# City of Ramsey
## Agenda
# Environmental Policy Board (EPB)
**Monday, January 25, 2021**
## 6:30 pm
## Council Chambers, 7550 Sunwood Drive NW

This meeting is being held in accordance with Minnesota Statutes 13D.021. Due to the COVID-19 Pandemic, it is not practical and prudent for all members of this board to attend in person. Current Minnesota law requires certain social distancing standards that impacts the capacity of the Council Chambers. For those at highest risk, it is advised to isolate themselves from the general public. For these reasons, it is not practical and prudent to have this meeting exclusively in person. Members of the public are welcome to attend in person or remotely.

Remote Attendance available at www.cityoframsey.com/meetings. To maximize social distancing due to the COVID-19 Pandemic, those that can join remotely are encouraged to do so. Those joining remotely and requesting to speak are asked to use a webcam when speaking.

**1. Call to Order**

**2. Citizen Input**

**3. Approve Agenda**

**4. Approve Minutes**

**1.** Approve Meeting Minutes Dated September 21, 2020

**5. Policy Board Business**

**1.** Consider Natural Resource Recommendations Related to Riverstone South; Case of Capstone Homes/Riverstone Development

**2.** Review Preliminary Plat and Density Transitioning for Northfork Meadows, Case of Lennar (Project #20-135)

**3.** Update on Water Efficiency Grant Program

**4.** Center Street Area Framework and Policy Plan

**6. Board/Staff Input**

**7. Adjournment**

**Environmental Policy Board (EPB)** **4. 1.**

**Meeting Date:** 01/25/2021

**By:** Chris Anderson, Community Development

## Information

**Title:**

Approve Meeting Minutes Dated September 21, 2020

**Action:**

## Attachments

Meeting Minutes Dated September 21, 2020

## Form Review

| Inbox | Reviewed By | Date |
|---|---|---|
| Tim Gladhill | Tim Gladhill | 01/20/2021 09:51 AM |
| Form Started By: Chris Anderson | | Started On: 01/13/2021 01:53 PM |
| Final Approval Date: 01/20/2021 | | |

**ENVIRONMENTAL POLICY BOARD**
**CITY OF RAMSEY**
**ANOKA COUNTY**
**STATE OF MINNESOTA**

On Monday, September 21, 2020, the Environmental Policy Board (EPB) met in the Council Chambers at the Ramsey Municipal Center, 7550 Sunwood Drive N.W., Ramsey, Minnesota.

| | |
|---|---|
| Members Present: | Chairperson Michael Valentine<br>Board Member Reid Bernard<br>Board Member Melissa Fetterley<br>Board Member Michael Hiatt<br>Board Member Jared Little<br>Board Member Laura Moore |
| Members Absent: | Board Member Jane Covart |
| Also Present: | City Planner Chris Anderson<br>City Councilmember Jeff Menth |

## 1. CALL TO ORDER

Chairperson Valentine called the meeting to order at 6:30 p.m.

## 2. CITIZEN INPUT

None.

## 3. APPROVE AGENDA

Motion by Board Member Fetterley and seconded by Board Member Hiatt to approve the agenda as submitted.

A roll call vote was performed:

| | |
|---|---|
| Board Member Moore | aye |
| Board Member Hiatt | aye |
| Board Member Little | aye |
| Board Member Fetterley | aye |
| Board Member Bernard | aye |
| Chairperson Valentine | aye |

Motion carried.

## 4. APPROVE MINUTES

### 4.01: Approve Meeting Minutes Dated August 17, 2020

Motion by Board Member Little and seconded by Board Member Fetterley to approve the regular meeting minutes dated August 17, 2020.

A roll call vote was performed:

| | |
|---|---|
| Board Member Bernard | aye |
| Board Member Fetterley | aye |
| Board Member Little | aye |
| Board Member Hiatt | aye |
| Board Member Moore | aye |
| Chairperson Valentine | aye |

Motion carried.

## 5. POLICY BOARD BUSINESS

### 5.01: Consider Recycling Programming for 2021

City Planner Anderson presented the staff report. He stated that each year the City receives SCORE funding for the recycling program through Anoka County. Ramsey's allotted base funding for 2021 is $57,990 but there is also an opportunity to request additional funding for various uses. The other categories include Drop-Off programming, General Enhancement, and Organics. The purpose of this case is to provide the EPB an opportunity to discuss and/or identify new programming opportunities and potential enhancements to the City's recycling program. Anoka County has provided more detailed documentation that needs to accommodate the funding request, which is due by September 30, 2020.

Board Member Hiatt stated that there appears to be an evolution in recycling. He asked the last time residents have been surveyed to determine if there are additional things they would like to dispose of.

City Planner Anderson stated that he receives a lot of calls leading up to recycling events to find out what will be accepted. He explained that there are rules in place as to how the funds can be used and they cannot be spent on refuse or garbage. He stated that about 10 years ago the City worked with ACCAP and accepted good, usable furniture in order to provide that to people in need within the community. He explained that was a form of reuse, but those opportunities have disappeared. He noted that there could be frustration from residents if they suggest certain materials that cannot be collected using these funds.

Board Member Moore stated that the goal is to have 75 percent recycling by 2030 for the State and that rate is currently near 50 percent. She asked the current percentage rate of Ramsey.

City Planner Anderson stated that he could review the information and provide the tonnage recycled but does not have the percentage rate as he does not have the information from each of the garbage haulers. He stated that he could provide the Board with the tonnage that was recycled.

Board Member Moore acknowledged that it is difficult to increase participation in the organics program. She believed that a curbside option for organics recycling would increase participation.

City Planner Anderson stated that the organics participation has increased. He stated that there are consistent waves of people signing up for the organics program but noted that there are still less than 200 people participating in the program. He stated that those participating in the program do an excellent job. He did not think the numbers would support a community wide curbside service as of yet.

Board Member Fetterley asked if staff is looking for input from the Board as to whether the City should continue to participate or additional ideas for continued participation.

City Planner Anderson replied that the City will continue to utilize the SCORE funds that it is able to access through the County. He noted that the purpose of the case tonight was to determine whether the Board has additional ideas of things to implement in 2021.

Board Member Fetterley stated that she likes the idea of using coupons as that could incentivize people to bring materials that perhaps they otherwise would not bring. She stated that perhaps coupons could be targeted for specific materials in the spring.

Board Member Little stated that he also likes the idea of coupons. He noted that some of his neighbors would be interested in disposing of certain items but are hesitant because of the cost. He commented that he is impressed with the work and attention Ramsey places on recycling.

Chairperson Valentine stated that there is pressure from the State and through the County to get people involved and reach the targets set for recycling. He stated that he would encourage staff to continue to obtain SCORE funds and be aggressive in its attempt to gain additional funds if possible.

City Planner Anderson explained that the SCORE funding does not require a City contribution to the program. He stated that the City still has to submit a request to the County to receive the funds but is not required to contribution additional funds to the program. He stated that to date the City has only used the SCORE funding to run its recycling program.

**5.02: Update on Water Efficiency Grant Program**

City Planner Anderson presented the staff report. He stated that as the Environmental Policy Board knows, the City was awarded $28,000 from the Metropolitan Council to implement a water efficiency grant program between January of 2020 and June 30, 2022. The City rolled out the grant program in May of 2020. To date, 29 households have participated in the program, with the majority of the upgrades focusing on smart irrigation controllers. There is still approximately $23,000 available for reimbursement through June of 2022.

Councilmember Menth stated that as people are aware there is manganese in the water in certain wells and therefore staff is looking into water treatment options. He stated that he went with staff to tour the Andover water treatment plant and it was fascinating. He stated that in Andover the treatment plant goes through 8,000,000 gallons per day compared to the winter, where 2,000,000 gallons per day goes through the water treatment plant. He stated that most of that difference is from irrigation and therefore the irrigation controllers are a great idea.

City Planner Anderson stated that Ramsey water usage is not quite as high as Andover's but agreed that the water usage almost triples in the summer compared to the winter months. He commented that it is amazing how much water is attributed to irrigation. He stated that even though the water is coming out of the ground to go back into the ground, it takes much longer for that water to go back into the aquifer.

Board Member Little asked if there is a more efficient water sprinkler that connects to hoses. He noted that most of his neighbors water with a sprinkler directly attached to a hose.

City Planner Anderson confirmed that there are likely more efficient above ground sprinklers that attach to hoses. He stated that while that could be promoted, it would not be eligible for reimbursement through this current grant.

Board Member Fetterley stated that if the funds are all spent during the course of the program, perhaps the City look into implementing its own system in the future.

City Planner Anderson agreed that if all the funds are used, he would see that as an opportunity for the City to look at a broader City program.

Board Member Hiatt asked the percentage of residents that use well water compared to City water.

City Planner Anderson replied that about 60 percent of residents use urban services and 40 percent on septic/well. He confirmed that about 40 percent of the community are not able to take advantage of this water savings program.

Board Member Hiatt commented that there are a lot of well and septic systems in Anoka County and asked if there would be an opportunity for legislators to develop incentive programs for those well and septic users.

Chairperson Valentine commented that would involve complicated dynamics.

Board Member Moore asked if the homes built near Pearson Park are on septic/well or City services.

City Planner Anderson stated that the Riverstone development is connected to City services. He stated that new construction projects are not eligible to participate in the program. He commented that most irrigation systems installed now already contain water savings equipment.

## 6. BOARD / STAFF INPUT

- **Fall Recycling Event**

City Planner Anderson reported that the Fall Recycling Event will be held Saturday, September 26th at the Public Works Campus from 8:00 a.m. to Noon.

## 7. ADJOURNMENT

Motion by Board Member Little and seconded by Board Member Fetterley to adjourn the meeting.

A roll call vote was performed:

| | |
|---|---|
| Board Member Moore | aye |
| Board Member Hiatt | aye |
| Board Member Bernard | aye |
| Chairperson Valentin | aye |
| Board Member Fetterley | aye |
| Board Member Little | aye |

Motion carried.

The meeting adjourned at 7:19 p.m.

Respectfully submitted,

_____
Chris Anderson
City Planner

ATTEST:

_____
JoAnn Shaw
Community Development Secretary

Drafted by Amanda Staple
*TimeSaver Off Site Secretarial, Inc.*

**Environmental Policy Board (EPB)** **5. 1.**

**Meeting Date:** 01/25/2021

**By:** Tim Gladhill, Community Development

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**Information**

**Title:**

Consider Natural Resource Recommendations Related to Riverstone South; Case of Capstone Homes/Riverstone Development

**Purpose/Background:**

The purpose of this case is to consider natural resources elements related to the proposed Riverstone South neighborhood. The City has been working with the Developer, Capstone Homes, over the past year on a long-range planning exercise to come to a consensus on a concept plan for this site. This Preliminary Plat Submittal represents conformance to the planning framework approved by the Planning Commission and City Council as well as the Sketch Plan recently submitted and reviewed by the Planning Commission.

**Notification:**

Notification is not required.

**Observations/Alternatives:**

This step is the result of a 12 month planning and collaboration process between the City, Developer, Property Owner and adjacent neighborhood. The Preliminary Plat has been prepared consistent with previous City direction. This case has been prepared at a summary level. Materials from the City Council direction at the Sketch Plan Phase are attached for more detailed background.

Comprehensive Plan

A majority of the site is consistent with the 2040 Comprehensive Plan showing this portion of the site as Low Density Residential. The smaller detached townhome portion will need to be amended to Medium Density Residential.

Zoning Code

The project site is generally located in the R-1 Residential (MUSA) District allowing for detached single-family homes on municipal services. However, lot sizes are smaller than allowed within this district and will need to be amended accordingly to R-1 Residential (MUSA - 65) and R-1 Residential (MUSA - 50). The detached townhomes will need to be amended to be included in the R-2 (Detached Townhome) District.

Environmental Assessment Worksheet (EAW)

The State of Minnesota Environmental Quality Board (EQB) administers mandatory environmental review parameters. For a project of this type, an EAW would not be required if the project is consistent with the City's Comprehensive Plan and less than 250 units. While the project is less than 250 units, it does require a Comprehensive Plan Amendment due to the detached townhomes and therefore meets the criteria for Mandatory EAW. The Riverstone North Neighborhood went through this same process without issue. There are quality ecological resources (significant native tree canopy and proximity to Mississippi River).

The City has some additional discretion in this project.

1. Project Requires Comprehensive Plan Amendment and Zoning Amendment (highest level of discretion the City can have in land use decisions)

2. The Project is requesting that the City contribute dollars to the Riverdale Drive Extension

Previous Steps

- Concept Plan Review
- Planning Framework
- Sketch Plan

Future Steps

- Environmental Assessment Worksheet (EAW)
- Final Plat
- Riverdale Drive Extension Approval

Alternatives

1. Recommend that the City Council approve the project as presented
2. Request amendments to the project
3. Postpone action requesting additional information
4. Recommend that the City Council deny the project

**Funding Source:**

All costs associated with reviewing this Application are the responsibility of the Applicant.

Additionally, the City has not yet secured a funding source for the acquisition of the 7 acre Tree Preservation Area. Staff strongly recommends against using Park Dedication Dollars for this purpose, as it will not leave sufficient funding to develop the 1 acre park also included within the proposed subdivision. The Preliminary Plat is also not valid until this funding source is solved.

**Recommendation:**

Staff recommends approval of the project with the following contingencies:

- Address any comments contained within the Official EAW Review Record when available
- Securing $350,000 for the acquisition of the Tree Preservation Area

While individual trees may not be of the highest quality, the quality of this area is the continuous canopy, a size of which is rarely still found in Ramsey.

**Action:**

Motion to recommend that the City Council approve this project.

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**Attachments**

Site Location Map

Approved Planning Framework

Density Exhibit

Sketch Plan

NRI Map

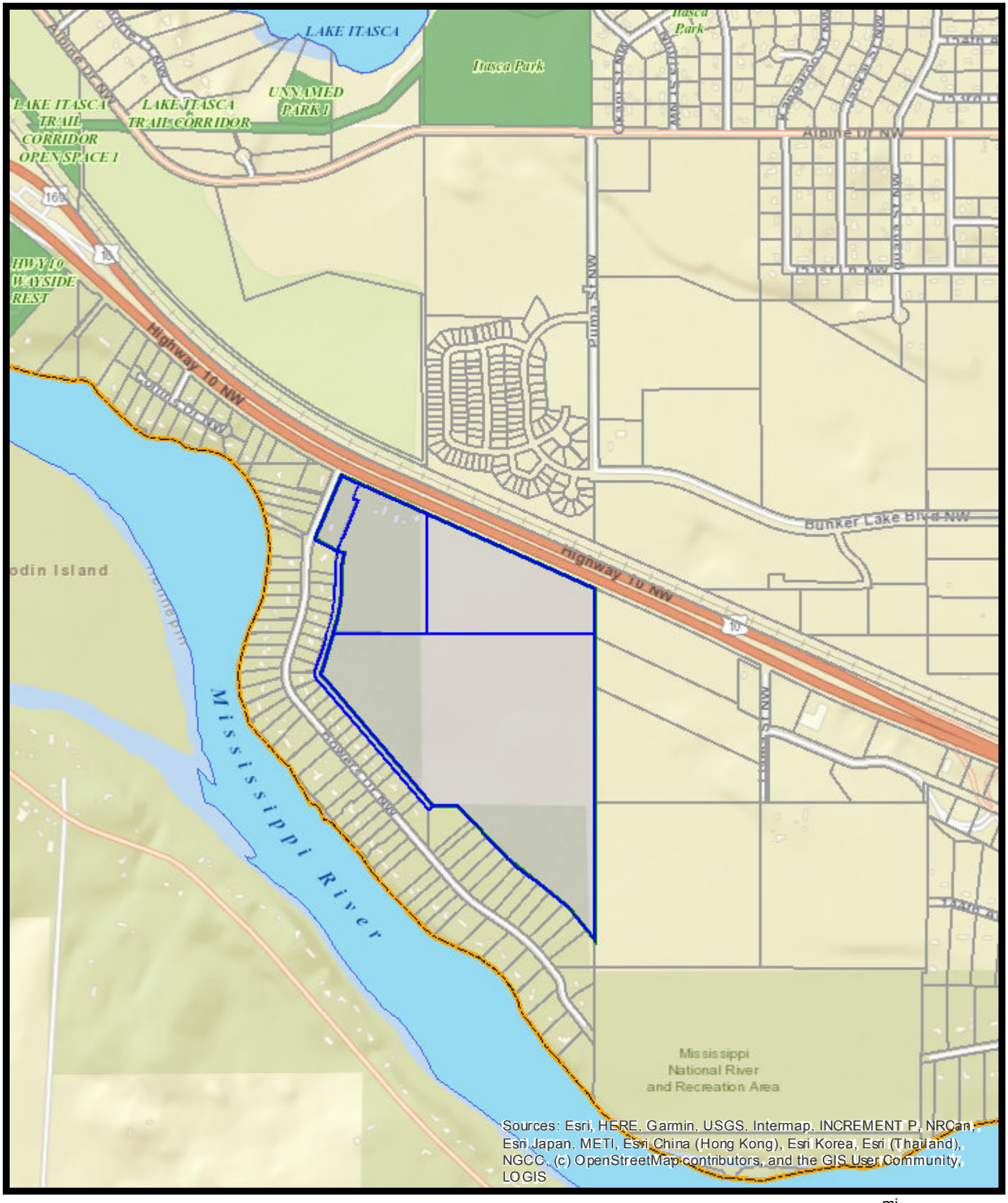
EAW

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**Form Review**

| Inbox | Reviewed By | Date |
|---|---|---|
| Tim Gladhill (Originator) | JoAnn Shaw | 01/20/2021 10:18 AM |
| Form Started By: Tim Gladhill | | Started On: 01/11/2021 02:34 PM |
| Final Approval Date: 01/20/2021 | | |

Site Location Map



# HIGHWAY 10 SOUTH SMALL AREA PLAN
# RIVERSTONE SOUTH PLANNING FRAMEWORK

PREVIOUS REVIEW
Sketch Plan Review

June, 2020

# Document Purpose

The purpose of this document is to outline high-level land use planning policy for a portion of the Highway 10 South Small Area Plan currently known as Riverstone South by Capstone Homes. This a visionary document to help guide policy discussions. This is not the official land use plan for the area nor carries any legal entitlements. This document would be implemented through amendments to the City's Comprehensive Plan and Zoning Code.

PREVIOUS REVIEW
Sketch Plan Review







City of RAMSEY

# Previous Review

| | |
|---|---|
| February 11, 2020 | Joint Meeting<br>City Council and Planning Commission<br>Broad Overview and Riverdale Drive Funding |
| February 18, 2020 | Public Works Committee<br>Riverdale Drive Funding |
| March 24, 2020 | City Council<br>Riverdale Drive Funding |
| April 7, 2020 | Small Group Neighborhood Meeting<br>Southern Public Safety Connection to Bowers Drive |
| April 14, 2020 | Public Webinar<br>Broad Overview and Land Use Planning |
| April 26, 2020 | Small Group Neighborhood Meeting<br>Riverdale Drive Connection to Highway 10 Options |

PREVIOUS REVIEW
Sketch Plan Review

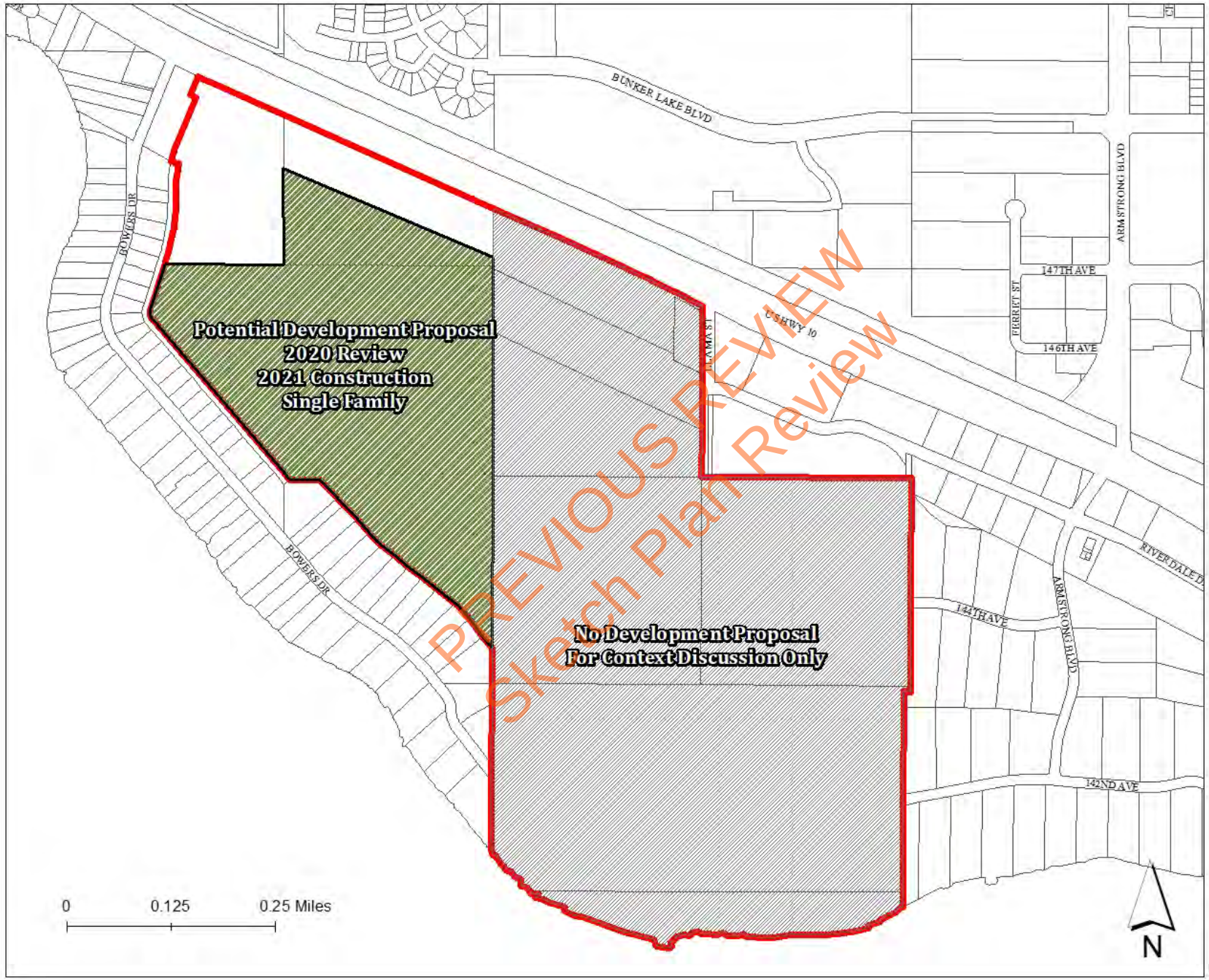
City of RAMSEY

# Review of This Document

| | | |
|---|---|---|
| Planning Commission | Thursday, June 4, 2020 | 7:00 p.m. |
| Park and Recreation Commission | Thursday, June 11, 2020 | 6:30 p.m. |
| Environmental Policy Board | Monday, June 15, 2020 | 6:30 p.m. |
| City Council | Tuesday, June 23, 2020 | 7:00 p.m. |

PREVIOUS REVIEW
Sketch Plan Review

City of RAMSEY




City of RAMSEY

# Highway 10 South Planning Area

No Development Proposal

Potential Development

Planning Area

Map Prepared by the City of Ramsey
Data Source: Anoka County, City of Ramsey
April 16, 2020
Lampert Conformal Conic Projection
Project Folder

# Existing Conditions

- Riverdale Drive/Highway 10/169
- Connexus Solar Farm (17 acres)
- Significant Ecological Resources
  - Tree Cover
  - Mississippi River Corridor Critical Area
- Adjacent Land Uses
  - Adjacent to Residential to west (Bowers Drive)
  - Adjacent to Agricultural/Future Residential to east (Riverside Farms)

PREVIOUS REVIEW
Sketch Plan Review

City of RAMSEY



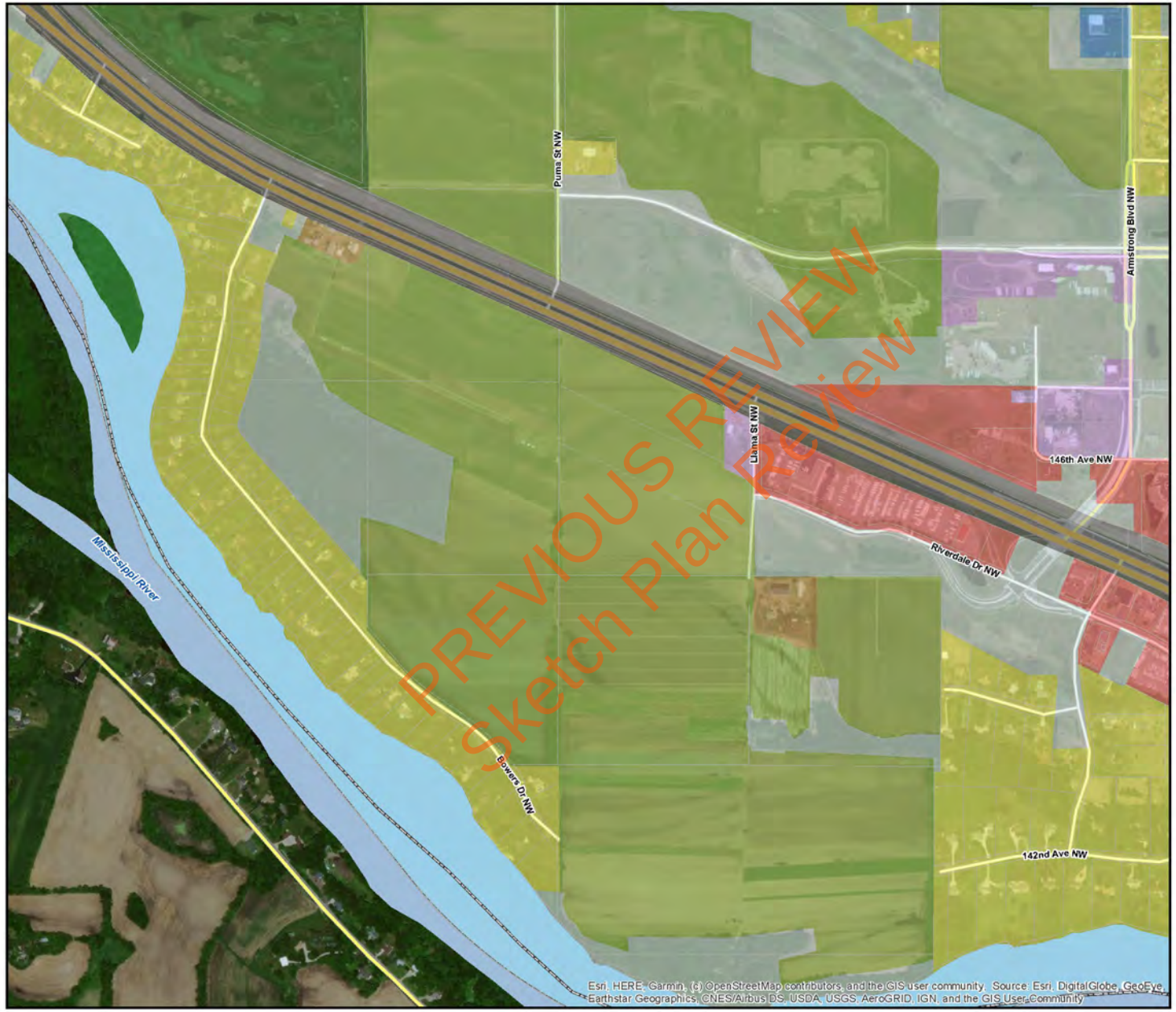

City of RAMSEY

# Tree Preservation

Mississippi River Critical Area

Potential Development

Map Prepared by the City of Ramsey
Data Source: Anoka County, City of Ramsey
April 16, 2020
Lampert Conformal Conic Projection
Project Folder




City of RAMSEY

# Ramsey Comprehensive Plan
## Existing Land Use
## Ramsey, MN

**Legend**

- Municipal Boundary
- Farmstead
- Single Family Detached
- Manufactured Housing Parks
- Single Family Attached
- Multifamily
- Retail and Other Commercial
- Office
- Mixed Use Residential
- Mixed Use Industrial
- Industrial and Utility
- Extractive
- Institutitional
- Park, Recreational, or Preserve
- Golf Course
- Major Highway
- Railway
- Airport
- Agricultural
- Open Water
- Undeveloped

N

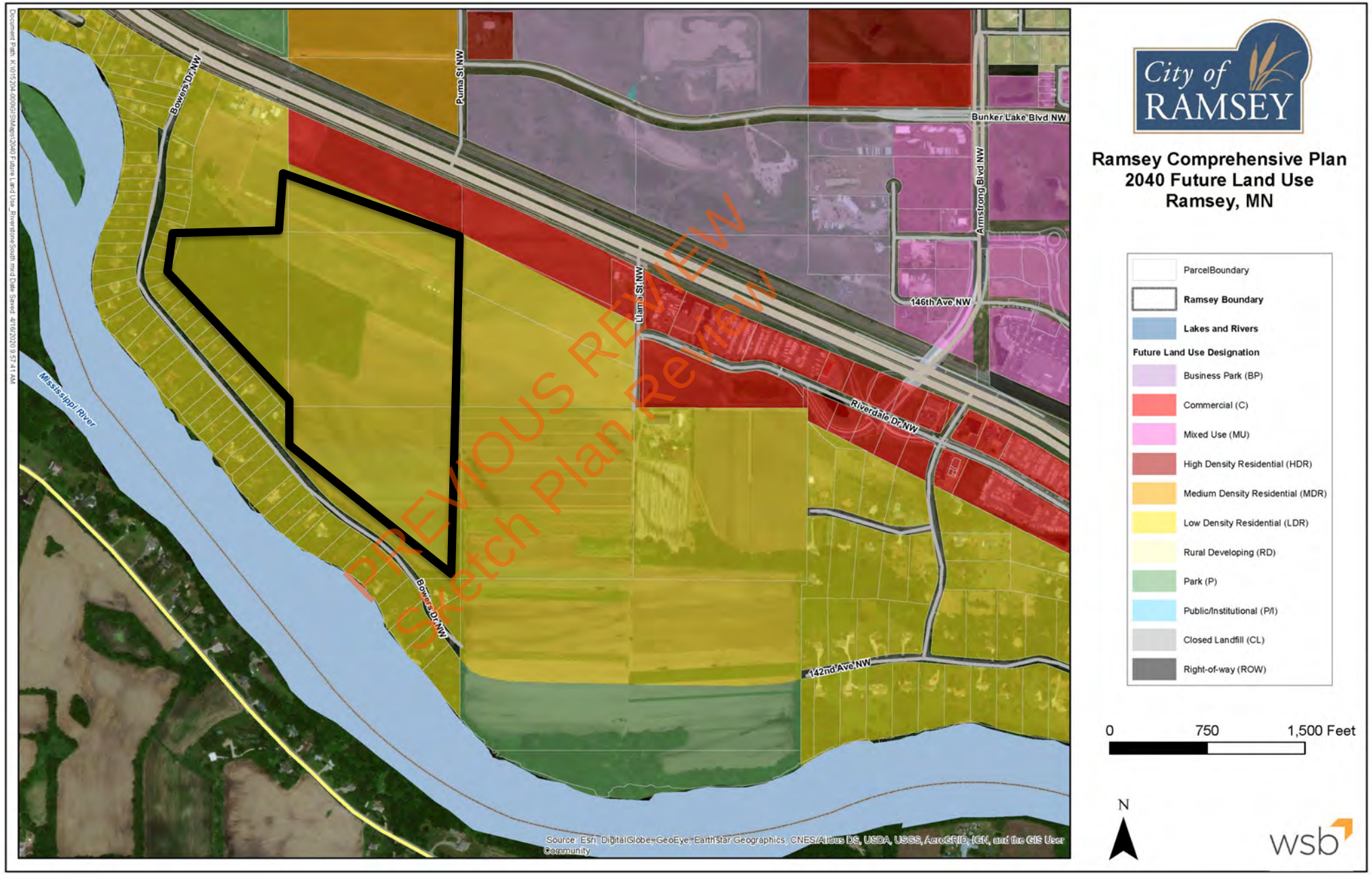
wsb

0 1,125 2,250 Feet

# Future Conditions

- Future Commercial/Industrial
  - North side of project
  - Between Highway 10 and future Riverdale Drive Extension
- Public Safety Connection to Bowers Drive
- Tree Preservation Plan
- Density Transition
  - Adjacent to Residential
  - Adjacent to Commercial/Industrial/Highway 10/169

