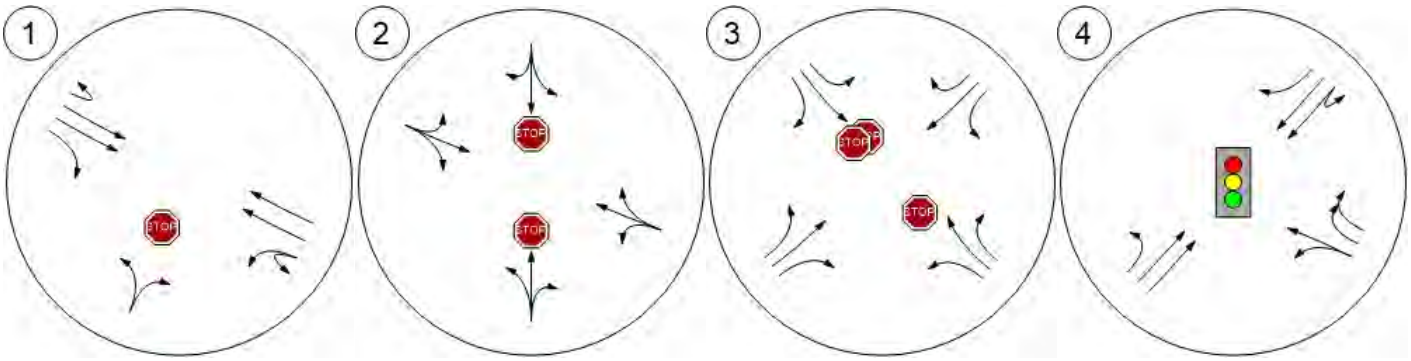
Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



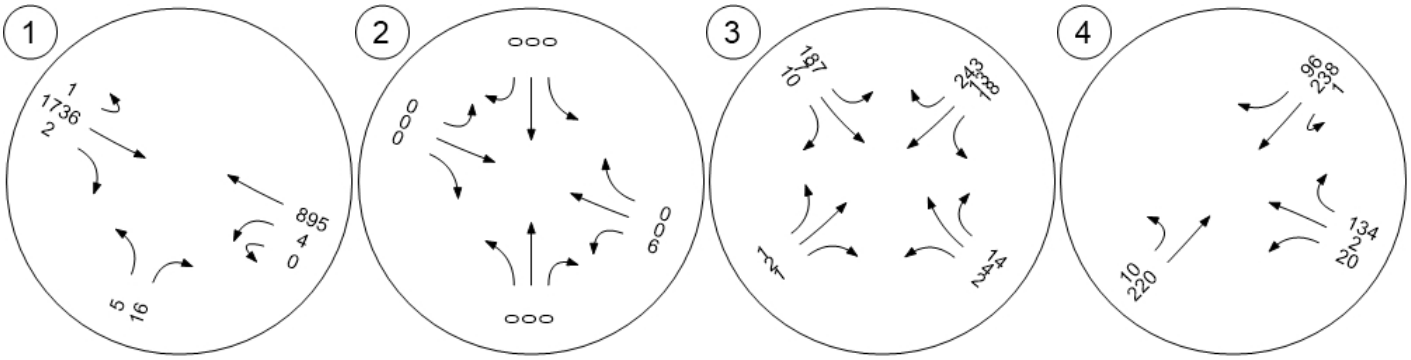
Lane Configuration and Traffic Control





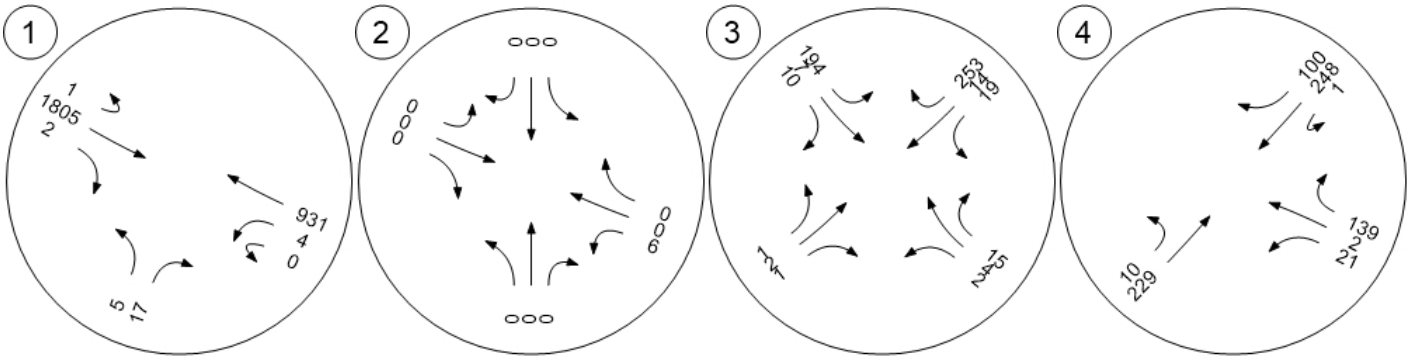
Traffic Volume - Base Volume





Traffic Volume - Future Total Volume





Vistro File: C:\...\Ramsey Model.vistro
Report File: C:\...\2022 PM nobuild.pdf

Scenario 4 2022 PM No-Build
11/9/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	HWY 10 and Bowers Drive	Two-way stop	HCM 6th Edition	NB Left	0.354	253.2	F
2	Riverdale Drive and Llama Street	Two-way stop	HCM 6th Edition	SB Left	0.003	8.6	A
3	Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp	Two-way stop	HCM 6th Edition	NWB Thru	0.023	11.7	B
4	Armstrong Boulevard and WB Hwy 10 Ramp	Signalized	HCM 6th Edition	NB Left	0.372	13.6	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 1: HWY 10 and Bowers Drive

Control Type:	Two-way stop	Delay (sec / veh):	253.2
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.354

Intersection Setup

Name								
Approach	Northbound		Eastbound			Westbound		
Lane Configuration								
Turning Movement	Left	Right	U-turn	Thru	Right	U-turn	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	1	1	0	0
Entry Pocket Length [ft]	100.00	100.00	325.00	100.00	225.00	360.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		65.00			65.00		
Grade [%]	0.00		0.00			0.00		
Crosswalk	Yes		Yes			Yes		

Volumes

Name								
Base Volume Input [veh/h]	6	17	1	1367	7	1	16	2051
Base Volume Adjustment Factor	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
Growth Factor	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	6	18	1	1422	7	1	17	2133
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	5	0	374	2	0	4	561
Total Analysis Volume [veh/h]	6	19	1	1497	7	1	18	2245
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	0.35	0.05	0.03	0.01	0.00	0.01	0.04	0.02
d_M, Delay for Movement [s/veh]	253.15	50.80	112.24	0.00	0.00	38.59	13.66	0.00
Movement LOS	F	F	F	A	A	E	B	A
95th-Percentile Queue Length [veh/ln]	1.54	1.54	0.09	0.00	0.00	0.16	0.16	0.00
95th-Percentile Queue Length [ft/ln]	38.54	38.54	2.19	0.00	0.00	3.93	3.93	0.00
d_A, Approach Delay [s/veh]	99.37		0.07			0.13		
Approach LOS	F		A			A		
d_I, Intersection Delay [s/veh]	0.76							
Intersection LOS	F							

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Intersection Level Of Service Report
Intersection 2: Riverdale Drive and Llama Street

Control Type:	Two-way stop	Delay (sec / veh):	8.6
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.003

Intersection Setup

Name													
Approach	Northbound			Southbound			Eastbound			Westbound			
Lane Configuration													
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	U-tu	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	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.0	100.0	100.0	100.0
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			35.00			
Grade [%]	0.00			0.00			0.00			0.00			
Crosswalk	Yes			Yes			Yes			Yes			

Volumes

Name													
Base Volume Input [veh/h]	0	0	1	3	0	0	0	0	0	1	1	0	4
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000
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	2.00
Growth Factor	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.040	1.040	1.040	1.040
In-Process Volume [veh/h]	0	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	0
Diverted Trips [veh/h]	0	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Total Hourly Volume [veh/h]	0	0	1	3	0	0	0	0	0	1	1	0	4
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.900	0.900	0.900	0.900
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000
Total 15-Minute Volume [veh/h]	0	0	0	1	0	0	0	0	0	0	0	0	1
Total Analysis Volume [veh/h]	0	0	1	3	0	0	0	0	0	1	1	0	4
Pedestrian Volume [ped/h]	0			0			0			0			

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Version 2020 (SP 0-3)

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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	0.00
d_M, Delay for Movement [s/veh]	8.55	9.07	8.32	8.56	9.06	8.34	7.23	0.00	0.00	8.12	7.22	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.07	0.07	0.07	0.22	0.22	0.22	0.00	0.00	0.00	0.11	0.11	0.11	0.11
d_A, Approach Delay [s/veh]	8.32			8.56			2.41			2.56			
Approach LOS	A			A			A			A			
d_I, Intersection Delay [s/veh]	4.93												
Intersection LOS	A												

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Version 2020 (SP 0-3)

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Intersection Level Of Service Report
Intersection 3: Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp

Control Type:	Two-way stop	Delay (sec / veh):	11.7
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.023

Intersection Setup

Name													
Approach	Southbound				Northeastbound				Southwestbound				
Lane Configuration													
Turning Movement	Left	Thru	Right	Right	Left	Left	Thru	Right	U-turn	Left	Thru	Right	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	12.00
No. of Lanes in Entry Pocket	0	0	0	0	1	0	0	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	300.00	100.00	100.00	300.00	100.0	100.0	100.0	100.0	100.0
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00				35.00				35.00				
Grade [%]	0.00				0.00				0.00				
Crosswalk	Yes				Yes				Yes				

Volumes

Name													
Base Volume Input [veh/h]	0	0	0	0	10	0	16	3	1	22	5	0	208
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.000
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	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0400	1.0000	1.0400	1.0400	1.040	1.040	1.040	1.000	1.040
In-Process Volume [veh/h]	0	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	0
Diverted Trips [veh/h]	0	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Total Hourly Volume [veh/h]	0	0	0	0	10	0	17	3	1	23	5	0	216
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	0.8610	1.0000	0.8610	0.8610	0.861	0.861	0.861	1.000	0.861
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.000
Total 15-Minute Volume [veh/h]	0	0	0	0	3	0	5	1	0	7	1	0	63
Total Analysis Volume [veh/h]	0	0	0	0	12	0	20	3	1	27	6	0	251
Pedestrian Volume [ped/h]	0				0				0				

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Version 2020 (SP 0-3)

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			
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	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	7.78	0.00	0.00	0.00	8.43	7.30	0.00	0.00	0.00
Movement LOS					A		A	A	A	A	A		A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.05	0.05	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.69	0.00	0.00	0.00	1.37	1.37	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00				2.67				0.72				
Approach LOS	A				A				A				
d_I, Intersection Delay [s/veh]	5.88												
Intersection LOS	B												

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Version 2020 (SP 0-3)

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Intersection Setup

Name									
Approach	Northwestbound					Southeastbound			
Lane Configuration									
Turning Movement	U-turn	Left	Thru	Thru	Right	Left	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	1	0	0	1
Entry Pocket Length [ft]	225.00	100.00	100.00	100.00	290.00	280.00	100.00	100.00	280.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00					30.00			
Grade [%]	0.00					0.00			
Crosswalk	Yes					Yes			

Volumes

Name									
Base Volume Input [veh/h]	1	1	11	0	46	193	0	8	4
Base Volume Adjustment Factor	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
Growth Factor	1.0400	1.0400	1.0400	1.0000	1.0400	1.0400	1.0000	1.0400	1.0400
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1	1	11	0	48	201	0	8	4
Peak Hour Factor	0.8610	0.8610	0.8610	1.0000	0.8610	0.8610	1.0000	0.8610	0.8610
Other Adjustment Factor	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	3	0	14	58	0	2	1
Total Analysis Volume [veh/h]	1	1	13	0	56	233	0	9	5
Pedestrian Volume [ped/h]	0					0			

Generated with PTV VISTRO
Version 2020 (SP 0-3)

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.02	0.00	0.05	0.30	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	10.21	10.21	11.66	0.00	8.59	11.47	0.00	9.79	8.36
Movement LOS	B	B	B		A	B		A	A
95th-Percentile Queue Length [veh/ln]	0.01	0.01	0.07	0.00	0.17	1.24	0.00	0.04	0.01
95th-Percentile Queue Length [ft/ln]	0.22	0.22	1.80	0.00	4.19	30.90	0.00	0.90	0.35
d_A, Approach Delay [s/veh]	9.20					11.34			
Approach LOS	A					B			
d_I, Intersection Delay [s/veh]	5.88								
Intersection LOS	B								

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Version 2020 (SP 0-3)

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Intersection Level Of Service Report
Intersection 4: Armstrong Boulevard and WB Hwy 10 Ramp

Control Type:	Signalized	Delay (sec / veh):	13.6
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.372

Intersection Setup

Name													
Approach	Northbound				Southbound			Eastbound			Westbound		
Lane Configuration													
Turning Movement	U-tu	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	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	395.0	100.0	100.0	100.0	100.00	100.00	315.00	100.00	100.00	100.00	685.00	100.00	685.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00				35.00			30.00			30.00		
Grade [%]	0.00				0.00			0.00			0.00		
Curb Present	No				No						No		
Crosswalk	No				No			No			Yes		

Volumes

Name													
Base Volume Input [veh/h]	2	34	248	0	0	210	257	0	0	0	19	2	320
Base Volume Adjustment Factor	1.000	1.000	1.000	1.000	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	2.00
Growth Factor	1.040	1.040	1.040	1.000	1.0000	1.0400	1.0400	1.0000	1.0000	1.0000	1.0400	1.0400	1.0400
In-Process Volume [veh/h]	0	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	0
Diverted Trips [veh/h]	0	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2	35	258	0	0	218	267	0	0	0	20	2	333
Peak Hour Factor	0.916	0.916	0.916	1.000	1.0000	0.9160	0.9160	1.0000	1.0000	1.0000	0.9160	0.9160	0.9160
Other Adjustment Factor	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	10	70	0	0	59	73	0	0	0	5	1	91
Total Analysis Volume [veh/h]	2	38	282	0	0	238	291	0	0	0	22	2	364
Presence of On-Street Parking	No			No	No		No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0				0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0				0			0			0		
v_co, Outbound Pedestrian Volume crossing	0				0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0				0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0				0			0			0		
Bicycle Volume [bicycles/h]	0				0			0			0		

Appendix F - Capacity Analysis Backup

Generated with PTV VISTRO
Version 2020 (SP 0-3)

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Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permi	Prote	Permi	Permi	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	0	5	2	0	0	6	0	0	0	0	0	8	0
Auxiliary Signal Groups													
Lead / Lag	-	Lead	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	7	10	0	0	10	0	0	0	0	0	10	0
Maximum Green [s]	0	20	35	0	0	35	0	0	0	0	0	30	0
Amber [s]	0.0	3.0	5.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
All red [s]	0.0	2.5	1.5	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	3.5	0.0
Split [s]	0	0	0	0	0	0	0	0	0	0	0	0	0
Vehicle Extension [s]	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
Walk [s]	0	0	7	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	20	0	0	0	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk			No			No						No	
I1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.5	4.5	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	4.5	0.0
Minimum Recall		No	Yes			Yes						No	
Maximum Recall		No	No			No						No	
Pedestrian Recall		No	No			No						No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	R		C	R
C, Cycle Length [s]	42	42	42	42		42	42
L, Total Lost Time per Cycle [s]	5.50	6.50	6.50	6.50		6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	3.50	4.50	4.50	4.50		4.50	4.50
g_i, Effective Green Time [s]	3	19	11	11		10	10
g / C, Green / Cycle	0.06	0.46	0.27	0.27		0.23	0.23
(v / s)_i Volume / Saturation Flow Rate	0.02	0.09	0.07	0.20		0.01	0.14
s, saturation flow rate [veh/h]	1603	3204	3204	1431		1609	2532
c, Capacity [veh/h]	101	1472	854	381		377	593
d1, Uniform Delay [s]	19.08	6.79	12.32	14.32		12.62	14.52
k, delay calibration	0.11	0.11	0.11	0.11		0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	2.49	0.06	0.18	3.20		0.07	1.04
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.40	0.19	0.28	0.76		0.06	0.61
d, Delay for Lane Group [s/veh]	21.57	6.86	12.50	17.51		12.69	15.56
Lane Group LOS	C	A	B	B		B	B
Critical Lane Group	Yes	No	No	Yes		No	Yes
50th-Percentile Queue Length [veh/ln]	0.39	0.52	0.73	2.35		0.16	1.39
50th-Percentile Queue Length [ft/ln]	9.86	12.89	18.25	58.85		3.91	34.63
95th-Percentile Queue Length [veh/ln]	0.71	0.93	1.31	4.24		0.28	2.49
95th-Percentile Queue Length [ft/ln]	17.74	23.21	32.86	105.93		7.03	62.33

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	21.57	21.57	6.86	0.00	0.00	12.50	17.51	0.00	0.00	0.00	12.69	12.69	15.56
Movement LOS	C	C	A			B	B				B	B	B
d_A, Approach Delay [s/veh]	8.69				15.26			0.00			15.39		
Approach LOS	A				B			A			B		
d_I, Intersection Delay [s/veh]	13.59												
Intersection LOS	B												
Intersection V/C	0.372												

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	34.67
l_p,int, Pedestrian LOS Score for Intersection	0.000	0.000	0.000	2.066
Crosswalk LOS	F	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	778	778	0	667
d_b, Bicycle Delay [s]	16.81	16.81	45.00	20.00
l_b,int, Bicycle LOS Score for Intersection	1.794	1.996	4.132	2.200
Bicycle LOS	A	A	D	B

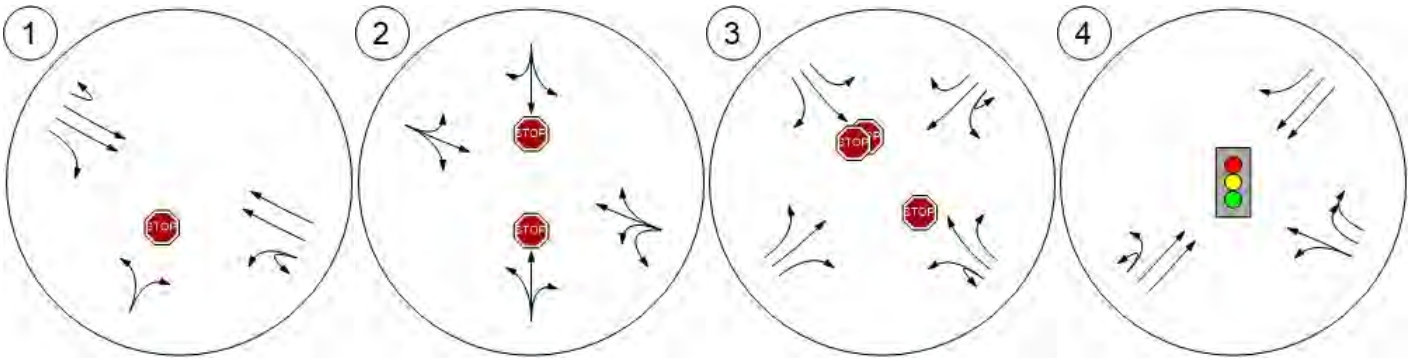
Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



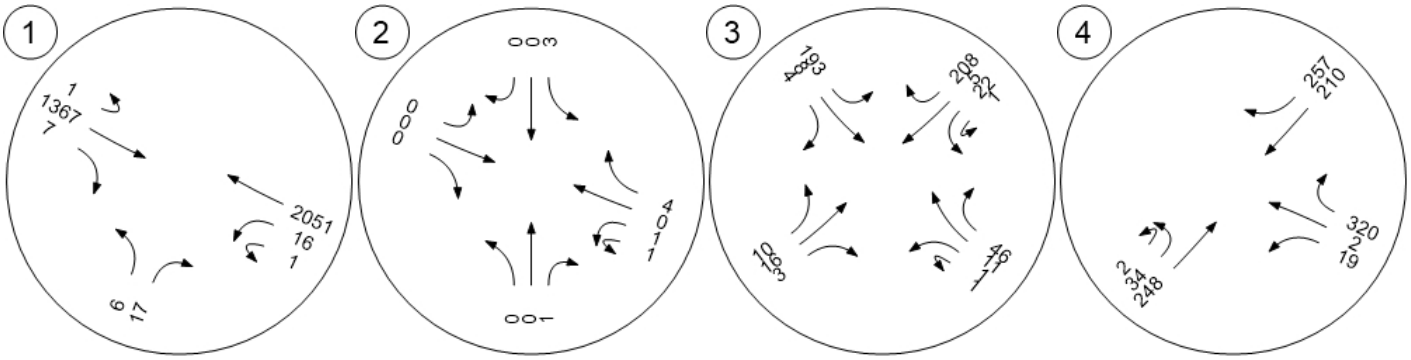
Lane Configuration and Traffic Control





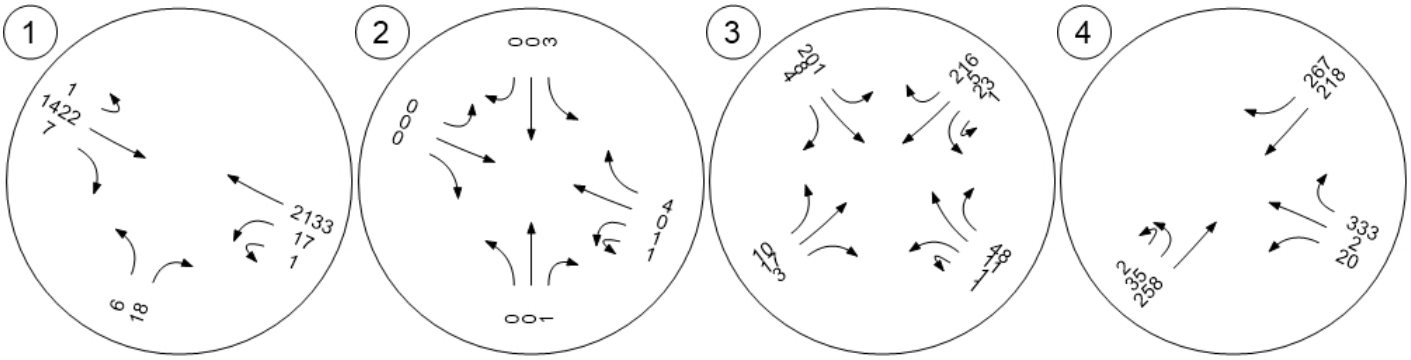
Traffic Volume - Base Volume





Traffic Volume - Future Total Volume





Vistro File: C:\...\Ramsey Model.vistro
Report File: C:\...\2040 AM nobuild.pdf

Scenario 5 2040 AM No-Build
11/9/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	HWY 10 and Bowers Drive	Two-way stop	HCM 6th Edition	NB Left	1.449	1,285.7	F
2	Riverdale Drive and Llama Street	Two-way stop	HCM 6th Edition	WB Left	0.006	7.2	A
3	Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp	Two-way stop	HCM 6th Edition	NWB Thru	0.012	12.5	B
4	Armstrong Boulevard and WB Hwy 10 Ramp	Signalized	HCM 6th Edition	NB Left	0.215	11.2	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 1: HWY 10 and Bowers Drive

Control Type:	Two-way stop	Delay (sec / veh):	1,285.7
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.449

Intersection Setup

Name								
Approach	Northbound		Eastbound			Westbound		
Lane Configuration								
Turning Movement	Left	Right	U-turn	Thru	Right	U-turn	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	1	1	0	0
Entry Pocket Length [ft]	100.00	100.00	325.00	100.00	225.00	360.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		65.00			65.00		
Grade [%]	0.00		0.00			0.00		
Crosswalk	Yes		Yes			Yes		

Volumes

Name								
Base Volume Input [veh/h]	5	16	1	1736	2	0	4	895
Base Volume Adjustment Factor	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
Growth Factor	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	24	1	2587	3	0	6	1334
Peak Hour Factor	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	6	0	683	1	0	2	352
Total Analysis Volume [veh/h]	7	25	1	2732	3	0	6	1409
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	1.45	0.18	0.01	0.03	0.00	0.00	0.04	0.01
d_M, Delay for Movement [s/veh]	1285.71	566.88	32.45	0.00	0.00	289.15	30.99	0.00
Movement LOS	F	F	D	A	A	F	D	A
95th-Percentile Queue Length [veh/ln]	4.32	4.32	0.02	0.00	0.00	0.13	0.13	0.00
95th-Percentile Queue Length [ft/ln]	108.09	108.09	0.57	0.00	0.00	3.22	3.22	0.00
d_A, Approach Delay [s/veh]	724.13		0.01			0.13		
Approach LOS	F		A			A		
d_I, Intersection Delay [s/veh]	5.59							
Intersection LOS	F							

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Intersection Level Of Service Report
Intersection 2: Riverdale Drive and Llama Street

Control Type:	Two-way stop	Delay (sec / veh):	7.2
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.006

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 Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry 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
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	0	0	0	0	0	0	6	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 Factor	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900
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	0	0	0	0	0	0	9	0	0
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	0	0	0	0	0	3	0	0
Total Analysis Volume [veh/h]	0	0	0	0	0	0	0	0	0	10	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	8.64	9.15	8.32	8.64	9.15	8.32	7.22	0.00	0.00	7.23	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.46	0.46
d_A, Approach Delay [s/veh]	8.70			8.70			2.41			7.23		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	7.23											
Intersection LOS	A											