PREVIOUS REVIEW
Sketch Plan Review


Document Path: K:\015204.000\GIS\Maps\2040 Future Land Use_RiverstoneSouth.mxd Date Saved: 4/16/2020 9:57:41 AM
Bowers Dr NW
Puma St NW
Bunker Lake Blvd NW
Armstrong Blvd NW
Llama St NW
146th Ave NW
Riverdale Dr NW
Mississippi River
Bowers Dr NW
142nd Ave NW
PREVIOUS REVIEW
Sketch Plan Review
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
City of RAMSEY
Ramsey Comprehensive Plan
2040 Future Land Use
Ramsey, MN
ParcelBoundary
Ramsey Boundary
Lakes and Rivers
Future Land Use Designation
Business Park (BP)
Commercial (C)
Mixed Use (MU)
High Density Residential (HDR)
Medium Density Residential (MDR)
Low Density Residential (LDR)
Rural Developing (RD)
Park (P)
Public/Institutional (P/I)
Closed Landfill (CL)
Right-of-way (ROW)
0
750
1,500 Feet
N
wsb




City of RAMSEY

## Built Environment

Potential Development

Map Prepared by the City of Ramsey
Data Source: Anoka County, City of Ramsey
April 16, 2020
Lampert Conformal Conic Projection
Project Folder

# Future Land Use/ Development Options

PREVIOUS REVIEW
Sketch Plan Review

# Connection to Bowers Drive (Public Safety)

Council Direction = No Connection



# Connection to Bowers Drive (Public Safety)

Council Direction = No Connection

- Alternative #1
  - Full Public Street (28 foot width OK)
- Alternative #2
  - Heavy Duty 'Driveway'
  - Surmountable Curb on Riverstone South Side – Local Road
    - Access itself does not need curb
  - Signage – Public Safety Access
  - 20 Foot Width
  - Landscaping
- Need turning templates

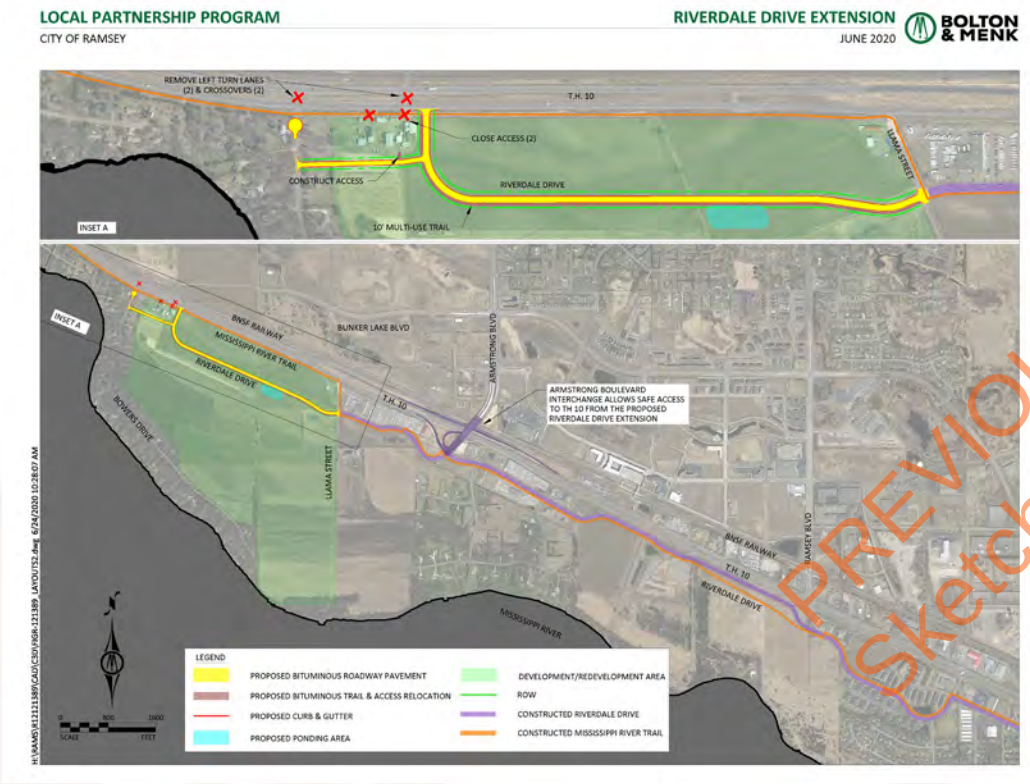
PREVIOUS REVIEW
Sketch Plan Review

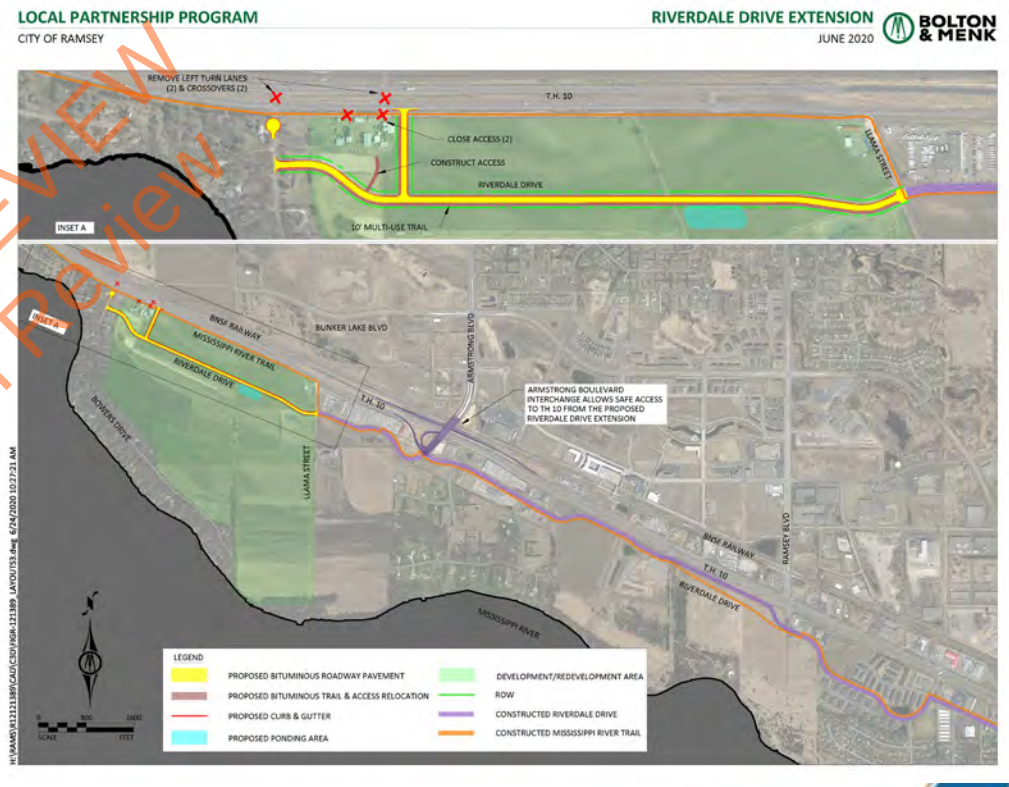
# Riverdale Drive Alternative #1 Developer/Owner Preference




City of RAMSEY

# Riverdale Drive Alternative #2
# Request by Neighboring Property




PREVIOUS REVIEW
Sketch Plan Review

City of RAMSEY

# Potential Land Use/Future Development Compromise

- Enhance Density Transitioning
  - More than currently required by City Code
- Enhance Tree Preservation
  - More than currently required by City Code
- Transects/Zones
  - Larger lots adjacent to Bowers Drive
  - Medium-sized lots in middle zone
  - Smaller lots to the northeast
    - Intersection of Commercial/Industrial and Solar Farm
- Conservation Subdivision Design
- Similar to Riverstone Neighborhood
  - North of Highway 10

PREVIOUS REVIEW
Sketch Plan Review

City of RAMSEY




City of RAMSEY

# Density Transitioning & Tree Preservation

Potential Development

Map Prepared by the City of Ramsey
Data Source: Anoka County, City of Ramsey
April 16, 2020
Lampert Conformal Conic Projection
Project Folder

# Enhanced Tree Preservation Plan




PREVIOUS REVIEW
Sketch Plan Review

- Alternative #1
  - 1 Acre Nature Based Park
    - Preservation of existing trees
  - Additional 25 foot buffer adjacent to existing 50 foot buffer
    - 75 foot buffer total
    - NOTE: Parcel C retained by Pearson Properties and not part of development area
- Alternative #2
  - Preserve 10% of Project Site
  - Combo of Park Dedication and Other Open Space Preservation Funding

Previous concept underlay for context only. Actual concept will look different.

# Open Space Preservation Funding Options

- Park Dedication Credit
- Trust for Public Land
- Anoka Conservation District
- Minnesota Department of Natural Resources
- Great River Greening

PREVIOUS REVIEW
Sketch Plan Review

# Implementation Plan

PREVIOUS REVIEW
Sketch Plan Review

# Implementation Plan

1. Allow mix of lot sizes in exchange for the following:
   - Enhanced tree preservation above and beyond minimum code requirements
2. Require a second connection to Bowers Drive in existing City-Owned Corridor
   1. Final design as full public roadway or reduced design for public safety to be evaluated with next steps
3. Require Riverdale Drive Extension
   1. Explore 2 options for connection to Highway 10/169







PREVIOUS REVIEW
Sketch Plan Review

City of RAMSEY

# Resolution #20-065: Riverdale Drive Funding

- 1/3 Cost Share of Pearson Frontage
- 1/3 Cost Share of Anoka County Frontage Funding Gap

| | Pearson Frontage | Anoka County Frontage | Total |
|---|---|---|---|
| City/Public* | $388,000 | $39,250 | $427,250 |
| Capstone | $339,125 | $39,250 | $378,375 |
| Pearson | $339,125 | $39,250 | $378,375 |
| **Total** | **$1,066,250** | **$117,750** | **$1,184,000** |

*Includes both City Contribution and MnDOT Grant

PREVIOUS REVIEW
Sketch Plan Review

City of RAMSEY

## 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

S00°08'36"W 1705.32

S00°17'33"W 1093.62

U.S. HIGHWAY NO. 10 & 169

COMMERCIAL DEVELOPMENT 21.96 AC

S66°01'43"E 1951.85

40' DETACHED TOWNHOMES

RESIDENTIAL DEV. 78.63 AC

65' SINGLE FAMILY

55' SINGLE FAMILY

PUBLIC PARK 1.0 AC.

PROPOSED INFILTRATION

PROPOSED POND

PROPOSED POND

STREET A

STREET B

STREET C

STREET D

STREET E

STREET F

PEARSON BLVD

RIVERDALE DRIVE

10' TRAIL

TRAIL/VEHICLE ACCESS

N51°55'40"W 620.99

S42°51'14"E 58.89

N89°47'35"W 193.74

334.66 S37°59'16"W

BOWERS DRIVE NW

MISSISSIPPI RIVER

AREA RETAINED BY LANDOWNER 9.70 AC

TREE PRESERVATION AREA 7.0 AC

EXISTING 50' TREE BUFFER

N40°39'19"W 1349.11

N17°54'18"E 322.61

S00°14'18"W 76.30

Δ=17°40'00" R=128.25 395.06

Δ=12°58'27" R=705.37 159.73

N69°29'50"W 205.79

N76°47'15"W 50.00

N22°30'16"E 451.73

Δ=06°31'20" R=955.37 100.41

Δ=03°27'10" R=450.00 270.04

Δ=58°33'37" R=60.36 61.69

0 60 120 240

( SCALE IN FEET )

## SITE DATA

| | |
|---|---|
| TOTAL AREA | ±110.29 AC. |
| RESIDENTIAL DEVELOPMENT AREA | 78.63 |
| PUBLIC PARK AREA | 1.0 |
| TREE PRESERVATION AREA | 7.0 |
| COMMERCIAL DEVELOPMENT AREA | 22.98 |
| AREA RETAINED BY LANDOWNER | 8.68 |

RESIDENTIAL DEVELOPMENT DATA

| | |
|---|---|
| TOTAL NUMBER OF LOTS | 242 |
| GROSS DENSITY | 3.1 U/AC |
| DETACHED TOWNHOMES | 77 |
| 55' SINGLE FAMILY | 115 |
| 65' SINGLE FAMILY | 50 |

| | |
|---|---|
| DETACHED TOWNHOME LOTS | 77 |
| DETACHED TOWNHOME GROSS AREA | 15.05 AC. |
| (MINUS 30' OUTLOTS) | 0.57 AC. |
| NET AREA | 14.48 AC. |
| NET DENSITY | 5.32 UNITS/AC. |

| | |
|---|---|
| 55' SINGLE FAMILY LOTS | 115 |
| 55' SINGLE FAMILY GROSS AREA | 32.96 AC. |
| (MINUS 30' OUTLOTS & PARK) | 1.48 AC. |
| NET AREA | 31.48 AC. |
| NET DENSITY | 3.65 UNITS/AC. |

| | |
|---|---|
| 65' SINGLE FAMILY LOTS | 50 |
| 65' SINGLE FAMILY GROSS AREA | 14.42 AC. |
| NET DENSITY | 3.47 UNITS/AC. |

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#
ISSUE DATE: 08/05/2020
Revisions:

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

**RIVERSTONE SOUTH**
Ramsey, Minnesota

**PRODUCT DENSITY EXHIBIT**

1 of 1

[Save Date: 08/05/20] F:\jobs\8481 - 8500\8494 - pearson place 2nd\cad c3d\survey\layouts\8494_layout 4 product areas.dwg

## 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.*

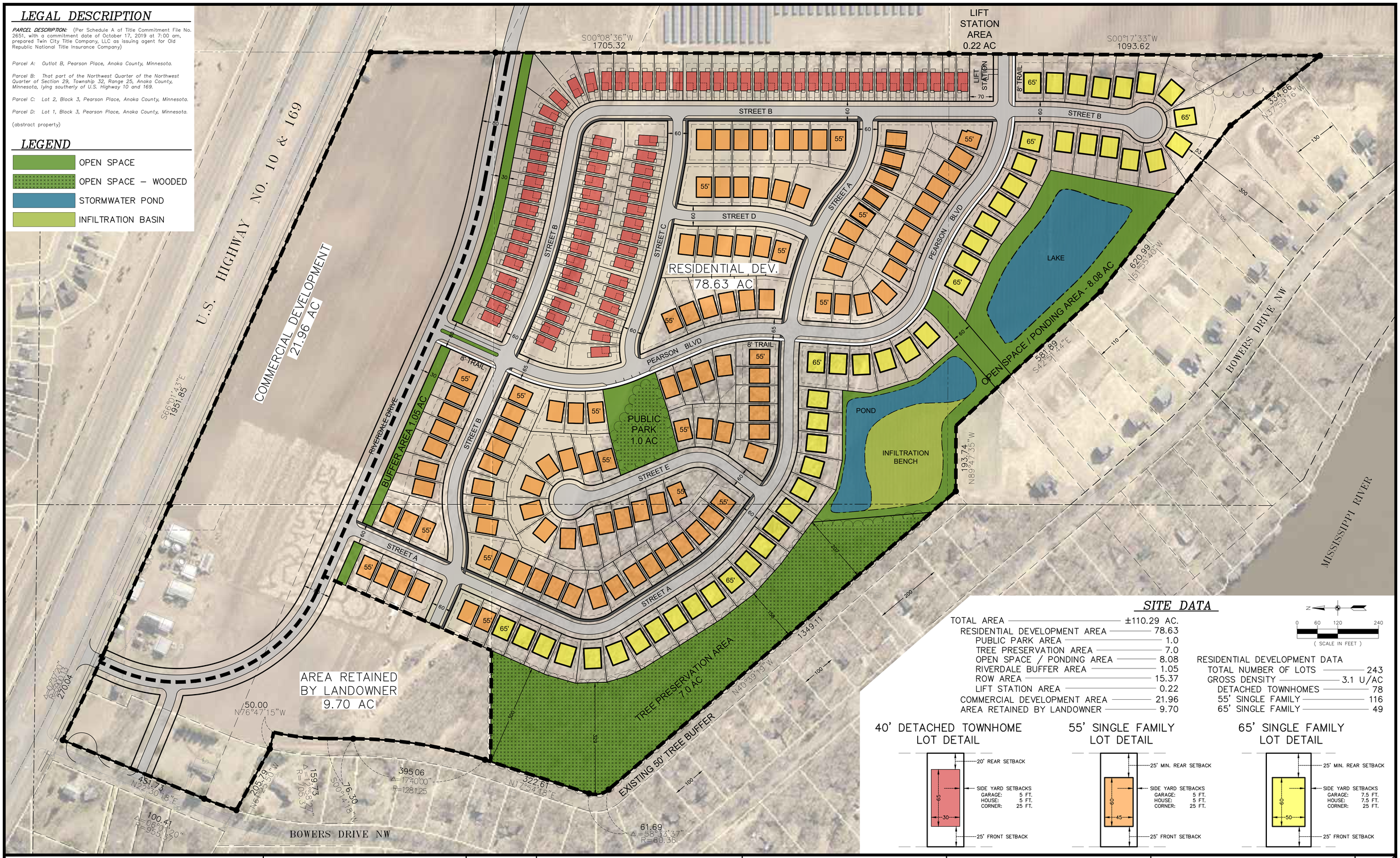
*Parcel C: Lot 2, Block 3, Pearson Place, Anoka County, Minnesota.*

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

(abstract property)

## LEGEND

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




## 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





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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

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**Area 29-3**
Oak forest

| MLCCS Code | Qualitative Rank | Acres |
|---|---|---|
| 32110 | D | |

| Canopy | | Shrub | | Ground | |
|---|---|---|---|---|---|
| *Quercus macrocarpa* | Bur oak | *Ribes nigrum* | Black currant | *Eupatorium rugosum* | White snakeroot |
| *Acer negundo* | Box elder | *Ostrya virginiana* | Ironwood | *Glechoma hederacea* | Creeping Charlie |
| *Celtis occidentalis* | Hackberry | *Acer negundo* | Box elder | *Glechoma hederacea* | Creeping Charlie |
| *Quercus alba* | White oak | *Vitis riparia* | Wild grape | *Leonurus cardiaca* | Common motherwort |
| | | *Lonicera tatarica* | Tartarian honeysuckle | *Bromus inermis* | Smooth brome |
| | | *Zanthoxylum americanum* | Prickly ash | *Hydrophyllum virginianum* | Virginia waterleaf |
| | | *Rhamnus cathartica* | Common buckthorn | | |

**Community:** 29-3
**Community Type:** Oak forest
**Qualitative Rank:** D - Poor condition natural community
**Additional Modifier:**
**Field Check Level:** Visited part of the site
**Restoration Potential:**
**MCBS Site:** **Biodiversly** **Threatened / Endangered**

**Community Description:**
Disturbed oak woodland. Likely grazed in the past. Canopy dominated by oaks with a subcanopy of hackberry and ironwood. Herbaceous layer lacking--a carpet of creeping charlie with motherwort and virginia waterleaf scattered throughout. Subcanopy with 2" shrub like trees (hackberry/ironwood).

# Riverstone South

# Environmental Assessment Worksheet



**Draft  December 8, 2020**

**Responsible Governmental Unit (RGU)**

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

7550 Sunwood Drive NW • Ramsey, MN 55303
City Hall: 763.427.1410 • Fax: 763.427.5543
www.cityoframsey.com

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 |
| Fax: | (763) 712-9060 | Fax: | (763) 433-9848 |
| 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<br>78 detached townhomes<br>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 95$^{th}$ 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.

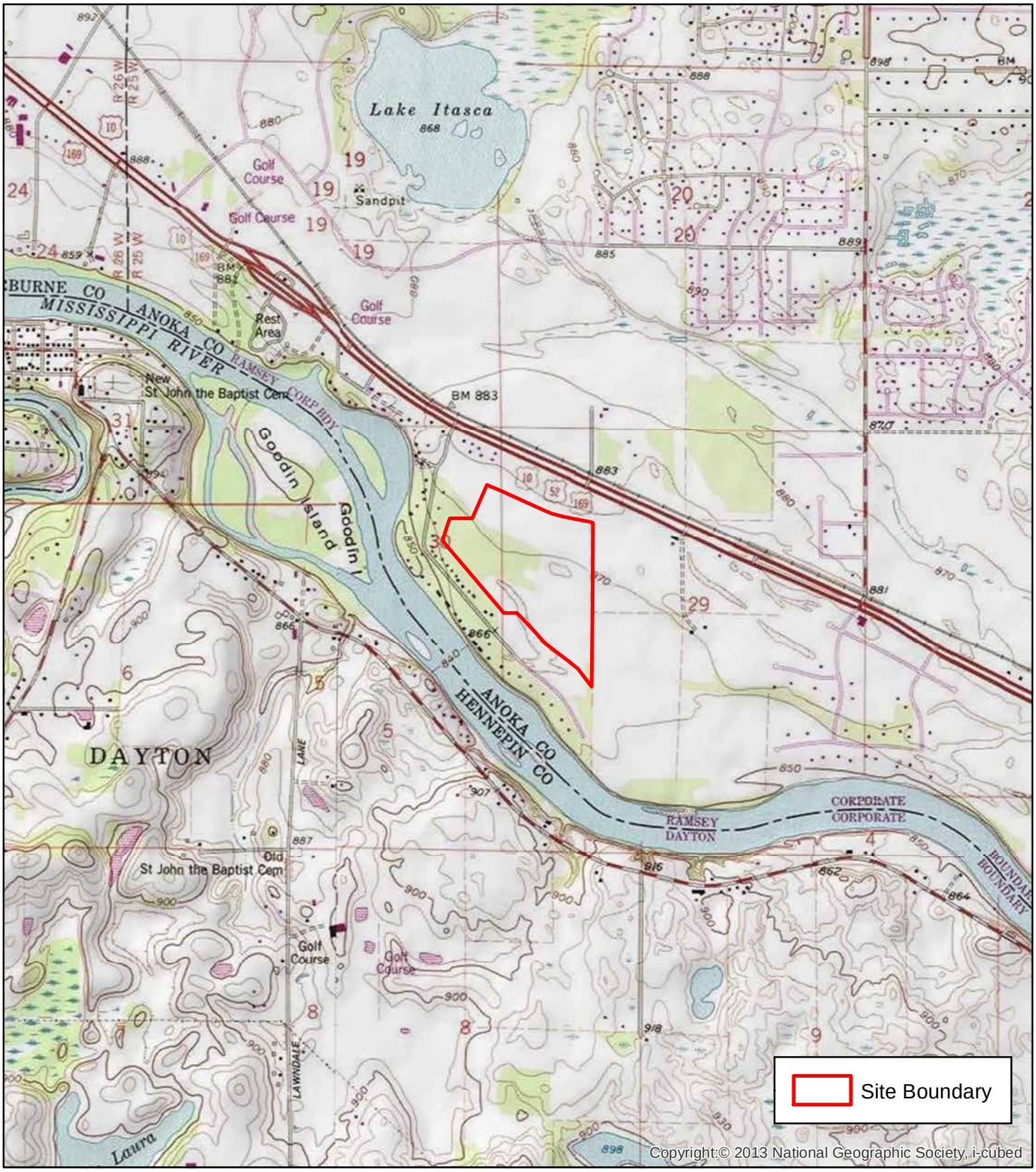



**Figure 2 - USGS Topography**

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.

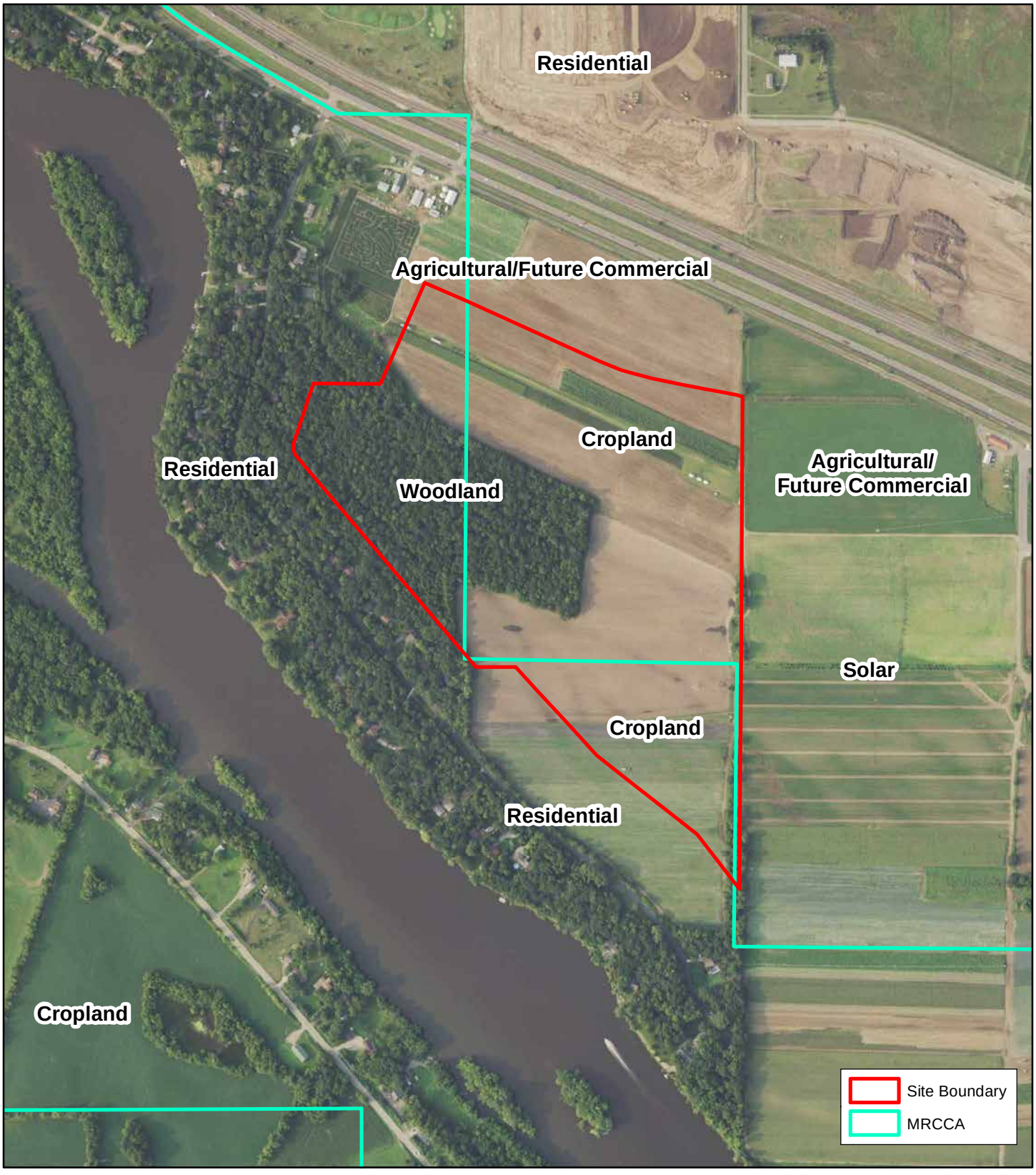



**Figure 4 - Existing Land Use and Mississippi River Critical Corridor Area**

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.

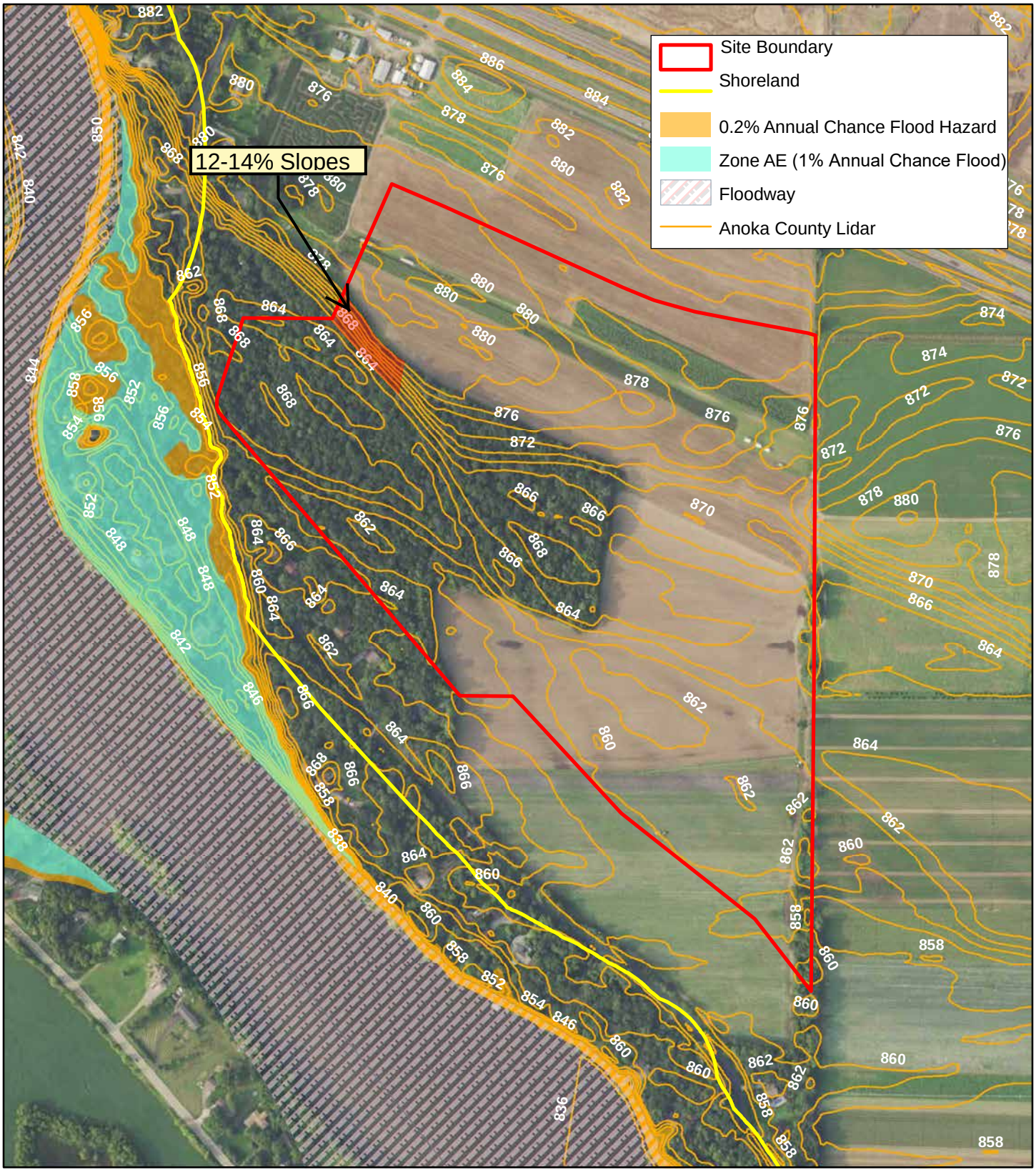



**Figure 5 - Floodplains, Shorelands, and Slopes**

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.

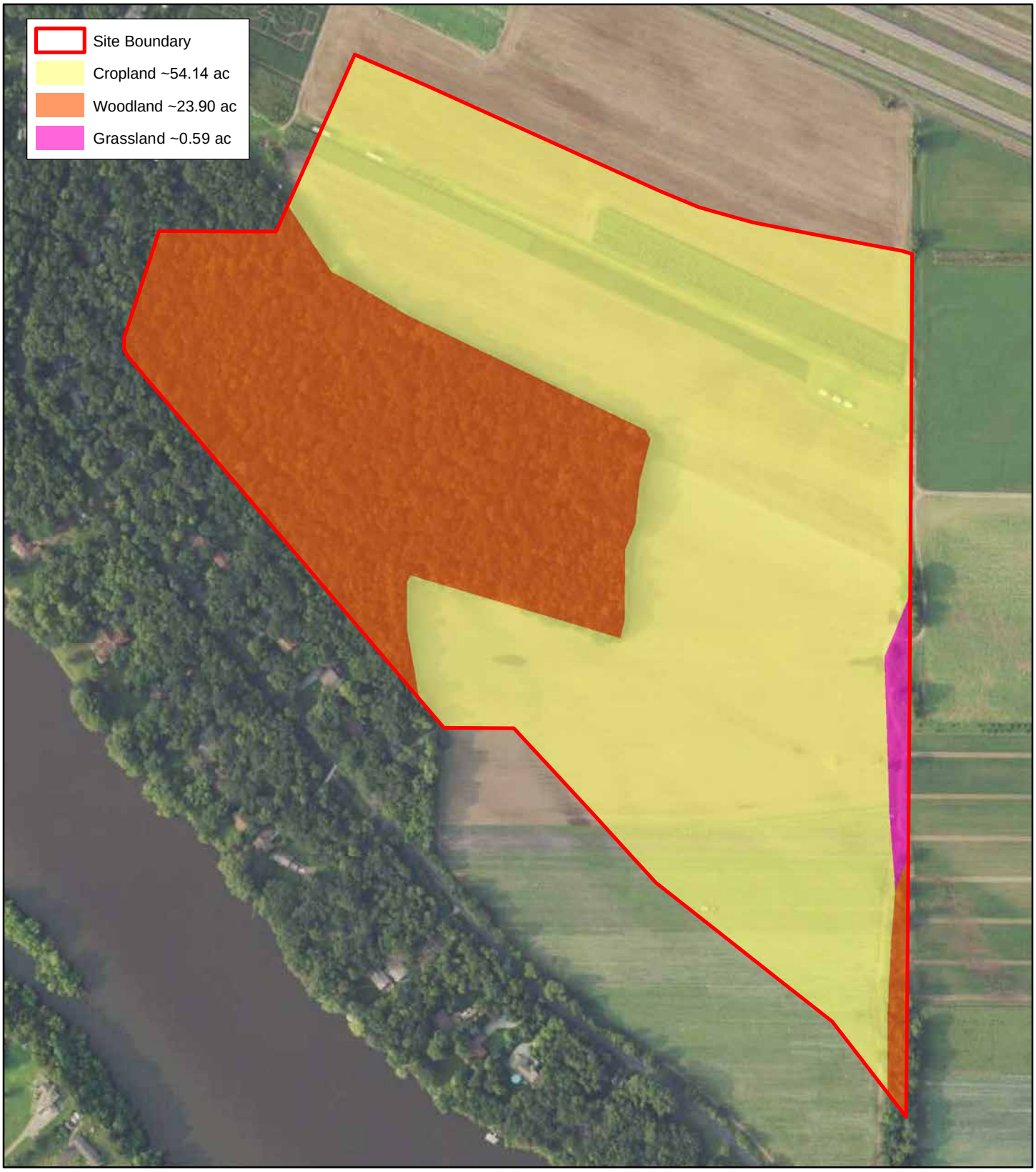



**Figure 6 - Existing Cover Types**

N

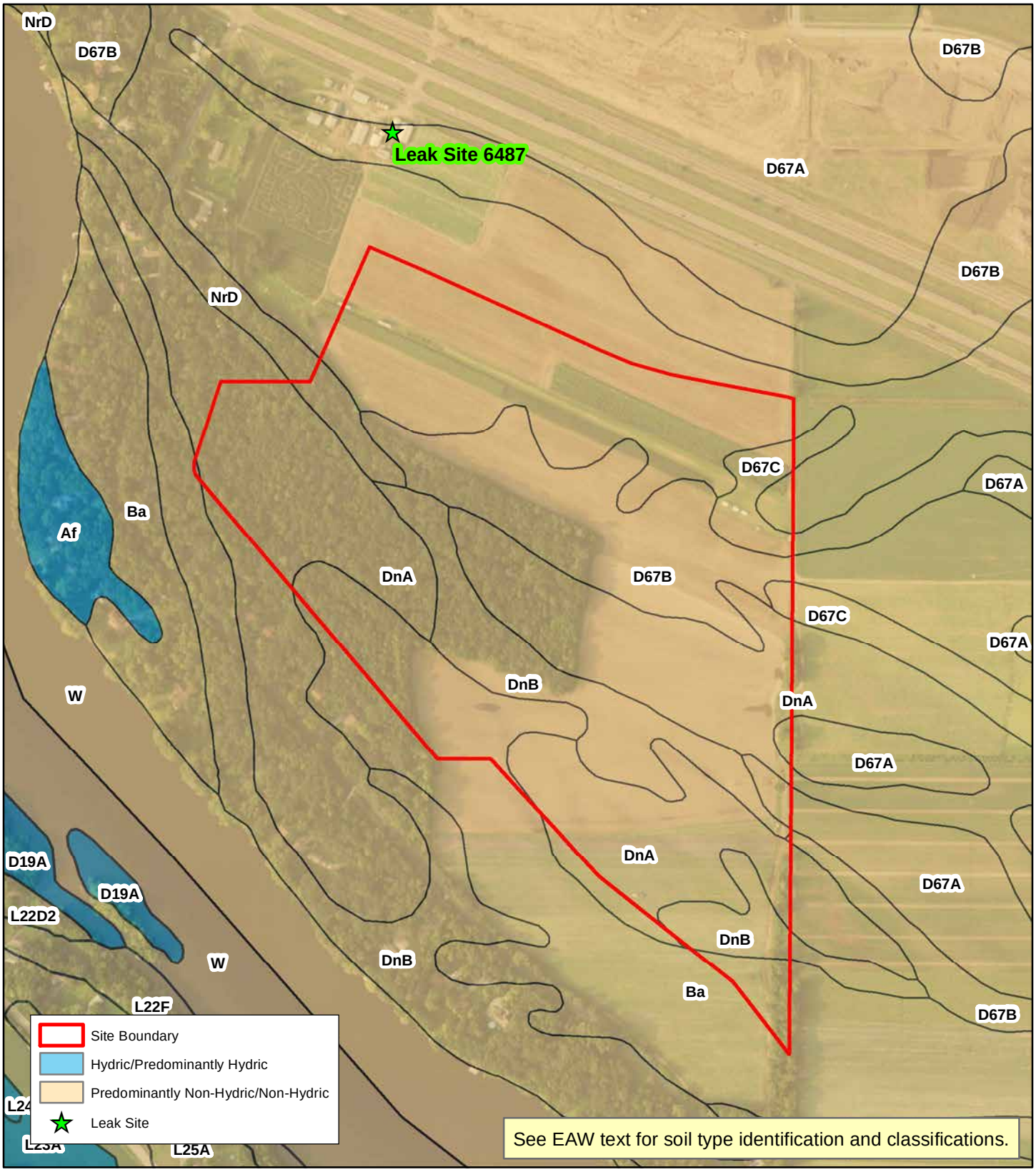
0 380 Feet

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.

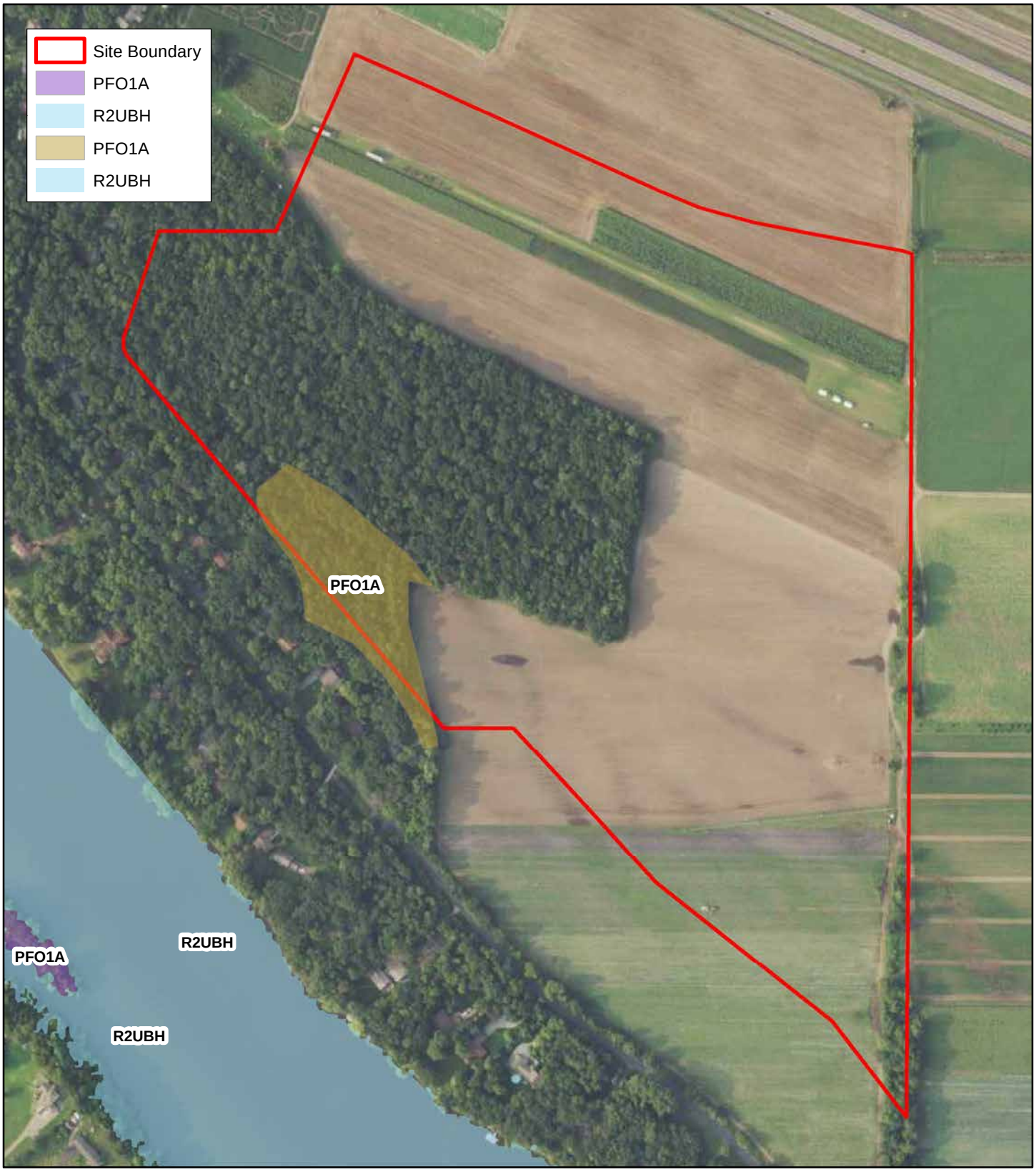



**Figure 8 - National Wetlands Inventory**

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.

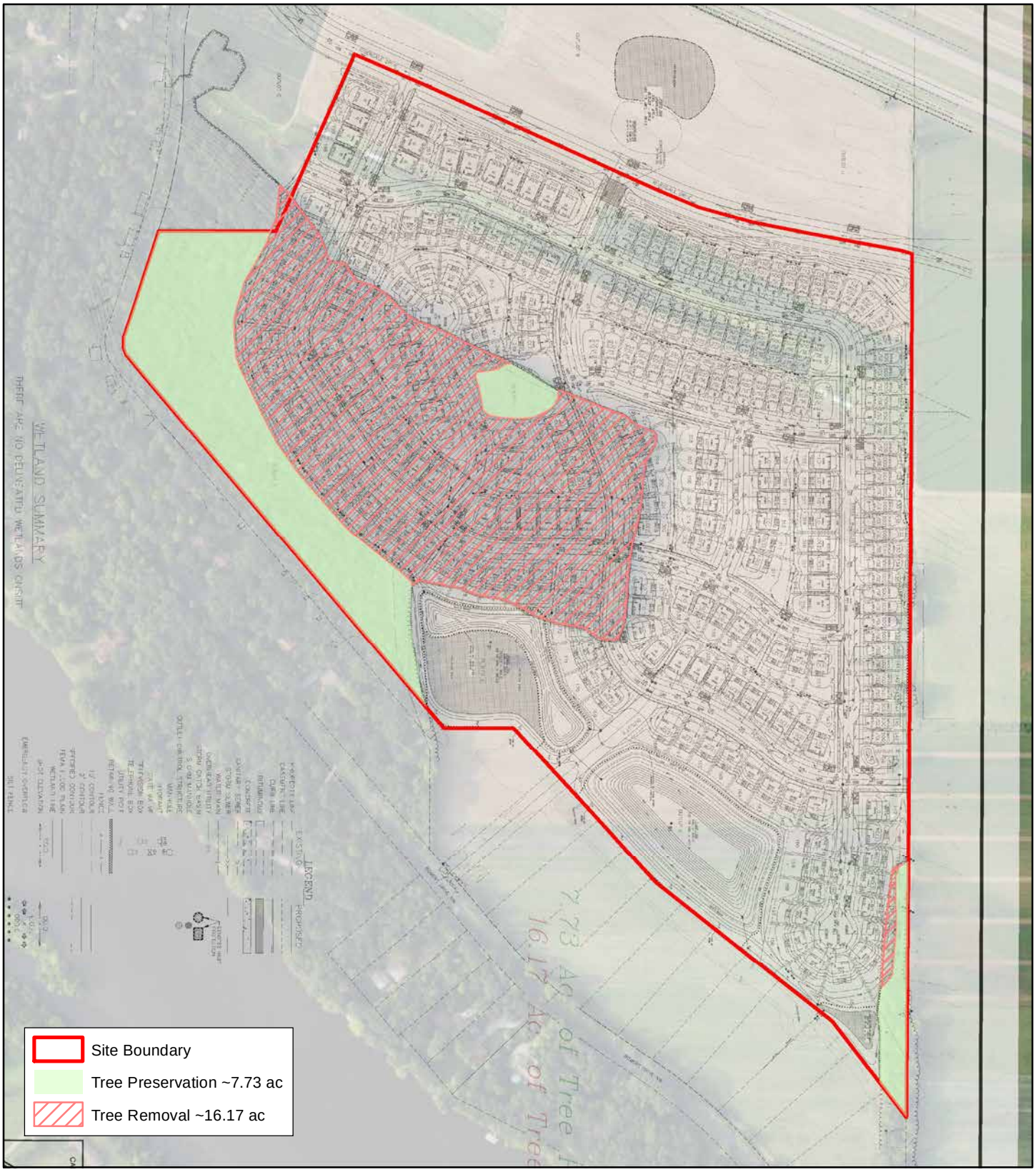



**Figure 9 - Tree Removal and Preservation**

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

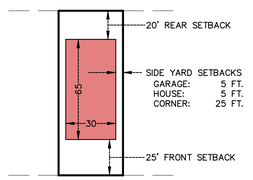
0 60 120 240

( SCALE IN FEET )

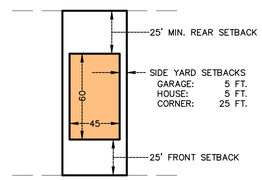
RESIDENTIAL DEVELOPMENT DATA

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

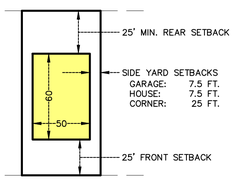
### 40' DETACHED TOWNHOME LOT DETAIL




### 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

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## 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

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#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.

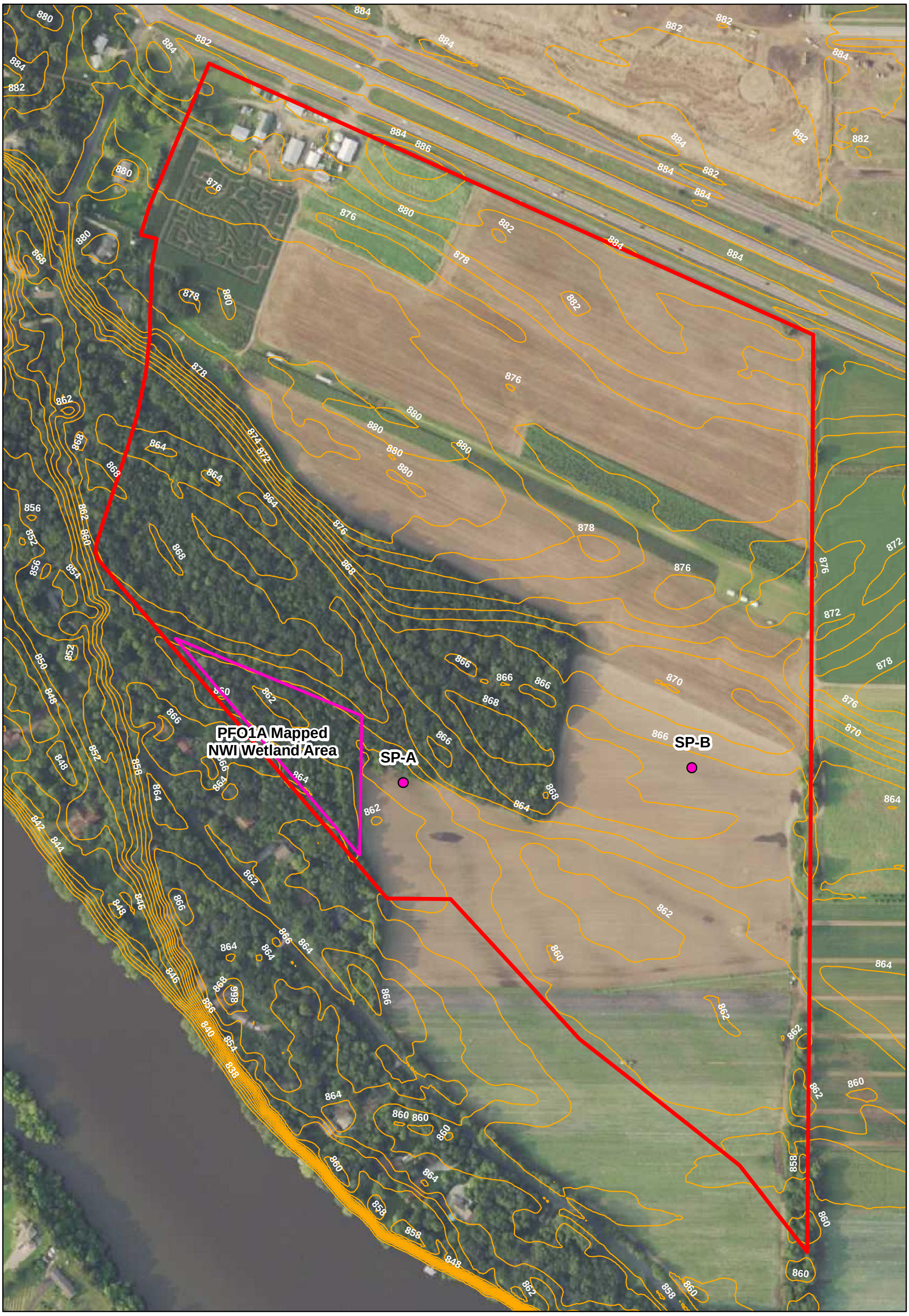



**Figure 2 - Existing Conditions (2017 FSA Photo - Wet Year)**

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.

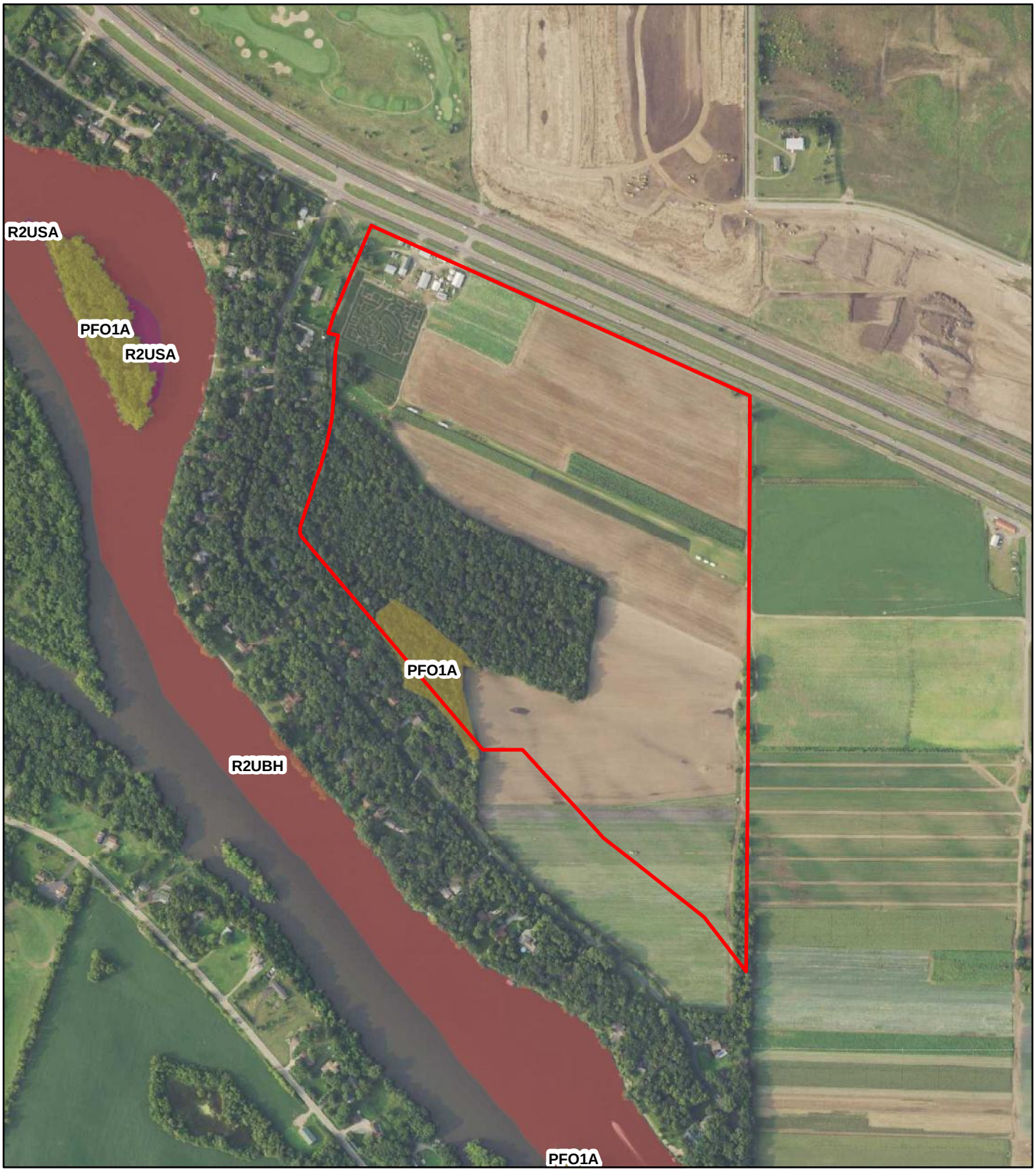



**Figure 3 - National Wetlands Inventory**

N

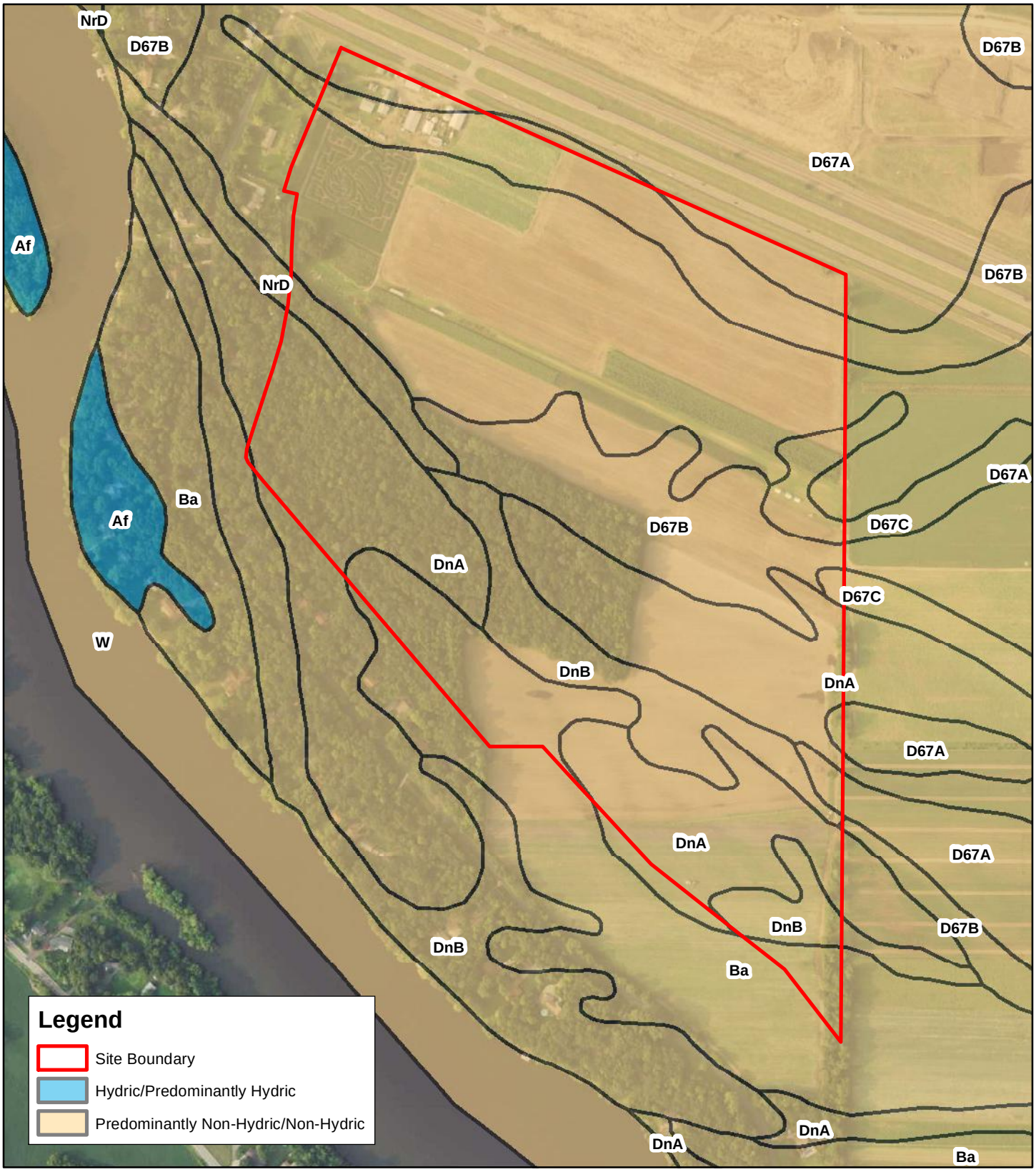
0 500 Feet

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

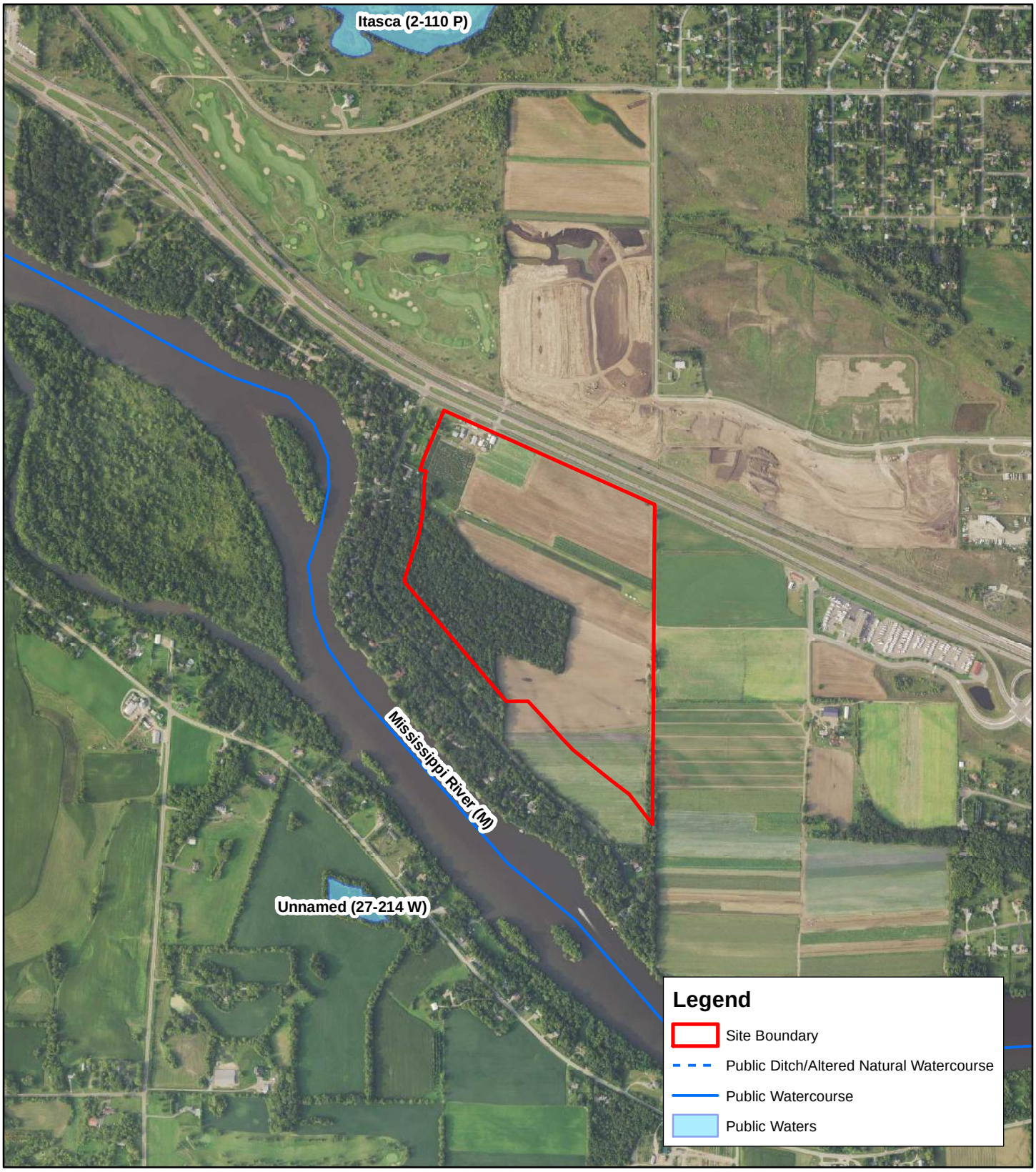
0 500 Feet

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.