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Intersection Level Of Service Report
Intersection 3: Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp

Control Type:	Two-way stop	Delay (sec / veh):	12.5
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.012

Intersection Setup

Name												
Approach	Southbound				Northeastbound				Southwestbound			
Lane Configuration												
Turning Movement	Left	Thru	Right	Right	Left	Left	Thru	Right	Left	Thru	Right	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 Entry Pocket	0	0	0	0	1	0	0	1	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	300.00	100.00	100.00	300.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00				35.00				35.00			
Grade [%]	0.00				0.00				0.00			
Crosswalk	Yes				Yes				Yes			

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	0	1	0	2	1	18	13	0	243
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 Factor	1.0000	1.0000	1.0000	1.0000	1.4900	1.0000	1.4900	1.4900	1.4900	1.4900	1.0000	1.4900
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	0	1	0	3	1	27	19	0	362
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	0.9430	1.0000	0.9430	0.9430	0.9430	0.9430	1.0000	0.9430
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	0	0	1	0	7	5	0	96
Total Analysis Volume [veh/h]	0	0	0	0	1	0	3	1	29	20	0	384
Pedestrian Volume [ped/h]	0				0				0			

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			
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	0.00	0.00	0.02	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	8.12	0.00	0.00	0.00	7.27	0.00	0.00	0.00
Movement LOS					A		A	A	A	A		A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	1.37	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00				1.62				0.49			
Approach LOS	A				A				A			
d_I, Intersection Delay [s/veh]	5.20											
Intersection LOS	B											

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Intersection Setup

Name								
Approach	Northwestbound				Southeastbound			
Lane Configuration								
Turning Movement	Left	Thru	Thru	Right	Left	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	1	0	0	1
Entry Pocket Length [ft]	225.00	100.00	100.00	290.00	280.00	100.00	100.00	280.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00				30.00			
Grade [%]	0.00				0.00			
Crosswalk	Yes				Yes			

Volumes

Name								
Base Volume Input [veh/h]	2	4	0	14	187	0	7	10
Base Volume Adjustment Factor	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
Growth Factor	1.4900	1.4900	1.0000	1.4900	1.4900	1.0000	1.4900	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	6	0	21	279	0	10	15
Peak Hour Factor	0.9430	0.9430	1.0000	0.9430	0.9430	1.0000	0.9430	0.9430
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	2	0	6	74	0	3	4
Total Analysis Volume [veh/h]	3	6	0	22	296	0	11	16
Pedestrian Volume [ped/h]	0				0			

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Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.01	0.00	0.02	0.34	0.00	0.01	0.02
d_M, Delay for Movement [s/veh]	10.67	12.53	0.00	8.40	11.36	0.00	9.62	8.46
Movement LOS	B	B		A	B		A	A
95th-Percentile Queue Length [veh/ln]	0.01	0.04	0.00	0.06	1.54	0.00	0.04	0.05
95th-Percentile Queue Length [ft/ln]	0.35	0.94	0.00	1.56	38.50	0.00	1.06	1.15
d_A, Approach Delay [s/veh]	9.42				11.16			
Approach LOS	A				B			
d_I, Intersection Delay [s/veh]	5.20							
Intersection LOS	B							

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Intersection Level Of Service Report
Intersection 4: Armstrong Boulevard and WB Hwy 10 Ramp

Control Type:	Signalized	Delay (sec / veh):	11.2
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.215

Intersection Setup

Name													
Approach	Northbound			Southbound				Eastbound			Westbound		
Lane Configuration													
Turning Movement	Left	Thru	Right	U-tu	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	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	395.00	100.00	100.00	100.0	100.0	100.0	315.0	100.00	100.00	100.00	685.00	100.00	685.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00			35.00				30.00			30.00		
Grade [%]	0.00			0.00				0.00			0.00		
Curb Present	No			No							No		
Crosswalk	No			No				No			Yes		

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Volumes

Name													
Base Volume Input [veh/h]	10	220	0	1	0	238	96	0	0	0	20	2	134
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	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	2.00
Growth Factor	1.4900	1.4900	1.0000	1.490	1.000	1.490	1.490	1.0000	1.0000	1.0000	1.4900	1.4900	1.4900
In-Process Volume [veh/h]	0	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	0
Diverted Trips [veh/h]	0	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	15	328	0	1	0	355	143	0	0	0	30	3	200
Peak Hour Factor	0.9310	0.9310	1.0000	0.931	1.000	0.931	0.931	1.0000	1.0000	1.0000	0.9310	0.9310	0.9310
Other Adjustment Factor	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	88	0	0	0	95	38	0	0	0	8	1	54
Total Analysis Volume [veh/h]	16	352	0	1	0	381	154	0	0	0	32	3	215
Presence of On-Street Parking	No		No	No			No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0				0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0				0			0		
v_co, Outbound Pedestrian Volume crossing	0			0				0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0				0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0				0			0		
Bicycle Volume [bicycles/h]	0			0				0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Permi	Permi	Permi	Permi	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	5	2	0	0	0	6	0	0	0	0	0	8	0
Auxiliary Signal Groups													
Lead / Lag	Lead	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	7	10	0	0	0	10	0	0	0	0	0	10	0
Maximum Green [s]	20	35	0	0	0	35	0	0	0	0	0	30	0
Amber [s]	3.0	5.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
All red [s]	2.5	1.5	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	3.5	0.0
Split [s]	0	0	0	0	0	0	0	0	0	0	0	0	0
Vehicle Extension [s]	3.0	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
Walk [s]	0	7	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	20	0	0	0	0	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No				No						No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	3.5	4.5	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	4.5	0.0
Minimum Recall	No	Yes				Yes						No	
Maximum Recall	No	No				No						No	
Pedestrian Recall	No	No				No						No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	R		C	R
C, Cycle Length [s]	40	40	40	40	40		40	40
L, Total Lost Time per Cycle [s]	5.50	6.50	6.50	6.50	6.50		6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	2.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	3.50	4.50	4.50	4.50	4.50		4.50	4.50
g_i, Effective Green Time [s]	1	17	11	11	11		9	9
g / C, Green / Cycle	0.03	0.44	0.27	0.27	0.27		0.24	0.24
(v / s)_i Volume / Saturation Flow Rate	0.01	0.11	0.12	0.12	0.11		0.02	0.08
s, saturation flow rate [veh/h]	1603	3204	1645	1532	1431		1609	2532
c, Capacity [veh/h]	51	1404	524	412	385		382	602
d1, Uniform Delay [s]	18.99	7.11	12.13	12.16	11.99		11.91	12.73
k, delay calibration	0.11	0.11	0.11	0.11	0.11		0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	3.51	0.09	0.45	0.76	0.67		0.10	0.36
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.32	0.25	0.38	0.45	0.40		0.09	0.36
d, Delay for Lane Group [s/veh]	22.50	7.20	12.58	12.92	12.66		12.01	13.09
Lane Group LOS	C	A	B	B	B		B	B
Critical Lane Group	Yes	No	No	Yes	No		No	Yes
50th-Percentile Queue Length [veh/ln]	0.17	0.64	1.18	1.13	0.93		0.21	0.68
50th-Percentile Queue Length [ft/ln]	4.32	15.90	29.61	28.26	23.32		5.26	17.12
95th-Percentile Queue Length [veh/ln]	0.31	1.15	2.13	2.03	1.68		0.38	1.23
95th-Percentile Queue Length [ft/ln]	7.78	28.63	53.30	50.87	41.97		9.46	30.82

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	22.50	7.20	0.00	12.58	0.00	12.74	12.66	0.00	0.00	0.00	12.01	12.01	13.09
Movement LOS	C	A		B		B	B				B	B	B
d_A, Approach Delay [s/veh]	7.87			12.72				0.00			12.94		
Approach LOS	A			B				A			B		
d_I, Intersection Delay [s/veh]	11.22												
Intersection LOS	B												
Intersection V/C	0.215												

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	34.67
l_p,int, Pedestrian LOS Score for Intersection	0.000	0.000	0.000	2.021
Crosswalk LOS	F	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	778	778	0	667
d_b, Bicycle Delay [s]	16.81	16.81	45.00	20.00
l_b,int, Bicycle LOS Score for Intersection	1.863	2.002	4.132	1.972
Bicycle LOS	A	B	D	A

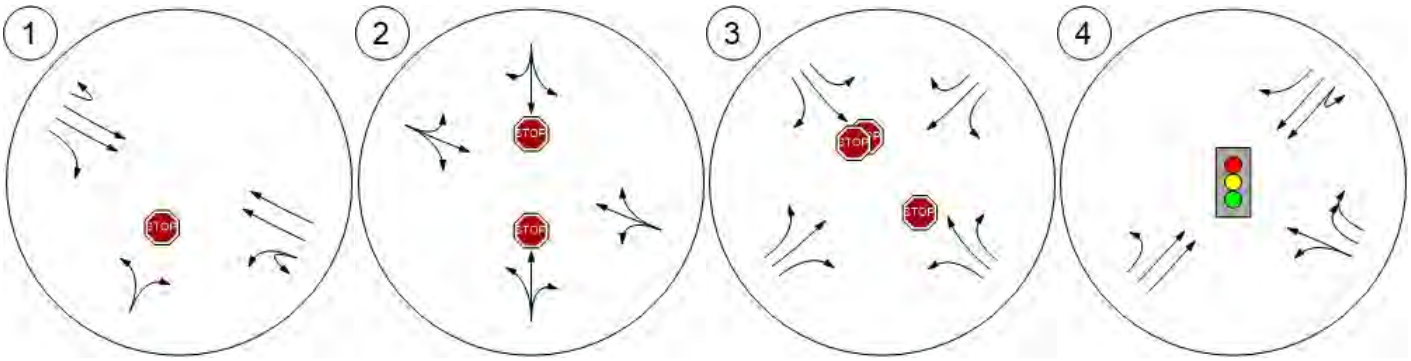
Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



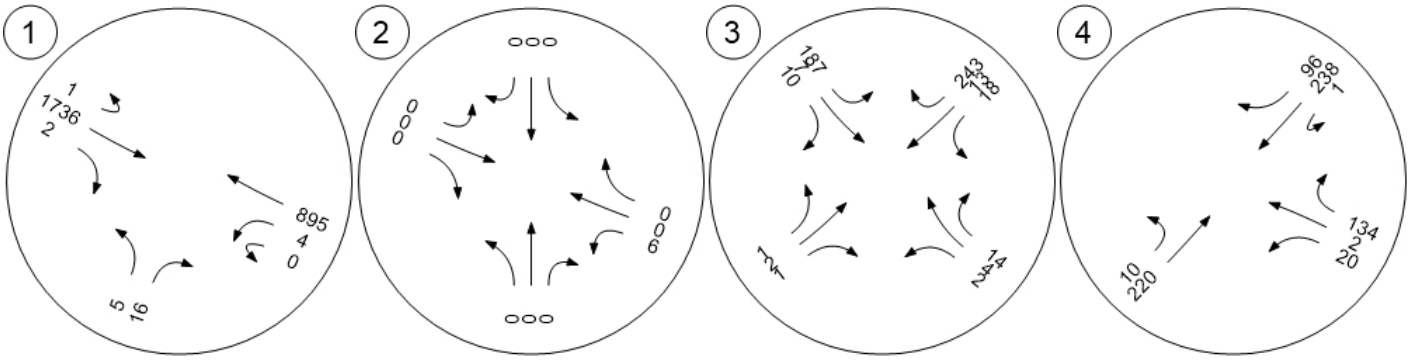
Lane Configuration and Traffic Control





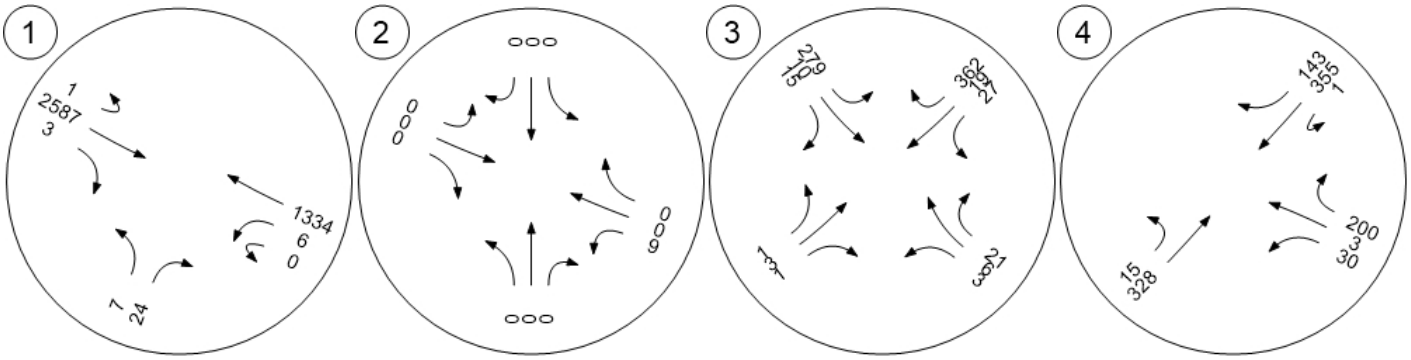
Traffic Volume - Base Volume





Traffic Volume - Future Total Volume





Vistro File: C:\...\Ramsey Model.vistro
Report File: C:\...\2040 PM nobuild.pdf

Scenario 6 2040 PM No-Build
11/9/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	HWY 10 and Bowers Drive	Two-way stop	HCM 6th Edition	NB Left	4.293	3,711.8	F
2	Riverdale Drive and Llama Street	Two-way stop	HCM 6th Edition	SB Left	0.004	8.6	A
3	Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp	Two-way stop	HCM 6th Edition	SEB Left	0.477	14.7	B
4	Armstrong Boulevard and WB Hwy 10 Ramp	Signalized	HCM 6th Edition	NB Left	0.535	17.3	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 1: HWY 10 and Bowers Drive

Control Type:	Two-way stop	Delay (sec / veh):	3,711.8
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	4.293

Intersection Setup

Name								
Approach	Northbound		Eastbound			Westbound		
Lane Configuration								
Turning Movement	Left	Right	U-turn	Thru	Right	U-turn	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	1	1	0	0
Entry Pocket Length [ft]	100.00	100.00	325.00	100.00	225.00	360.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		65.00			65.00		
Grade [%]	0.00		0.00			0.00		
Crosswalk	Yes		Yes			Yes		

Volumes

Name								
Base Volume Input [veh/h]	6	17	1	1367	7	1	16	2051
Base Volume Adjustment Factor	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
Growth Factor	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	9	25	1	2037	10	1	24	3056
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	7	0	536	3	0	6	804
Total Analysis Volume [veh/h]	9	26	1	2144	11	1	25	3217
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	4.29	0.12	0.14	0.02	0.00	0.03	0.10	0.03
d_M, Delay for Movement [s/veh]	3711.85	2011.10	596.59	0.00	0.00	108.14	22.29	0.00
Movement LOS	F	F	F	A	A	F	C	A
95th-Percentile Queue Length [veh/ln]	5.69	5.69	0.34	0.00	0.00	0.44	0.44	0.00
95th-Percentile Queue Length [ft/ln]	142.26	142.26	8.62	0.00	0.00	10.95	10.95	0.00
d_A, Approach Delay [s/veh]	2448.43		0.28			0.21		
Approach LOS	F		A			A		
d_I, Intersection Delay [s/veh]	16.00							
Intersection LOS	F							

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Intersection Level Of Service Report
Intersection 2: Riverdale Drive and Llama Street

Control Type:	Two-way stop	Delay (sec / veh):	8.6
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

Intersection Setup

Name													
Approach	Northbound			Southbound			Eastbound			Westbound			
Lane Configuration													
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	U-tu	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	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.0	100.0	100.0	100.0
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			35.00			
Grade [%]	0.00			0.00			0.00			0.00			
Crosswalk	Yes			Yes			Yes			Yes			

Volumes

Name													
Base Volume Input [veh/h]	0	0	1	3	0	0	0	0	0	1	1	0	4
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000
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	2.00
Growth Factor	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.490	1.490	1.490	1.490
In-Process Volume [veh/h]	0	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	0
Diverted Trips [veh/h]	0	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Total Hourly Volume [veh/h]	0	0	1	4	0	0	0	0	0	1	1	0	6
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.900	0.900	0.900	0.900
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000
Total 15-Minute Volume [veh/h]	0	0	0	1	0	0	0	0	0	0	0	0	2
Total Analysis Volume [veh/h]	0	0	1	4	0	0	0	0	0	1	1	0	7
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	0.00
d_M, Delay for Movement [s/veh]	8.55	9.08	8.32	8.57	9.08	8.35	7.23	0.00	0.00	8.12	7.22	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.07	0.07	0.07	0.30	0.30	0.30	0.00	0.00	0.00	0.11	0.11	0.11	0.11
d_A, Approach Delay [s/veh]	8.32			8.57			2.41			1.71			
Approach LOS	A			A			A			A			
d_I, Intersection Delay [s/veh]	4.14												
Intersection LOS	A												

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Intersection Level Of Service Report
Intersection 3: Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp

Control Type:	Two-way stop	Delay (sec / veh):	14.7
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.477

Intersection Setup

Name													
Approach	Southbound				Northeastbound				Southwestbound				
Lane Configuration													
Turning Movement	Left	Thru	Right	Right	Left	Left	Thru	Right	U-turn	Left	Thru	Right	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	12.00
No. of Lanes in Entry Pocket	0	0	0	0	1	0	0	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	300.00	100.00	100.00	300.00	100.0	100.0	100.0	100.0	100.0
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00				35.00				35.00				
Grade [%]	0.00				0.00				0.00				
Crosswalk	Yes				Yes				Yes				

Volumes

Name													
Base Volume Input [veh/h]	0	0	0	0	10	0	16	3	1	22	5	0	208
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.000
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	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.4900	1.0000	1.4900	1.4900	1.490	1.490	1.490	1.000	1.490
In-Process Volume [veh/h]	0	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	0
Diverted Trips [veh/h]	0	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Total Hourly Volume [veh/h]	0	0	0	0	15	0	24	4	1	33	7	0	310
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	0.8610	1.0000	0.8610	0.8610	0.861	0.861	0.861	1.000	0.861
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.000
Total 15-Minute Volume [veh/h]	0	0	0	0	4	0	7	1	0	10	2	0	90
Total Analysis Volume [veh/h]	0	0	0	0	17	0	28	5	1	38	8	0	360
Pedestrian Volume [ped/h]	0				0				0				

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			
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	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	8.07	0.00	0.00	0.00	8.58	7.34	0.00	0.00	0.00
Movement LOS					A		A	A	A	A	A		A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.08	0.08	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	1.09	0.00	0.00	0.00	1.93	1.93	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00				2.74				0.71				
Approach LOS	A				A				A				
d_I, Intersection Delay [s/veh]	7.14												
Intersection LOS	B												

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Intersection Setup

Name									
Approach	Northwestbound					Southeastbound			
Lane Configuration									
Turning Movement	U-turn	Left	Thru	Thru	Right	Left	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	1	0	0	1
Entry Pocket Length [ft]	225.00	100.00	100.00	100.00	290.00	280.00	100.00	100.00	280.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00					30.00			
Grade [%]	0.00					0.00			
Crosswalk	Yes					Yes			

Volumes

Name									
Base Volume Input [veh/h]	1	1	11	0	46	193	0	8	4
Base Volume Adjustment Factor	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
Growth Factor	1.4900	1.4900	1.4900	1.0000	1.4900	1.4900	1.0000	1.4900	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1	1	16	0	69	288	0	12	6
Peak Hour Factor	0.8610	0.8610	0.8610	1.0000	0.8610	0.8610	1.0000	0.8610	0.8610
Other Adjustment Factor	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	5	0	20	84	0	3	2
Total Analysis Volume [veh/h]	1	1	19	0	80	334	0	14	7
Pedestrian Volume [ped/h]	0					0			

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Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.04	0.00	0.08	0.48	0.00	0.02	0.01
d_M, Delay for Movement [s/veh]	11.16	11.16	13.36	0.00	8.72	14.72	0.00	10.17	8.37
Movement LOS	B	B	B		A	B		B	A
95th-Percentile Queue Length [veh/ln]	0.01	0.01	0.13	0.00	0.25	2.59	0.00	0.06	0.02
95th-Percentile Queue Length [ft/ln]	0.26	0.26	3.30	0.00	6.19	64.64	0.00	1.51	0.49
d_A, Approach Delay [s/veh]	9.64					14.42			
Approach LOS	A					B			
d_I, Intersection Delay [s/veh]	7.14								
Intersection LOS	B								

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Intersection Level Of Service Report
Intersection 4: Armstrong Boulevard and WB Hwy 10 Ramp

Control Type:	Signalized	Delay (sec / veh):	17.3
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.535

Intersection Setup

Name													
Approach	Northbound				Southbound			Eastbound			Westbound		
Lane Configuration													
Turning Movement	U-tu	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	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	395.0	100.0	100.0	100.0	100.00	100.00	315.00	100.00	100.00	100.00	685.00	100.00	685.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00				35.00			30.00			30.00		
Grade [%]	0.00				0.00			0.00			0.00		
Curb Present	No				No						No		
Crosswalk	No				No			No			Yes		

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Volumes

Name													
Base Volume Input [veh/h]	2	34	248	0	0	210	257	0	0	0	19	2	320
Base Volume Adjustment Factor	1.000	1.000	1.000	1.000	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	2.00
Growth Factor	1.490	1.490	1.490	1.000	1.0000	1.4900	1.4900	1.0000	1.0000	1.0000	1.4900	1.4900	1.4900
In-Process Volume [veh/h]	0	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	0
Diverted Trips [veh/h]	0	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	51	370	0	0	313	383	0	0	0	28	3	477
Peak Hour Factor	0.916	0.916	0.916	1.000	1.0000	0.9160	0.9160	1.0000	1.0000	1.0000	0.9160	0.9160	0.9160
Other Adjustment Factor	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	14	101	0	0	85	105	0	0	0	8	1	130
Total Analysis Volume [veh/h]	3	56	404	0	0	342	418	0	0	0	31	3	521
Presence of On-Street Parking	No			No	No		No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0				0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0				0			0			0		
v_co, Outbound Pedestrian Volume crossing	0				0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0				0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0				0			0			0		
Bicycle Volume [bicycles/h]	0				0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permi	Prote	Permi	Permi	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	0	5	2	0	0	6	0	0	0	0	0	8	0
Auxiliary Signal Groups													
Lead / Lag	-	Lead	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	7	10	0	0	10	0	0	0	0	0	10	0
Maximum Green [s]	0	20	35	0	0	35	0	0	0	0	0	30	0
Amber [s]	0.0	3.0	5.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
All red [s]	0.0	2.5	1.5	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	3.5	0.0
Split [s]	0	0	0	0	0	0	0	0	0	0	0	0	0
Vehicle Extension [s]	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
Walk [s]	0	0	7	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	20	0	0	0	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk			No			No						No	
I1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.5	4.5	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	4.5	0.0
Minimum Recall		No	Yes			Yes						No	
Maximum Recall		No	No			No						No	
Pedestrian Recall		No	No			No						No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	R		C	R
C, Cycle Length [s]	57	57	57	57		57	57
L, Total Lost Time per Cycle [s]	5.50	6.50	6.50	6.50		6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	3.50	4.50	4.50	4.50		4.50	4.50
g_i, Effective Green Time [s]	4	29	19	19		14	14
g / C, Green / Cycle	0.08	0.51	0.34	0.34		0.26	0.26
(v / s)_i Volume / Saturation Flow Rate	0.04	0.13	0.11	0.29		0.02	0.21
s, saturation flow rate [veh/h]	1603	3204	3204	1431		1610	2532
c, Capacity [veh/h]	121	1649	1097	490		412	649
d1, Uniform Delay [s]	25.18	7.65	13.73	17.33		16.03	19.75
k, delay calibration	0.11	0.11	0.11	0.11		0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	3.04	0.08	0.16	4.35		0.08	2.38
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.49	0.25	0.31	0.85		0.08	0.80
d, Delay for Lane Group [s/veh]	28.22	7.72	13.90	21.68		16.11	22.13
Lane Group LOS	C	A	B	C		B	C
Critical Lane Group	Yes	No	No	Yes		No	Yes
50th-Percentile Queue Length [veh/ln]	0.80	1.06	1.41	4.86		0.32	3.10
50th-Percentile Queue Length [ft/ln]	20.04	26.56	35.22	121.54		7.89	77.58
95th-Percentile Queue Length [veh/ln]	1.44	1.91	2.54	8.48		0.57	5.59
95th-Percentile Queue Length [ft/ln]	36.07	47.82	63.39	211.94		14.20	139.65

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	28.22	28.22	7.72	0.00	0.00	13.90	21.68	0.00	0.00	0.00	16.11	16.11	22.13
Movement LOS	C	C	A			B	C				B	B	C
d_A, Approach Delay [s/veh]	10.34				18.18			0.00			21.76		
Approach LOS	B				B			A			C		
d_I, Intersection Delay [s/veh]	17.25												
Intersection LOS	B												
Intersection V/C	0.535												

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	34.67
l_p,int, Pedestrian LOS Score for Intersection	0.000	0.000	0.000	2.120
Crosswalk LOS	F	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	778	778	0	667
d_b, Bicycle Delay [s]	16.81	16.81	45.00	20.00
l_b,int, Bicycle LOS Score for Intersection	1.895	2.187	4.132	2.475
Bicycle LOS	A	B	D	B