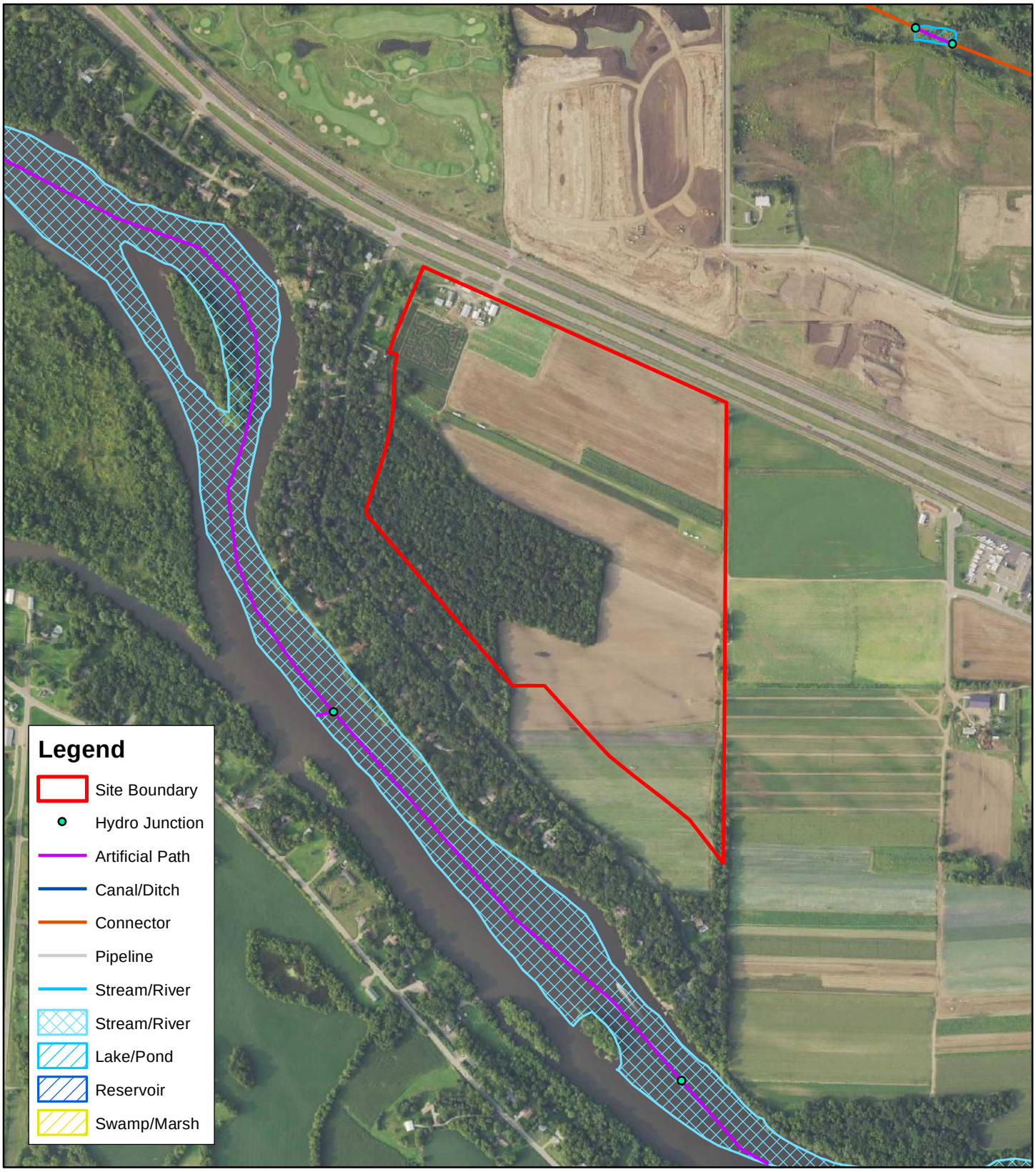



**Figure 6 - National Hydrography Dataset**

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.

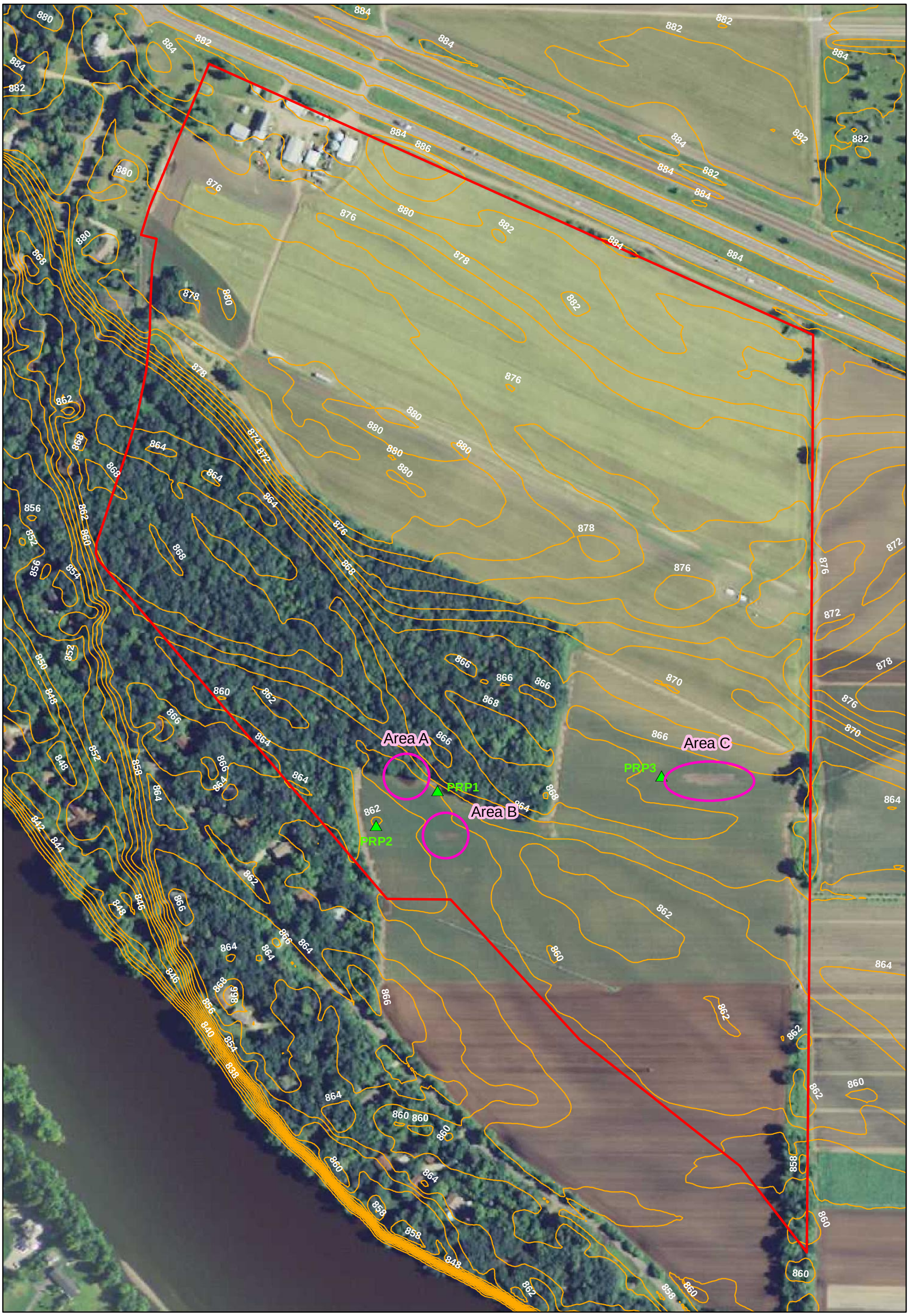



**Figure 7 - Offsite Hydrology Review Areas (2013 FSA Photo - Wet Year)**

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)<br>**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)<br>☐No-Loss (8420.0415) ☐Exemption (8420.0420)<br>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:<br>☐ 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]<br>List Conditions: | ☒ Approved[1] | ☐ Denied |
| **Decision-Maker for this Application:** ☐ Staff ☒ Governing Board/Council ☐ Other:<br><br>**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**<br>☒ Summary:<br>**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.**<br>**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

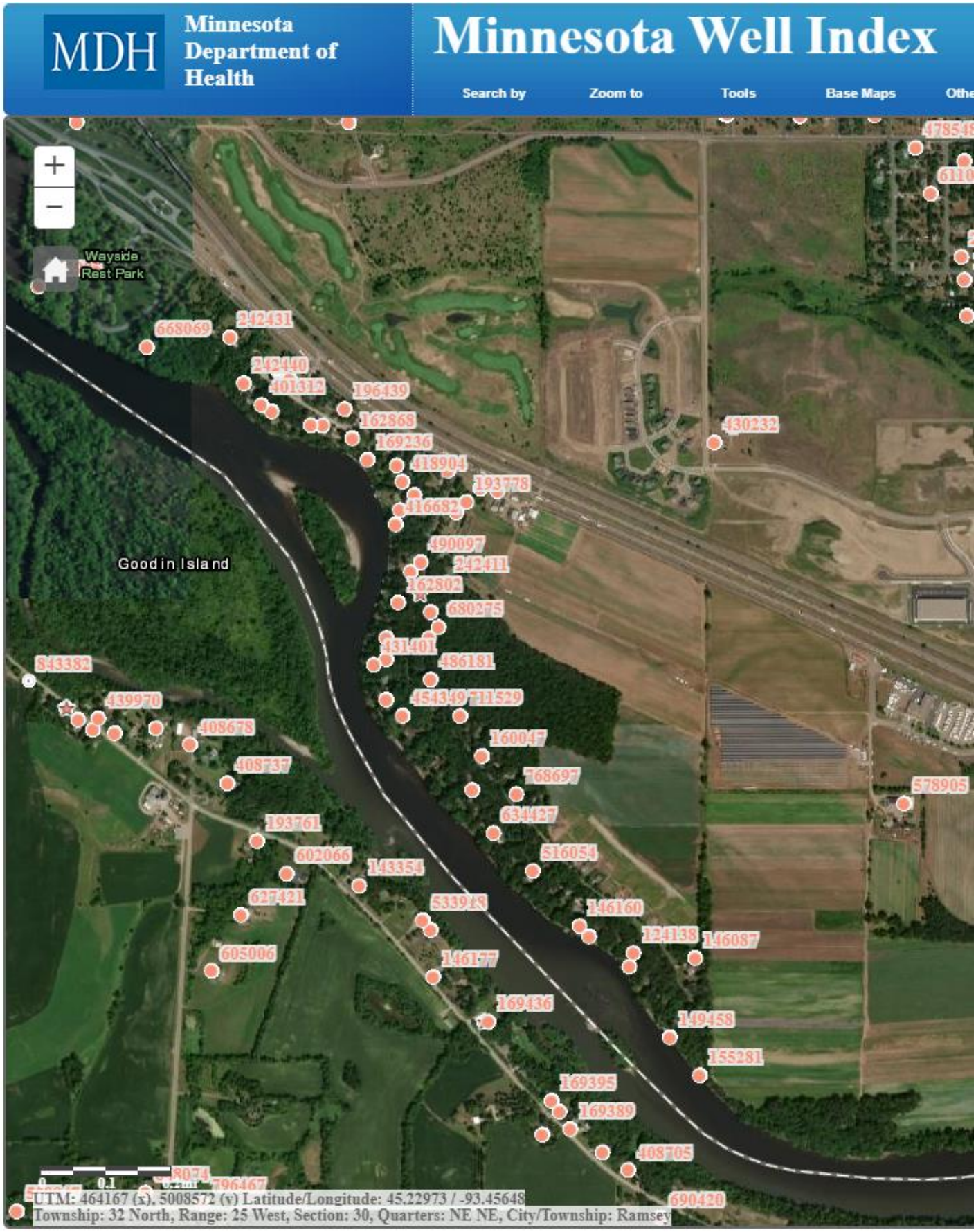
cc:
Melissa Barrett (Agent)
Karen Wold (LGU)
Ben Meyer (BWSR)

# 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

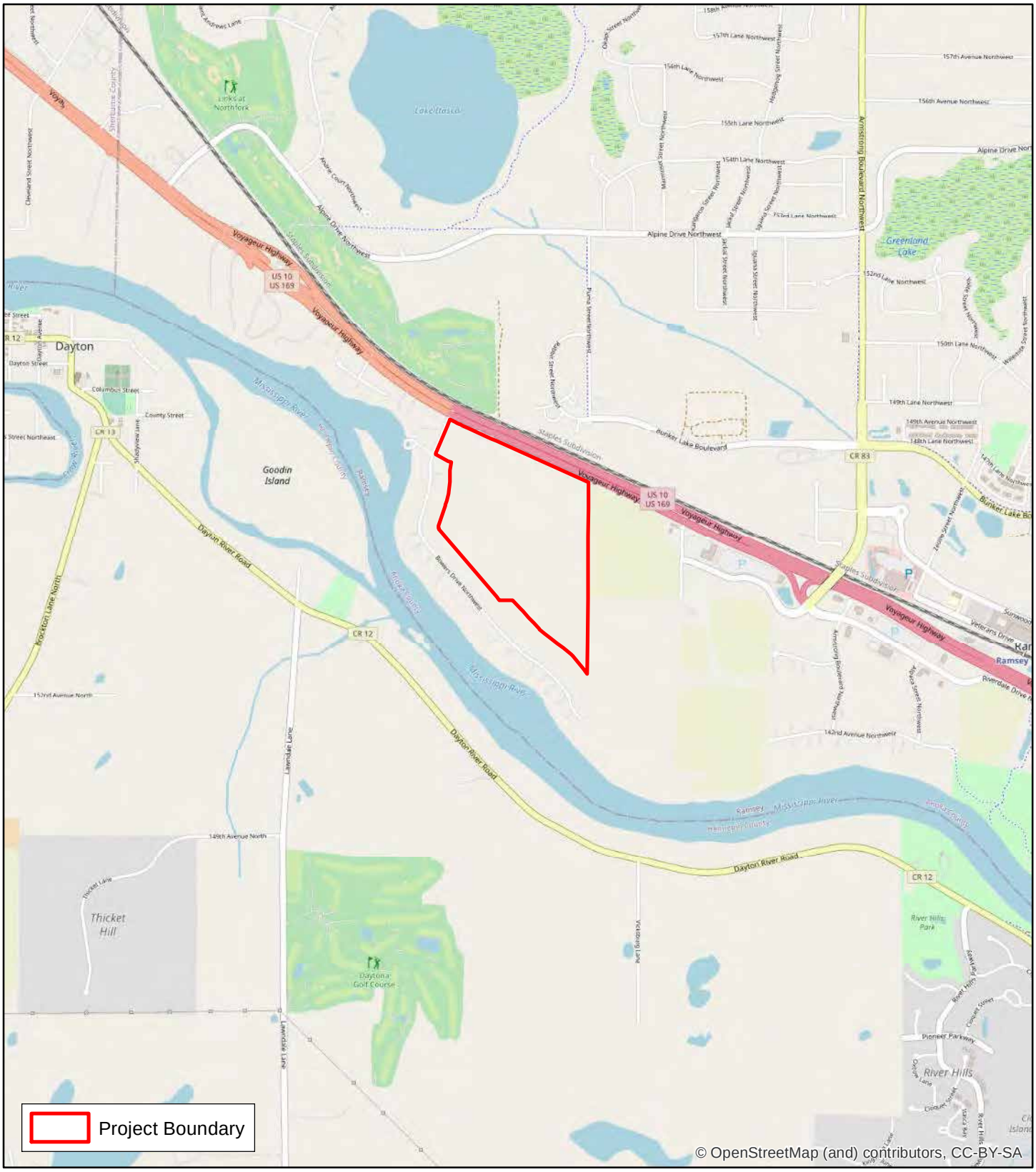



**Figure 1 - Site Location**

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.

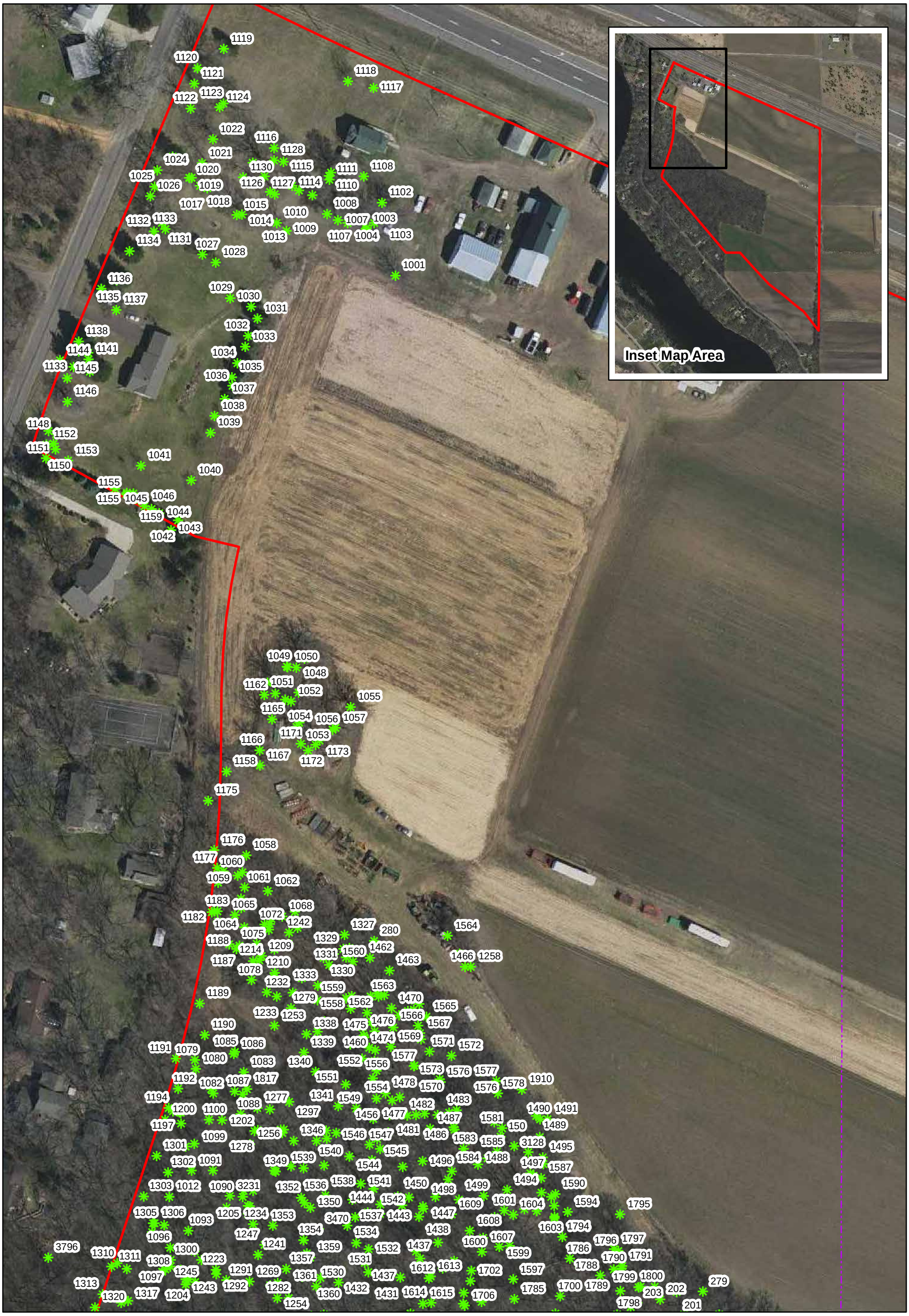



**Figure 2A - Tree Location (2016 MnGeo Imagery)**

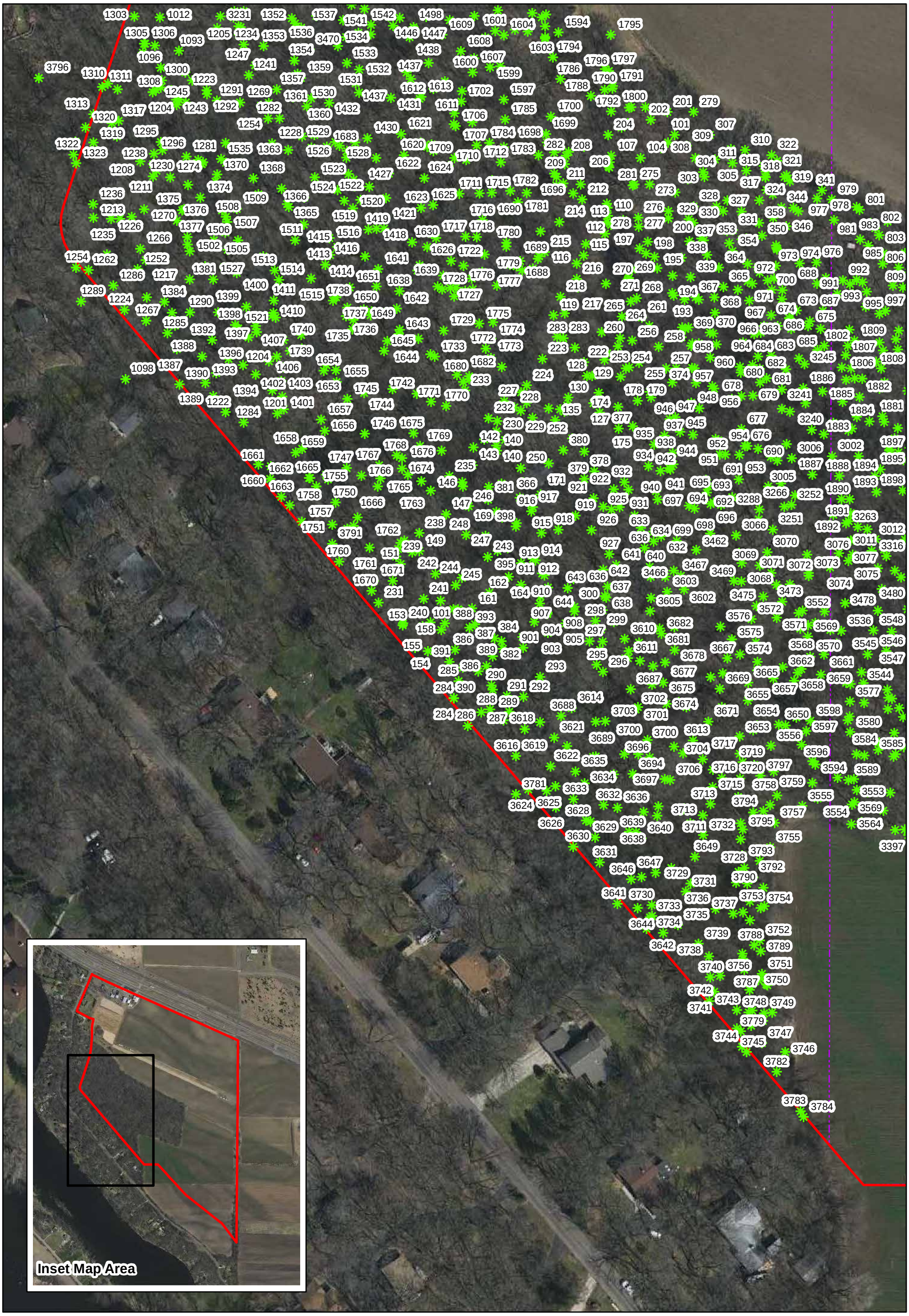



**Figure 2B - Tree Location (2016 MnGeo Imagery)**

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.

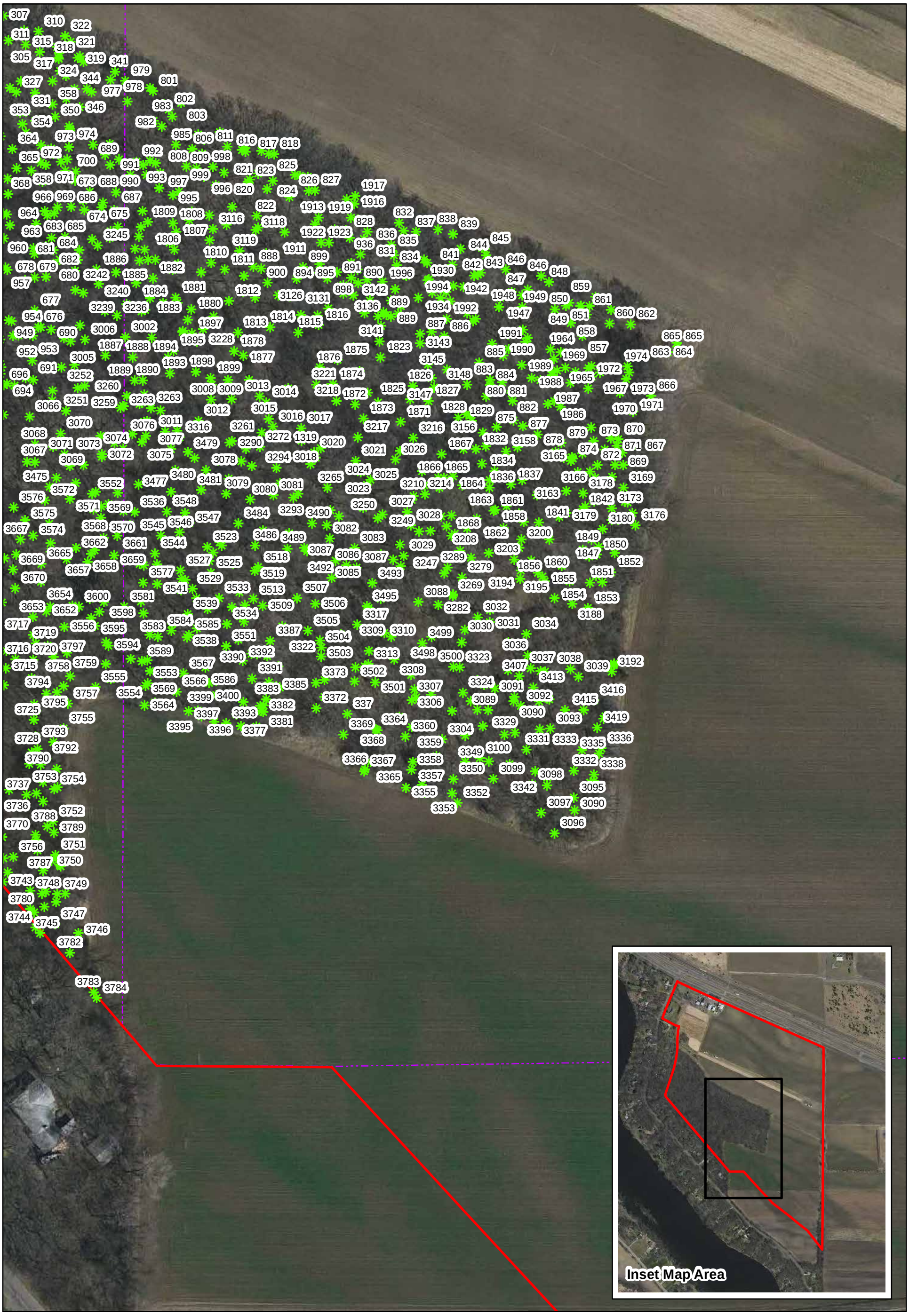



**Figure 2C - Tree Location (2016 MnGeo Imagery)**

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.

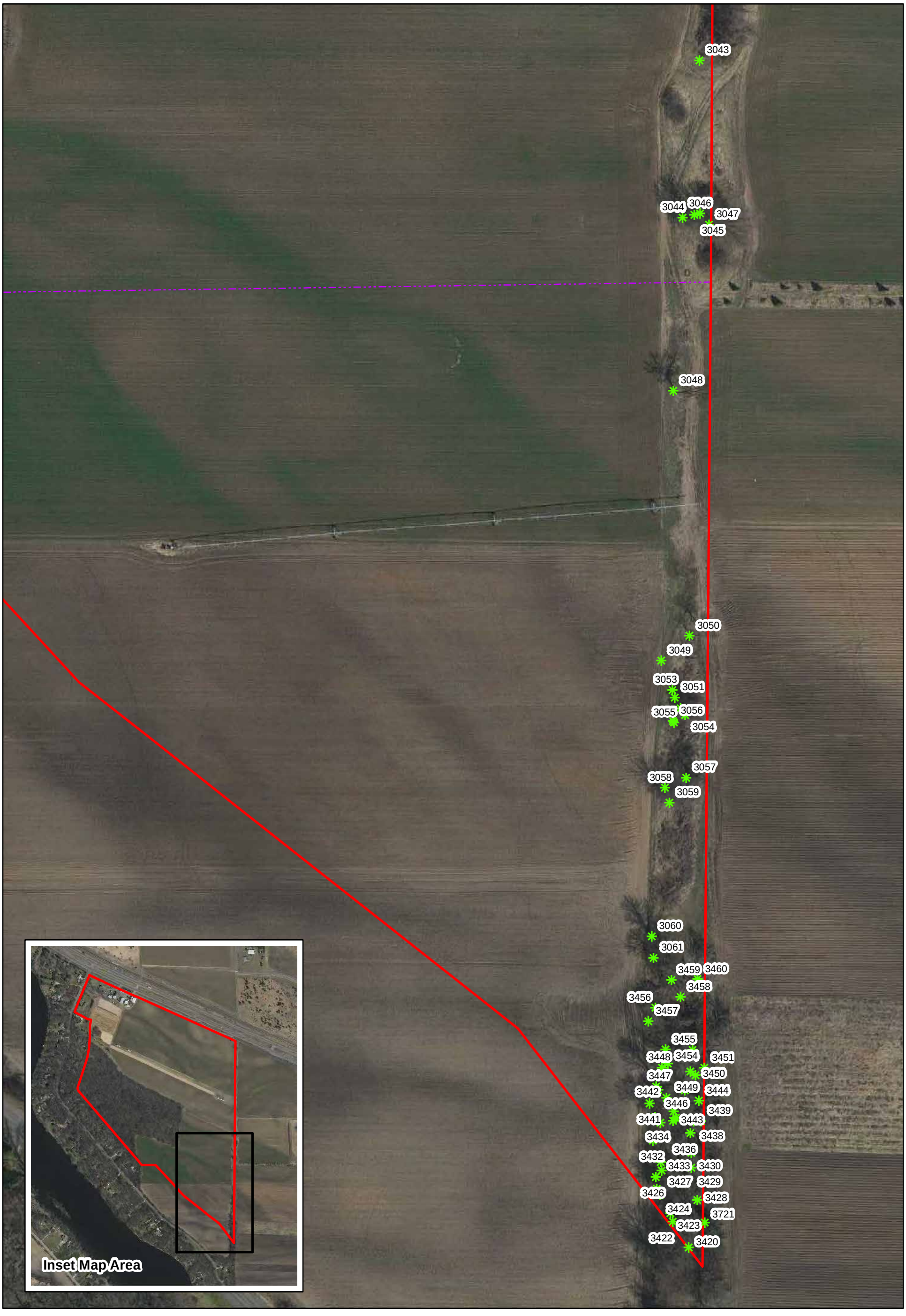



**Figure 2D - Tree Location (2016 MnGeo Imagery)**

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.

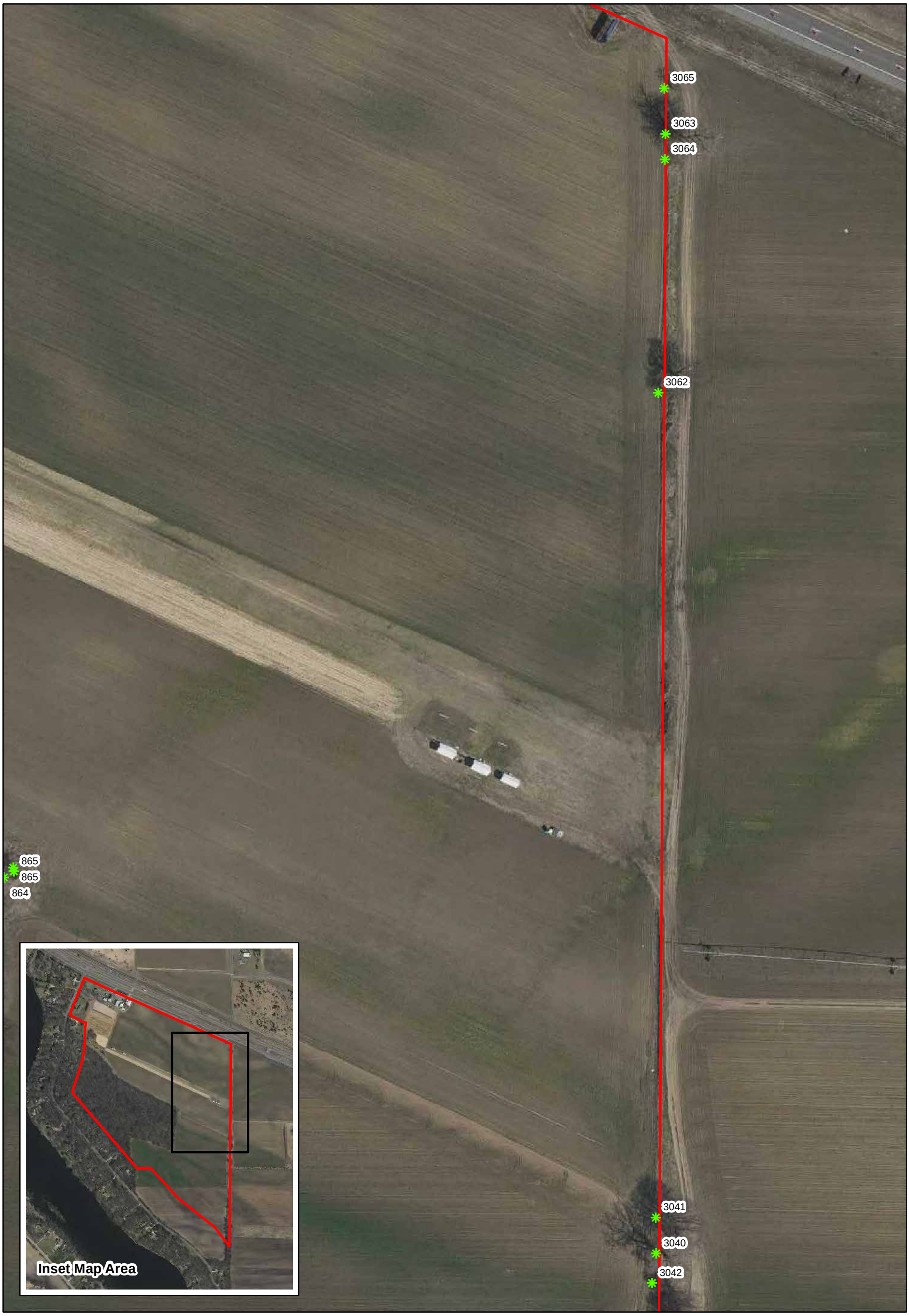



**Figure 2E - Tree Location (2016 MnGeo Imagery)**

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.

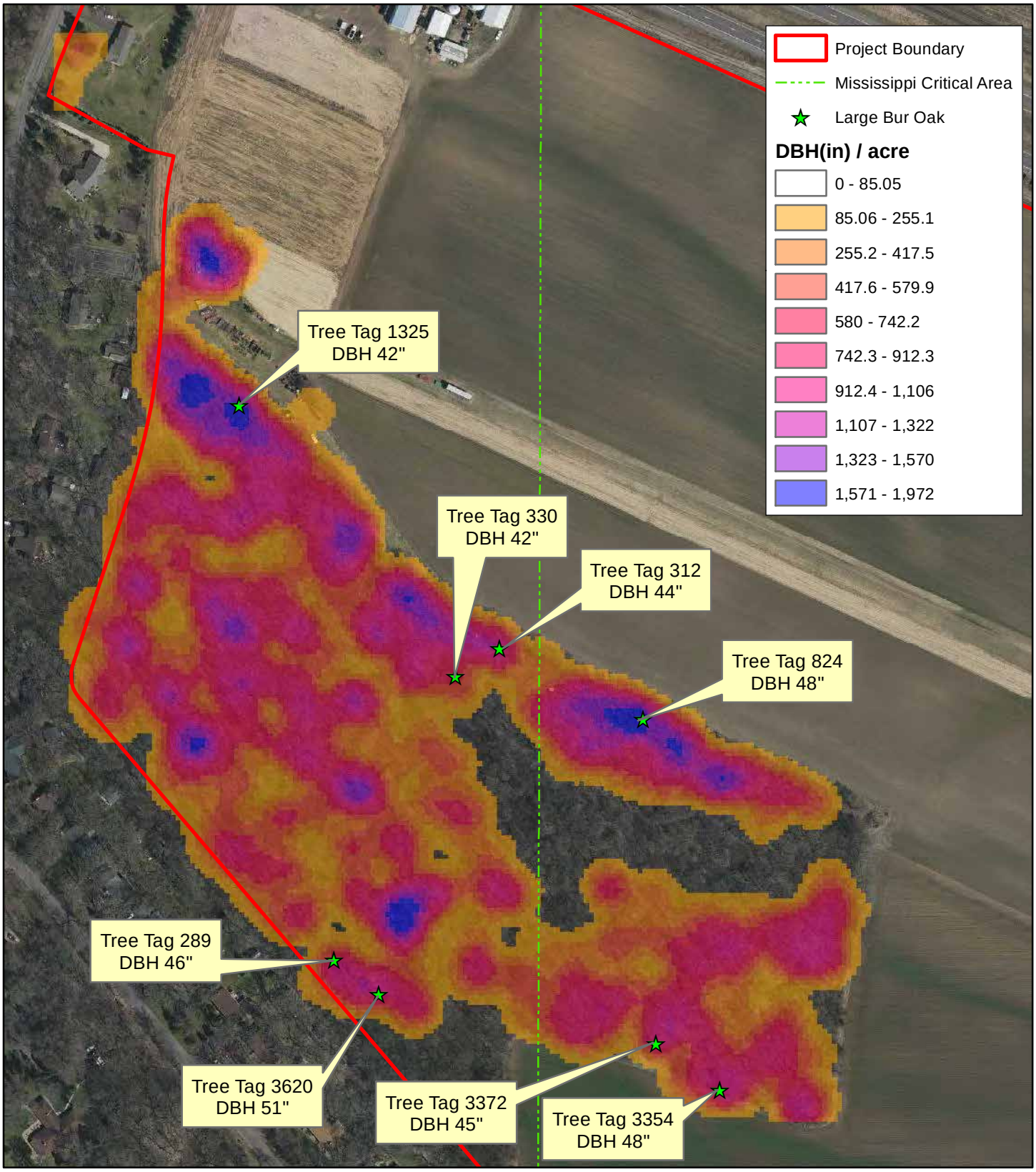



**Figure 3A - Oak Density (2016 MnGeo Imagery)**

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.

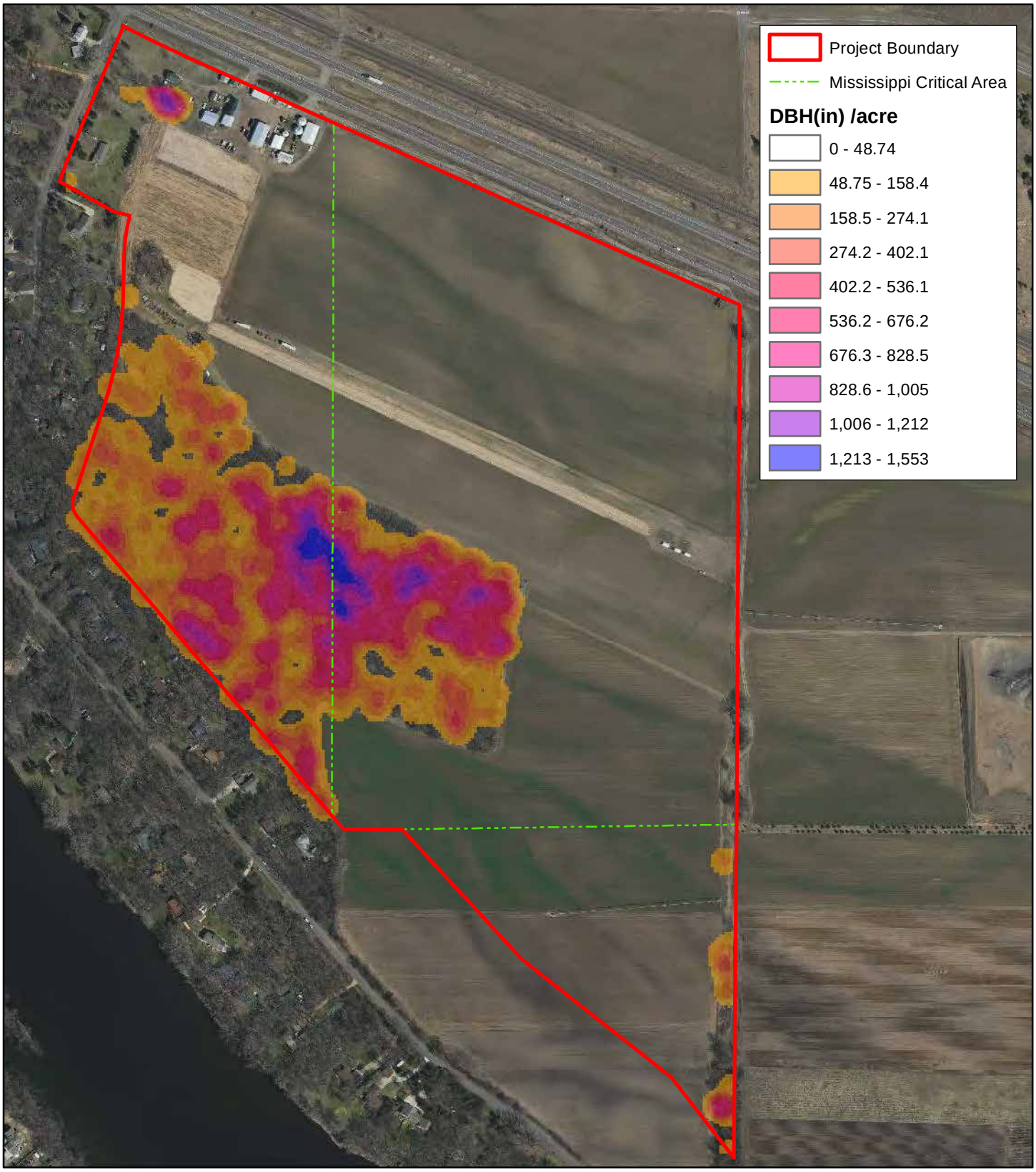



**Figure 3B - Elm Density (2016 MnGeo Imagery)**

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.

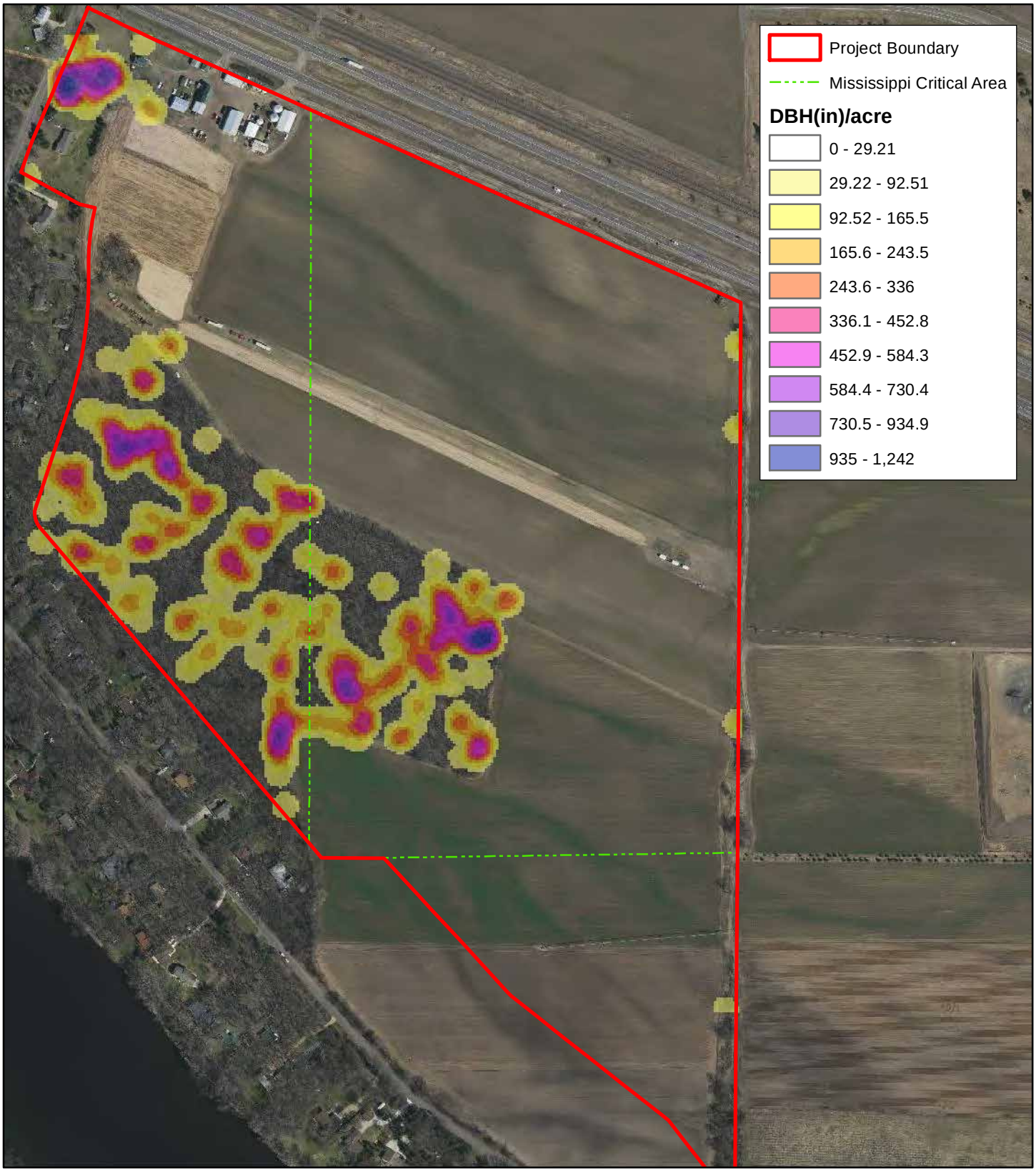



**Figure 3C - Hackberry Density (2016 MnGeo Imagery)**

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.

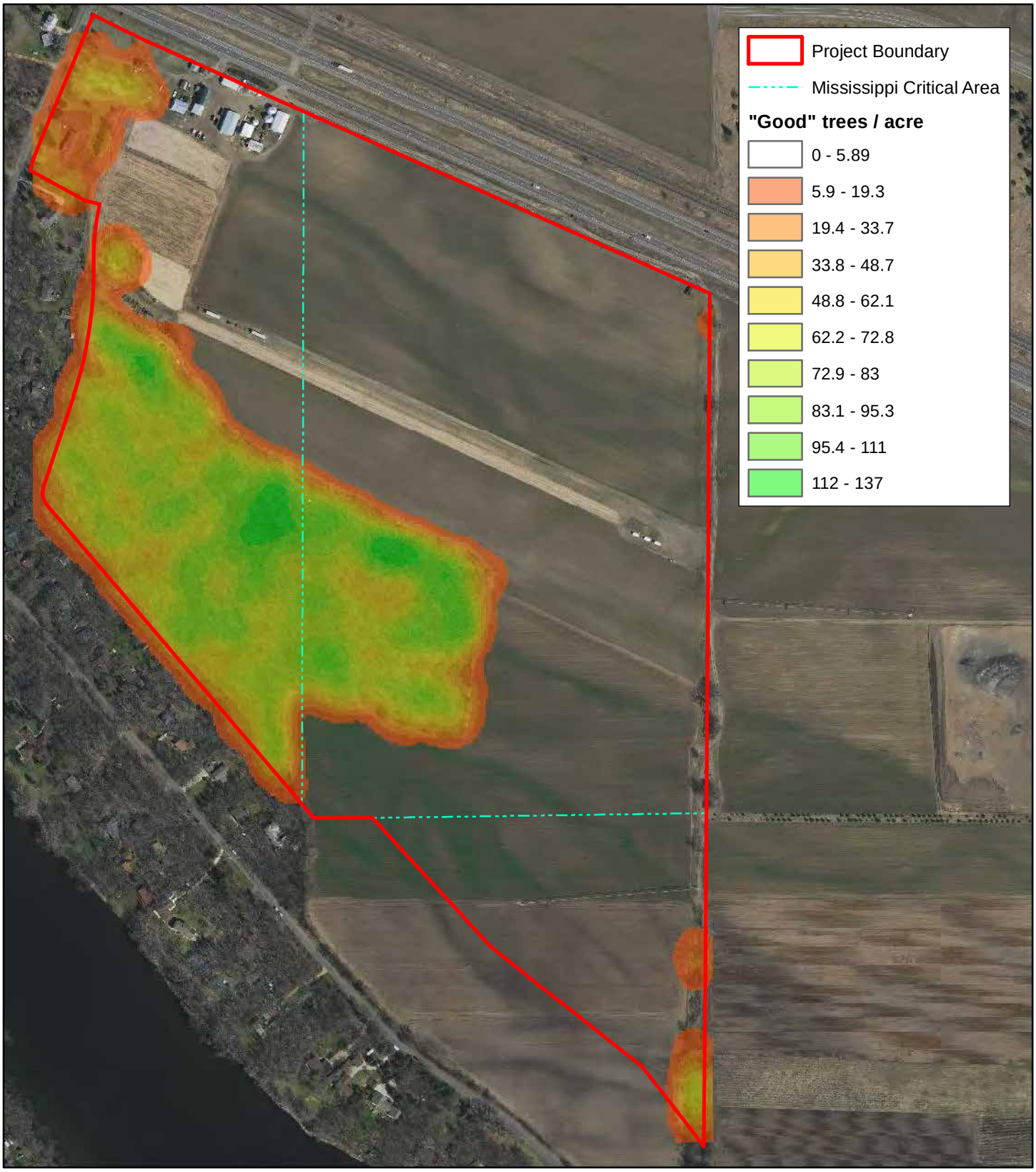



**Figure 4 - Healthy Tree Density (2016 MnGeo Imagery)**

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.

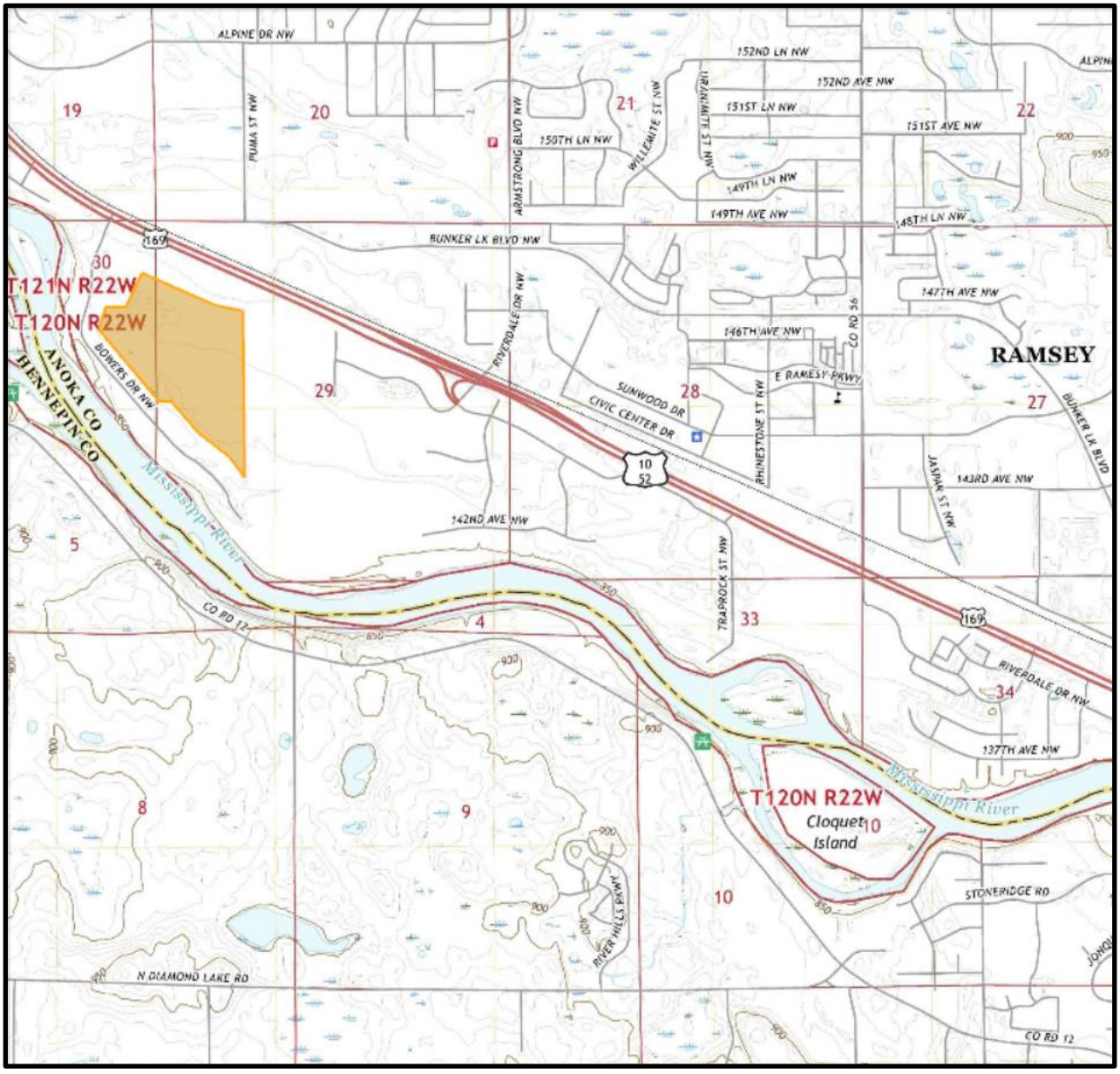



Figure 1: USGS Topographic Map Illustrating Project Area (orange polygon).
(USGS 7.5' Topographic Map, Anoka Quadrangle, 2019, 1:24,000)

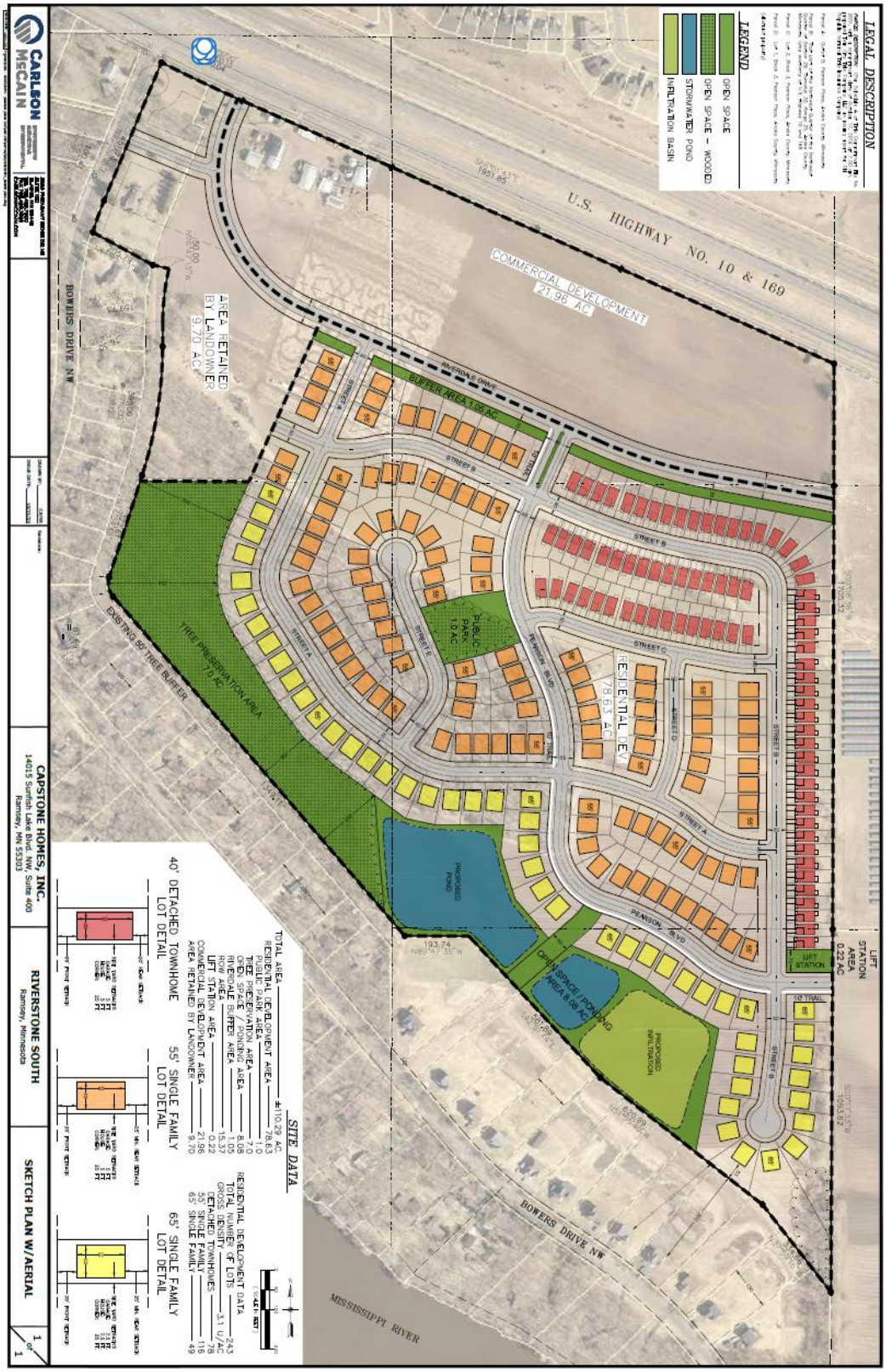



Figure 2: Engineering Sketch Plan of Project Area.
(Provided by Capstone Homes, Inc.)