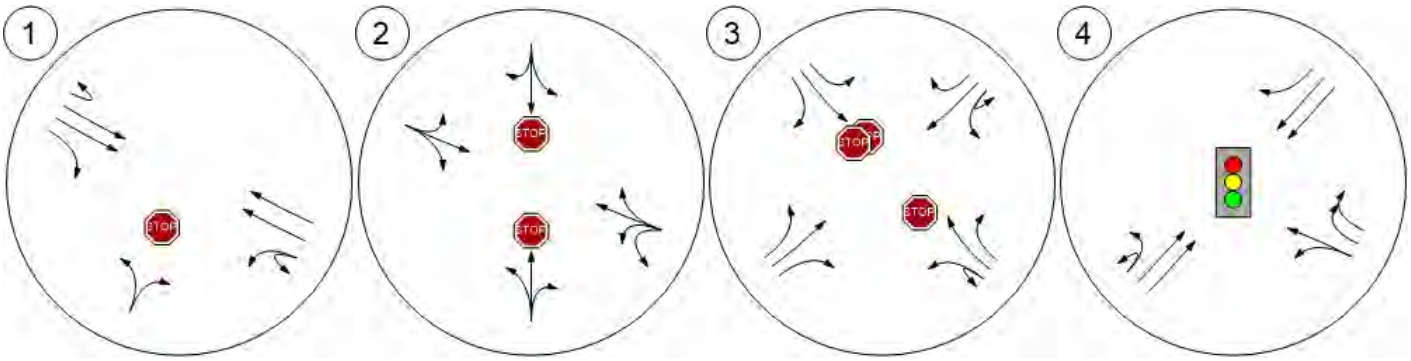
Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



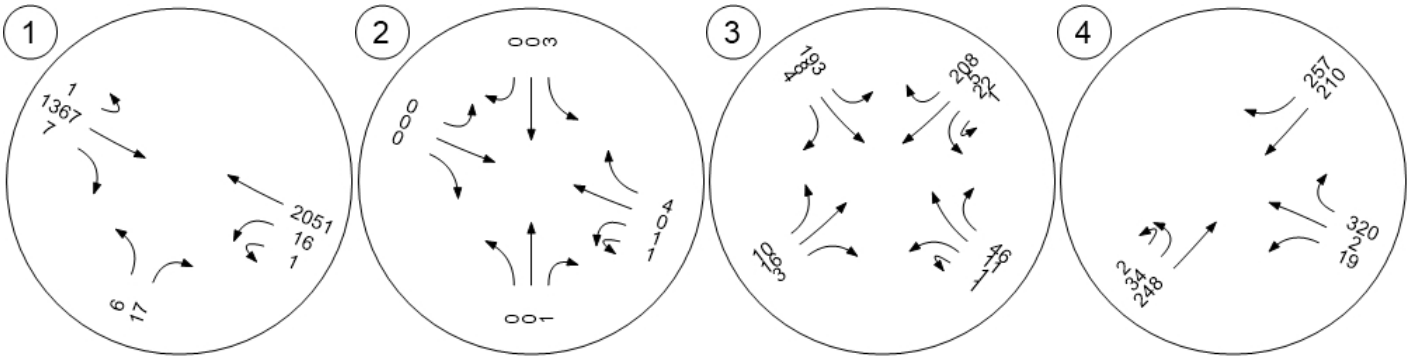
Lane Configuration and Traffic Control





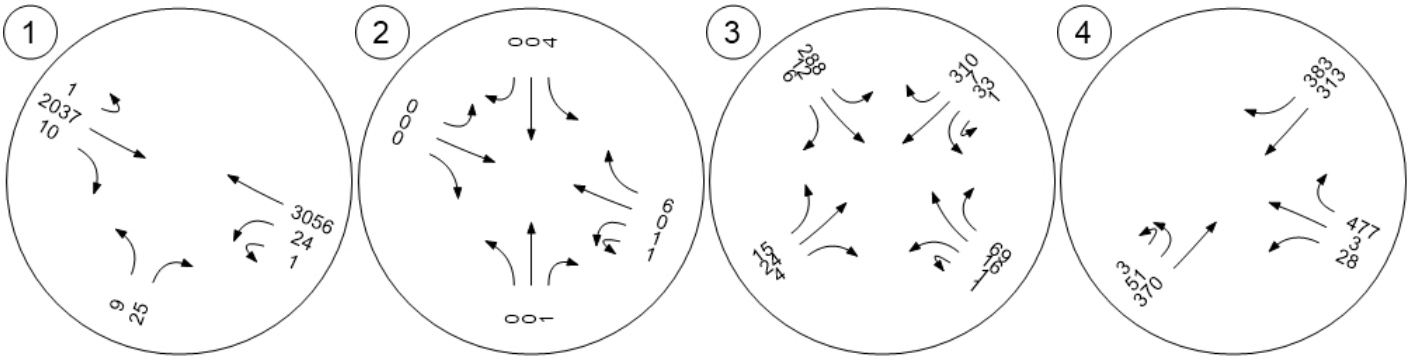
Traffic Volume - Base Volume





Traffic Volume - Future Total Volume





Vistro File: C:\...\Ramsey Model.vistro
Report File: C:\...\2022 AM Build.pdf

Scenario 7 2022 AM Build
11/9/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	HWY 10 and Bowers Drive	Two-way stop	HCM 6th Edition	NB Left	1.179	438.7	F
2	Riverdale Drive and Llama Street	Two-way stop	HCM 6th Edition	WB Left	0.005	7.3	A
3	Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp	Two-way stop	HCM 6th Edition	NWB Thru	0.008	12.2	B
4	Armstrong Boulevard and WB Hwy 10 Ramp	Signalized	HCM 6th Edition	NB Left	0.166	11.2	B
8	Bower Dr and Riverdale Dr	Two-way stop	HCM 6th Edition	EB Left	0.025	9.0	A
9	Riverdale Drive and Western Site Access	Two-way stop	HCM 6th Edition	NB Left	0.020	9.0	A
10	Riverdale Drive and Eastern Site Access	Two-way stop	HCM 6th Edition	NB Left	0.031	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: HWY 10 and Bowers Drive

Control Type:	Two-way stop	Delay (sec / veh):	438.7
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.179

Intersection Setup

Name								
Approach	Northbound		Eastbound			Westbound		
Lane Configuration								
Turning Movement	Left	Right	U-turn	Thru	Right	U-turn	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	1	1	0	0
Entry Pocket Length [ft]	100.00	100.00	325.00	100.00	225.00	360.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		65.00			65.00		
Grade [%]	0.00		0.00			0.00		
Crosswalk	Yes		Yes			Yes		

Volumes

Name								
Base Volume Input [veh/h]	5	16	1	1736	2	0	4	895
Base Volume Adjustment Factor	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
Growth Factor	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	23	23	0	0	17	0	5	23
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	28	40	1	1805	19	0	9	954
Peak Hour Factor	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	11	0	477	5	0	2	252
Total Analysis Volume [veh/h]	30	42	1	1906	20	0	10	1007
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	1.18	0.16	0.00	0.02	0.00	0.00	0.03	0.01
d_M, Delay for Movement [s/veh]	438.67	311.00	19.56	0.00	0.00	77.21	17.31	0.00
Movement LOS	F	F	C	A	A	F	C	A
95th-Percentile Queue Length [veh/ln]	6.47	6.47	0.01	0.00	0.00	0.10	0.10	0.00
95th-Percentile Queue Length [ft/ln]	161.64	161.64	0.30	0.00	0.00	2.56	2.56	0.00
d_A, Approach Delay [s/veh]	364.20		0.01			0.17		
Approach LOS	F		A			A		
d_I, Intersection Delay [s/veh]	8.76							
Intersection LOS	F							

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Intersection Level Of Service Report
Intersection 2: Riverdale Drive and Llama Street

Control Type:	Two-way stop	Delay (sec / veh):	7.3
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.005

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 Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry 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
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	0	0	0	0	0	0	6	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 Factor	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400
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	57	0	0	16	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	0	0	0	0	57	0	6	16	0
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	0	0	0	16	0	2	4	0
Total Analysis Volume [veh/h]	0	0	0	0	0	0	0	63	0	7	18	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.07	9.55	8.59	9.07	9.55	8.39	7.25	0.00	0.00	7.35	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.34	0.34
d_A, Approach Delay [s/veh]	9.07			9.00			0.00			2.06		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	0.58											
Intersection LOS	A											

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Intersection Level Of Service Report
Intersection 3: Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp

Control Type:	Two-way stop	Delay (sec / veh):	12.2
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.008

Intersection Setup

Name												
Approach	Southbound				Northeastbound				Southwestbound			
Lane Configuration												
Turning Movement	Left	Thru	Right	Right	Left	Left	Thru	Right	Left	Thru	Right	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 Entry Pocket	0	0	0	0	1	0	0	1	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	300.00	100.00	100.00	300.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00				35.00				35.00			
Grade [%]	0.00				0.00				0.00			
Crosswalk	Yes				Yes				Yes			

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	0	1	0	2	1	18	13	0	243
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 Factor	1.0000	1.0000	1.0000	1.0000	1.0400	1.0000	1.0400	1.0400	1.0400	1.0400	1.0000	1.0400
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	23	0	34	1	0	16	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	0	24	0	36	2	19	30	0	253
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	0.9430	1.0000	0.9430	0.9430	0.9430	0.9430	1.0000	0.9430
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	6	0	10	1	5	8	0	67
Total Analysis Volume [veh/h]	0	0	0	0	25	0	38	2	20	32	0	268
Pedestrian Volume [ped/h]	0				0				0			

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	7.91	0.00	0.00	0.00	7.32	0.00	0.00	0.00
Movement LOS					A		A	A	A	A		A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.04	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	1.52	0.00	0.00	0.00	0.97	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00				3.04				0.46			
Approach LOS	A				A				A			
d_I, Intersection Delay [s/veh]	4.86											
Intersection LOS	B											

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Intersection Setup

Name								
Approach	Northwestbound				Southeastbound			
Lane Configuration								
Turning Movement	Left	Thru	Thru	Right	Left	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	1	0	0	1
Entry Pocket Length [ft]	225.00	100.00	100.00	290.00	280.00	100.00	100.00	280.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00				30.00			
Grade [%]	0.00				0.00			
Crosswalk	Yes				Yes			

Volumes

Name								
Base Volume Input [veh/h]	2	4	0	14	187	0	7	10
Base Volume Adjustment Factor	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
Growth Factor	1.0400	1.0400	1.0000	1.0400	1.0400	1.0000	1.0400	1.0400
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2	4	0	15	194	0	7	10
Peak Hour Factor	0.9430	0.9430	1.0000	0.9430	0.9430	1.0000	0.9430	0.9430
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	1	0	4	51	0	2	3
Total Analysis Volume [veh/h]	2	4	0	16	206	0	7	11
Pedestrian Volume [ped/h]	0				0			

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Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.01	0.00	0.02	0.27	0.00	0.01	0.01
d_M, Delay for Movement [s/veh]	10.81	12.22	0.00	8.54	11.43	0.00	10.14	8.49
Movement LOS	B	B		A	B		B	A
95th-Percentile Queue Length [veh/ln]	0.01	0.02	0.00	0.05	1.09	0.00	0.03	0.03
95th-Percentile Queue Length [ft/ln]	0.24	0.60	0.00	1.18	27.20	0.00	0.75	0.80
d_A, Approach Delay [s/veh]	9.41				11.24			
Approach LOS	A				B			
d_I, Intersection Delay [s/veh]	4.86							
Intersection LOS	B							

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Intersection Level Of Service Report
Intersection 4: Armstrong Boulevard and WB Hwy 10 Ramp

Control Type:	Signalized	Delay (sec / veh):	11.2
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.166

Intersection Setup

Name													
Approach	Northbound			Southbound				Eastbound			Westbound		
Lane Configuration													
Turning Movement	Left	Thru	Right	U-tu	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	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	395.00	100.00	100.00	100.0	100.0	100.0	315.0	100.00	100.00	100.00	685.00	100.00	685.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00			35.00				30.00			30.00		
Grade [%]	0.00			0.00				0.00			0.00		
Curb Present	No			No							No		
Crosswalk	No			No				No			Yes		

Volumes

Name													
Base Volume Input [veh/h]	10	220	0	1	0	238	96	0	0	0	20	2	134
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	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	2.00
Growth Factor	1.0400	1.0400	1.0000	1.040	1.000	1.040	1.040	1.0000	1.0000	1.0000	1.0400	1.0400	1.0400
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	23	11	0	0	0	4	0	0	0	0	12	0	0
Diverted Trips [veh/h]	0	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	33	240	0	1	0	252	100	0	0	0	33	2	139
Peak Hour Factor	0.9310	0.9310	1.0000	0.931	1.000	0.931	0.931	1.0000	1.0000	1.0000	0.9310	0.9310	0.9310
Other Adjustment Factor	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	64	0	0	0	68	27	0	0	0	9	1	37
Total Analysis Volume [veh/h]	35	258	0	1	0	271	107	0	0	0	35	2	149
Presence of On-Street Parking	No		No	No			No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0				0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0				0			0		
v_co, Outbound Pedestrian Volume crossing	0			0				0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0				0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0				0			0		
Bicycle Volume [bicycles/h]	0			0				0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Permi	Permi	Permi	Permi	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	5	2	0	0	0	6	0	0	0	0	0	8	0
Auxiliary Signal Groups													
Lead / Lag	Lead	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	7	10	0	0	0	10	0	0	0	0	0	10	0
Maximum Green [s]	20	35	0	0	0	35	0	0	0	0	0	30	0
Amber [s]	3.0	5.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
All red [s]	2.5	1.5	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	3.5	0.0
Split [s]	0	0	0	0	0	0	0	0	0	0	0	0	0
Vehicle Extension [s]	3.0	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
Walk [s]	0	7	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	20	0	0	0	0	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No				No						No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	3.5	4.5	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	4.5	0.0
Minimum Recall	No	Yes				Yes						No	
Maximum Recall	No	No				No						No	
Pedestrian Recall	No	No				No						No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	R		C	R
C, Cycle Length [s]	40	40	40	40	40		40	40
L, Total Lost Time per Cycle [s]	5.50	6.50	6.50	6.50	6.50		6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	2.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	3.50	4.50	4.50	4.50	4.50		4.50	4.50
g_i, Effective Green Time [s]	2	18	10	10	10		9	9
g / C, Green / Cycle	0.06	0.45	0.26	0.26	0.26		0.22	0.22
(v / s)_i Volume / Saturation Flow Rate	0.02	0.08	0.09	0.09	0.07		0.02	0.06
s, saturation flow rate [veh/h]	1603	3204	1641	1532	1431		1607	2532
c, Capacity [veh/h]	97	1455	501	393	367		357	563
d1, Uniform Delay [s]	18.13	6.51	12.11	12.14	12.00		12.43	12.90
k, delay calibration	0.11	0.11	0.11	0.11	0.11		0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	2.26	0.06	0.30	0.50	0.44		0.13	0.25
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.36	0.18	0.28	0.33	0.29		0.10	0.26
d, Delay for Lane Group [s/veh]	20.38	6.57	12.42	12.63	12.43		12.55	13.15
Lane Group LOS	C	A	B	B	B		B	B
Critical Lane Group	Yes	No	No	Yes	No		No	Yes
50th-Percentile Queue Length [veh/ln]	0.32	0.43	0.83	0.79	0.64		0.23	0.47
50th-Percentile Queue Length [ft/ln]	8.07	10.66	20.78	19.77	15.96		5.76	11.87
95th-Percentile Queue Length [veh/ln]	0.58	0.77	1.50	1.42	1.15		0.41	0.85
95th-Percentile Queue Length [ft/ln]	14.53	19.19	37.41	35.58	28.72		10.37	21.37

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	20.38	6.57	0.00	12.42	0.00	12.52	12.43	0.00	0.00	0.00	12.55	12.55	13.15
Movement LOS	C	A		B		B	B				B	B	B
d_A, Approach Delay [s/veh]	8.22			12.50				0.00			13.03		
Approach LOS	A			B				A			B		
d_I, Intersection Delay [s/veh]	11.15												
Intersection LOS	B												
Intersection V/C	0.166												

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	34.67
l_p,int, Pedestrian LOS Score for Intersection	0.000	0.000	0.000	2.000
Crosswalk LOS	F	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	778	778	0	667
d_b, Bicycle Delay [s]	16.81	16.81	45.00	20.00
l_b,int, Bicycle LOS Score for Intersection	1.801	1.872	4.132	1.867
Bicycle LOS	A	A	D	A

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Intersection Level Of Service Report
Intersection 8: Bower Dr and Riverdale Dr

Control Type:	Two-way stop	Delay (sec / veh):	9.0
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.025

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	6	21	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	22	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	45	22	6	22	0
Peak Hour Factor	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	12	6	2	6	0
Total Analysis Volume [veh/h]	0	48	23	6	23	0
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.02	0.00
d_M, Delay for Movement [s/veh]	7.27	0.00	0.00	0.00	8.97	8.53
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.08	0.08
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	1.90	1.90
d_A, Approach Delay [s/veh]	0.00		0.00		8.97	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.06					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 9: Riverdale Drive and Western Site Access

Control Type:	Two-way stop	Delay (sec / veh):	9.0
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.020

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 Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0400	1.0000	1.0000	1.0400
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	18	23	13	9	4	27
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]	18	23	13	9	4	27
Peak Hour Factor	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	6	3	2	1	7
Total Analysis Volume [veh/h]	19	24	14	10	4	29
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	0.02	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	8.95	8.56	0.00	0.00	7.27	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.13	0.13	0.00	0.00	0.01	0.01
95th-Percentile Queue Length [ft/ln]	3.34	3.34	0.00	0.00	0.19	0.19
d_A, Approach Delay [s/veh]	8.73		0.00		0.88	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	4.05					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 10: Riverdale Drive and Eastern Site Access

Control Type:	Two-way stop	Delay (sec / veh):	9.1
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.031

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 Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0400	1.0000	1.0000	1.0400
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	27	34	23	13	12	4
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]	27	34	23	13	12	4
Peak Hour Factor	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	9	6	3	3	1
Total Analysis Volume [veh/h]	29	36	24	14	13	4
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

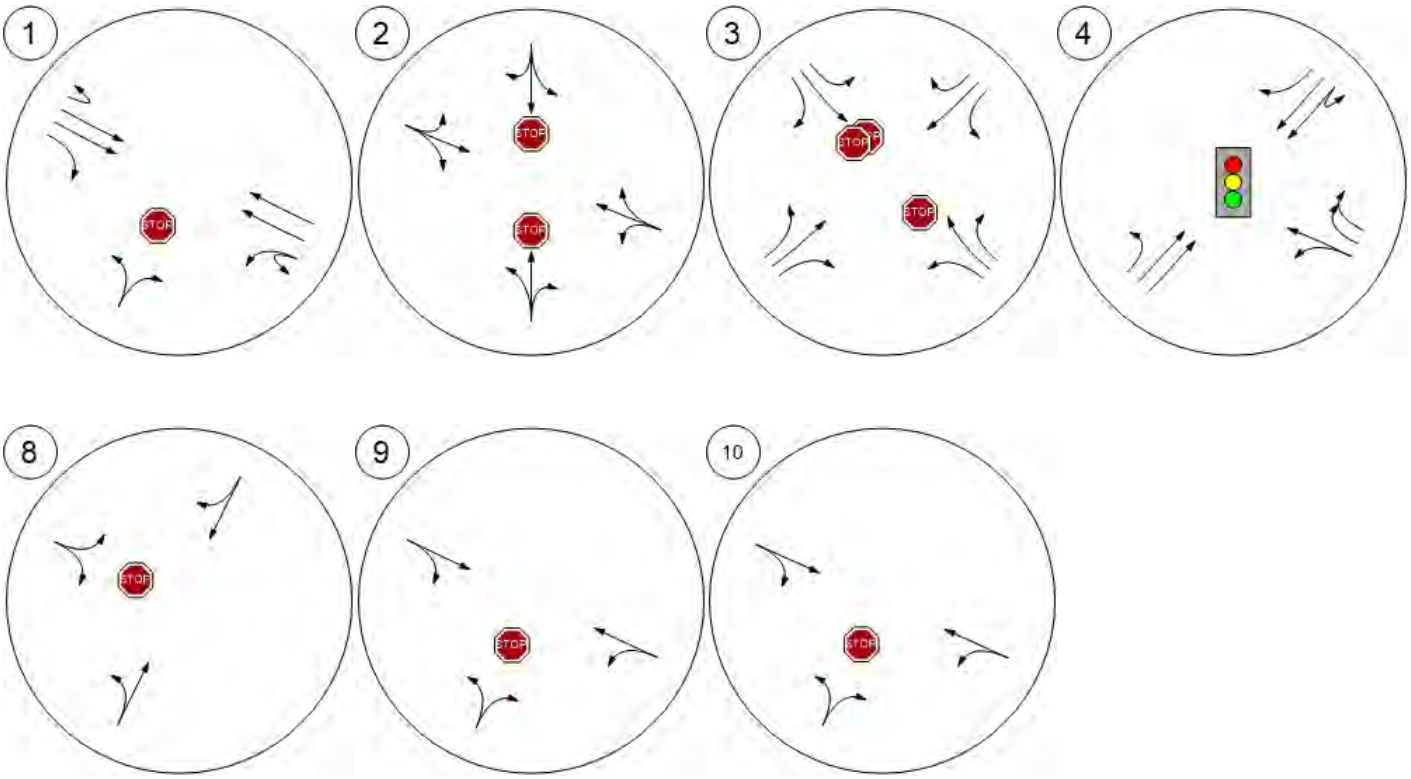
Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.03	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	9.09	8.70	0.00	0.00	7.31	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.21	0.21	0.00	0.00	0.03	0.03
95th-Percentile Queue Length [ft/ln]	5.24	5.24	0.00	0.00	0.63	0.63
d_A, Approach Delay [s/veh]	8.88		0.00		5.59	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	5.60					
Intersection LOS	A					