## 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.

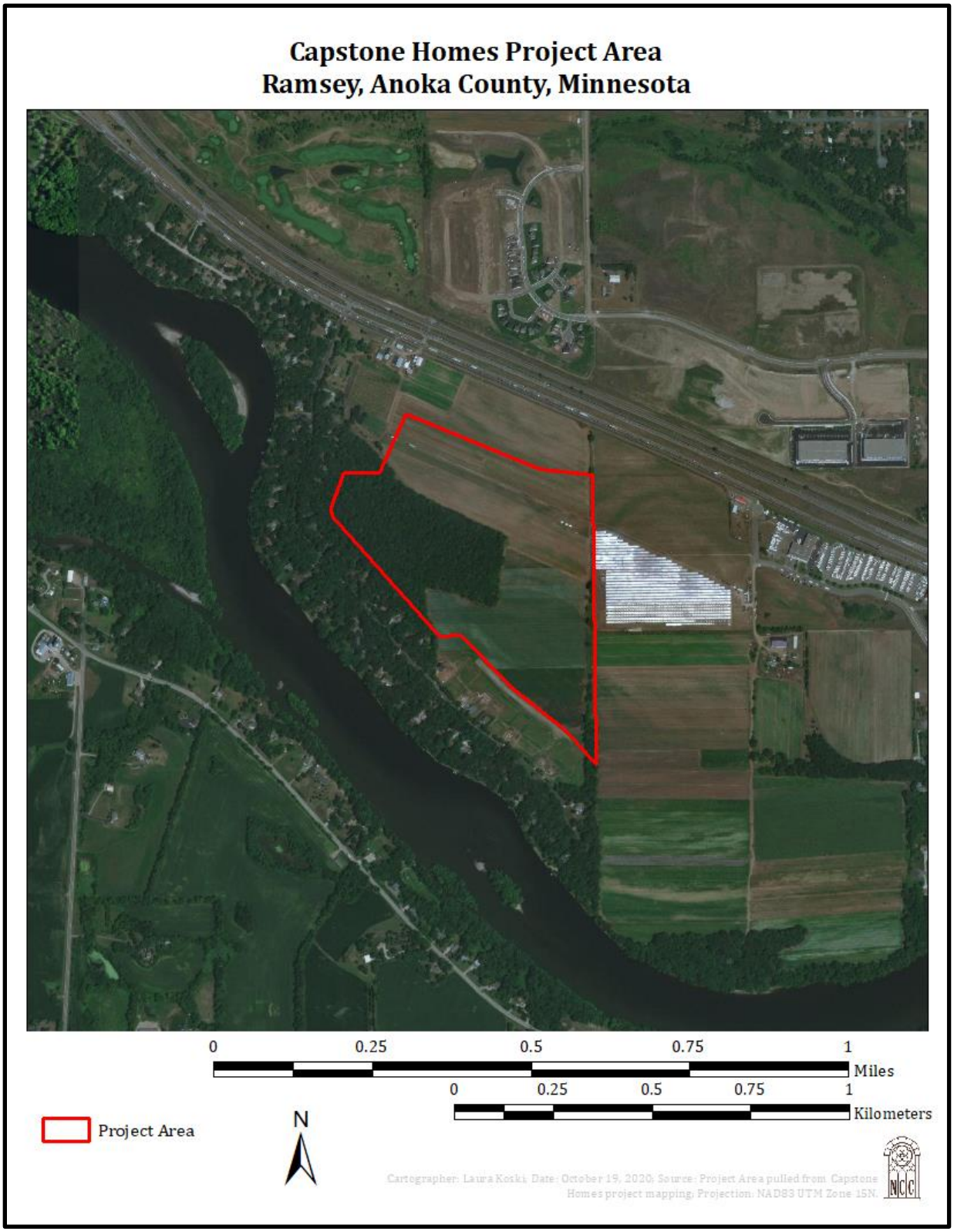



Figure 3: Illustration of Project Area Boundary (red border).
(Basemap provided by 2016 Google Satellite Imagery)

## 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

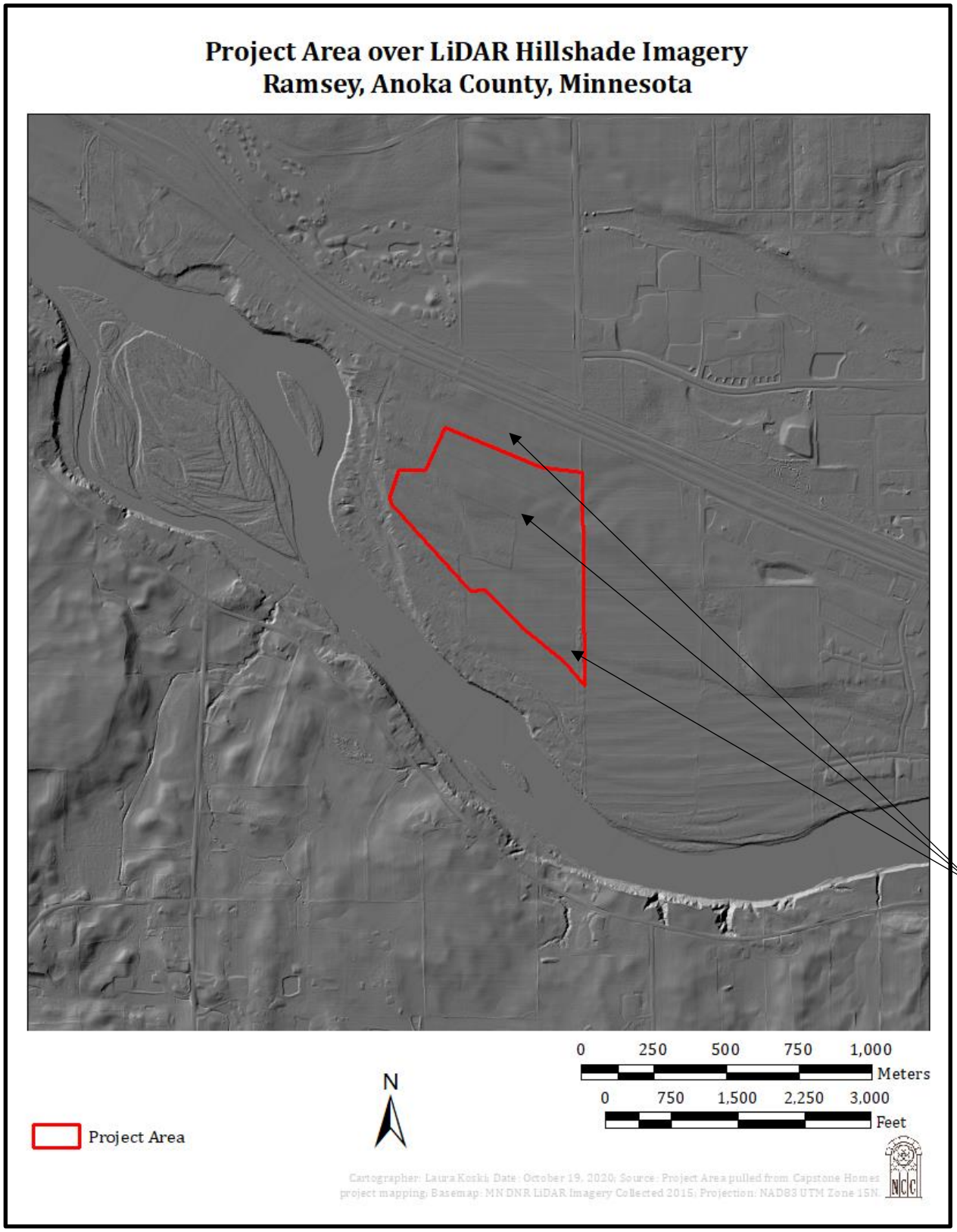



Figure 4: Map of Project Area over LiDAR Hillshade Imagery.

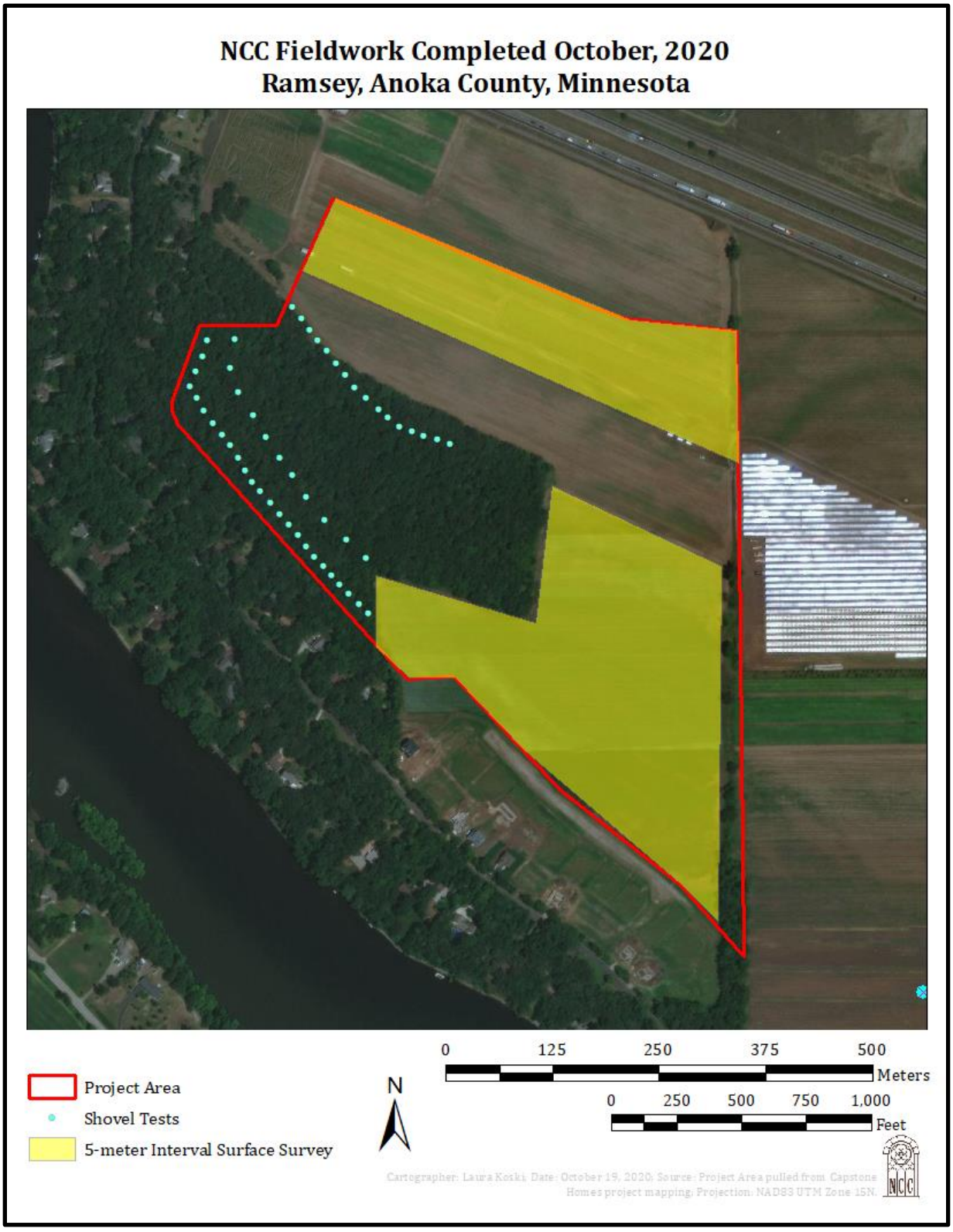



Figure 5: Map of surface surveyed areas and shovel test locations within greater project area. (Basemap provided by 2016 Google Satellite Imagery)

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

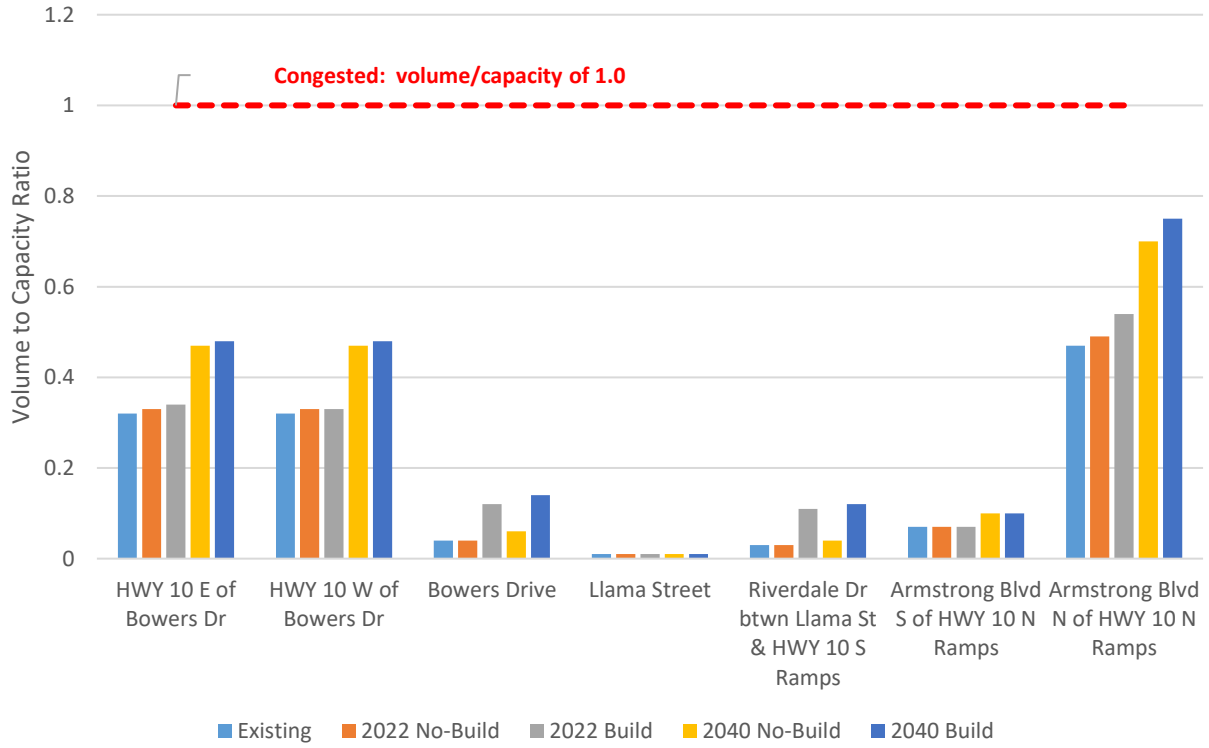
While many factors contribute to a road feeling congested, the two biggest factors are volume, how many vehicles are using the road, and capacity, how many vehicles the road can accommodate a day. Transportation professionals use these pieces of information to create a ratio of volume to capacity. For 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**

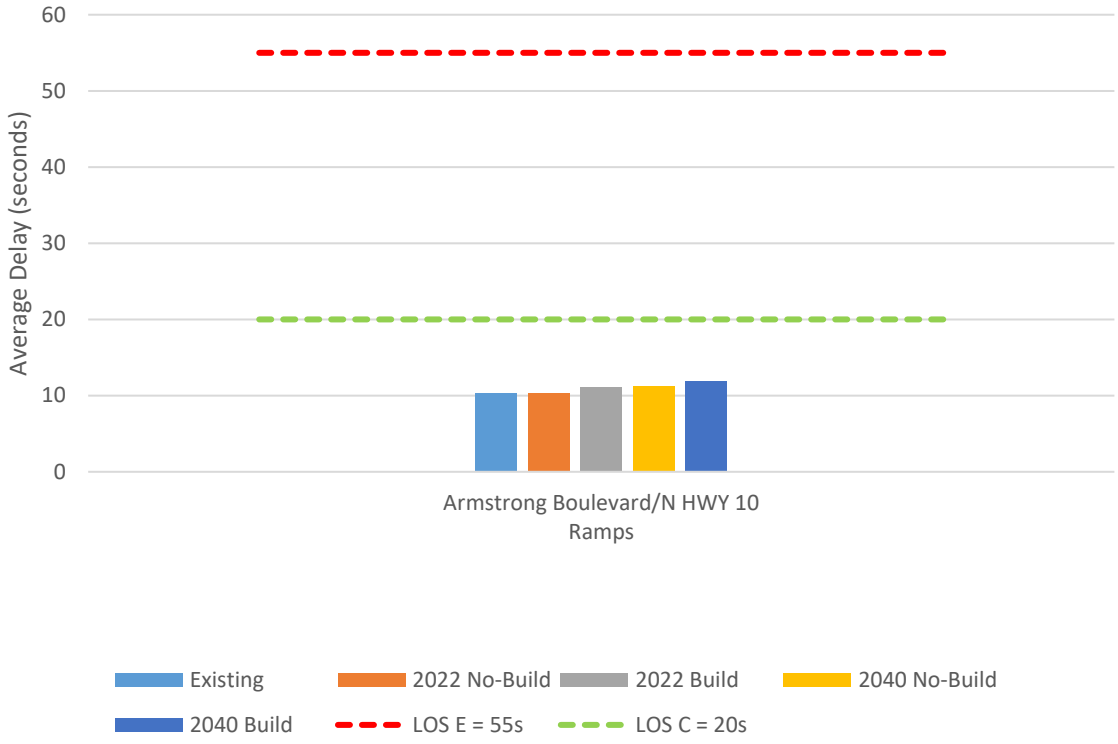



**Chart 3 – P.M. Peak Hour Delays: Signal Controlled Intersections**



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**

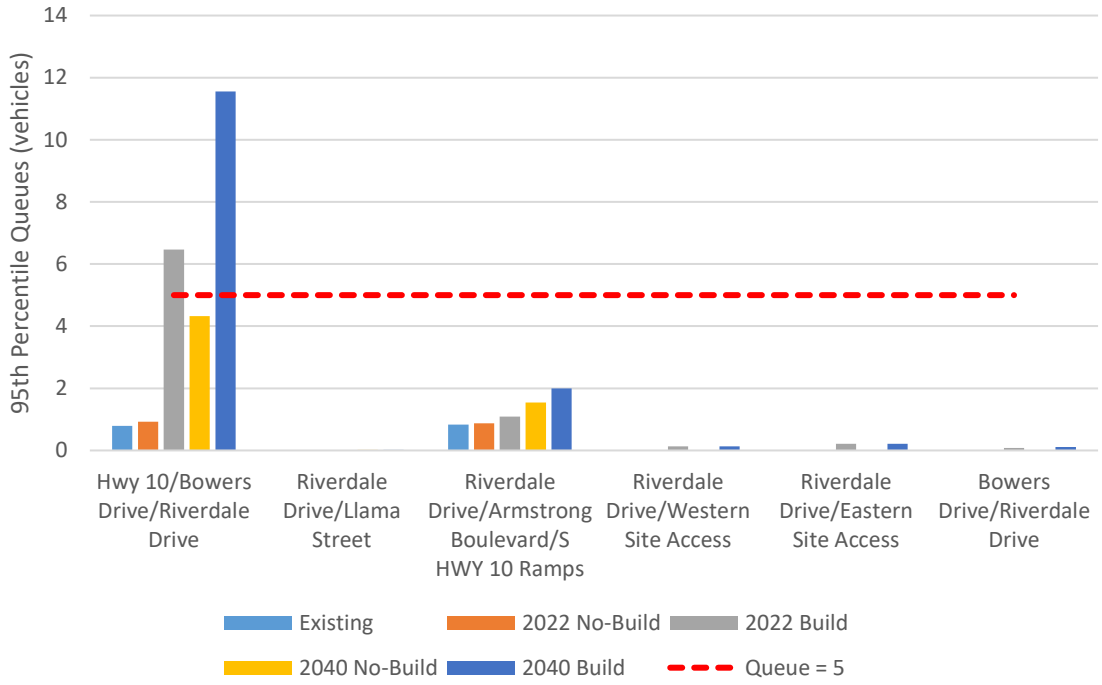
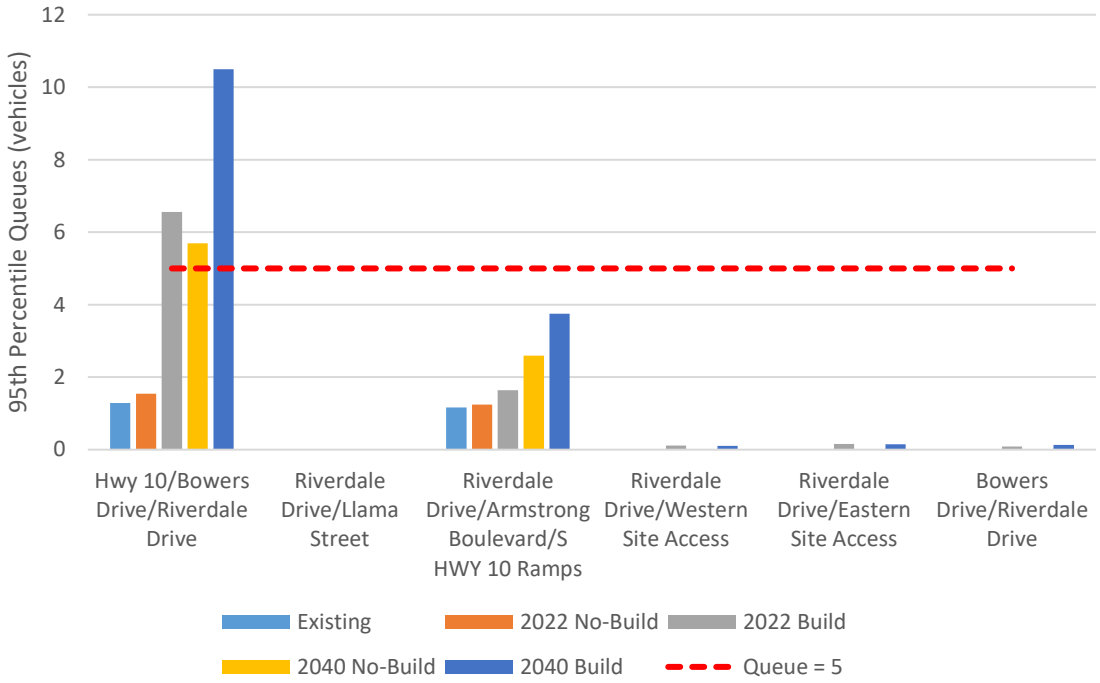


**Chart 7 – P.M. Peak Hour Queues: Side Street Stop Sign Controlled Intersections**




## 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 95$^{th}$ 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

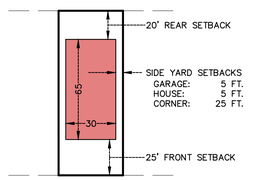
0 60 120 240

( SCALE IN FEET )

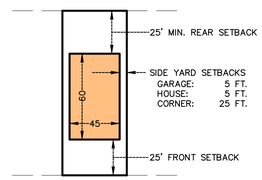
RESIDENTIAL DEVELOPMENT DATA

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

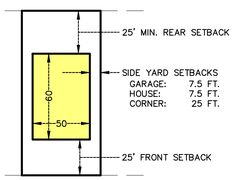
### 40' DETACHED TOWNHOME LOT DETAIL




### 55' SINGLE FAMILY LOT DETAIL




### 65' SINGLE FAMILY LOT DETAIL





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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

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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.

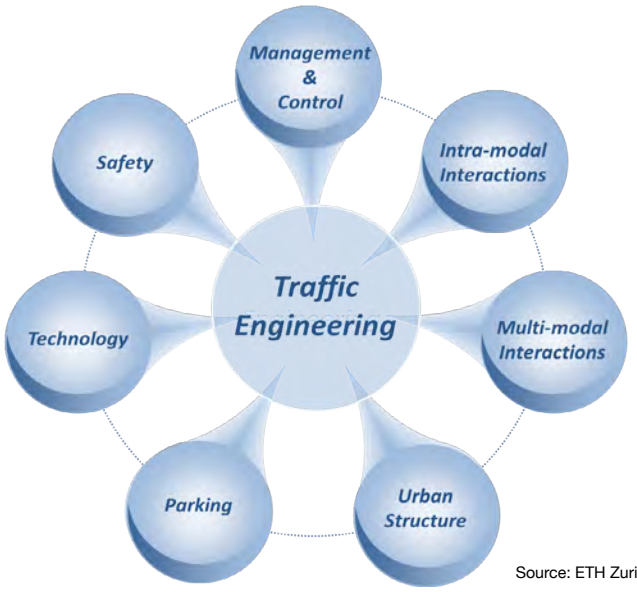
**Speed Study** – A review of existing travel speeds and the corridor characteristics to determine if speeding is an issue, the appropriate speed to post as the limit, and/or areas to provide reduced speed warnings.

**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

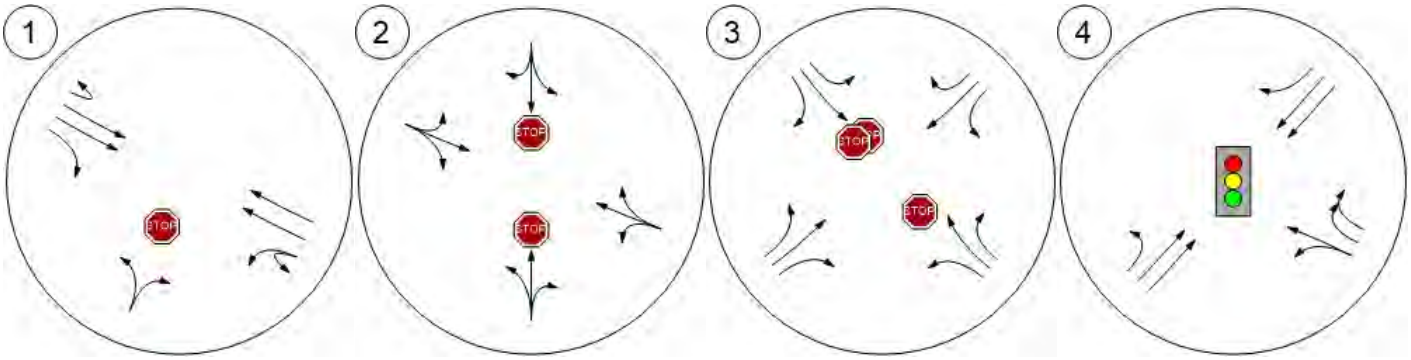
Highway Safety Manual, HSM

## 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



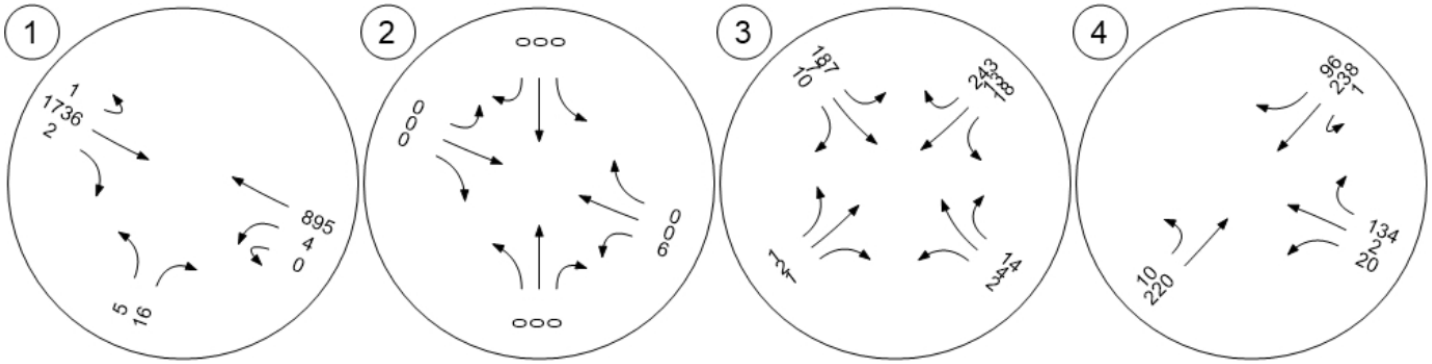
# Appendix C - Figures 1 - 4

## Figure 2 Through Figure 4

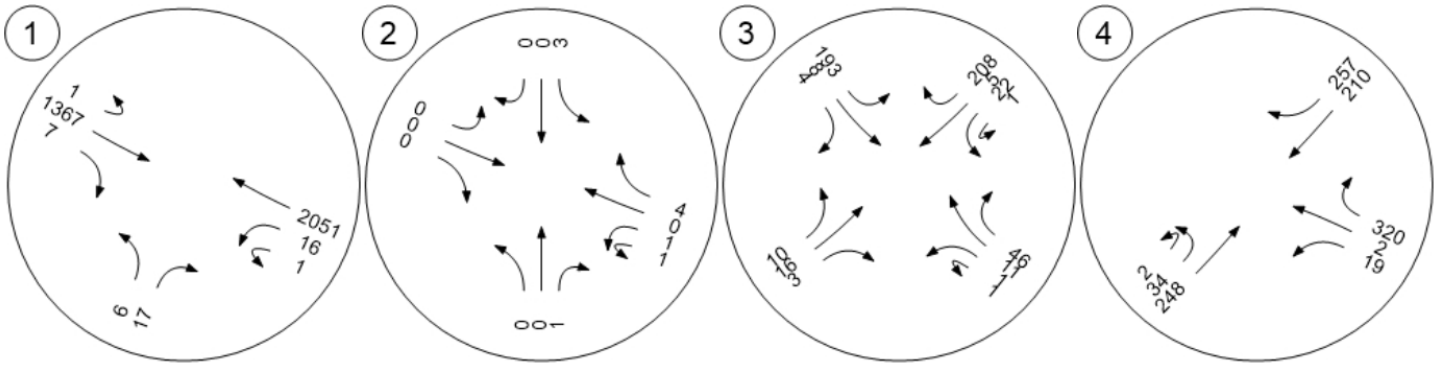
### Figure 2 – Existing Scenario




Existing AM Peak



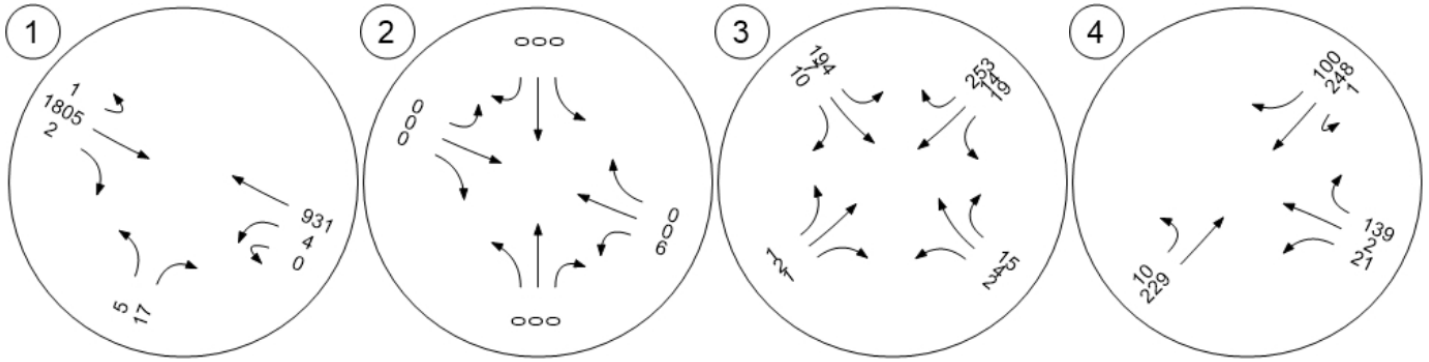

Existing PM Peak



## Figure 3 – No Build Scenario




2022 No-Build AM Peak




2022 No-Build PM Peak

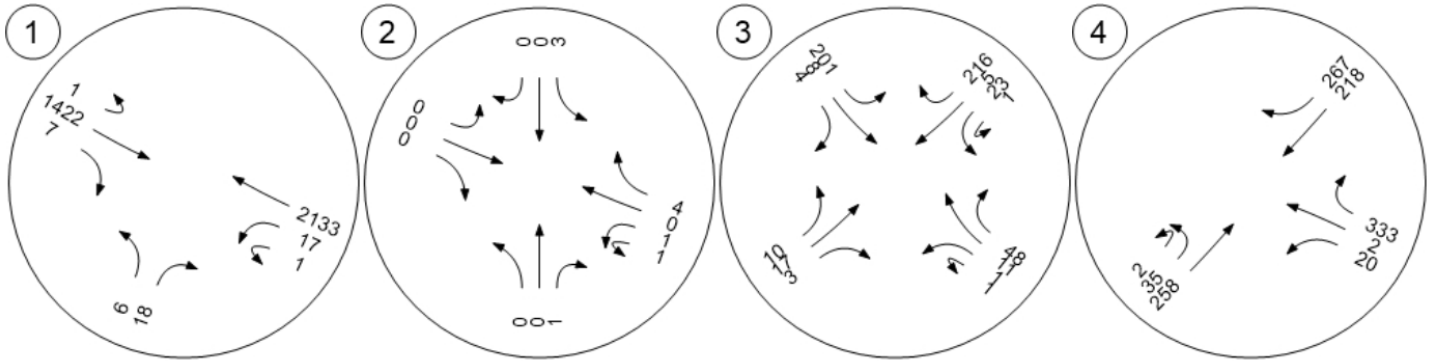
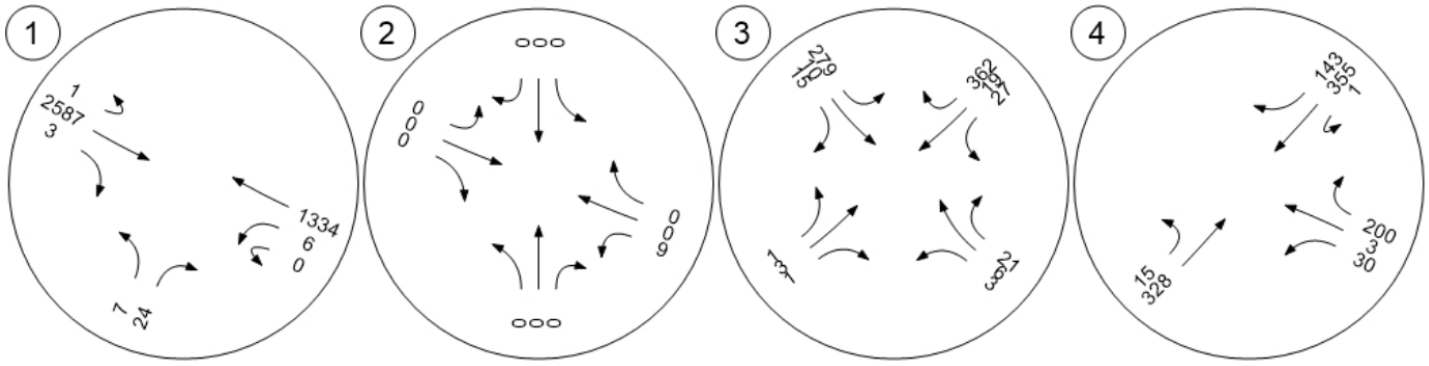