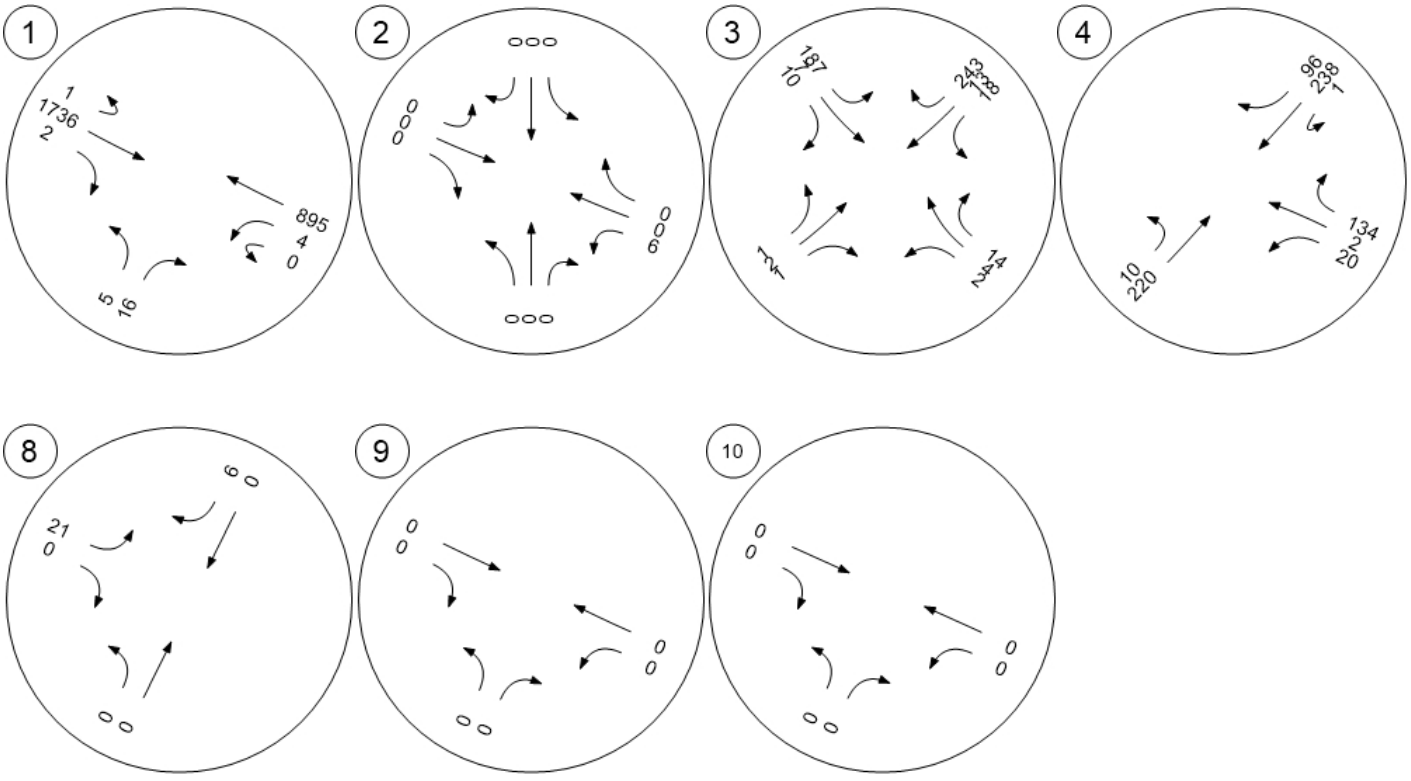
Lane Configuration and Traffic Control





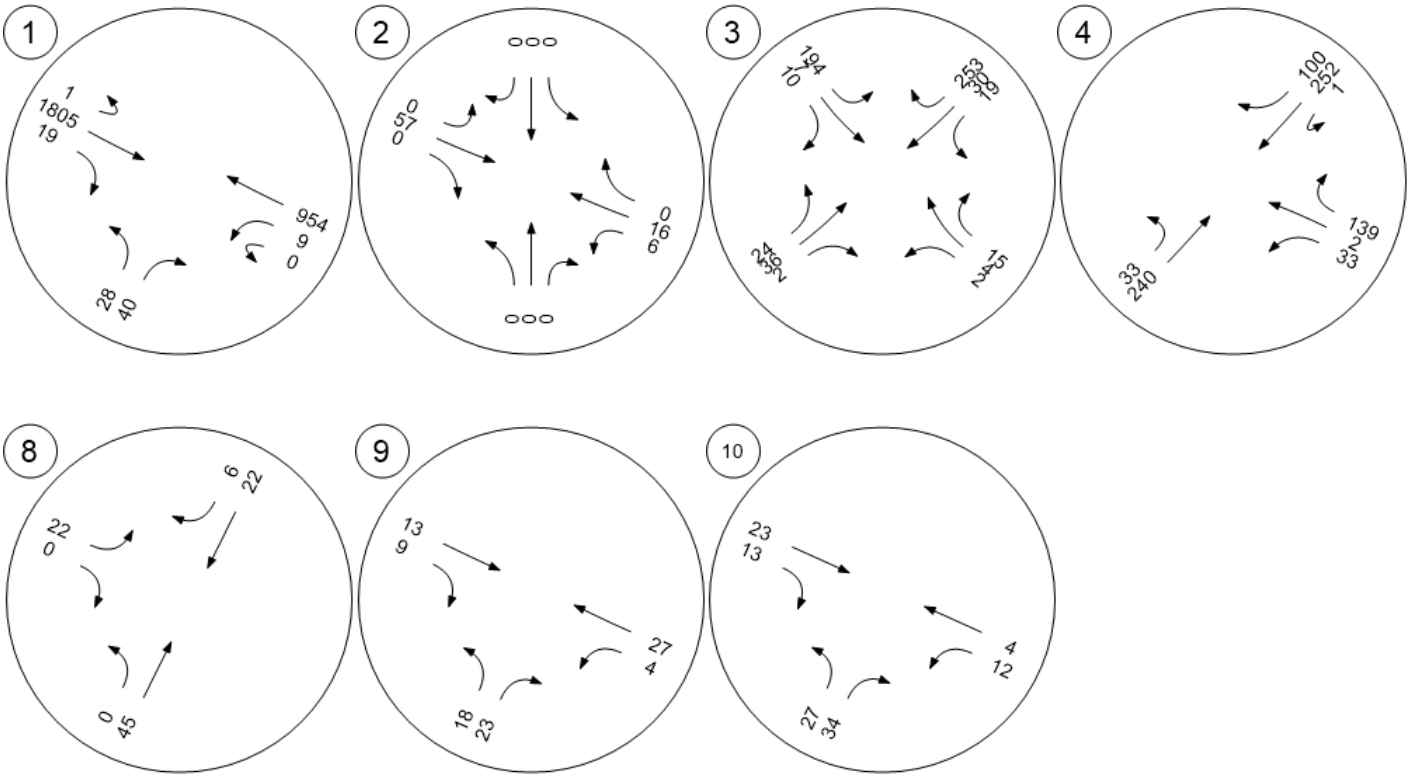
Traffic Volume - Base Volume




1
1
1736
2
895
4
0
5
16
2
0
0
0
0
0
0
0
0
0
3
187
10
243
14
4
4
4

Traffic Volume - Future Total Volume





Vistro File: C:\...\Ramsey Model.vistro
Report File: C:\...\2022 PM Build.pdf

Scenario 8 2022 PM Build
11/9/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	HWY 10 and Bowers Drive	Two-way stop	HCM 6th Edition	NB Left	1.572	705.4	F
2	Riverdale Drive and Llama Street	Two-way stop	HCM 6th Edition	SB Left	0.003	9.1	A
3	Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp	Two-way stop	HCM 6th Edition	SEB Left	0.361	13.7	B
4	Armstrong Boulevard and WB Hwy 10 Ramp	Signalized	HCM 6th Edition	NB Left	0.384	14.1	B
8	Bower Dr and Riverdale Dr	Two-way stop	HCM 6th Edition	EB Left	0.028	9.2	A
9	Riverdale Drive and Western Site Access	Two-way stop	HCM 6th Edition	NB Left	0.017	9.2	A
10	Riverdale Drive and Eastern Site Access	Two-way stop	HCM 6th Edition	NB Left	0.025	9.4	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: HWY 10 and Bowers Drive

Control Type:	Two-way stop	Delay (sec / veh):	705.4
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.572

Intersection Setup

Name								
Approach	Northbound		Eastbound			Westbound		
Lane Configuration								
Turning Movement	Left	Right	U-turn	Thru	Right	U-turn	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	1	1	0	0
Entry Pocket Length [ft]	100.00	100.00	325.00	100.00	225.00	360.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		65.00			65.00		
Grade [%]	0.00		0.00			0.00		
Crosswalk	Yes		Yes			Yes		

Volumes

Name								
Base Volume Input [veh/h]	6	17	1	1367	7	1	16	2051
Base Volume Adjustment Factor	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
Growth Factor	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	17	17	0	0	48	0	14	17
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	23	35	1	1422	55	1	31	2150
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	9	0	374	14	0	8	566
Total Analysis Volume [veh/h]	24	37	1	1497	58	1	33	2263
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	1.57	0.10	0.03	0.01	0.00	0.01	0.08	0.02
d_M, Delay for Movement [s/veh]	705.43	479.84	115.52	0.00	0.00	40.86	14.43	0.00
Movement LOS	F	F	F	A	A	E	B	A
95th-Percentile Queue Length [veh/ln]	6.56	6.56	0.09	0.00	0.00	0.29	0.29	0.00
95th-Percentile Queue Length [ft/ln]	164.04	164.04	2.25	0.00	0.00	7.19	7.19	0.00
d_A, Approach Delay [s/veh]	568.59		0.07			0.23		
Approach LOS	F		A			A		
d_I, Intersection Delay [s/veh]	9.02							
Intersection LOS	F							

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Intersection Level Of Service Report
Intersection 2: Riverdale Drive and Llama Street

Control Type:	Two-way stop	Delay (sec / veh):	9.1
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.003

Intersection Setup

Name													
Approach	Northbound			Southbound			Eastbound			Westbound			
Lane Configuration													
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	U-tu	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	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.0	100.0	100.0	100.0
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			35.00			
Grade [%]	0.00			0.00			0.00			0.00			
Crosswalk	Yes			Yes			Yes			Yes			

Volumes

Name													
Base Volume Input [veh/h]	0	0	1	3	0	0	0	0	0	1	1	0	4
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000
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	2.00
Growth Factor	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400	1.040	1.040	1.040	1.040
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	43	0	0	0	47	0
Diverted Trips [veh/h]	0	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Total Hourly Volume [veh/h]	0	0	1	3	0	0	0	43	0	1	1	47	4
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.900	0.900	0.900	0.900
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000
Total 15-Minute Volume [veh/h]	0	0	0	1	0	0	0	12	0	0	0	13	1
Total Analysis Volume [veh/h]	0	0	1	3	0	0	0	48	0	1	1	52	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.12	9.61	8.53	9.14	9.61	8.57	7.32	0.00	0.00	8.36	7.31	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.07	0.07	0.07	0.26	0.26	0.26	0.00	0.00	0.00	0.12	0.12	0.12	0.12
d_A, Approach Delay [s/veh]	8.53			9.14			0.00			0.27			
Approach LOS	A			A			A			A			
d_I, Intersection Delay [s/veh]	0.47												
Intersection LOS	A												

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Intersection Level Of Service Report
Intersection 3: Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp

Control Type:	Two-way stop	Delay (sec / veh):	13.7
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.361

Intersection Setup

Name													
Approach	Southbound				Northeastbound				Southwestbound				
Lane Configuration													
Turning Movement	Left	Thru	Right	Right	Left	Left	Thru	Right	U-turn	Left	Thru	Right	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	12.00
No. of Lanes in Entry Pocket	0	0	0	0	1	0	0	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	300.00	100.00	100.00	300.00	100.0	100.0	100.0	100.0	100.0
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00				35.00				35.00				
Grade [%]	0.00				0.00				0.00				
Crosswalk	Yes				Yes				Yes				

Volumes

Name													
Base Volume Input [veh/h]	0	0	0	0	10	0	16	3	1	22	5	0	208
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.000
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	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0400	1.0000	1.0400	1.0400	1.040	1.040	1.040	1.000	1.040
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	17	0	25	1	0	0	46	0	0
Diverted Trips [veh/h]	0	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Total Hourly Volume [veh/h]	0	0	0	0	27	0	42	4	1	23	51	0	216
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	0.8610	1.0000	0.8610	0.8610	0.861	0.861	0.861	1.000	0.861
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.000
Total 15-Minute Volume [veh/h]	0	0	0	0	8	0	12	1	0	7	15	0	63
Total Analysis Volume [veh/h]	0	0	0	0	31	0	49	5	1	27	59	0	251
Pedestrian Volume [ped/h]	0				0				0				

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	7.95	0.00	0.00	0.00	8.59	7.36	0.00	0.00	0.00
Movement LOS					A		A	A	A	A	A		A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.06	0.06	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	1.91	0.00	0.00	0.00	1.40	1.40	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00				2.90				0.61				
Approach LOS	A				A				A				
d_I, Intersection Delay [s/veh]	6.03												
Intersection LOS	B												

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Intersection Setup

Name									
Approach	Northwestbound					Southeastbound			
Lane Configuration									
Turning Movement	U-turn	Left	Thru	Thru	Right	Left	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	1	0	0	1
Entry Pocket Length [ft]	225.00	100.00	100.00	100.00	290.00	280.00	100.00	100.00	280.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00					30.00			
Grade [%]	0.00					0.00			
Crosswalk	Yes					Yes			

Volumes

Name									
Base Volume Input [veh/h]	1	1	11	0	46	193	0	8	4
Base Volume Adjustment Factor	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
Growth Factor	1.0400	1.0400	1.0400	1.0000	1.0400	1.0400	1.0000	1.0400	1.0400
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	1	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1	2	11	0	48	201	0	8	4
Peak Hour Factor	0.8610	0.8610	0.8610	1.0000	0.8610	0.8610	1.0000	0.8610	0.8610
Other Adjustment Factor	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	1	3	0	14	58	0	2	1
Total Analysis Volume [veh/h]	1	2	13	0	56	233	0	9	5
Pedestrian Volume [ped/h]	0					0			

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Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.03	0.00	0.05	0.36	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	11.35	11.35	12.94	0.00	8.74	13.69	0.00	10.70	8.59
Movement LOS	B	B	B		A	B		B	A
95th-Percentile Queue Length [veh/ln]	0.02	0.02	0.09	0.00	0.17	1.64	0.00	0.04	0.01
95th-Percentile Queue Length [ft/ln]	0.40	0.40	2.15	0.00	4.35	41.02	0.00	1.07	0.37
d_A, Approach Delay [s/veh]	9.60					13.47			
Approach LOS	A					B			
d_I, Intersection Delay [s/veh]	6.03								
Intersection LOS	B								

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Intersection Level Of Service Report
Intersection 4: Armstrong Boulevard and WB Hwy 10 Ramp

Control Type:	Signalized	Delay (sec / veh):	14.1
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.384

Intersection Setup

Name													
Approach	Northbound				Southbound			Eastbound			Westbound		
Lane Configuration													
Turning Movement	U-tu	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	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	395.0	100.0	100.0	100.0	100.00	100.00	315.00	100.00	100.00	100.00	685.00	100.00	685.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00				35.00			30.00			30.00		
Grade [%]	0.00				0.00			0.00			0.00		
Curb Present	No				No						No		
Crosswalk	No				No			No			Yes		

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Volumes

Name													
Base Volume Input [veh/h]	2	34	248	0	0	210	257	0	0	0	19	2	320
Base Volume Adjustment Factor	1.000	1.000	1.000	1.000	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	2.00
Growth Factor	1.040	1.040	1.040	1.000	1.0000	1.0400	1.0400	1.0000	1.0000	1.0000	1.0400	1.0400	1.0400
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	17	8	0	0	12	0	0	0	0	34	0	0
Diverted Trips [veh/h]	0	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	2	52	266	0	0	230	267	0	0	0	54	2	333
Peak Hour Factor	0.916	0.916	0.916	1.000	1.0000	0.9160	0.9160	1.0000	1.0000	1.0000	0.9160	0.9160	0.9160
Other Adjustment Factor	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	14	73	0	0	63	73	0	0	0	15	1	91
Total Analysis Volume [veh/h]	2	57	290	0	0	251	291	0	0	0	59	2	364
Presence of On-Street Parking	No			No	No		No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0				0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0				0			0			0		
v_co, Outbound Pedestrian Volume crossing	0				0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0				0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0				0			0			0		
Bicycle Volume [bicycles/h]	0				0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permi	Prote	Permi	Permi	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	0	5	2	0	0	6	0	0	0	0	0	8	0
Auxiliary Signal Groups													
Lead / Lag	-	Lead	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	7	10	0	0	10	0	0	0	0	0	10	0
Maximum Green [s]	0	20	35	0	0	35	0	0	0	0	0	30	0
Amber [s]	0.0	3.0	5.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
All red [s]	0.0	2.5	1.5	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	3.5	0.0
Split [s]	0	0	0	0	0	0	0	0	0	0	0	0	0
Vehicle Extension [s]	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
Walk [s]	0	0	7	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	20	0	0	0	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk			No			No						No	
I1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.5	4.5	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	4.5	0.0
Minimum Recall		No	Yes			Yes						No	
Maximum Recall		No	No			No						No	
Pedestrian Recall		No	No			No						No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	R		C	R
C, Cycle Length [s]	44	44	44	44		44	44
L, Total Lost Time per Cycle [s]	5.50	6.50	6.50	6.50		6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	3.50	4.50	4.50	4.50		4.50	4.50
g_i, Effective Green Time [s]	4	21	12	12		10	10
g / C, Green / Cycle	0.08	0.47	0.26	0.26		0.23	0.23
(v / s)_i Volume / Saturation Flow Rate	0.04	0.09	0.08	0.20		0.04	0.14
s, saturation flow rate [veh/h]	1603	3204	3204	1431		1605	2532
c, Capacity [veh/h]	133	1520	850	379		366	578
d1, Uniform Delay [s]	19.07	6.64	12.79	14.80		13.53	15.20
k, delay calibration	0.11	0.11	0.11	0.11		0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	2.30	0.06	0.19	3.27		0.21	1.14
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.44	0.19	0.30	0.77		0.17	0.63
d, Delay for Lane Group [s/veh]	21.37	6.70	12.98	18.07		13.74	16.34
Lane Group LOS	C	A	B	B		B	B
Critical Lane Group	Yes	No	No	Yes		No	Yes
50th-Percentile Queue Length [veh/ln]	0.57	0.53	0.81	2.46		0.43	1.46
50th-Percentile Queue Length [ft/ln]	14.37	13.33	20.29	61.53		10.78	36.61
95th-Percentile Queue Length [veh/ln]	1.03	0.96	1.46	4.43		0.78	2.64
95th-Percentile Queue Length [ft/ln]	25.87	24.00	36.52	110.76		19.40	65.90

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	21.37	21.37	6.70	0.00	0.00	12.98	18.07	0.00	0.00	0.00	13.74	13.74	16.34
Movement LOS	C	C	A			B	B				B	B	B
d_A, Approach Delay [s/veh]	9.18				15.72			0.00			15.96		
Approach LOS	A				B			A			B		
d_I, Intersection Delay [s/veh]	14.06												
Intersection LOS	B												
Intersection V/C	0.384												

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	34.67
l_p,int, Pedestrian LOS Score for Intersection	0.000	0.000	0.000	2.078
Crosswalk LOS	F	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	778	778	0	667
d_b, Bicycle Delay [s]	16.81	16.81	45.00	20.00
l_b,int, Bicycle LOS Score for Intersection	1.801	2.007	4.132	2.261
Bicycle LOS	A	B	D	B

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Intersection Level Of Service Report
Intersection 8: Bower Dr and Riverdale Dr

Control Type:	Two-way stop	Delay (sec / veh):	9.2
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.028

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	23	23	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0400	1.0400	1.0400	1.0400	1.0400	1.0400
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	34	62	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	34	62	24	24	0
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	9	16	6	6	0
Total Analysis Volume [veh/h]	0	36	65	25	25	0
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.03	0.00
d_M, Delay for Movement [s/veh]	7.39	0.00	0.00	0.00	9.20	8.78
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.09	0.09
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	2.18	2.18
d_A, Approach Delay [s/veh]	0.00		0.00		9.20	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.52					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 9: Riverdale Drive and Western Site Access

Control Type:	Two-way stop	Delay (sec / veh):	9.2
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.017

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 Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0400	1.0000	1.0000	1.0400
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	14	17	36	26	13	20
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]	14	17	36	26	13	20
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	4	9	7	3	5
Total Analysis Volume [veh/h]	15	18	38	27	14	21
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	0.02	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	9.18	8.68	0.00	0.00	7.36	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.11	0.11	0.00	0.00	0.03	0.03
95th-Percentile Queue Length [ft/ln]	2.68	2.68	0.00	0.00	0.69	0.69
d_A, Approach Delay [s/veh]	8.91		0.00		2.95	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.98					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 10: Riverdale Drive and Eastern Site Access

Control Type:	Two-way stop	Delay (sec / veh):	9.4
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.025

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 Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0400	1.0000	1.0000	1.0400
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	20	26	17	36	34	13
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	20	26	17	36	34	13
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	7	4	9	9	3
Total Analysis Volume [veh/h]	21	27	18	38	36	14
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

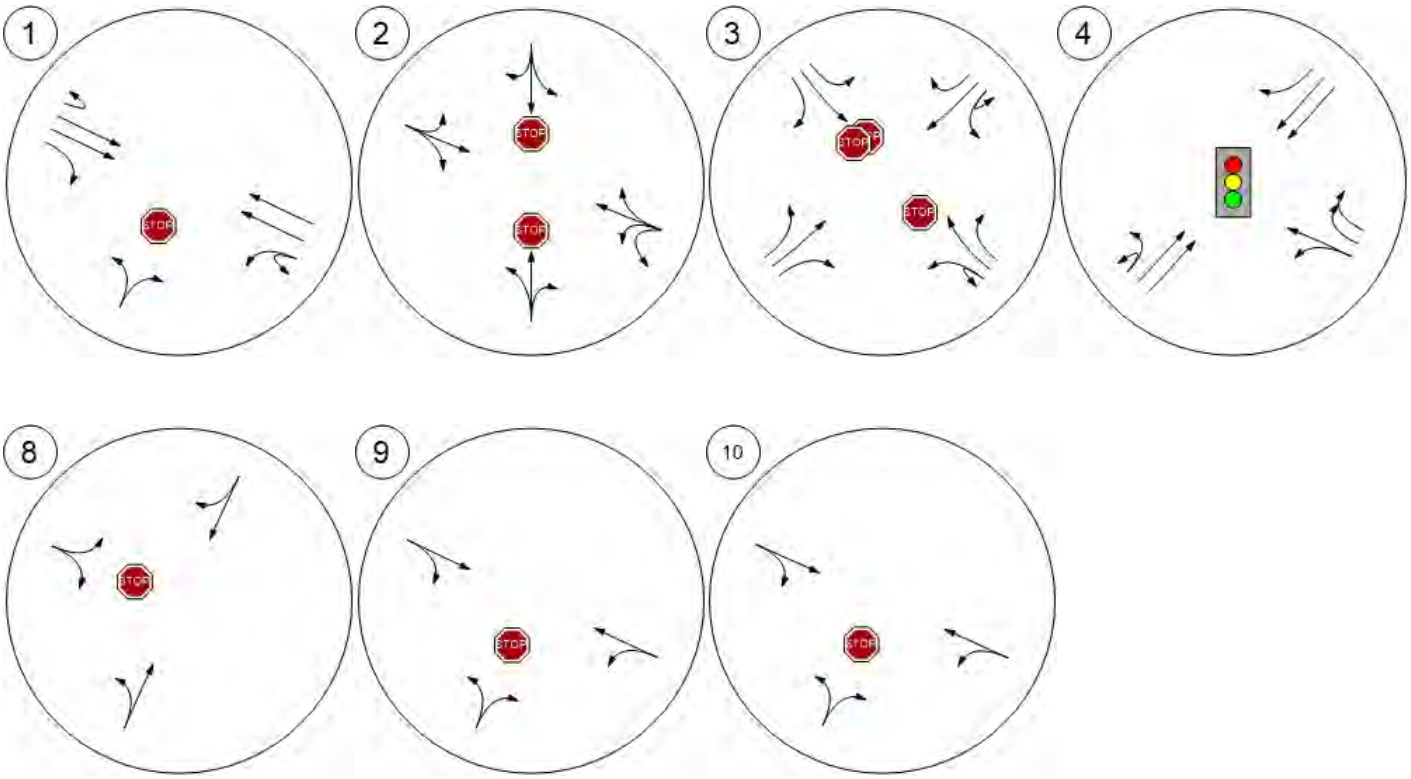
Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.03	0.00	0.00	0.02	0.00
d_M, Delay for Movement [s/veh]	9.43	8.68	0.00	0.00	7.38	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.16	0.16	0.00	0.00	0.07	0.07
95th-Percentile Queue Length [ft/ln]	4.00	4.00	0.00	0.00	1.78	1.78
d_A, Approach Delay [s/veh]	9.01		0.00		5.31	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	4.53					
Intersection LOS	A					

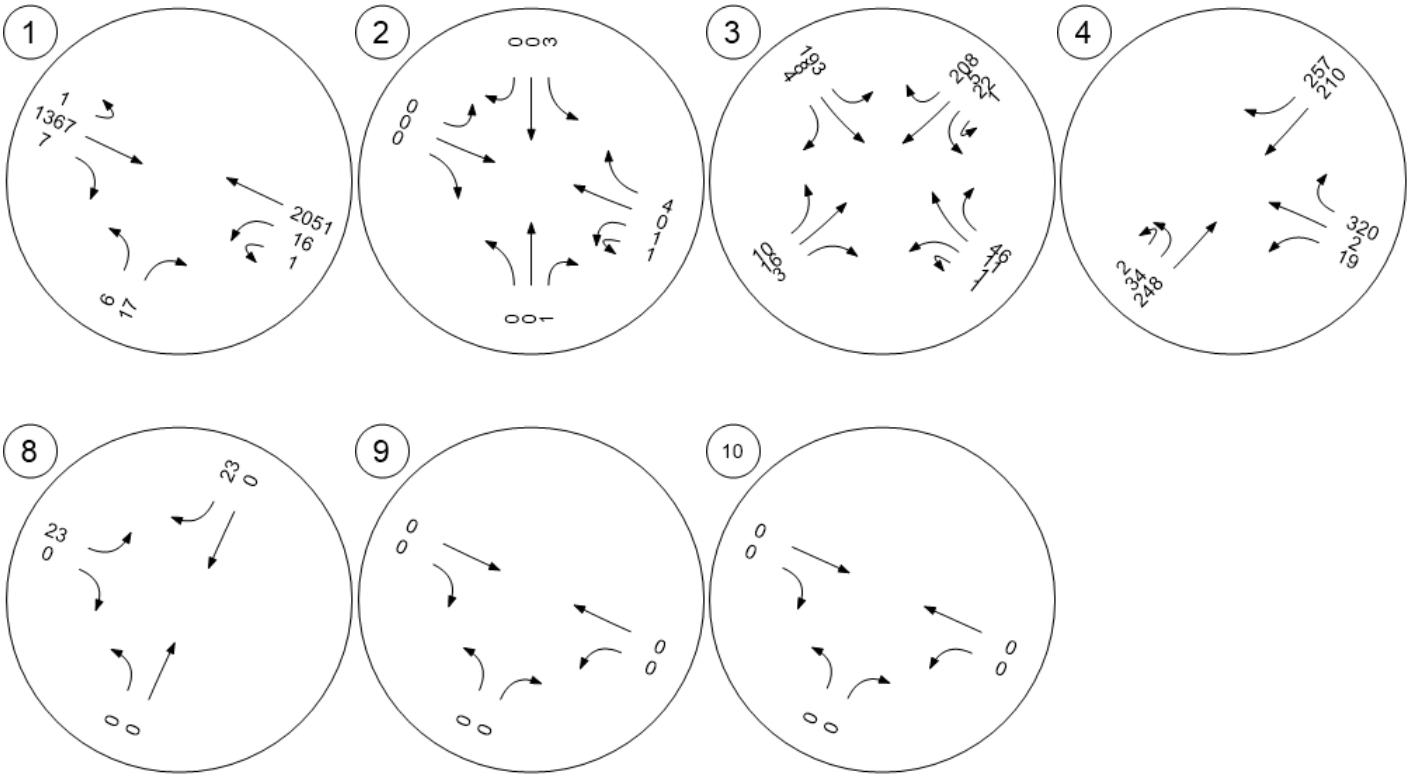
Lane Configuration and Traffic Control





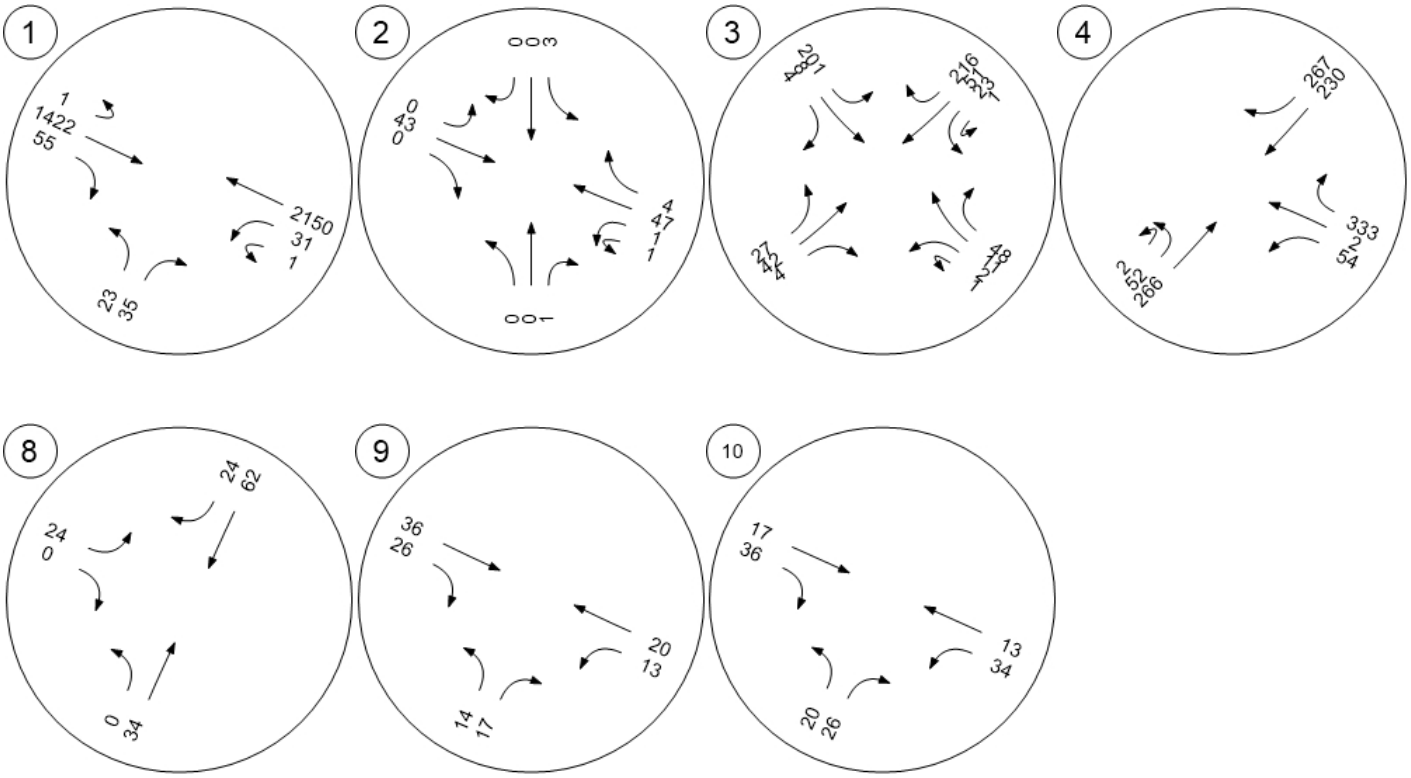
Traffic Volume - Base Volume





Traffic Volume - Future Total Volume





Vistro File: C:\...\Ramsey Model.vistro
Report File: C:\...\2040 AM Build.pdf

Scenario 9 2040 AM Build
11/9/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	HWY 10 and Bowers Drive	Two-way stop	HCM 6th Edition	NB Left	7.215	4,121.2	F
2	Riverdale Drive and Llama Street	Two-way stop	HCM 6th Edition	WB Left	0.006	7.4	A
3	Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp	Two-way stop	HCM 6th Edition	NWB Thru	0.014	13.8	B
4	Armstrong Boulevard and WB Hwy 10 Ramp	Signalized	HCM 6th Edition	NB Left	0.232	11.9	B
8	Bower Dr and Riverdale Dr	Two-way stop	HCM 6th Edition	EB Left	0.036	9.0	A
9	Riverdale Drive and Western Site Access	Two-way stop	HCM 6th Edition	NB Left	0.020	9.0	A
10	Riverdale Drive and Eastern Site Access	Two-way stop	HCM 6th Edition	NB Left	0.031	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: HWY 10 and Bowers Drive

Control Type:	Two-way stop	Delay (sec / veh):	4,121.2
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	7.215

Intersection Setup

Name								
Approach	Northbound		Eastbound			Westbound		
Lane Configuration								
Turning Movement	Left	Right	U-turn	Thru	Right	U-turn	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	1	1	0	0
Entry Pocket Length [ft]	100.00	100.00	325.00	100.00	225.00	360.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		65.00			65.00		
Grade [%]	0.00		0.00			0.00		
Crosswalk	Yes		Yes			Yes		

Volumes

Name								
Base Volume Input [veh/h]	5	16	1	1736	2	0	4	895
Base Volume Adjustment Factor	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
Growth Factor	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	23	23	0	0	17	0	5	23
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	30	47	1	2587	20	0	11	1357
Peak Hour Factor	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	8	12	0	683	5	0	3	358
Total Analysis Volume [veh/h]	32	50	1	2732	21	0	12	1433
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	7.21	0.36	0.01	0.03	0.00	0.00	0.08	0.01
d_M, Delay for Movement [s/veh]	4121.16	3335.75	33.52	0.00	0.00	371.73	32.65	0.00
Movement LOS	F	F	D	A	A	F	D	A
95th-Percentile Queue Length [veh/ln]	11.56	11.56	0.02	0.00	0.00	0.27	0.27	0.00
95th-Percentile Queue Length [ft/ln]	288.95	288.95	0.59	0.00	0.00	6.80	6.80	0.00
d_A, Approach Delay [s/veh]	3642.25		0.01			0.27		
Approach LOS	F		A			A		
d_I, Intersection Delay [s/veh]	69.86							
Intersection LOS	F							

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Intersection Level Of Service Report
Intersection 2: Riverdale Drive and Llama Street

Control Type:	Two-way stop	Delay (sec / veh):	7.4
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.006

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 Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry 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
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	0	0	0	0	0	0	6	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 Factor	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900
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	57	0	0	16	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	0	0	0	0	57	0	9	16	0
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	0	0	0	16	0	3	4	0
Total Analysis Volume [veh/h]	0	0	0	0	0	0	0	63	0	10	18	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	9.11	9.59	8.59	9.11	9.59	8.39	7.25	0.00	0.00	7.35	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.49	0.49
d_A, Approach Delay [s/veh]	9.10			9.03			0.00			2.63		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	0.81											
Intersection LOS	A											

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Intersection Level Of Service Report
Intersection 3: Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp

Control Type:	Two-way stop	Delay (sec / veh):	13.8
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.014

Intersection Setup

Name												
Approach	Southbound				Northeastbound				Southwestbound			
Lane Configuration												
Turning Movement	Left	Thru	Right	Right	Left	Left	Thru	Right	Left	Thru	Right	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 Entry Pocket	0	0	0	0	1	0	0	1	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	300.00	100.00	100.00	300.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00				35.00				35.00			
Grade [%]	0.00				0.00				0.00			
Crosswalk	Yes				Yes				Yes			

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	0	1	0	2	1	18	13	0	243
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 Factor	1.0000	1.0000	1.0000	1.0000	1.4900	1.0000	1.4900	1.4900	1.4900	1.4900	1.0000	1.4900
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	23	0	34	1	0	16	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	0	24	0	37	2	27	35	0	362
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	0.9430	1.0000	0.9430	0.9430	0.9430	0.9430	1.0000	0.9430
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	6	0	10	1	7	9	0	96
Total Analysis Volume [veh/h]	0	0	0	0	25	0	39	2	29	37	0	384
Pedestrian Volume [ped/h]	0				0				0			

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	8.23	0.00	0.00	0.00	7.34	0.00	0.00	0.00
Movement LOS					A		A	A	A	A		A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.06	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	1.68	0.00	0.00	0.00	1.41	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00				3.12				0.47			
Approach LOS	A				A				A			
d_I, Intersection Delay [s/veh]	5.66											
Intersection LOS	B											

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Intersection Setup

Name								
Approach	Northwestbound				Southeastbound			
Lane Configuration								
Turning Movement	Left	Thru	Thru	Right	Left	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	1	0	0	1
Entry Pocket Length [ft]	225.00	100.00	100.00	290.00	280.00	100.00	100.00	280.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00				30.00			
Grade [%]	0.00				0.00			
Crosswalk	Yes				Yes			

Volumes

Name								
Base Volume Input [veh/h]	2	4	0	14	187	0	7	10
Base Volume Adjustment Factor	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
Growth Factor	1.4900	1.4900	1.0000	1.4900	1.4900	1.0000	1.4900	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	6	0	21	279	0	10	15
Peak Hour Factor	0.9430	0.9430	1.0000	0.9430	0.9430	1.0000	0.9430	0.9430
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	2	0	6	74	0	3	4
Total Analysis Volume [veh/h]	3	6	0	22	296	0	11	16
Pedestrian Volume [ped/h]	0				0			

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Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.01	0.00	0.02	0.41	0.00	0.02	0.02
d_M, Delay for Movement [s/veh]	11.74	13.80	0.00	8.56	13.35	0.00	10.38	8.53
Movement LOS	B	B		A	B		B	A
95th-Percentile Queue Length [veh/ln]	0.02	0.04	0.00	0.07	2.00	0.00	0.05	0.05
95th-Percentile Queue Length [ft/ln]	0.42	1.10	0.00	1.63	49.92	0.00	1.23	1.18
d_A, Approach Delay [s/veh]	9.88				13.01			
Approach LOS	A				B			
d_I, Intersection Delay [s/veh]	5.66							
Intersection LOS	B							

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Intersection Level Of Service Report
Intersection 4: Armstrong Boulevard and WB Hwy 10 Ramp

Control Type:	Signalized	Delay (sec / veh):	11.9
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.232

Intersection Setup

Name													
Approach	Northbound			Southbound				Eastbound			Westbound		
Lane Configuration													
Turning Movement	Left	Thru	Right	U-tu	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	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	395.00	100.00	100.00	100.0	100.0	100.0	315.0	100.00	100.00	100.00	685.00	100.00	685.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00			35.00				30.00			30.00		
Grade [%]	0.00			0.00				0.00			0.00		
Curb Present	No			No							No		
Crosswalk	No			No				No			Yes		

Volumes

Name													
Base Volume Input [veh/h]	10	220	0	1	0	238	96	0	0	0	20	2	134
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	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	2.00
Growth Factor	1.4900	1.4900	1.0000	1.490	1.000	1.490	1.490	1.0000	1.0000	1.0000	1.4900	1.4900	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	23	11	0	0	0	4	0	0	0	0	12	0	0
Diverted Trips [veh/h]	0	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	38	339	0	1	0	359	143	0	0	0	42	3	200
Peak Hour Factor	0.9310	0.9310	1.0000	0.931	1.000	0.931	0.931	1.0000	1.0000	1.0000	0.9310	0.9310	0.9310
Other Adjustment Factor	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	10	91	0	0	0	96	38	0	0	0	11	1	54
Total Analysis Volume [veh/h]	41	364	0	1	0	386	154	0	0	0	45	3	215
Presence of On-Street Parking	No		No	No			No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0				0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0				0			0		
v_co, Outbound Pedestrian Volume crossing	0			0				0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0				0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0				0			0		
Bicycle Volume [bicycles/h]	0			0				0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Permi	Permi	Permi	Permi	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	5	2	0	0	0	6	0	0	0	0	0	8	0
Auxiliary Signal Groups													
Lead / Lag	Lead	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	7	10	0	0	0	10	0	0	0	0	0	10	0
Maximum Green [s]	20	35	0	0	0	35	0	0	0	0	0	30	0
Amber [s]	3.0	5.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
All red [s]	2.5	1.5	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	3.5	0.0
Split [s]	0	0	0	0	0	0	0	0	0	0	0	0	0
Vehicle Extension [s]	3.0	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
Walk [s]	0	7	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	20	0	0	0	0	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No				No						No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	3.5	4.5	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	4.5	0.0
Minimum Recall	No	Yes				Yes						No	
Maximum Recall	No	No				No						No	
Pedestrian Recall	No	No				No						No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	R		C	R
C, Cycle Length [s]	42	42	42	42	42		42	42
L, Total Lost Time per Cycle [s]	5.50	6.50	6.50	6.50	6.50		6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	2.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	3.50	4.50	4.50	4.50	4.50		4.50	4.50
g_i, Effective Green Time [s]	3	19	11	11	11		10	10
g / C, Green / Cycle	0.07	0.46	0.26	0.26	0.26		0.23	0.23
(v / s)_i Volume / Saturation Flow Rate	0.03	0.11	0.12	0.12	0.11		0.03	0.08
s, saturation flow rate [veh/h]	1603	3204	1645	1532	1431		1608	2532
c, Capacity [veh/h]	108	1467	503	396	370		372	585
d1, Uniform Delay [s]	18.65	6.93	13.03	13.07	12.86		12.73	13.49
k, delay calibration	0.11	0.11	0.11	0.11	0.11		0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	2.20	0.09	0.51	0.87	0.75		0.16	0.39
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.38	0.25	0.40	0.47	0.42		0.13	0.37
d, Delay for Lane Group [s/veh]	20.85	7.02	13.54	13.93	13.61		12.88	13.88
Lane Group LOS	C	A	B	B	B		B	B
Critical Lane Group	Yes	No	No	Yes	No		No	Yes
50th-Percentile Queue Length [veh/ln]	0.39	0.67	1.31	1.25	1.02		0.31	0.74
50th-Percentile Queue Length [ft/ln]	9.73	16.69	32.81	31.33	25.44		7.83	18.41
95th-Percentile Queue Length [veh/ln]	0.70	1.20	2.36	2.26	1.83		0.56	1.33
95th-Percentile Queue Length [ft/ln]	17.51	30.04	59.05	56.39	45.78		14.09	33.15

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	20.85	7.02	0.00	13.54	0.00	13.73	13.61	0.00	0.00	0.00	12.88	12.88	13.88
Movement LOS	C	A		B		B	B				B	B	B
d_A, Approach Delay [s/veh]	8.42			13.69				0.00			13.70		
Approach LOS	A			B				A			B		
d_I, Intersection Delay [s/veh]	11.93												
Intersection LOS	B												
Intersection V/C	0.232												

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	34.67
l_p,int, Pedestrian LOS Score for Intersection	0.000	0.000	0.000	2.025
Crosswalk LOS	F	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	778	778	0	667
d_b, Bicycle Delay [s]	16.81	16.81	45.00	20.00
l_b,int, Bicycle LOS Score for Intersection	1.894	2.006	4.132	1.994
Bicycle LOS	A	B	D	A

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Intersection Level Of Service Report
Intersection 8: Bower Dr and Riverdale Dr

Control Type:	Two-way stop	Delay (sec / veh):	9.0
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.036

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	6	21	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	45	22	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	45	22	9	31	0
Peak Hour Factor	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	12	6	2	8	0
Total Analysis Volume [veh/h]	0	48	23	10	33	0
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.04	0.00
d_M, Delay for Movement [s/veh]	7.28	0.00	0.00	0.00	9.03	8.58
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.11	0.11
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	2.77	2.77
d_A, Approach Delay [s/veh]	0.00		0.00		9.03	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.61					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 9: Riverdale Drive and Western Site Access

Control Type:	Two-way stop	Delay (sec / veh):	9.0
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.020

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 Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.4900	1.0000	1.0000	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	18	23	13	9	4	27
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]	18	23	13	9	4	27
Peak Hour Factor	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	6	3	2	1	7
Total Analysis Volume [veh/h]	19	24	14	10	4	29
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	0.02	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	8.95	8.56	0.00	0.00	7.27	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.13	0.13	0.00	0.00	0.01	0.01
95th-Percentile Queue Length [ft/ln]	3.34	3.34	0.00	0.00	0.19	0.19
d_A, Approach Delay [s/veh]	8.73		0.00		0.88	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	4.05					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 10: Riverdale Drive and Eastern Site Access

Control Type:	Two-way stop	Delay (sec / veh):	9.1
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.031

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 Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.4900	1.0000	1.0000	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	27	34	23	13	12	4
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]	27	34	23	13	12	4
Peak Hour Factor	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	9	6	3	3	1
Total Analysis Volume [veh/h]	29	36	24	14	13	4
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

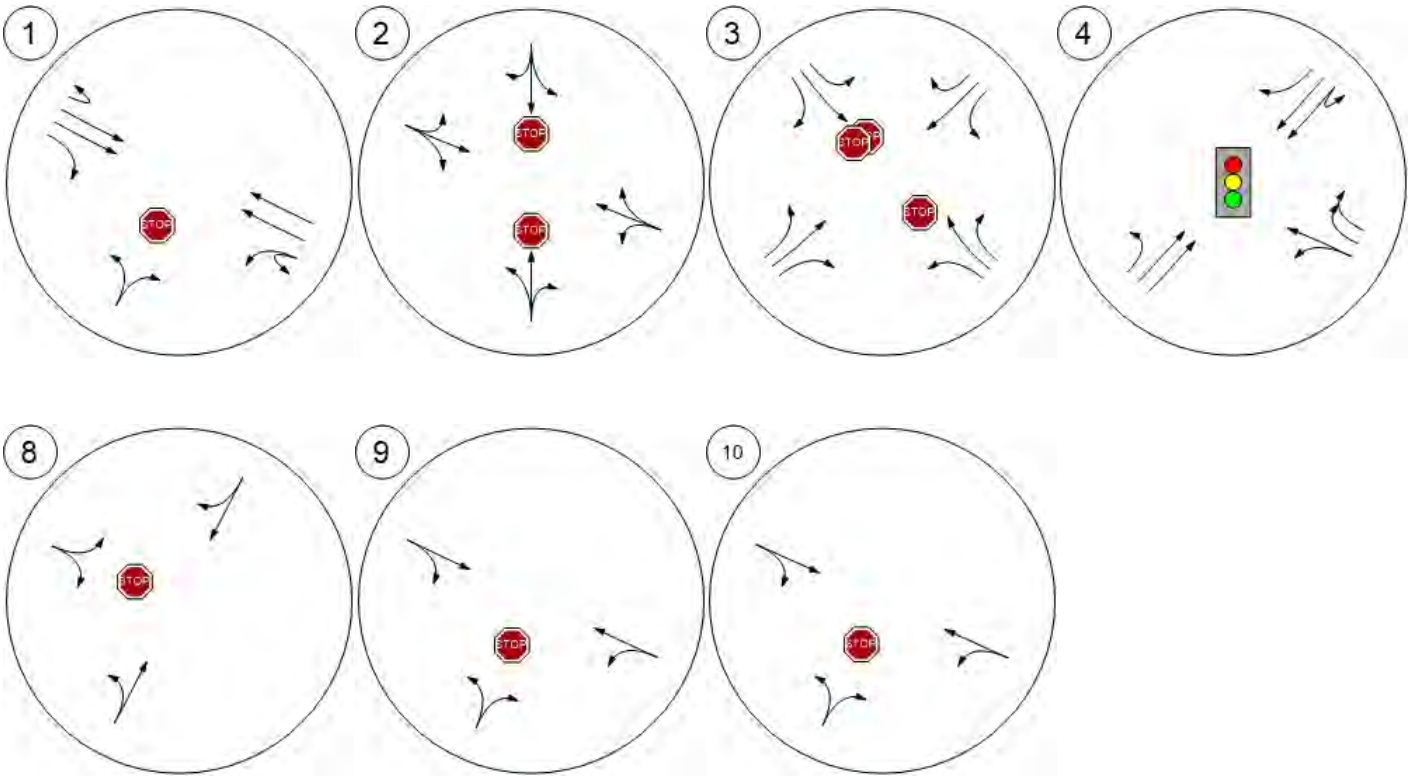
Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.03	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	9.09	8.70	0.00	0.00	7.31	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.21	0.21	0.00	0.00	0.03	0.03
95th-Percentile Queue Length [ft/ln]	5.24	5.24	0.00	0.00	0.63	0.63
d_A, Approach Delay [s/veh]	8.88		0.00		5.59	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	5.60					
Intersection LOS	A					

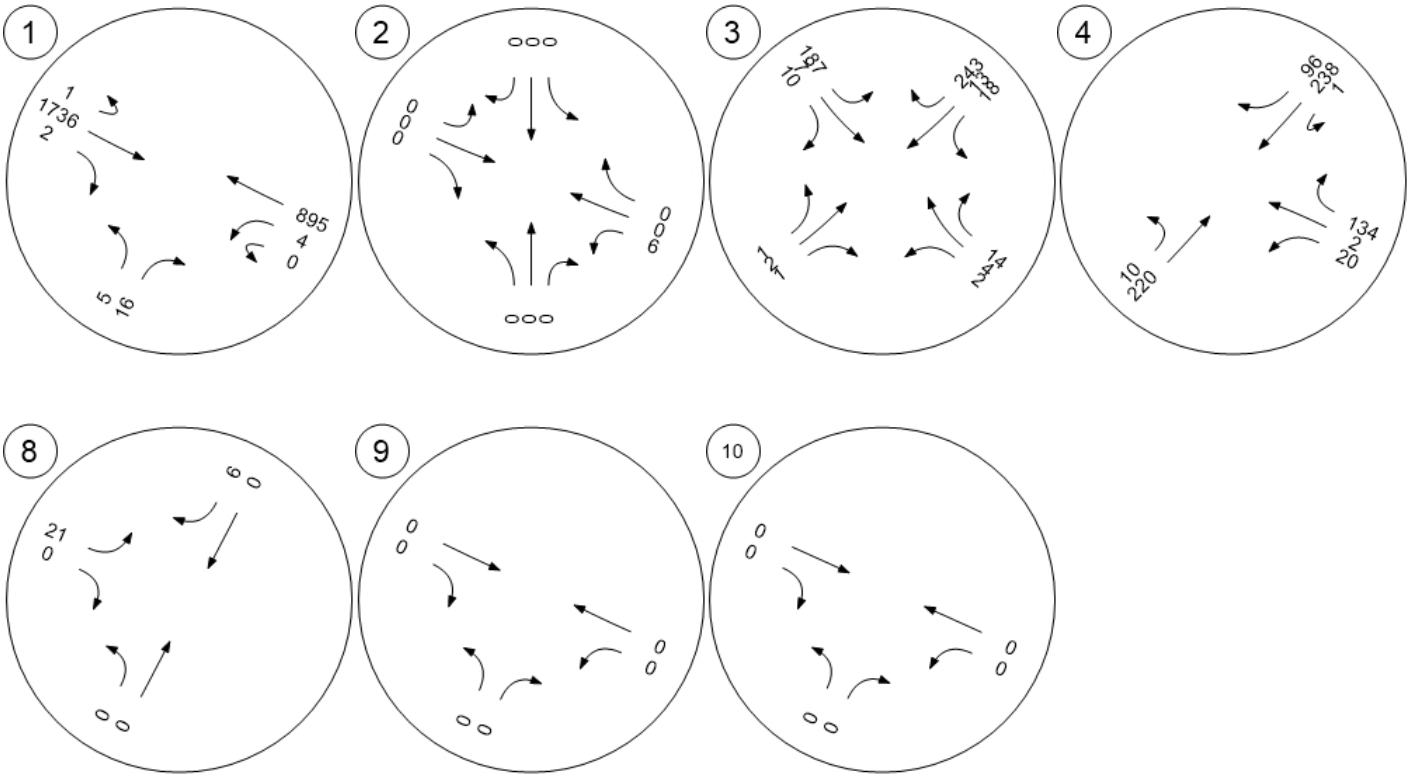
Lane Configuration and Traffic Control





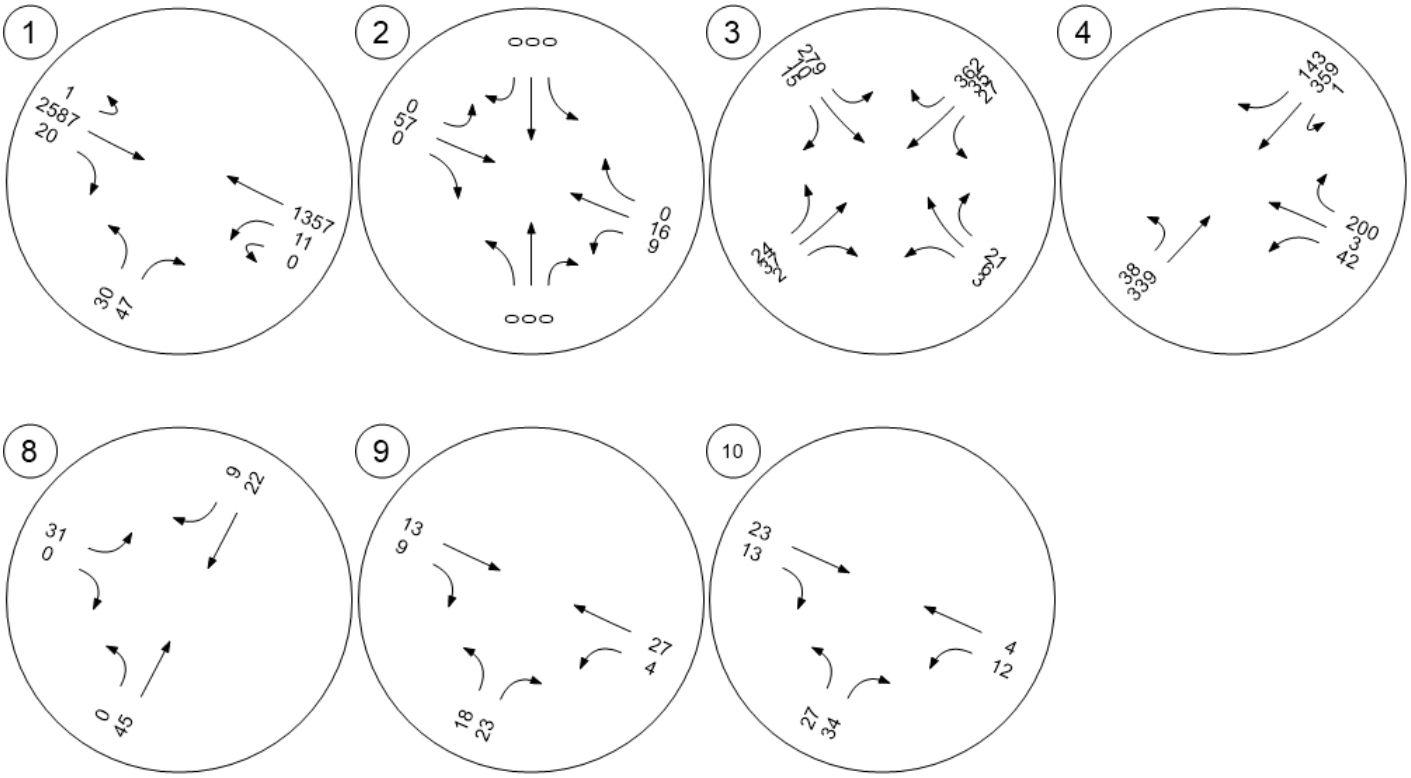
Traffic Volume - Base Volume





Traffic Volume - Future Total Volume





Vistro File: C:\...\Ramsey Model.vistro
Report File: C:\...\2040 PM Build.pdf

Scenario 10 2040 PM Build
11/9/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	HWY 10 and Bowers Drive	Two-way stop	HCM 6th Edition	NB Left	14.494	8,908.8	F
2	Riverdale Drive and Llama Street	Two-way stop	HCM 6th Edition	SB Left	0.005	9.1	A
3	Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp	Two-way stop	HCM 6th Edition	SEB Left	0.585	19.8	C
4	Armstrong Boulevard and WB Hwy 10 Ramp	Signalized	HCM 6th Edition	NB Left	0.545	17.7	B
8	Bower Dr and Riverdale Dr	Two-way stop	HCM 6th Edition	EB Left	0.041	9.3	A
9	Riverdale Drive and Western Site Access	Two-way stop	HCM 6th Edition	NB Left	0.016	9.2	A
10	Riverdale Drive and Eastern Site Access	Two-way stop	HCM 6th Edition	NB Left	0.023	9.4	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: HWY 10 and Bowers Drive