Figure 3 Cont. – No Build Scenario




2040 No-Build AM Peak




2040 No-Build PM Peak

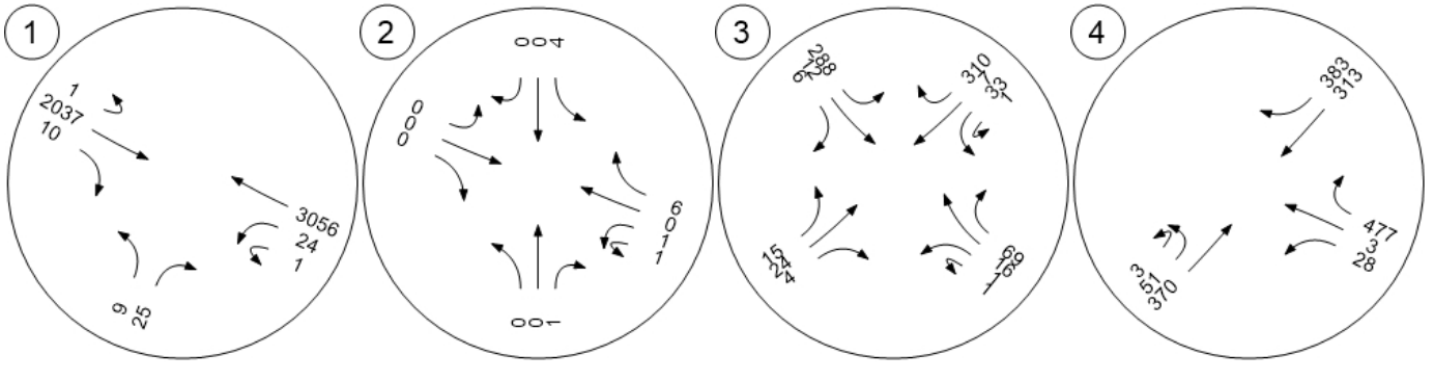
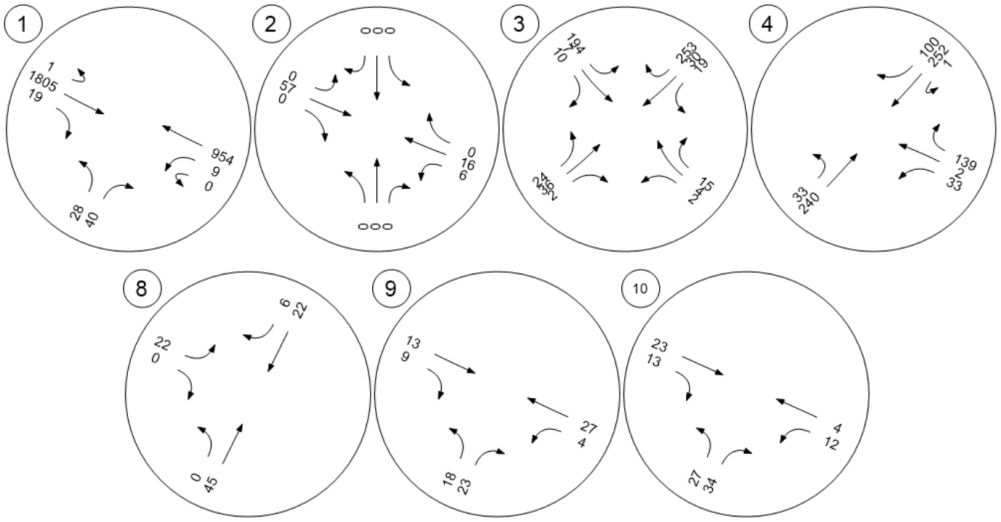


Figure 4 – Build Scenario




2022 Build AM Peak




2022 Build PM Peak

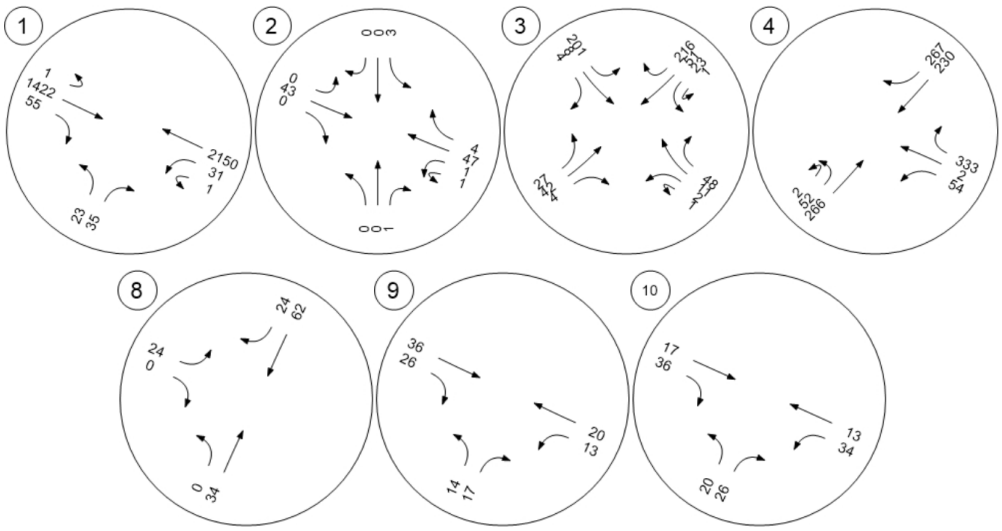
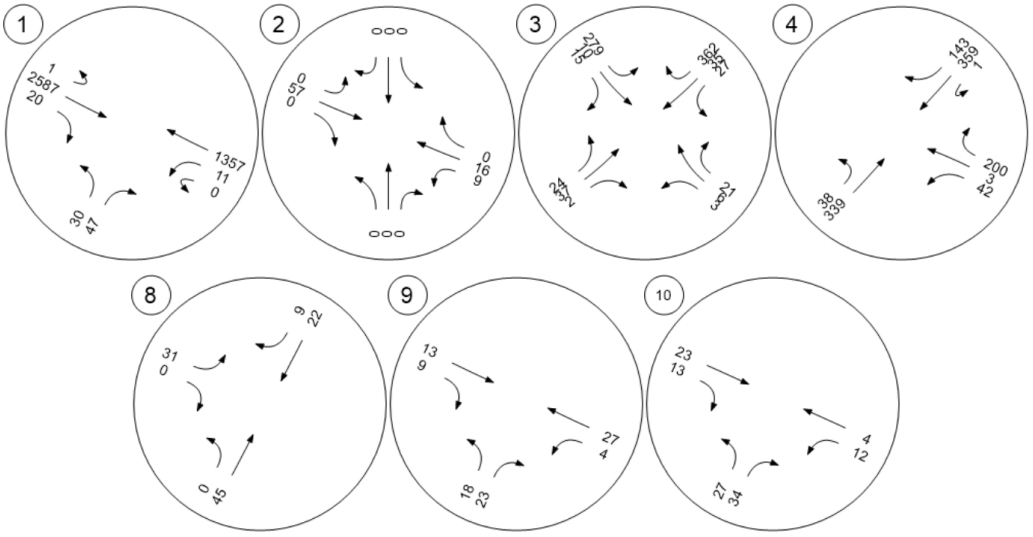


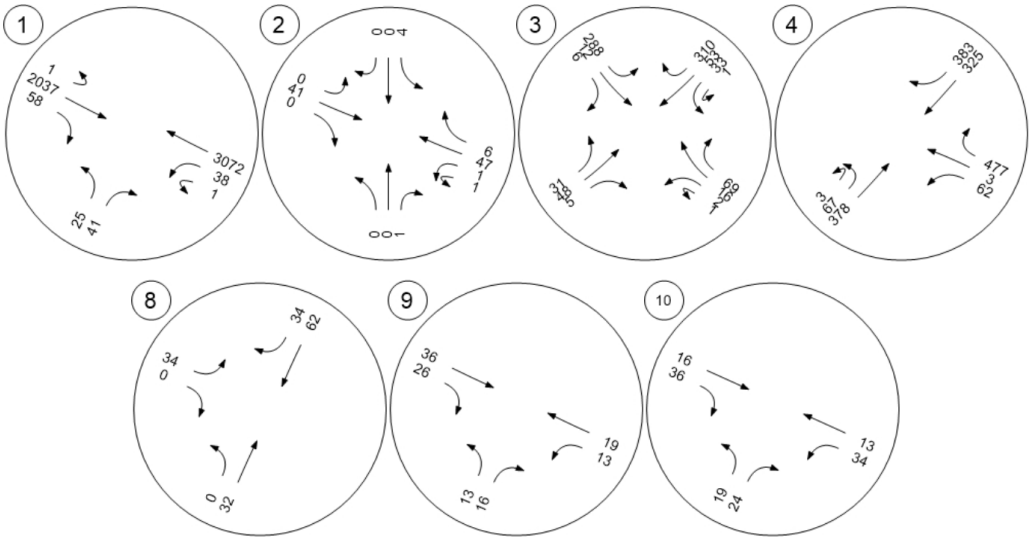
Figure 4 Cont. – Build Scenario




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** |

**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!** |

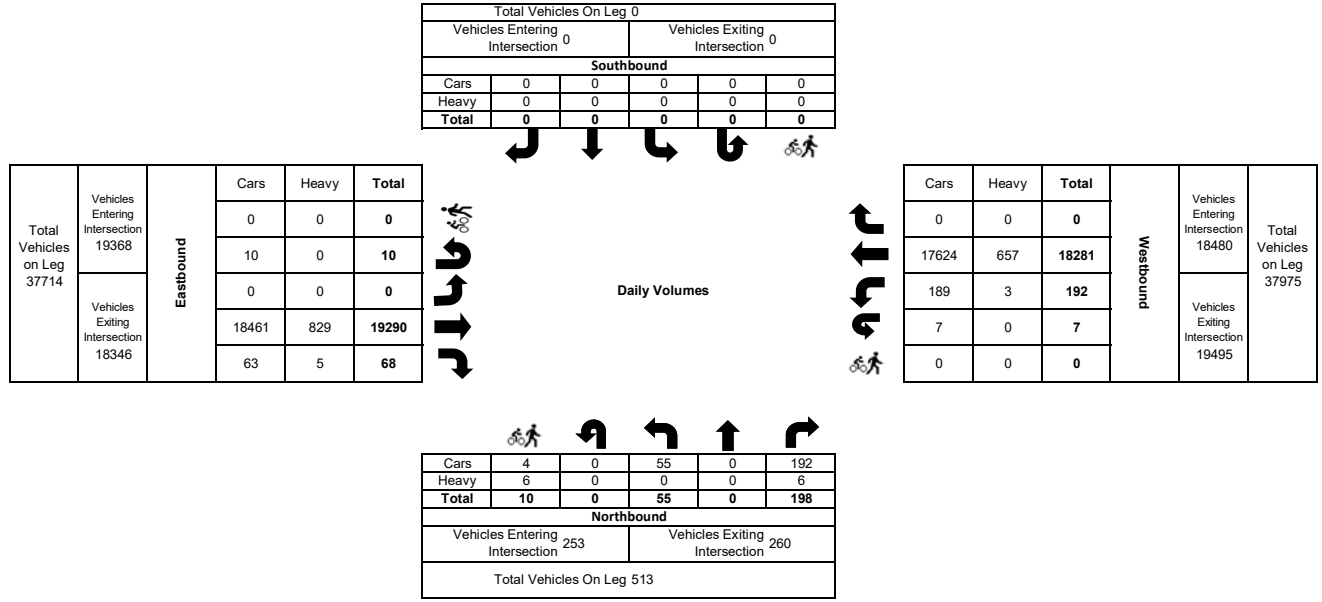
## 01 Hwy 10 and Bowers Dr
## Ramsey MN
## Wednesday, September 30, 2020

### 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%** |

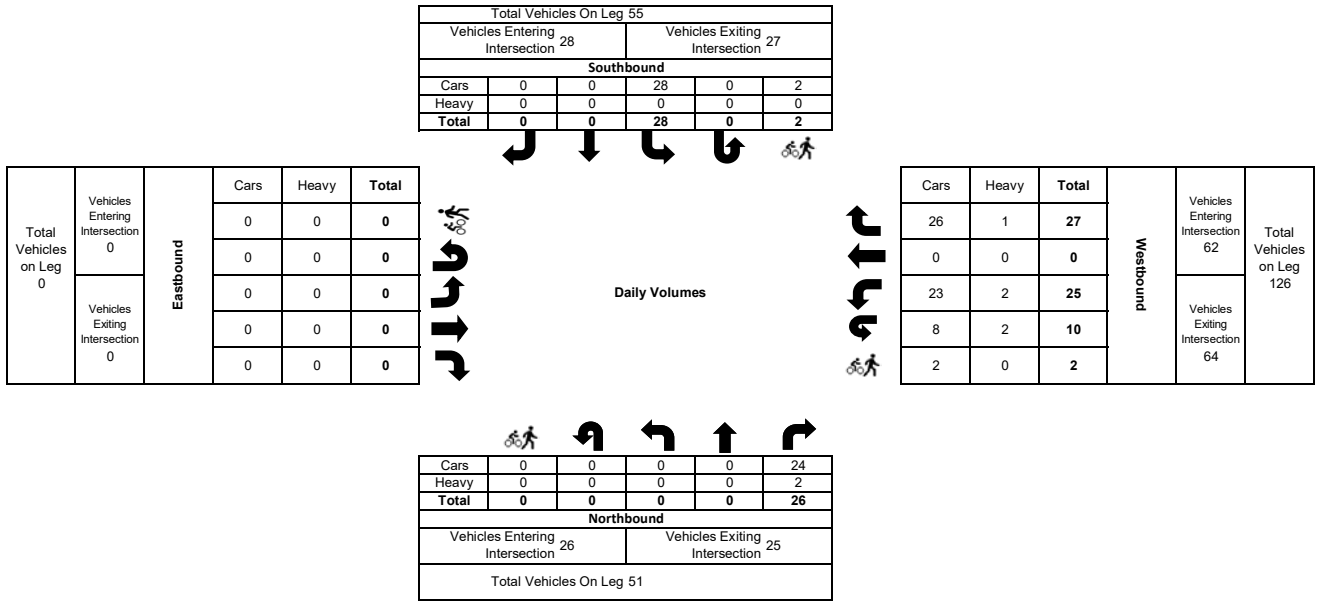
## 02 Riverdale Dr and Llama St
## Ramsey MN
## Wednesday, September 30, 2020

### 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%** |

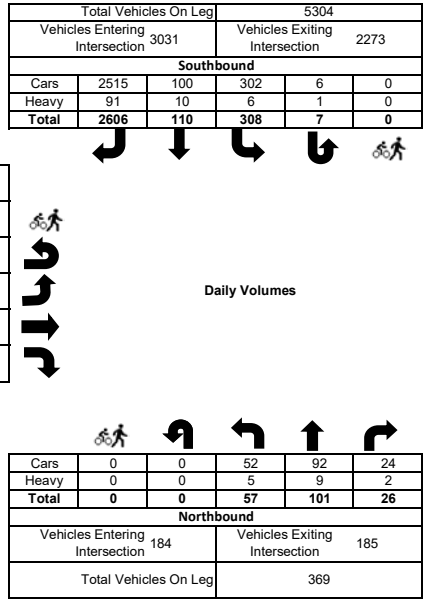
## Riverdale Dr and Southern Ramps
## Ramsey MN
## Wednesday, October 21, 2020

### 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** |

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## Ramsey MN
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| 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%** |

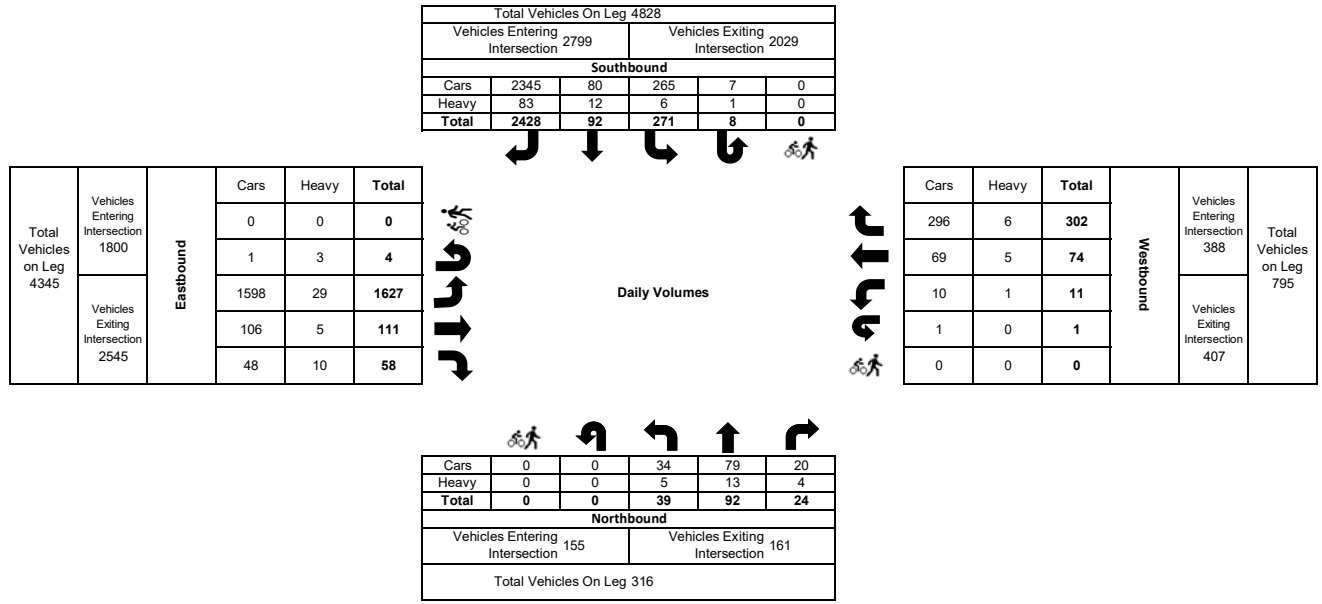
## Riverdale Dr and Southern Ramps
## Ramsey MN
## Thursday, October 22, 2020

### 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%** |

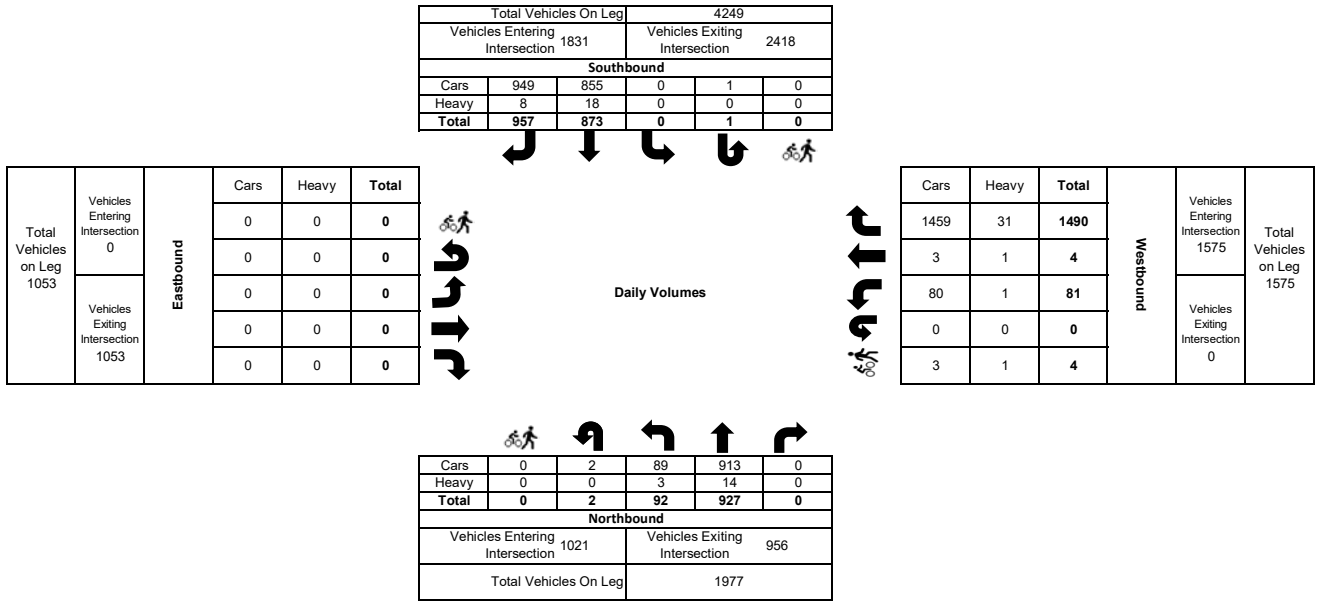
## 04 HWY 10 North Ramps and Armstorng Blvd
## Ramsey MN
## Tuesday, October 13, 2020

### 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%** |

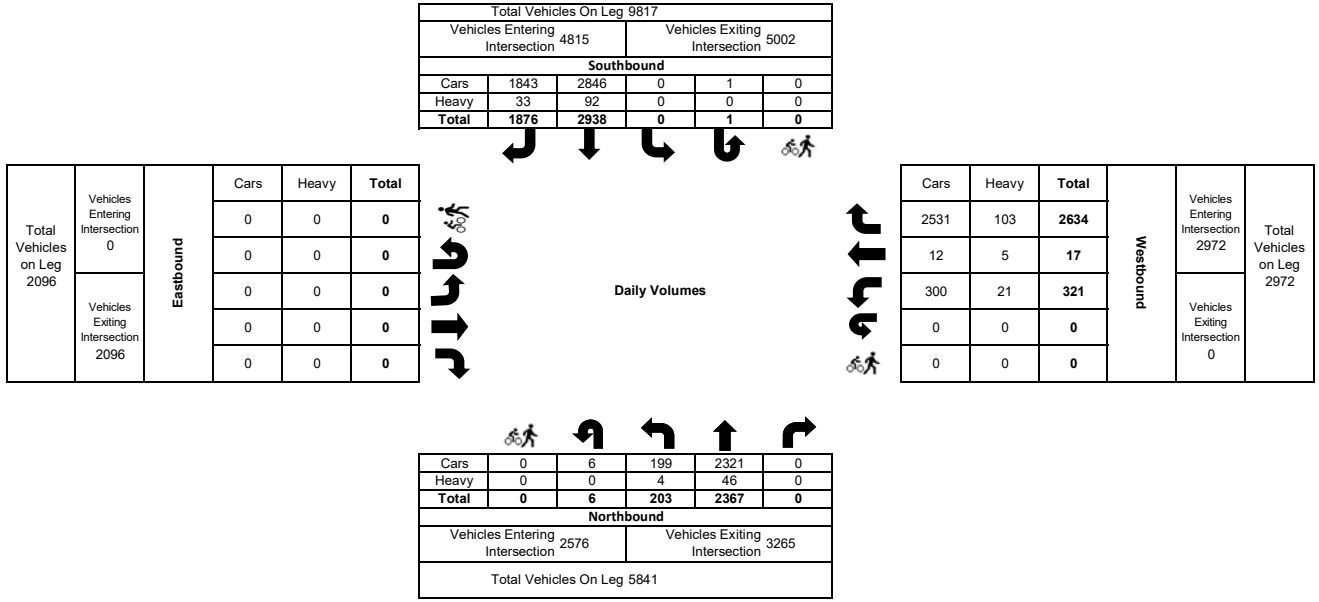
## 04 HWY 10 North Ramps and Armstorng Blvd
## Ramsey MN
## Wednesday, October 14, 2020

### 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

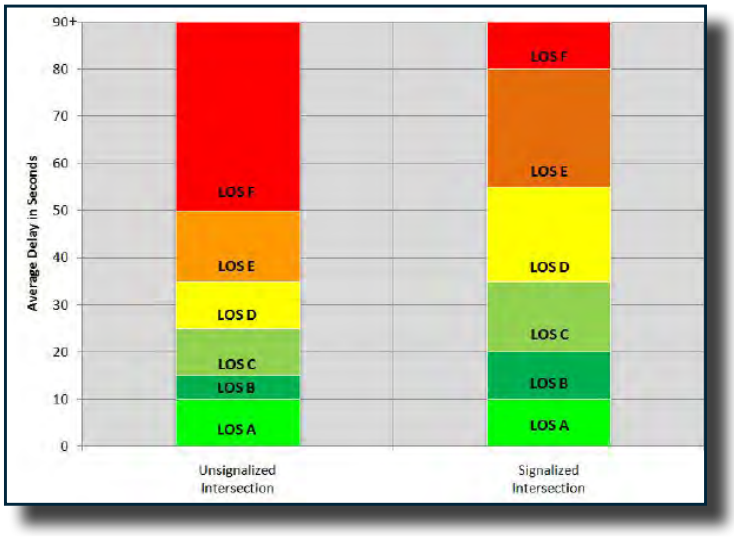
- **Number of Lanes.**
- **Traffic Volumes.**
- **Intersection Control (stop sign, signal, roundabout, interchange.)**
- **Amount of access on a corridor.**
- **Percentage of turning traffic.**
- **Traffic signal cycle length (green time devoted to each approach) and phasing (one green for all approach 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



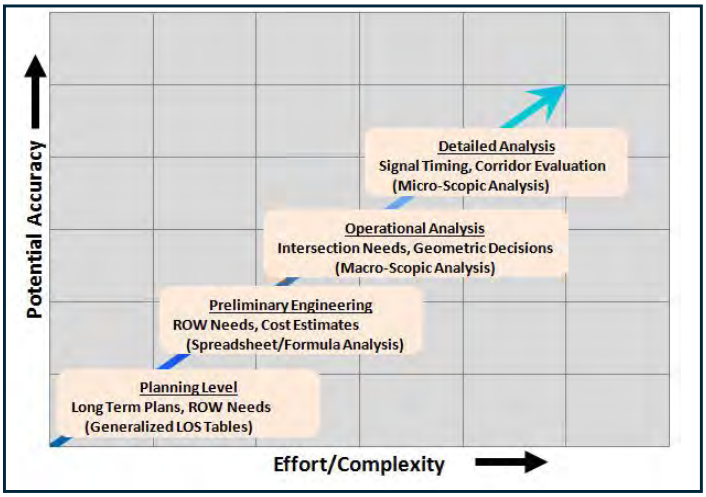
LOS F = Unacceptable

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.