Control Type:	Two-way stop	Delay (sec / veh):	8,908.8
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	14.494

Intersection Setup

Name								
Approach	Northbound		Eastbound			Westbound		
Lane Configuration								
Turning Movement	Left	Right	U-turn	Thru	Right	U-turn	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	1	1	0	0
Entry Pocket Length [ft]	100.00	100.00	325.00	100.00	225.00	360.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		65.00			65.00		
Grade [%]	0.00		0.00			0.00		
Crosswalk	Yes		Yes			Yes		

Volumes

Name								
Base Volume Input [veh/h]	6	17	1	1367	7	1	16	2051
Base Volume Adjustment Factor	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
Growth Factor	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	16	16	0	0	48	0	14	16
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	25	41	1	2037	58	1	38	3072
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	7	11	0	536	15	0	10	808
Total Analysis Volume [veh/h]	26	43	1	2144	61	1	40	3234
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	14.49	0.20	0.15	0.02	0.00	0.03	0.17	0.03
d_M, Delay for Movement [s/veh]	8908.80	6918.55	615.50	0.00	0.00	119.73	24.70	0.00
Movement LOS	F	F	F	A	A	F	C	A
95th-Percentile Queue Length [veh/ln]	10.50	10.50	0.35	0.00	0.00	0.73	0.73	0.00
95th-Percentile Queue Length [ft/ln]	262.55	262.55	8.77	0.00	0.00	18.20	18.20	0.00
d_A, Approach Delay [s/veh]	7668.50		0.28			0.34		
Approach LOS	F		A			A		
d_I, Intersection Delay [s/veh]	95.65							
Intersection LOS	F							

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Intersection Level Of Service Report
Intersection 2: Riverdale Drive and Llama Street

Control Type:	Two-way stop	Delay (sec / veh):	9.1
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.005

Intersection Setup

Name													
Approach	Northbound			Southbound			Eastbound			Westbound			
Lane Configuration													
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	U-tu	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	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.0	100.0	100.0	100.0
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			35.00			
Grade [%]	0.00			0.00			0.00			0.00			
Crosswalk	Yes			Yes			Yes			Yes			

Volumes

Name													
Base Volume Input [veh/h]	0	0	1	3	0	0	0	0	0	1	1	0	4
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000
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	2.00
Growth Factor	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.490	1.490	1.490	1.490
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	41	0	0	0	47	0
Diverted Trips [veh/h]	0	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Total Hourly Volume [veh/h]	0	0	1	4	0	0	0	41	0	1	1	47	6
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.900	0.900	0.900	0.900
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000
Total 15-Minute Volume [veh/h]	0	0	0	1	0	0	0	11	0	0	0	13	2
Total Analysis Volume [veh/h]	0	0	1	4	0	0	0	46	0	1	1	52	7
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	0.00
d_M, Delay for Movement [s/veh]	9.11	9.62	8.52	9.14	9.61	8.58	7.33	0.00	0.00	8.35	7.31	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.07	0.07	0.07	0.34	0.34	0.34	0.00	0.00	0.00	0.12	0.12	0.12	0.12
d_A, Approach Delay [s/veh]	8.52			9.14			0.00			0.26			
Approach LOS	A			A			A			A			
d_I, Intersection Delay [s/veh]	0.54												
Intersection LOS	A												

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Intersection Level Of Service Report
Intersection 3: Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp

Control Type:	Two-way stop	Delay (sec / veh):	19.8
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.585

Intersection Setup

Name													
Approach	Southbound				Northeastbound				Southwestbound				
Lane Configuration													
Turning Movement	Left	Thru	Right	Right	Left	Left	Thru	Right	U-turn	Left	Thru	Right	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	12.00
No. of Lanes in Entry Pocket	0	0	0	0	1	0	0	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	300.00	100.00	100.00	300.00	100.0	100.0	100.0	100.0	100.0
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00				35.00				35.00				
Grade [%]	0.00				0.00				0.00				
Crosswalk	Yes				Yes				Yes				

Volumes

Name													
Base Volume Input [veh/h]	0	0	0	0	10	0	16	3	1	22	5	0	208
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.000
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	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.4900	1.0000	1.4900	1.4900	1.490	1.490	1.490	1.000	1.490
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	16	0	24	1	0	0	46	0	0
Diverted Trips [veh/h]	0	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Total Hourly Volume [veh/h]	0	0	0	0	31	0	48	5	1	33	53	0	310
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	0.8610	1.0000	0.8610	0.8610	0.861	0.861	0.861	1.000	0.861
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.000
Total 15-Minute Volume [veh/h]	0	0	0	0	9	0	14	1	0	10	15	0	90
Total Analysis Volume [veh/h]	0	0	0	0	36	0	56	6	1	38	62	0	360
Pedestrian Volume [ped/h]	0				0				0				

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	8.27	0.00	0.00	0.00	8.74	7.40	0.00	0.00	0.00
Movement LOS					A		A	A	A	A	A		A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.08	0.08	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	2.45	0.00	0.00	0.00	1.98	1.98	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00				3.04				0.63				
Approach LOS	A				A				A				
d_I, Intersection Delay [s/veh]	8.32												
Intersection LOS	C												

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Intersection Setup

Name									
Approach	Northwestbound					Southeastbound			
Lane Configuration									
Turning Movement	U-turn	Left	Thru	Thru	Right	Left	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	1	0	0	1
Entry Pocket Length [ft]	225.00	100.00	100.00	100.00	290.00	280.00	100.00	100.00	280.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00					30.00			
Grade [%]	0.00					0.00			
Crosswalk	Yes					Yes			

Volumes

Name									
Base Volume Input [veh/h]	1	1	11	0	46	193	0	8	4
Base Volume Adjustment Factor	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
Growth Factor	1.4900	1.4900	1.4900	1.0000	1.4900	1.4900	1.0000	1.4900	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	1	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1	2	16	0	69	288	0	12	6
Peak Hour Factor	0.8610	0.8610	0.8610	1.0000	0.8610	0.8610	1.0000	0.8610	0.8610
Other Adjustment Factor	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	1	5	0	20	84	0	3	2
Total Analysis Volume [veh/h]	1	2	19	0	80	334	0	14	7
Pedestrian Volume [ped/h]	0					0			

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Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.05	0.00	0.08	0.58	0.00	0.02	0.01
d_M, Delay for Movement [s/veh]	12.55	12.55	15.05	0.00	8.87	19.80	0.00	11.17	8.61
Movement LOS	B	B	C		A	C		B	A
95th-Percentile Queue Length [veh/ln]	0.02	0.02	0.16	0.00	0.26	3.75	0.00	0.07	0.02
95th-Percentile Queue Length [ft/ln]	0.47	0.47	3.97	0.00	6.43	93.80	0.00	1.80	0.53
d_A, Approach Delay [s/veh]	10.13					19.24			
Approach LOS	B					C			
d_I, Intersection Delay [s/veh]	8.32								
Intersection LOS	C								

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Intersection Level Of Service Report
Intersection 4: Armstrong Boulevard and WB Hwy 10 Ramp

Control Type:	Signalized	Delay (sec / veh):	17.7
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.545

Intersection Setup

Name													
Approach	Northbound				Southbound			Eastbound			Westbound		
Lane Configuration													
Turning Movement	U-tu	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	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	395.0	100.0	100.0	100.0	100.00	100.00	315.00	100.00	100.00	100.00	685.00	100.00	685.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00				35.00			30.00			30.00		
Grade [%]	0.00				0.00			0.00			0.00		
Curb Present	No				No						No		
Crosswalk	No				No			No			Yes		

Volumes

Name													
Base Volume Input [veh/h]	2	34	248	0	0	210	257	0	0	0	19	2	320
Base Volume Adjustment Factor	1.000	1.000	1.000	1.000	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	2.00
Growth Factor	1.490	1.490	1.490	1.000	1.0000	1.4900	1.4900	1.0000	1.0000	1.0000	1.4900	1.4900	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	16	8	0	0	12	0	0	0	0	34	0	0
Diverted Trips [veh/h]	0	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	67	378	0	0	325	383	0	0	0	62	3	477
Peak Hour Factor	0.916	0.916	0.916	1.000	1.0000	0.9160	0.9160	1.0000	1.0000	1.0000	0.9160	0.9160	0.9160
Other Adjustment Factor	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	18	103	0	0	89	105	0	0	0	17	1	130
Total Analysis Volume [veh/h]	3	73	413	0	0	355	418	0	0	0	68	3	521
Presence of On-Street Parking	No			No	No		No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0				0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0				0			0			0		
v_co, Outbound Pedestrian Volume crossing	0				0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0				0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0				0			0			0		
Bicycle Volume [bicycles/h]	0				0			0			0		

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Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permi	Prote	Permi	Permi	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	0	5	2	0	0	6	0	0	0	0	0	8	0
Auxiliary Signal Groups													
Lead / Lag	-	Lead	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	7	10	0	0	10	0	0	0	0	0	10	0
Maximum Green [s]	0	20	35	0	0	35	0	0	0	0	0	30	0
Amber [s]	0.0	3.0	5.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
All red [s]	0.0	2.5	1.5	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	3.5	0.0
Split [s]	0	0	0	0	0	0	0	0	0	0	0	0	0
Vehicle Extension [s]	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
Walk [s]	0	0	7	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	20	0	0	0	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk			No			No						No	
I1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.5	4.5	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	4.5	0.0
Minimum Recall		No	Yes			Yes						No	
Maximum Recall		No	No			No						No	
Pedestrian Recall		No	No			No						No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	R		C	R
C, Cycle Length [s]	58	58	58	58		58	58
L, Total Lost Time per Cycle [s]	5.50	6.50	6.50	6.50		6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	3.50	4.50	4.50	4.50		4.50	4.50
g_i, Effective Green Time [s]	5	30	20	20		15	15
g / C, Green / Cycle	0.09	0.52	0.34	0.34		0.26	0.26
(v / s)_i Volume / Saturation Flow Rate	0.05	0.13	0.11	0.29		0.04	0.21
s, saturation flow rate [veh/h]	1603	3204	3204	1431		1606	2532
c, Capacity [veh/h]	137	1670	1093	488		411	648
d1, Uniform Delay [s]	25.58	7.67	14.23	17.87		16.88	20.31
k, delay calibration	0.11	0.11	0.11	0.11		0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	3.47	0.08	0.17	4.45		0.20	2.40
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.55	0.25	0.32	0.86		0.17	0.80
d, Delay for Lane Group [s/veh]	29.05	7.75	14.40	22.33		17.08	22.71
Lane Group LOS	C	A	B	C		B	C
Critical Lane Group	Yes	No	No	Yes		No	Yes
50th-Percentile Queue Length [veh/ln]	1.06	1.11	1.53	5.05		0.70	3.21
50th-Percentile Queue Length [ft/ln]	26.55	27.87	38.26	126.36		17.53	80.32
95th-Percentile Queue Length [veh/ln]	1.91	2.01	2.75	8.74		1.26	5.78
95th-Percentile Queue Length [ft/ln]	47.79	50.16	68.86	218.54		31.56	144.57

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	29.05	29.05	7.75	0.00	0.00	14.40	22.33	0.00	0.00	0.00	17.08	17.08	22.71
Movement LOS	C	C	A			B	C				B	B	C
d_A, Approach Delay [s/veh]	11.06				18.69			0.00			22.03		
Approach LOS	B				B			A			C		
d_I, Intersection Delay [s/veh]	17.74												
Intersection LOS	B												
Intersection V/C	0.545												

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	34.67
l_p,int, Pedestrian LOS Score for Intersection	0.000	0.000	0.000	2.132
Crosswalk LOS	F	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	778	778	0	667
d_b, Bicycle Delay [s]	16.81	16.81	45.00	20.00
l_b,int, Bicycle LOS Score for Intersection	1.903	2.197	4.132	2.536
Bicycle LOS	A	B	D	B

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Intersection Level Of Service Report
Intersection 8: Bower Dr and Riverdale Dr

Control Type:	Two-way stop	Delay (sec / veh):	9.3
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.041

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	23	23	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	32	62	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	32	62	34	34	0
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	8	16	9	9	0
Total Analysis Volume [veh/h]	0	34	65	36	36	0
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.04	0.00
d_M, Delay for Movement [s/veh]	7.41	0.00	0.00	0.00	9.27	8.86
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.13	0.13
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	3.20	3.20
d_A, Approach Delay [s/veh]	0.00		0.00		9.27	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.95					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 9: Riverdale Drive and Western Site Access

Control Type:	Two-way stop	Delay (sec / veh):	9.2
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.016

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 Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.4900	1.0000	1.0000	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	13	16	36	26	13	19
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	13	16	36	26	13	19
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	4	9	7	3	5
Total Analysis Volume [veh/h]	14	17	38	27	14	20
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	0.02	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	9.17	8.67	0.00	0.00	7.36	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.10	0.10	0.00	0.00	0.03	0.03
95th-Percentile Queue Length [ft/ln]	2.51	2.51	0.00	0.00	0.69	0.69
d_A, Approach Delay [s/veh]	8.89		0.00		3.03	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.91					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 10: Riverdale Drive and Eastern Site Access

Control Type:	Two-way stop	Delay (sec / veh):	9.4
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.023

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 Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.4900	1.0000	1.0000	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	19	24	16	36	34	13
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	19	24	16	36	34	13
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	6	4	9	9	3
Total Analysis Volume [veh/h]	20	25	17	38	36	14
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

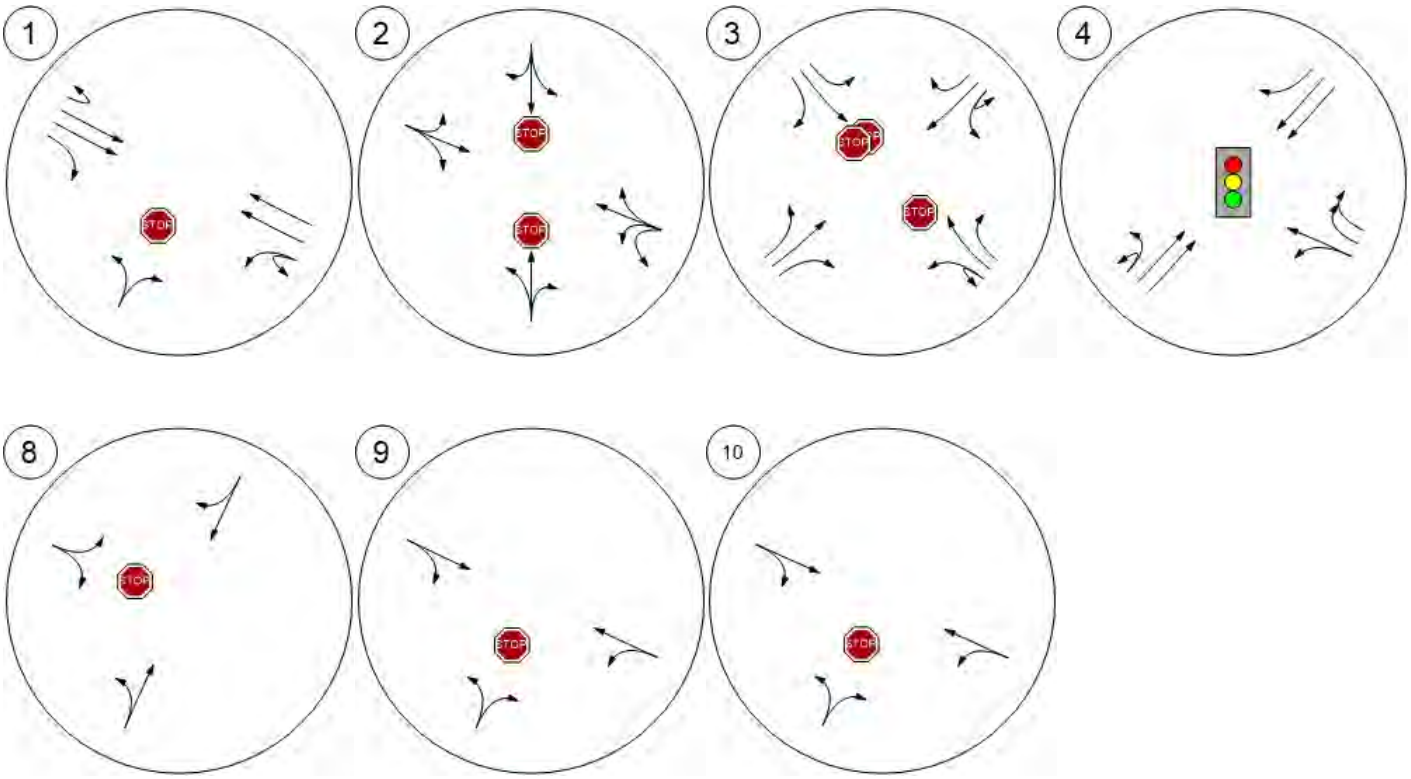
Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.02	0.00	0.00	0.02	0.00
d_M, Delay for Movement [s/veh]	9.41	8.66	0.00	0.00	7.38	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.15	0.15	0.00	0.00	0.07	0.07
95th-Percentile Queue Length [ft/ln]	3.74	3.74	0.00	0.00	1.78	1.78
d_A, Approach Delay [s/veh]	9.00		0.00		5.31	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	4.47					
Intersection LOS	A					

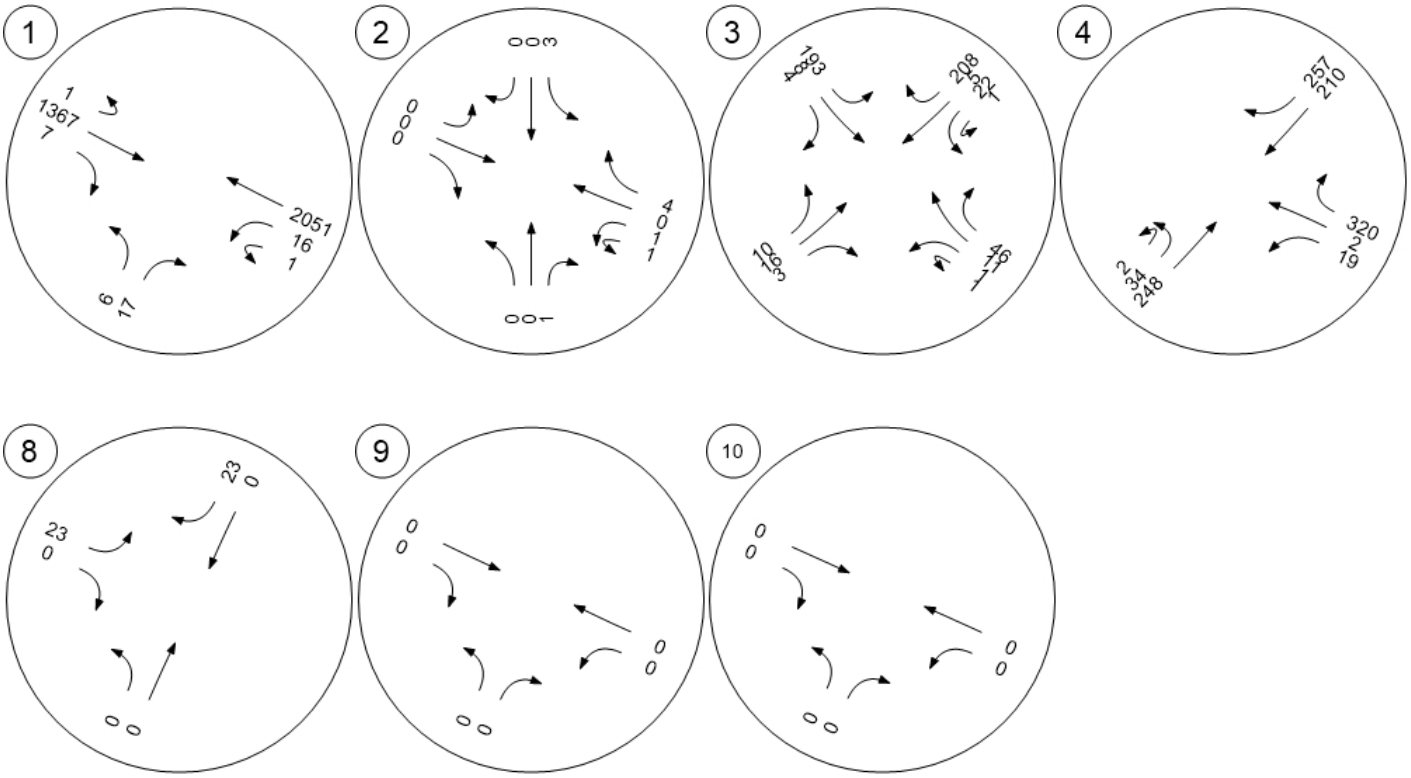
Lane Configuration and Traffic Control





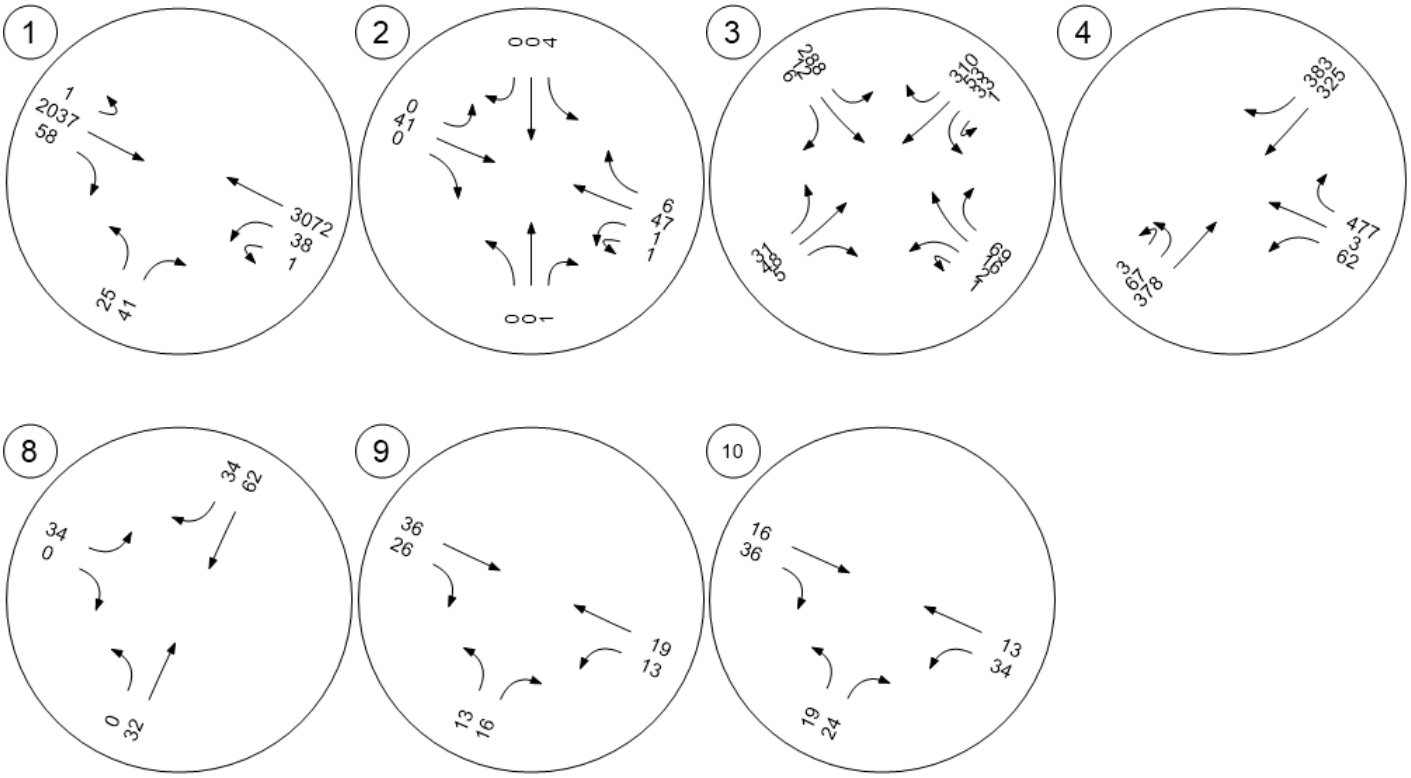
Traffic Volume - Base Volume





Traffic Volume - Future Total Volume





Vistro File: C:\...\Ramsey Model.vistro
Report File: C:\...\Mitigated 2040 AM Build.pdf

Scenario 11 Mitigated 2040 AM Build
11/9/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	HWY 10 and Bowers Drive	Two-way stop	HCM 6th Edition	NB Right	0.365	45.7	E
2	Riverdale Drive and Llama Street	Two-way stop	HCM 6th Edition	WB Left	0.007	7.4	A
3	Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp	Two-way stop	HCM 6th Edition	NWB Thru	0.015	14.2	B
4	Armstrong Boulevard and WB Hwy 10 Ramp	Signalized	HCM 6th Edition	NB Left	0.252	12.6	B
8	Bower Dr and Riverdale Dr	Two-way stop	HCM 6th Edition	NB Thru	0.028	9.3	A
9	Riverdale Drive and Western Site Access	Two-way stop	HCM 6th Edition	NB Left	0.010	8.9	A
10	Riverdale Drive and Eastern Site Access	Two-way stop	HCM 6th Edition	NB Left	0.016	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: HWY 10 and Bowers Drive

Control Type:	Two-way stop	Delay (sec / veh):	45.7
Analysis Method:	HCM 6th Edition	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.365

Intersection Setup

Name								
Approach	Northbound		Eastbound			Westbound		
Lane Configuration								
Turning Movement	Left	Right	U-turn	Thru	Right	U-turn	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	1	1	0	0
Entry Pocket Length [ft]	100.00	100.00	325.00	100.00	225.00	360.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		65.00			65.00		
Grade [%]	0.00		0.00			0.00		
Crosswalk	Yes		Yes			Yes		

Volumes

Name								
Base Volume Input [veh/h]	5	16	1	1736	2	0	4	895
Base Volume Adjustment Factor	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
Growth Factor	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	23	0	0	17	0	5	45
Diverted Trips [veh/h]	-7	0	0	0	0	0	0	7
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	47	1	2587	20	0	11	1386
Peak Hour Factor	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	12	0	683	5	0	3	366
Total Analysis Volume [veh/h]	0	50	1	2732	21	0	12	1464
Pedestrian Volume [ped/h]	0		0			0		

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Version 2020 (SP 0-3)

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	0.36	0.01	0.03	0.00	0.00	0.08	0.01
d_M, Delay for Movement [s/veh]	852.38	45.66	34.97	0.00	0.00	371.73	32.65	0.00
Movement LOS	F	E	D	A	A	F	D	A
95th-Percentile Queue Length [veh/ln]	1.51	1.51	0.02	0.00	0.00	0.27	0.27	0.00
95th-Percentile Queue Length [ft/ln]	37.84	37.84	0.62	0.00	0.00	6.80	6.80	0.00
d_A, Approach Delay [s/veh]	45.66		0.01			0.27		
Approach LOS	E		A			A		
d_I, Intersection Delay [s/veh]	0.63							
Intersection LOS	E							

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Intersection Level Of Service Report
Intersection 2: Riverdale Drive and Llama Street

Control Type:	Two-way stop	Delay (sec / veh):	7.4
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.007

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 Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry 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
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	0	0	0	0	0	0	6	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 Factor	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900
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	80	0	0	16	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	7	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	0	0	0	0	87	0	9	16	0
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	0	0	0	24	0	3	4	0
Total Analysis Volume [veh/h]	0	0	0	0	0	0	0	97	0	10	18	0
Pedestrian Volume [ped/h]	0			0			0			0		

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Version 2020 (SP 0-3)

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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	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	9.33	9.80	8.75	9.33	9.80	8.39	7.25	0.00	0.00	7.42	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.50	0.50
d_A, Approach Delay [s/veh]	9.29			9.17			0.00			2.65		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	0.59											
Intersection LOS	A											

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Version 2020 (SP 0-3)

Spack SOLUTIONS

Intersection Level Of Service Report
Intersection 3: Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp

Control Type:	Two-way stop	Delay (sec / veh):	14.2
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.015

Intersection Setup

Name												
Approach	Southbound				Northeastbound				Southwestbound			
Lane Configuration												
Turning Movement	Left	Thru	Right	Right	Left	Left	Thru	Right	Left	Thru	Right	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 Entry Pocket	0	0	0	0	1	0	0	1	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	300.00	100.00	100.00	300.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00				35.00				35.00			
Grade [%]	0.00				0.00				0.00			
Crosswalk	Yes				Yes				Yes			

Volumes

Name												
Base Volume Input [veh/h]	0	0	0	0	1	0	2	1	18	13	0	243
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 Factor	1.0000	1.0000	1.0000	1.0000	1.4900	1.0000	1.4900	1.4900	1.4900	1.4900	1.0000	1.4900
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	23	0	56	1	0	16	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	7	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	0	24	0	66	2	27	35	0	362
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	0.9430	1.0000	0.9430	0.9430	0.9430	0.9430	1.0000	0.9430
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	6	0	17	1	7	9	0	96
Total Analysis Volume [veh/h]	0	0	0	0	25	0	70	2	29	37	0	384
Pedestrian Volume [ped/h]	0				0				0			

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Version 2020 (SP 0-3)

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	8.23	0.00	0.00	0.00	7.40	0.00	0.00	0.00
Movement LOS					A		A	A	A	A		A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.06	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	1.68	0.00	0.00	0.00	1.45	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00				2.12				0.48			
Approach LOS	A				A				A			
d_I, Intersection Delay [s/veh]	5.72											
Intersection LOS	B											

Appendix F - Capacity Analysis Backup

Generated with PTV VISTRO
Version 2020 (SP 0-3)

Spack SOLUTIONS

Intersection Setup

Name								
Approach	Northwestbound				Southeastbound			
Lane Configuration								
Turning Movement	Left	Thru	Thru	Right	Left	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	1	0	0	1
Entry Pocket Length [ft]	225.00	100.00	100.00	290.00	280.00	100.00	100.00	280.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00				30.00			
Grade [%]	0.00				0.00			
Crosswalk	Yes				Yes			

Volumes

Name								
Base Volume Input [veh/h]	2	4	0	14	187	0	7	10
Base Volume Adjustment Factor	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
Growth Factor	1.4900	1.4900	1.0000	1.4900	1.4900	1.0000	1.4900	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	6	0	21	279	0	10	15
Peak Hour Factor	0.9430	0.9430	1.0000	0.9430	0.9430	1.0000	0.9430	0.9430
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	2	0	6	74	0	3	4
Total Analysis Volume [veh/h]	3	6	0	22	296	0	11	16
Pedestrian Volume [ped/h]	0				0			

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Version 2020 (SP 0-3)

Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.02	0.00	0.02	0.43	0.00	0.02	0.02
d_M, Delay for Movement [s/veh]	12.08	14.17	0.00	8.71	14.07	0.00	10.60	8.53
Movement LOS	B	B		A	B		B	A
95th-Percentile Queue Length [veh/ln]	0.02	0.05	0.00	0.07	2.16	0.00	0.05	0.05
95th-Percentile Queue Length [ft/ln]	0.44	1.15	0.00	1.70	53.91	0.00	1.28	1.18
d_A, Approach Delay [s/veh]	10.09				13.68			
Approach LOS	B				B			
d_I, Intersection Delay [s/veh]	5.72							
Intersection LOS	B							

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Version 2020 (SP 0-3)

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Intersection Level Of Service Report
Intersection 4: Armstrong Boulevard and WB Hwy 10 Ramp

Control Type:	Signalized	Delay (sec / veh):	12.6
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.252

Intersection Setup

Name													
Approach	Northbound			Southbound				Eastbound			Westbound		
Lane Configuration													
Turning Movement	Left	Thru	Right	U-tu	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	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	395.00	100.00	100.00	100.0	100.0	100.0	315.0	100.00	100.00	100.00	685.00	100.00	685.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00			35.00				30.00			30.00		
Grade [%]	0.00			0.00				0.00			0.00		
Curb Present	No			No							No		
Crosswalk	No			No				No			Yes		

Volumes

Name													
Base Volume Input [veh/h]	10	220	0	1	0	238	96	0	0	0	20	2	134
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	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	2.00
Growth Factor	1.4900	1.4900	1.0000	1.490	1.000	1.490	1.490	1.0000	1.0000	1.0000	1.4900	1.4900	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	45	11	0	0	0	4	0	0	0	0	12	0	0
Diverted Trips [veh/h]	7	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	67	339	0	1	0	359	143	0	0	0	42	3	200
Peak Hour Factor	0.9310	0.9310	1.0000	0.931	1.000	0.931	0.931	1.0000	1.0000	1.0000	0.9310	0.9310	0.9310
Other Adjustment Factor	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	18	91	0	0	0	96	38	0	0	0	11	1	54
Total Analysis Volume [veh/h]	72	364	0	1	0	386	154	0	0	0	45	3	215
Presence of On-Street Parking	No		No	No			No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0			0				0			0		
v_di, Inbound Pedestrian Volume crossing m	0			0				0			0		
v_co, Outbound Pedestrian Volume crossing	0			0				0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0				0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0				0			0		
Bicycle Volume [bicycles/h]	0			0				0			0		

Appendix F - Capacity Analysis Backup

Generated with PTV VISTRO
Version 2020 (SP 0-3)

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Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Permi	Permi	Permi	Permi	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	5	2	0	0	0	6	0	0	0	0	0	8	0
Auxiliary Signal Groups													
Lead / Lag	Lead	-	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	7	10	0	0	0	10	0	0	0	0	0	10	0
Maximum Green [s]	20	35	0	0	0	35	0	0	0	0	0	30	0
Amber [s]	3.0	5.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
All red [s]	2.5	1.5	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	3.5	0.0
Split [s]	0	0	0	0	0	0	0	0	0	0	0	0	0
Vehicle Extension [s]	3.0	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
Walk [s]	0	7	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	20	0	0	0	0	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No				No						No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	3.5	4.5	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	4.5	0.0
Minimum Recall	No	Yes				Yes						No	
Maximum Recall	No	No				No						No	
Pedestrian Recall	No	No				No						No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	C	R		C	R
C, Cycle Length [s]	43	43	43	43	43		43	43
L, Total Lost Time per Cycle [s]	5.50	6.50	6.50	6.50	6.50		6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	2.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	3.50	4.50	4.50	4.50	4.50		4.50	4.50
g_i, Effective Green Time [s]	4	20	11	11	11		10	10
g / C, Green / Cycle	0.10	0.47	0.25	0.25	0.25		0.22	0.22
(v / s)_i Volume / Saturation Flow Rate	0.04	0.11	0.12	0.12	0.11		0.03	0.08
s, saturation flow rate [veh/h]	1603	3204	1645	1532	1431		1608	2532
c, Capacity [veh/h]	156	1522	486	383	358		361	568
d1, Uniform Delay [s]	18.43	6.72	13.80	13.84	13.62		13.40	14.21
k, delay calibration	0.11	0.11	0.11	0.11	0.11		0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	2.11	0.08	0.56	0.96	0.82		0.17	0.42
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.46	0.24	0.41	0.49	0.43		0.13	0.38
d, Delay for Lane Group [s/veh]	20.54	6.80	14.36	14.79	14.44		13.57	14.63
Lane Group LOS	C	A	B	B	B		B	B
Critical Lane Group	Yes	No	No	Yes	No		No	Yes
50th-Percentile Queue Length [veh/ln]	0.67	0.67	1.41	1.34	1.09		0.33	0.78
50th-Percentile Queue Length [ft/ln]	16.79	16.73	35.20	33.62	27.29		8.32	19.60
95th-Percentile Queue Length [veh/ln]	1.21	1.20	2.53	2.42	1.96		0.60	1.41
95th-Percentile Queue Length [ft/ln]	30.23	30.12	63.36	60.51	49.11		14.98	35.28

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	20.54	6.80	0.00	14.36	0.00	14.57	14.44	0.00	0.00	0.00	13.57	13.57	14.63
Movement LOS	C	A		B		B	B				B	B	B
d_A, Approach Delay [s/veh]	9.07			14.53				0.00			14.43		
Approach LOS	A			B				A			B		
d_I, Intersection Delay [s/veh]	12.59												
Intersection LOS	B												
Intersection V/C	0.252												

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	34.67
l_p,int, Pedestrian LOS Score for Intersection	0.000	0.000	0.000	2.025
Crosswalk LOS	F	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	778	778	0	667
d_b, Bicycle Delay [s]	16.81	16.81	45.00	20.00
l_b,int, Bicycle LOS Score for Intersection	1.919	2.006	4.132	1.994
Bicycle LOS	A	B	D	A

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Intersection Level Of Service Report
Intersection 8: Bower Dr and Riverdale Dr

Control Type:	Two-way stop	Delay (sec / veh):	9.3
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.028

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	6	21	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	23	22	0	0	0
Diverted Trips [veh/h]	0	0	0	0	-5	5
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	23	22	9	26	5
Peak Hour Factor	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	6	6	2	7	1
Total Analysis Volume [veh/h]	0	24	23	10	27	5
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.03	0.01	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	8.94	9.29	7.31	0.00	0.00	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.09	0.09	0.06	0.06	0.00	0.00
95th-Percentile Queue Length [ft/ln]	2.14	2.14	1.60	1.60	0.00	0.00
d_A, Approach Delay [s/veh]	9.29		5.09		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	4.39					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 9: Riverdale Drive and Western Site Access

Control Type:	Two-way stop	Delay (sec / veh):	8.9
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.010

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 Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.4900	1.0000	1.0000	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	9	32	13	9	4	14
Diverted Trips [veh/h]	0	0	7	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]	9	32	20	9	4	14
Peak Hour Factor	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	8	5	2	1	4
Total Analysis Volume [veh/h]	10	34	21	10	4	15
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	0.03	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	8.92	8.59	0.00	0.00	7.28	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.13	0.13	0.00	0.00	0.01	0.01
95th-Percentile Queue Length [ft/ln]	3.35	3.35	0.00	0.00	0.19	0.19
d_A, Approach Delay [s/veh]	8.66		0.00		1.53	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	4.36					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 10: Riverdale Drive and Eastern Site Access

Control Type:	Two-way stop	Delay (sec / veh):	9.2
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.016

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 Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.4900	1.0000	1.0000	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	14	48	32	13	12	4
Diverted Trips [veh/h]	0	0	7	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]	14	48	39	13	12	4
Peak Hour Factor	0.9470	0.9470	0.9470	0.9470	0.9470	0.9470
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	13	10	3	3	1
Total Analysis Volume [veh/h]	15	51	41	14	13	4
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

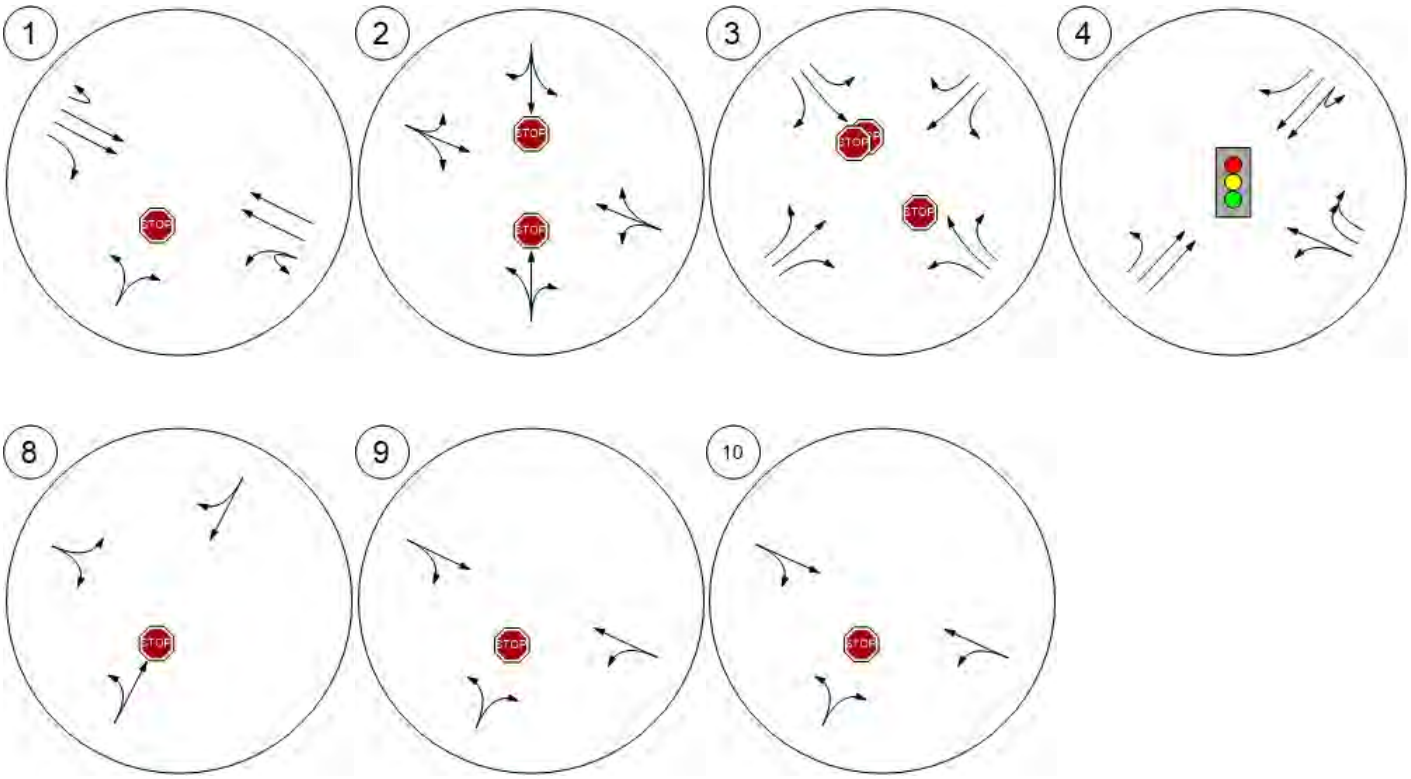
Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.05	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	9.18	8.78	0.00	0.00	7.34	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.21	0.21	0.00	0.00	0.03	0.03
95th-Percentile Queue Length [ft/ln]	5.32	5.32	0.00	0.00	0.63	0.63
d_A, Approach Delay [s/veh]	8.87		0.00		5.61	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	4.94					
Intersection LOS	A					

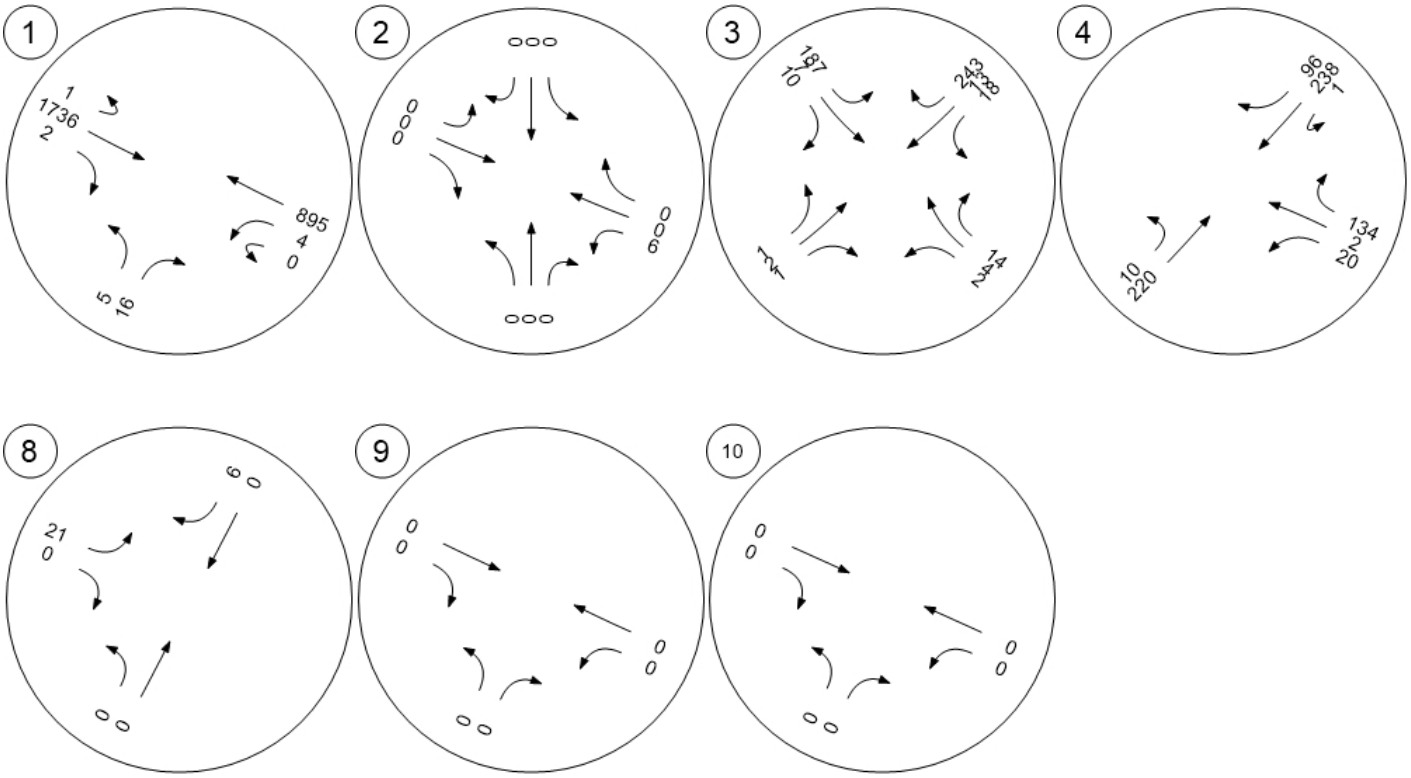
Lane Configuration and Traffic Control





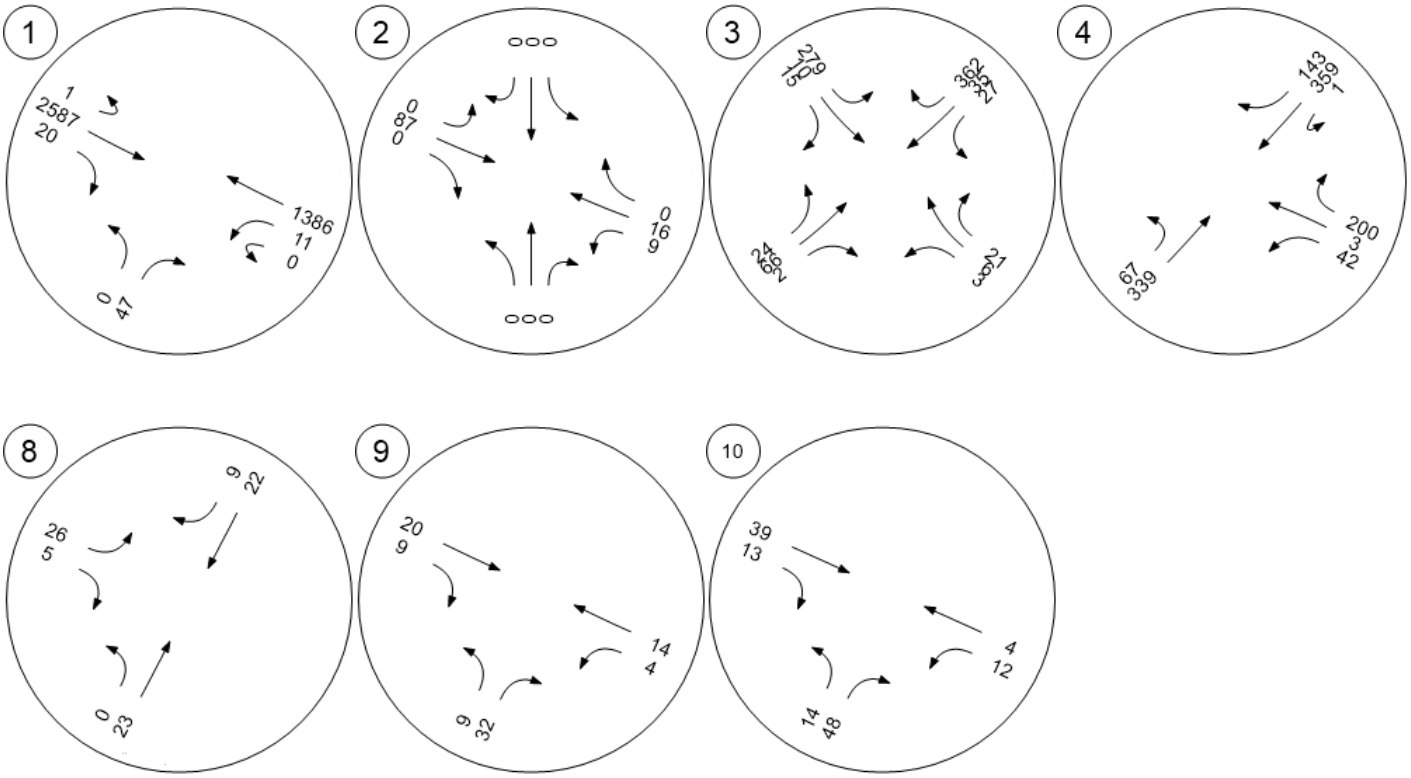
Traffic Volume - Base Volume





Traffic Volume - Future Total Volume





Vistro File: C:\...\Ramsey Model.vistro
Report File: C:\...\Mitigated 2040 PM Build.pdf

Scenario 12 Mitigated 2040 PM Build
11/9/2020

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	HWY 10 and Bowers Drive	Two-way stop	HCM 6th Edition	EB U-T	0.155	645.6	F
2	Riverdale Drive and Llama Street	Two-way stop	HCM 6th Edition	SB Left	0.005	9.3	A
3	Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp	Two-way stop	HCM 6th Edition	SEB Left	0.614	21.6	C
4	Armstrong Boulevard and WB Hwy 10 Ramp	Signalized	HCM 6th Edition	NB Left	0.562	18.4	B
8	Bower Dr and Riverdale Dr	Two-way stop	HCM 6th Edition	NB Thru	0.020	9.3	A
9	Riverdale Drive and Western Site Access	Two-way stop	HCM 6th Edition	NB Left	0.007	9.1	A
10	Riverdale Drive and Eastern Site Access	Two-way stop	HCM 6th Edition	NB Left	0.011	9.5	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: HWY 10 and Bowers Drive

Control Type:	Two-way stop	Delay (sec / veh):	645.6
Analysis Method:	HCM 6th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.155

Intersection Setup

Name								
Approach	Northbound		Eastbound			Westbound		
Lane Configuration								
Turning Movement	Left	Right	U-turn	Thru	Right	U-turn	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	1	0	1	1	0	0
Entry Pocket Length [ft]	100.00	100.00	325.00	100.00	225.00	360.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		65.00			65.00		
Grade [%]	0.00		0.00			0.00		
Crosswalk	Yes		Yes			Yes		

Volumes

Name								
Base Volume Input [veh/h]	6	17	1	1367	7	1	16	2051
Base Volume Adjustment Factor	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
Growth Factor	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	16	0	0	48	0	14	32
Diverted Trips [veh/h]	-9	0	0	0	0	0	0	9
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	41	1	2037	58	1	38	3097
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	11	0	536	15	0	10	815
Total Analysis Volume [veh/h]	0	43	1	2144	61	1	40	3260
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	0.20	0.15	0.02	0.00	0.03	0.17	0.03
d_M, Delay for Movement [s/veh]	2079.43	25.74	645.64	0.00	0.00	119.73	24.70	0.00
Movement LOS	F	D	F	A	A	F	C	A
95th-Percentile Queue Length [veh/ln]	0.72	0.72	0.36	0.00	0.00	0.73	0.73	0.00
95th-Percentile Queue Length [ft/ln]	18.02	18.02	8.99	0.00	0.00	18.20	18.20	0.00
d_A, Approach Delay [s/veh]	25.74		0.29			0.34		
Approach LOS	D		A			A		
d_I, Intersection Delay [s/veh]	0.52							
Intersection LOS	F							

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Intersection Level Of Service Report
Intersection 2: Riverdale Drive and Llama Street

Control Type:	Two-way stop	Delay (sec / veh):	9.3
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.005

Intersection Setup

Name													
Approach	Northbound			Southbound			Eastbound			Westbound			
Lane Configuration													
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	U-tu	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	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.0	100.0	100.0	100.0
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			35.00			
Grade [%]	0.00			0.00			0.00			0.00			
Crosswalk	Yes			Yes			Yes			Yes			

Volumes

Name													
Base Volume Input [veh/h]	0	0	1	3	0	0	0	0	0	1	1	0	4
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000
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	2.00
Growth Factor	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900	1.490	1.490	1.490	1.490
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	57	0	0	0	47	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	9	0	0	0	0	0
Pass-by Trips [veh/h]	0	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	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	1	4	0	0	0	66	0	1	1	47	6
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.900	0.900	0.900	0.900
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000
Total 15-Minute Volume [veh/h]	0	0	0	1	0	0	0	18	0	0	0	13	2
Total Analysis Volume [veh/h]	0	0	1	4	0	0	0	73	0	1	1	52	7
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	0.00
d_M, Delay for Movement [s/veh]	9.28	9.78	8.64	9.31	9.78	8.58	7.33	0.00	0.00	8.48	7.36	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.08	0.08	0.08	0.36	0.36	0.36	0.00	0.00	0.00	0.12	0.12	0.12	0.12
d_A, Approach Delay [s/veh]	8.64			9.31			0.00			0.26			
Approach LOS	A			A			A			A			
d_I, Intersection Delay [s/veh]	0.44												
Intersection LOS	A												

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Intersection Level Of Service Report
Intersection 3: Riverdale Drive/Armostrong Boulevard and EB Hwy 10 Ramp

Control Type:	Two-way stop	Delay (sec / veh):	21.6
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.614

Intersection Setup

Name													
Approach	Southbound				Northeastbound				Southwestbound				
Lane Configuration													
Turning Movement	Left	Thru	Right	Right	Left	Left	Thru	Right	U-turn	Left	Thru	Right	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	12.00
No. of Lanes in Entry Pocket	0	0	0	0	1	0	0	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	300.00	100.00	100.00	300.00	100.0	100.0	100.0	100.0	100.0
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00				35.00				35.00				
Grade [%]	0.00				0.00				0.00				
Crosswalk	Yes				Yes				Yes				

Volumes

Name													
Base Volume Input [veh/h]	0	0	0	0	10	0	16	3	1	22	5	0	208
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.000
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	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.4900	1.0000	1.4900	1.4900	1.490	1.490	1.490	1.000	1.490
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	16	0	40	1	0	0	46	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	9	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	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	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	0	0	0	31	0	73	5	1	33	53	0	310
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	0.8610	1.0000	0.8610	0.8610	0.861	0.861	0.861	1.000	0.861
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.000	1.000	1.000	1.000	1.000
Total 15-Minute Volume [veh/h]	0	0	0	0	9	0	21	1	0	10	15	0	90
Total Analysis Volume [veh/h]	0	0	0	0	36	0	85	6	1	38	62	0	360
Pedestrian Volume [ped/h]	0				0				0				

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Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	0.00	0.00	8.27	0.00	0.00	0.00	8.92	7.46	0.00	0.00	0.00
Movement LOS					A		A	A	A	A	A		A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.08	0.08	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	2.45	0.00	0.00	0.00	2.03	2.03	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	0.00				2.34				0.63				
Approach LOS	A				A				A				
d_I, Intersection Delay [s/veh]	8.69												
Intersection LOS	C												

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Intersection Setup

Name									
Approach	Northwestbound					Southeastbound			
Lane Configuration									
Turning Movement	U-turn	Left	Thru	Thru	Right	Left	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	1	1	0	0	1
Entry Pocket Length [ft]	225.00	100.00	100.00	100.00	290.00	280.00	100.00	100.00	280.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00					30.00			
Grade [%]	0.00					0.00			
Crosswalk	Yes					Yes			

Volumes

Name									
Base Volume Input [veh/h]	1	1	11	0	46	193	0	8	4
Base Volume Adjustment Factor	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
Growth Factor	1.4900	1.4900	1.4900	1.0000	1.4900	1.4900	1.0000	1.4900	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	1	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	1	2	16	0	69	288	0	12	6
Peak Hour Factor	0.8610	0.8610	0.8610	1.0000	0.8610	0.8610	1.0000	0.8610	0.8610
Other Adjustment Factor	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	1	5	0	20	84	0	3	2
Total Analysis Volume [veh/h]	1	2	19	0	80	334	0	14	7
Pedestrian Volume [ped/h]	0					0			

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Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.05	0.00	0.08	0.61	0.00	0.02	0.01
d_M, Delay for Movement [s/veh]	12.90	12.90	15.47	0.00	9.03	21.60	0.00	11.42	8.61
Movement LOS	B	B	C		A	C		B	A
95th-Percentile Queue Length [veh/ln]	0.02	0.02	0.17	0.00	0.27	4.13	0.00	0.07	0.02
95th-Percentile Queue Length [ft/ln]	0.49	0.49	4.13	0.00	6.70	103.22	0.00	1.87	0.53
d_A, Approach Delay [s/veh]	10.34					20.94			
Approach LOS	B					C			
d_I, Intersection Delay [s/veh]	8.69								
Intersection LOS	C								

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Intersection Level Of Service Report
Intersection 4: Armstrong Boulevard and WB Hwy 10 Ramp

Control Type:	Signalized	Delay (sec / veh):	18.4
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.562

Intersection Setup

Name													
Approach	Northbound				Southbound			Eastbound			Westbound		
Lane Configuration													
Turning Movement	U-tu	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	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0	1	0	0	0	1	0	1
Entry Pocket Length [ft]	395.0	100.0	100.0	100.0	100.00	100.00	315.00	100.00	100.00	100.00	685.00	100.00	685.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00				35.00			30.00			30.00		
Grade [%]	0.00				0.00			0.00			0.00		
Curb Present	No				No						No		
Crosswalk	No				No			No			Yes		

Volumes

Name													
Base Volume Input [veh/h]	2	34	248	0	0	210	257	0	0	0	19	2	320
Base Volume Adjustment Factor	1.000	1.000	1.000	1.000	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	2.00
Growth Factor	1.490	1.490	1.490	1.000	1.0000	1.4900	1.4900	1.0000	1.0000	1.0000	1.4900	1.4900	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	32	8	0	0	12	0	0	0	0	34	0	0
Diverted Trips [veh/h]	0	9	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	0
Existing Site Adjustment Volume [veh/h]	0	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	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	92	378	0	0	325	383	0	0	0	62	3	477
Peak Hour Factor	0.916	0.916	0.916	1.000	1.0000	0.9160	0.9160	1.0000	1.0000	1.0000	0.9160	0.9160	0.9160
Other Adjustment Factor	1.000	1.000	1.000	1.000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	25	103	0	0	89	105	0	0	0	17	1	130
Total Analysis Volume [veh/h]	3	100	413	0	0	355	418	0	0	0	68	3	521
Presence of On-Street Parking	No			No	No		No				No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	0				0			0			0		
v_di, Inbound Pedestrian Volume crossing m	0				0			0			0		
v_co, Outbound Pedestrian Volume crossing	0				0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0				0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0				0			0			0		
Bicycle Volume [bicycles/h]	0				0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	90
Coordination Type	Free Running
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Permi	Prote	Permi	Permi	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal Group	0	5	2	0	0	6	0	0	0	0	0	8	0
Auxiliary Signal Groups													
Lead / Lag	-	Lead	-	-	-	-	-	-	-	-	-	-	-
Minimum Green [s]	0	7	10	0	0	10	0	0	0	0	0	10	0
Maximum Green [s]	0	20	35	0	0	35	0	0	0	0	0	30	0
Amber [s]	0.0	3.0	5.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
All red [s]	0.0	2.5	1.5	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	3.5	0.0
Split [s]	0	0	0	0	0	0	0	0	0	0	0	0	0
Vehicle Extension [s]	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
Walk [s]	0	0	7	0	0	0	0	0	0	0	0	0	0
Pedestrian Clearance [s]	0	0	20	0	0	0	0	0	0	0	0	0	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk			No			No						No	
I1, Start-Up Lost Time [s]	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.5	4.5	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	4.5	0.0
Minimum Recall		No	Yes			Yes						No	
Maximum Recall		No	No			No						No	
Pedestrian Recall		No	No			No						No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	R		C	R
C, Cycle Length [s]	60	60	60	60		60	60
L, Total Lost Time per Cycle [s]	5.50	6.50	6.50	6.50		6.50	6.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00		0.00	0.00
l2, Clearance Lost Time [s]	3.50	4.50	4.50	4.50		4.50	4.50
g_i, Effective Green Time [s]	6	31	20	20		15	15
g / C, Green / Cycle	0.10	0.53	0.34	0.34		0.25	0.25
(v / s)_i Volume / Saturation Flow Rate	0.06	0.13	0.11	0.29		0.04	0.21
s, saturation flow rate [veh/h]	1603	3204	3204	1431		1606	2532
c, Capacity [veh/h]	154	1692	1088	486		409	644
d1, Uniform Delay [s]	26.08	7.64	14.66	18.41		17.38	20.91
k, delay calibration	0.11	0.11	0.11	0.11		0.11	0.11
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00		1.00	1.00
d2, Incremental Delay [s]	4.88	0.07	0.17	4.59		0.20	2.48
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00		0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00		1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00		1.00	1.00

Lane Group Results

X, volume / capacity	0.67	0.24	0.33	0.86		0.17	0.81
d, Delay for Lane Group [s/veh]	30.96	7.72	14.83	23.00		17.58	23.39
Lane Group LOS	C	A	B	C		B	C
Critical Lane Group	Yes	No	No	Yes		No	Yes
50th-Percentile Queue Length [veh/ln]	1.51	1.13	1.59	5.25		0.73	3.33
50th-Percentile Queue Length [ft/ln]	37.87	28.35	39.75	131.18		18.16	83.21
95th-Percentile Queue Length [veh/ln]	2.73	2.04	2.86	9.00		1.31	5.99
95th-Percentile Queue Length [ft/ln]	68.17	51.04	71.56	225.09		32.68	149.77

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Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	30.96	30.96	7.72	0.00	0.00	14.83	23.00	0.00	0.00	0.00	17.58	17.58	23.39
Movement LOS	C	C	A			B	C				B	B	C
d_A, Approach Delay [s/veh]	12.36				19.25			0.00			22.69		
Approach LOS	B				B			A			C		
d_I, Intersection Delay [s/veh]	18.44												
Intersection LOS	B												
Intersection V/C	0.562												

Other Modes

g_Walk,mi, Effective Walk Time [s]	0.0	0.0	0.0	11.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
d_p, Pedestrian Delay [s]	0.00	0.00	0.00	34.67
l_p,int, Pedestrian LOS Score for Intersection	0.000	0.000	0.000	2.132
Crosswalk LOS	F	F	F	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	778	778	0	667
d_b, Bicycle Delay [s]	16.81	16.81	45.00	20.00
l_b,int, Bicycle LOS Score for Intersection	1.903	2.197	4.132	2.536
Bicycle LOS	A	B	D	B

Sequence

Ring 1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Intersection Level Of Service Report
Intersection 8: Bower Dr and Riverdale Dr

Control Type:	Two-way stop	Delay (sec / veh):	9.3
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.020

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	23	23	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.4900	1.4900	1.4900	1.4900	1.4900	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	16	62	0	0	0
Diverted Trips [veh/h]	0	0	0	0	-9	9
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	16	62	34	25	9
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	4	16	9	7	2
Total Analysis Volume [veh/h]	0	17	65	36	26	9
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

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

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.02	0.04	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.26	9.26	7.37	0.00	0.00	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.06	0.06	0.20	0.20	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.51	1.51	5.11	5.11	0.00	0.00
d_A, Approach Delay [s/veh]	9.26		4.74		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	4.16					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 9: Riverdale Drive and Western Site Access

Control Type:	Two-way stop	Delay (sec / veh):	9.1
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.007

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 Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.4900	1.0000	1.0000	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	6	23	36	26	13	9
Diverted Trips [veh/h]	0	0	9	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	6	23	45	26	13	9
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	6	12	7	3	2
Total Analysis Volume [veh/h]	6	24	47	27	14	9
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	0.02	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	9.15	8.70	0.00	0.00	7.38	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.09	0.09	0.00	0.00	0.03	0.03
95th-Percentile Queue Length [ft/ln]	2.37	2.37	0.00	0.00	0.69	0.69
d_A, Approach Delay [s/veh]	8.79		0.00		4.49	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.89					
Intersection LOS	A					

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Intersection Level Of Service Report
Intersection 10: Riverdale Drive and Eastern Site Access

Control Type:	Two-way stop	Delay (sec / veh):	9.5
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.011

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 Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		Yes		Yes	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.4900	1.0000	1.0000	1.4900
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	9	34	23	36	34	13
Diverted Trips [veh/h]	0	0	9	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]	9	34	32	36	34	13
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	9	8	9	9	3
Total Analysis Volume [veh/h]	9	36	34	38	36	14
Pedestrian Volume [ped/h]	0		0		0	

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Intersection Settings

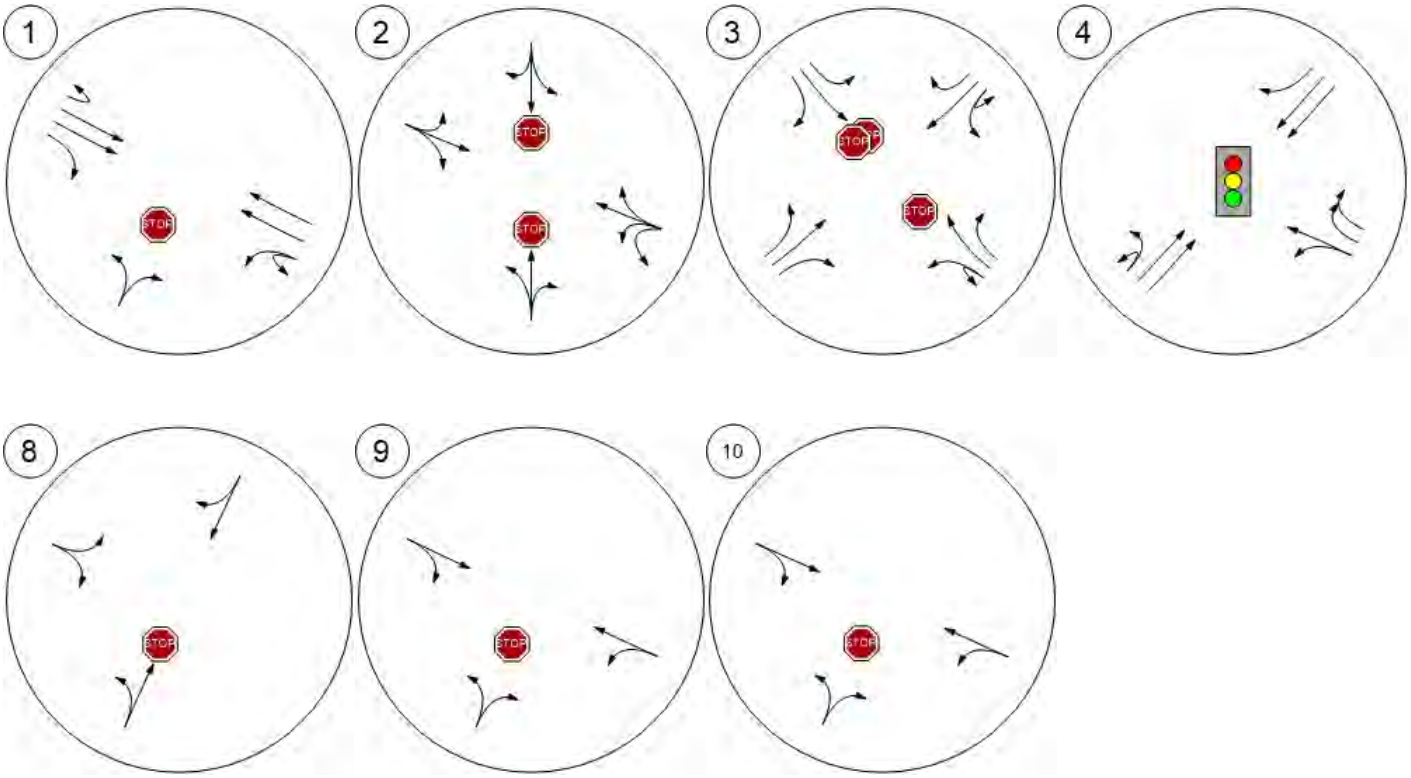
Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.04	0.00	0.00	0.02	0.00
d_M, Delay for Movement [s/veh]	9.50	8.73	0.00	0.00	7.41	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.15	0.15	0.00	0.00	0.07	0.07
95th-Percentile Queue Length [ft/ln]	3.64	3.64	0.00	0.00	1.81	1.81
d_A, Approach Delay [s/veh]	8.88		0.00		5.34	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	3.99					
Intersection LOS	A					

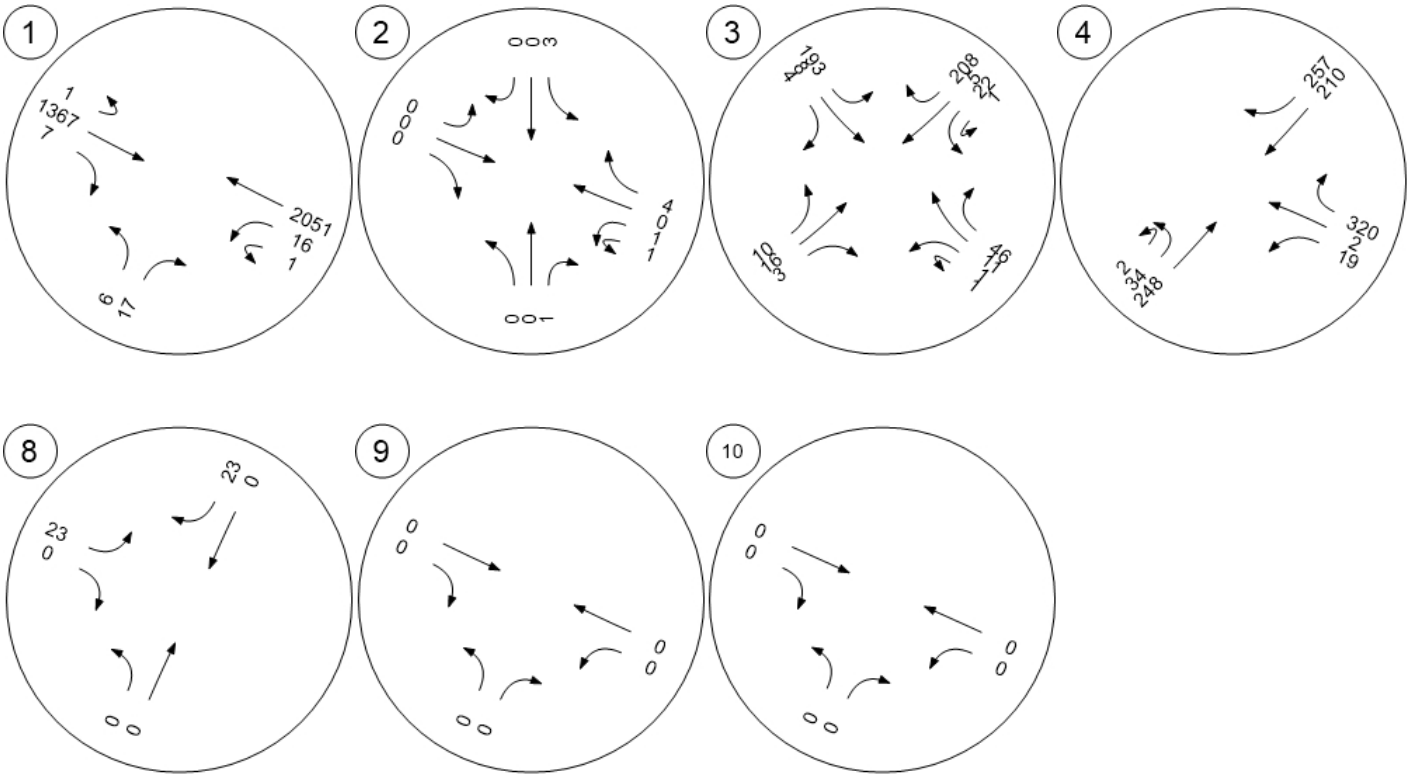
Lane Configuration and Traffic Control





Traffic Volume - Base Volume





Traffic Volume - Future Total Volume