Generated with PTV VISTRO
Version 2020 (SP 0-3)

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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

Generated with PTV VISTRO
Version 2020 (SP 0-3)

Spack SOLUTIONS

**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 | | | | | | | |

Generated with PTV VISTRO
Version 2020 (SP 0-3)

Spack SOLUTIONS

**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 | | | | | | | | | | | |

Generated with PTV VISTRO
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): | 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 | | | |

Generated with PTV VISTRO
Version 2020 (SP 0-3)

Spack SOLUTIONS

**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 | | | | | | | | | | | |

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 | 1.0000 | 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 | | | |

Generated with PTV VISTRO
Version 2020 (SP 0-3)

Spack SOLUTIONS

**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 | | | | | | | |

Generated with PTV VISTRO
Version 2020 (SP 0-3)

Spack SOLUTIONS

**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)

Spack SOLUTIONS

**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 |

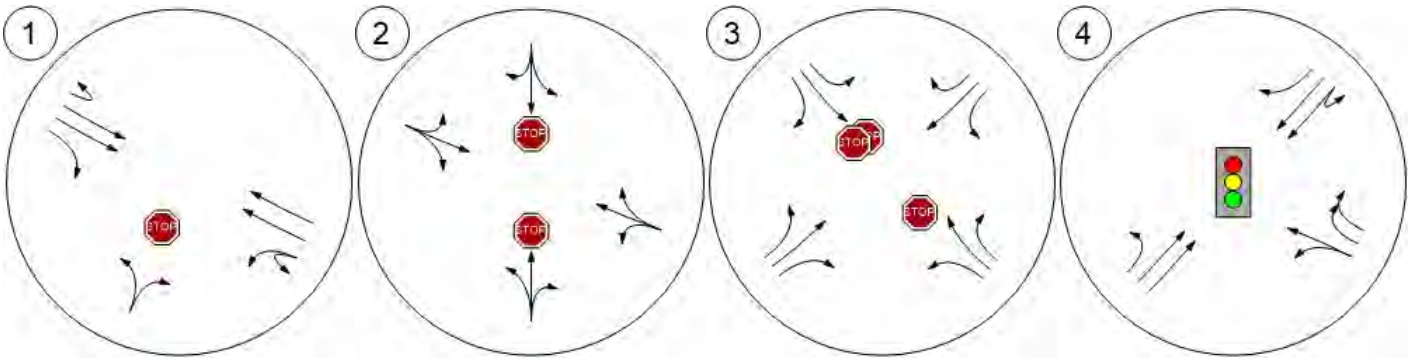
## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | - | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 5 | 6 | - | 8 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |



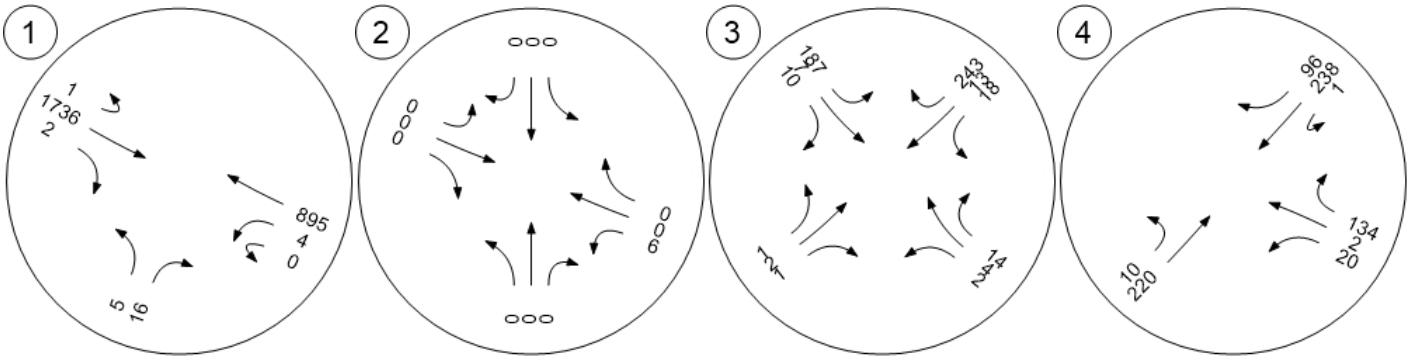
## Lane Configuration and Traffic Control



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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**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 | | | | |

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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 | 7.76 | 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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**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 |

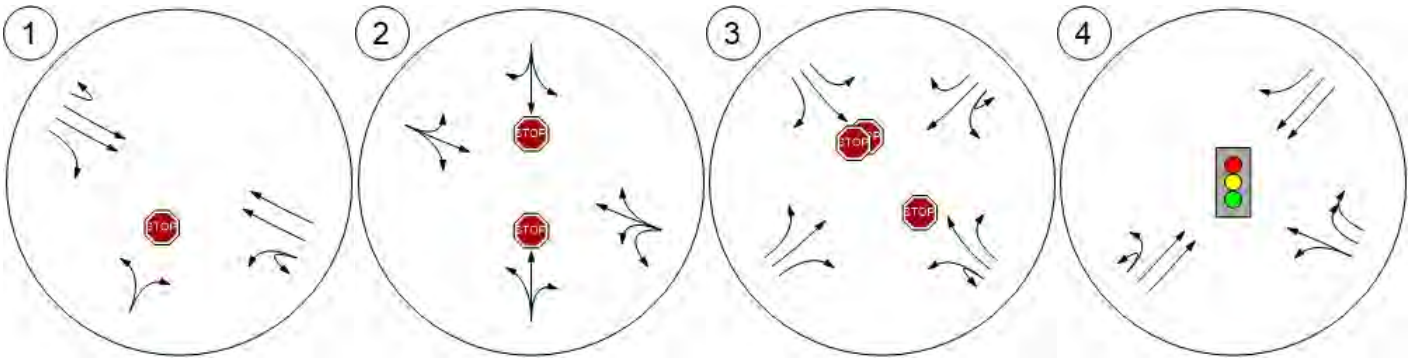
## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | - | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 5 | 6 | - | 8 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |



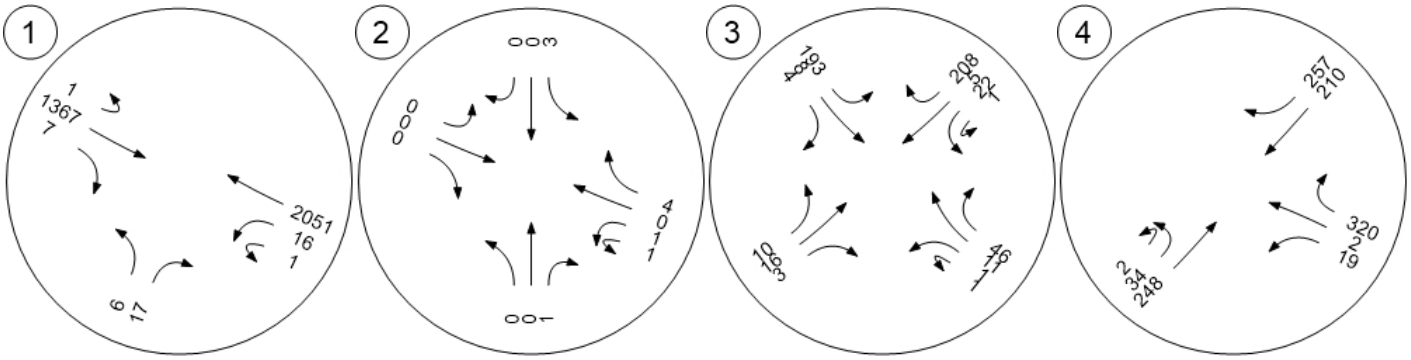
## Lane Configuration and Traffic Control



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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Version 2020 (SP 0-3)

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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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**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 | | | | | | | | | | | |

Generated with PTV VISTRO
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): | 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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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 | 1.0400 | 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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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 | 0.01 | 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 |

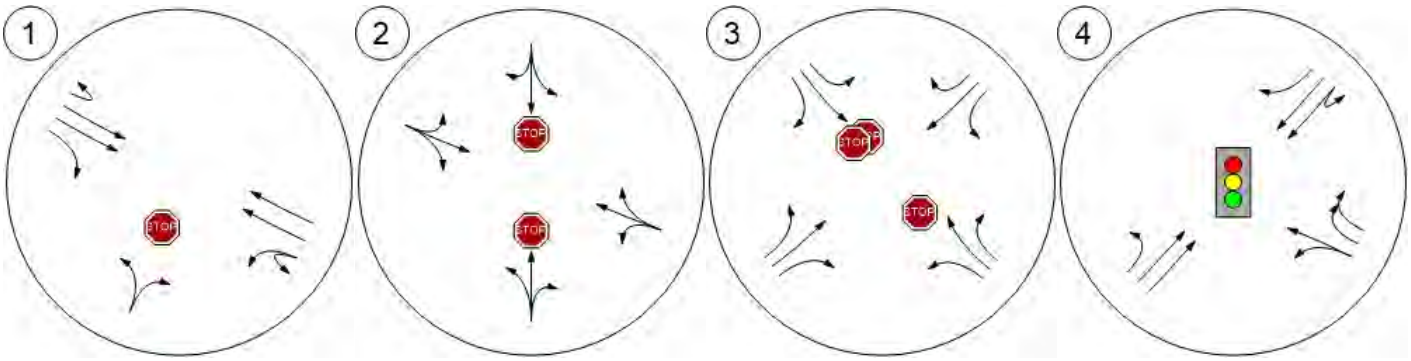
## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | - | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 5 | 6 | - | 8 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |



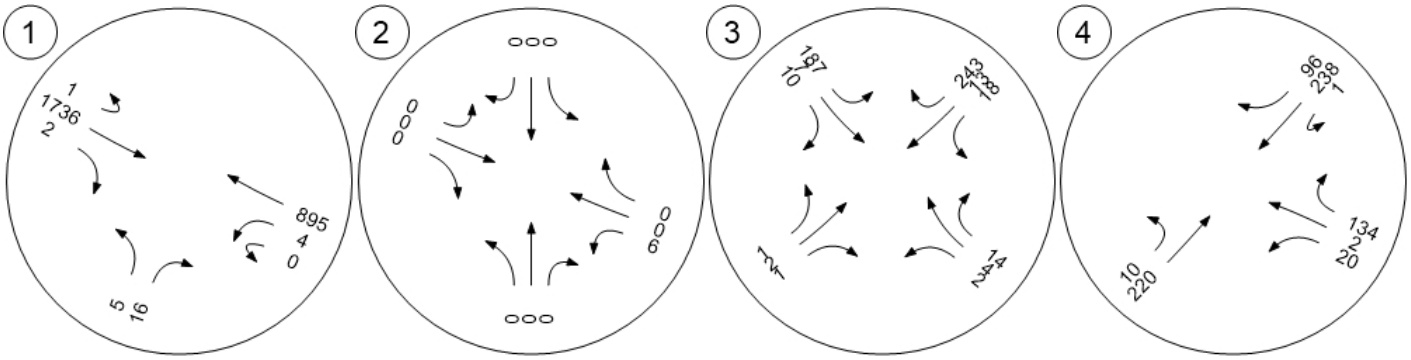
## Lane Configuration and Traffic Control



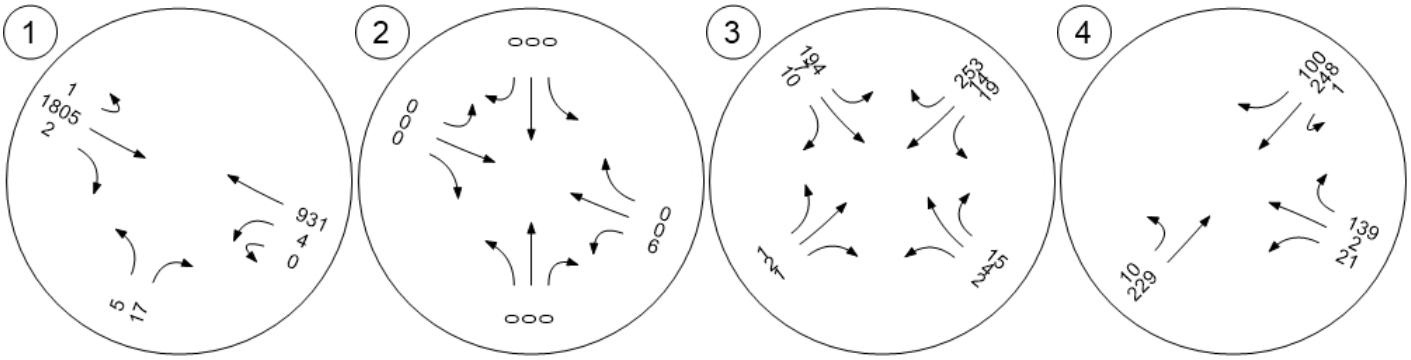
Traffic Volume - Base Volume



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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**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): | 11.7 |
| 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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**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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**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 | | | |

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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 | 0.00 | 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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**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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Version 2020 (SP 0-3)

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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 |

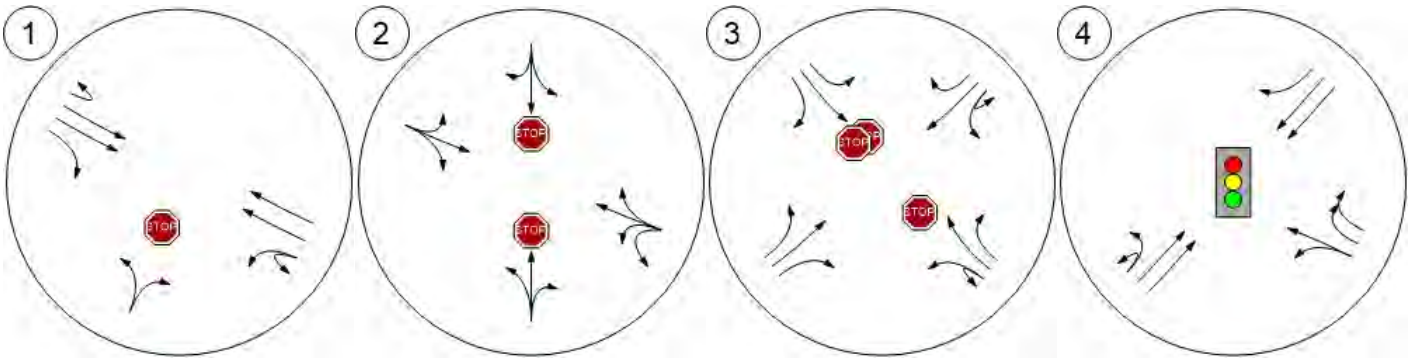
## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | - | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 5 | 6 | - | 8 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |



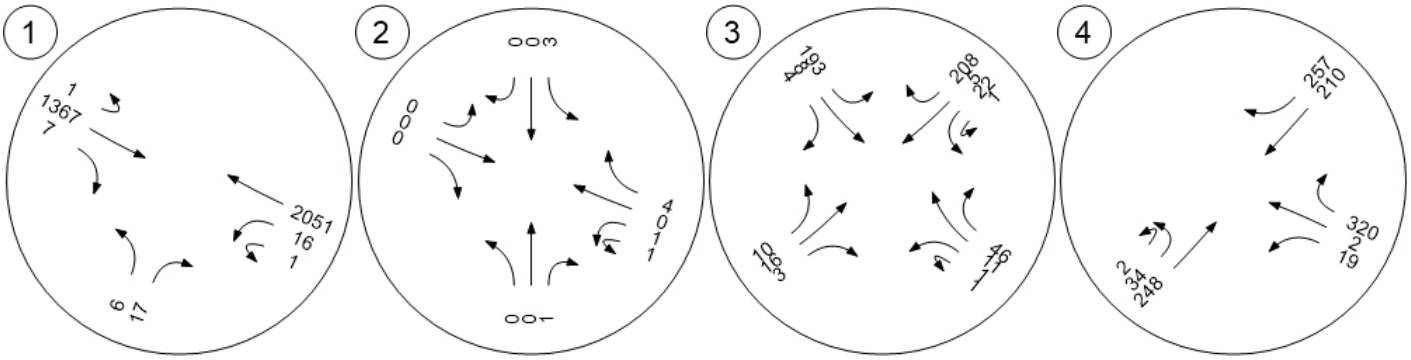
## Lane Configuration and Traffic Control



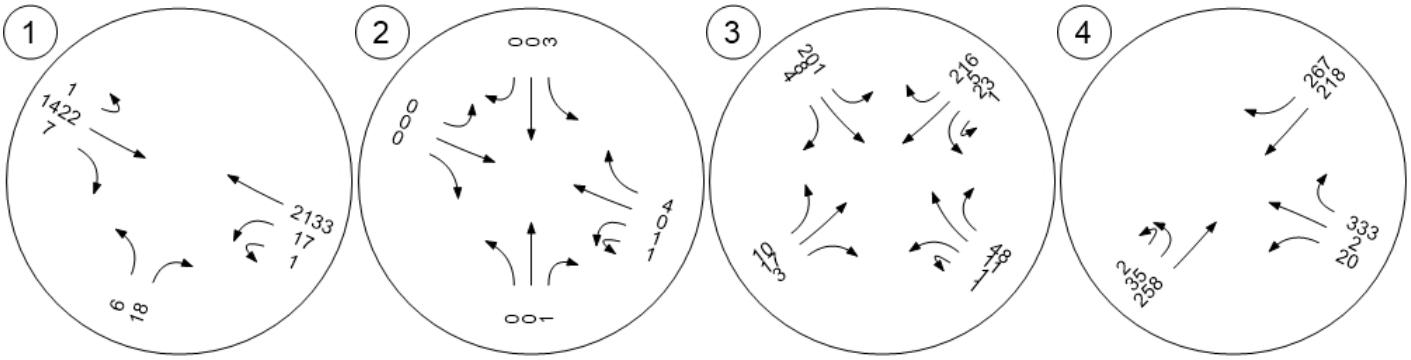
Traffic Volume - Base Volume



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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Version 2020 (SP 0-3)

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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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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 | 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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Version 2020 (SP 0-3)

Spack SOLUTIONS

**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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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): | 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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Version 2020 (SP 0-3)

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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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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 | 0.01 | 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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Version 2020 (SP 0-3)

**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 |

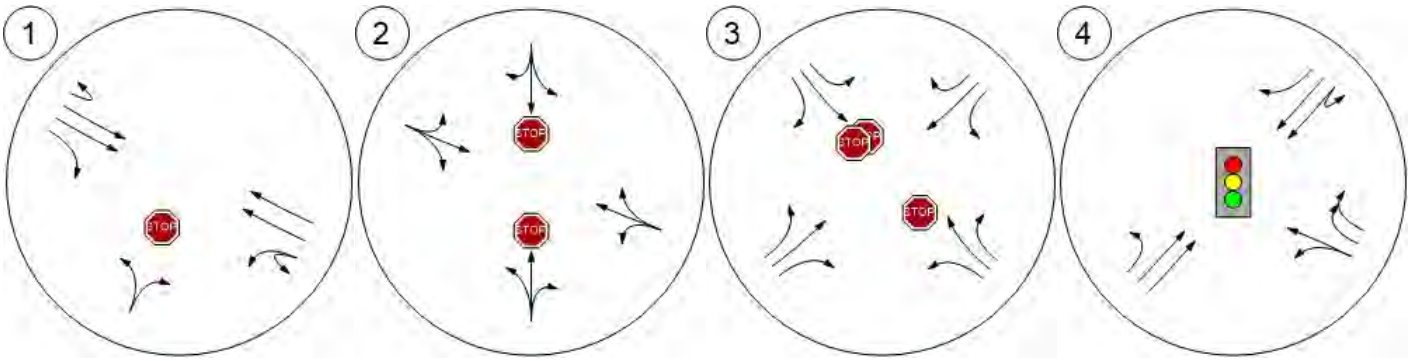
## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | - | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 5 | 6 | - | 8 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |



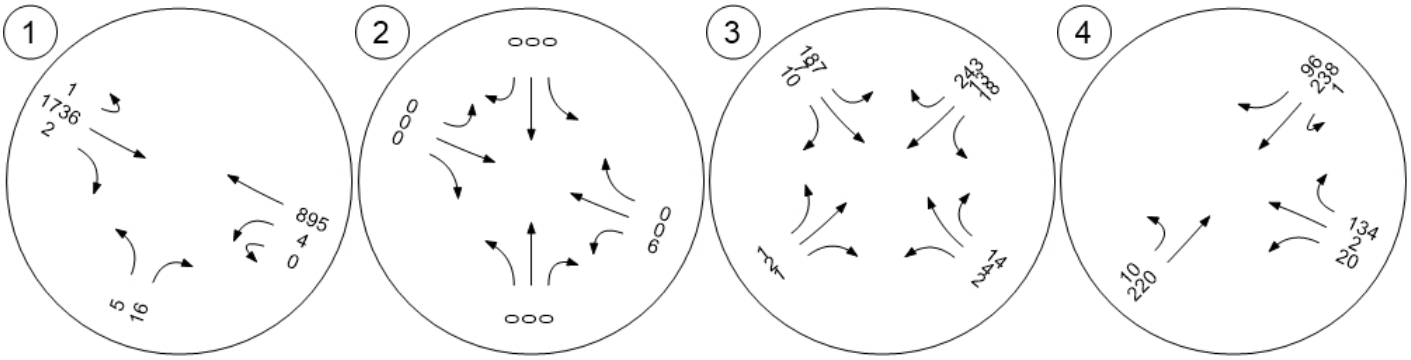
## Lane Configuration and Traffic Control



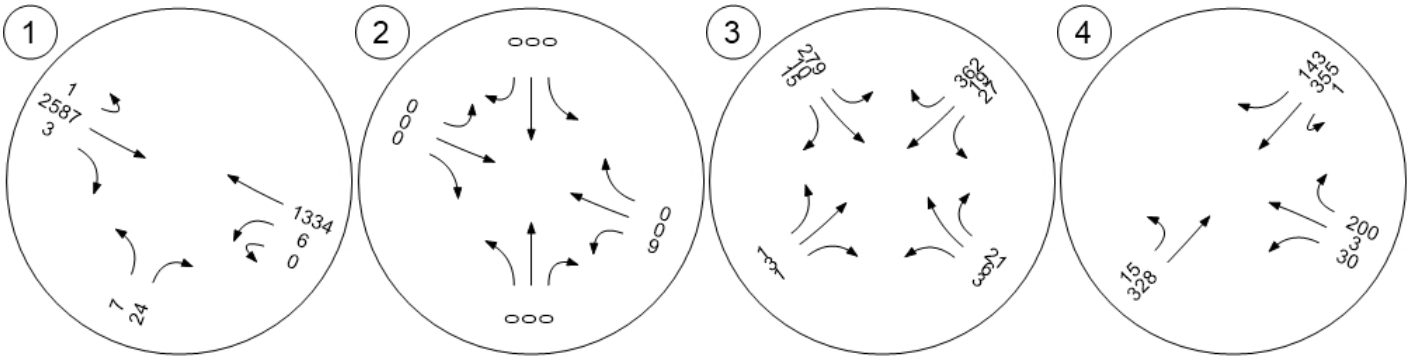
Traffic Volume - Base Volume



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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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 | 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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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 | 0.04 | 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 |

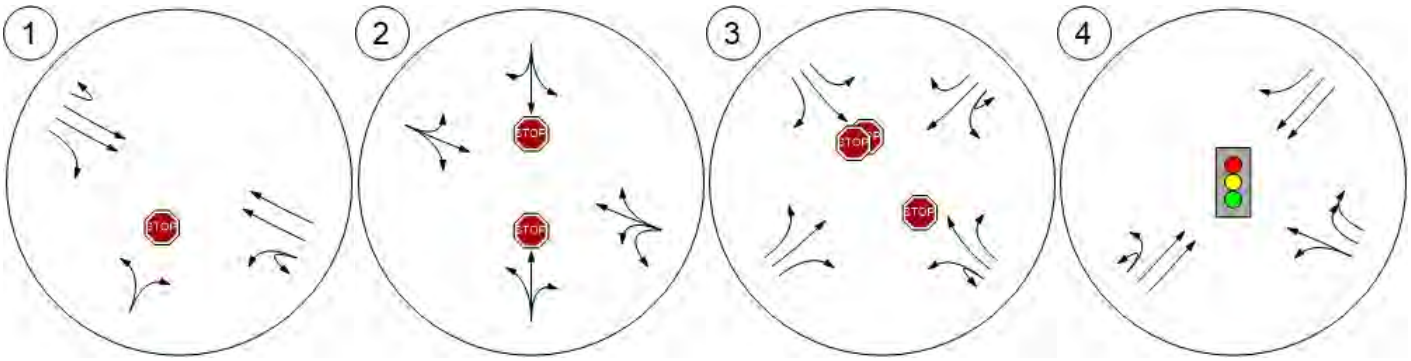
## Sequence

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ring 1 | - | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 2 | 5 | 6 | - | 8 | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ring 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |



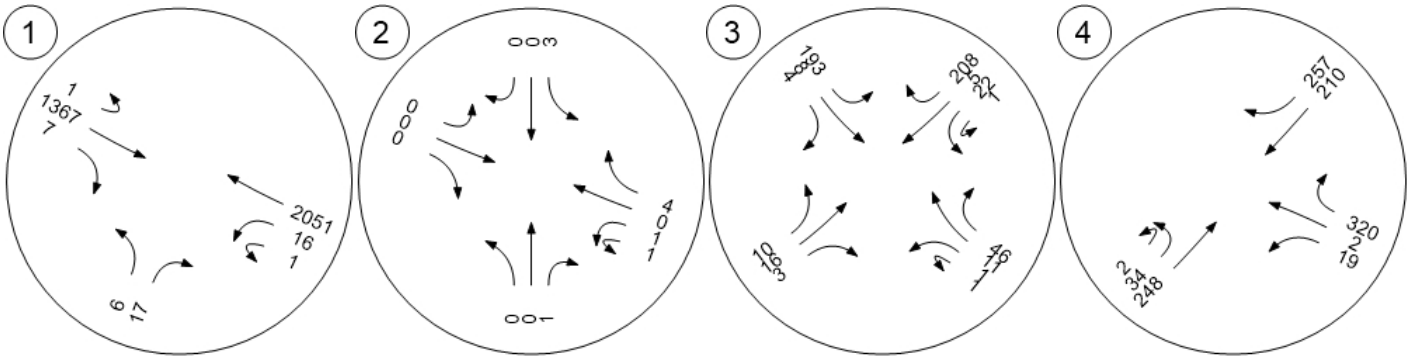
## Lane Configuration and Traffic Control



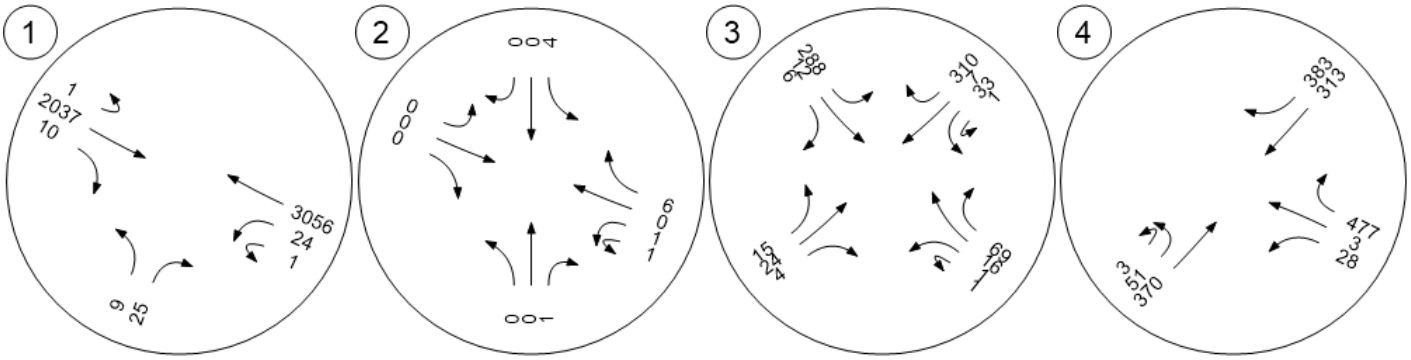
Traffic Volume - Base Volume



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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Version 2020 (SP 0-3)

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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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Version 2020 (SP 0-3)

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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 | | | | | | | | | | | |

Generated with PTV VISTRO
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): | 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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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 | 0.01 | 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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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 | 1.0400 | 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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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 | 0.01 | 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 | | | | | | | |

Generated with PTV VISTRO
Version 2020 (SP 0-3)

**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**

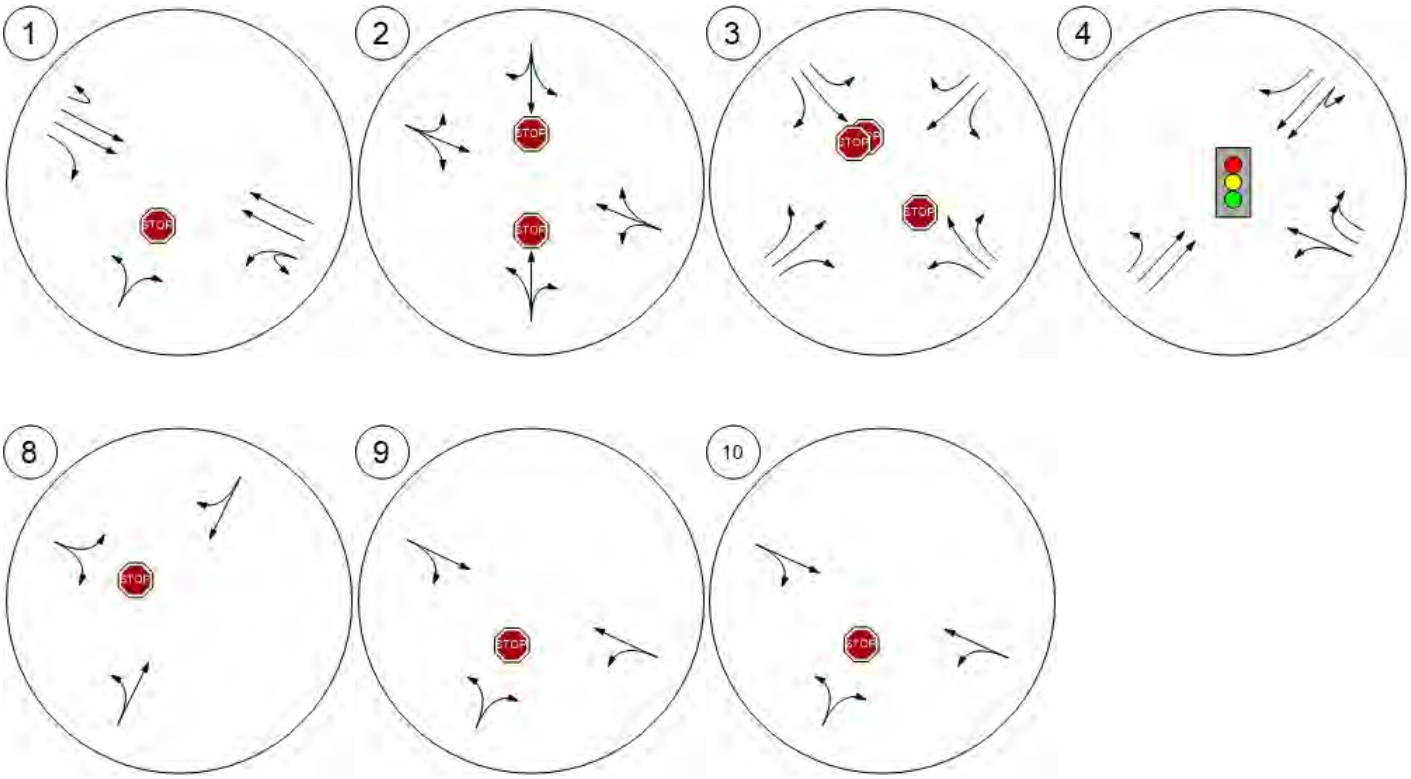
| Priority Scheme | Stop | Free | Free |
|---|---|---|---|
| Flared Lane | No | | |
| Storage Area [veh] | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | No | | |
| Number of Storage Spaces in Median | 0 | 0 | 0 |

**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 | | | | | |

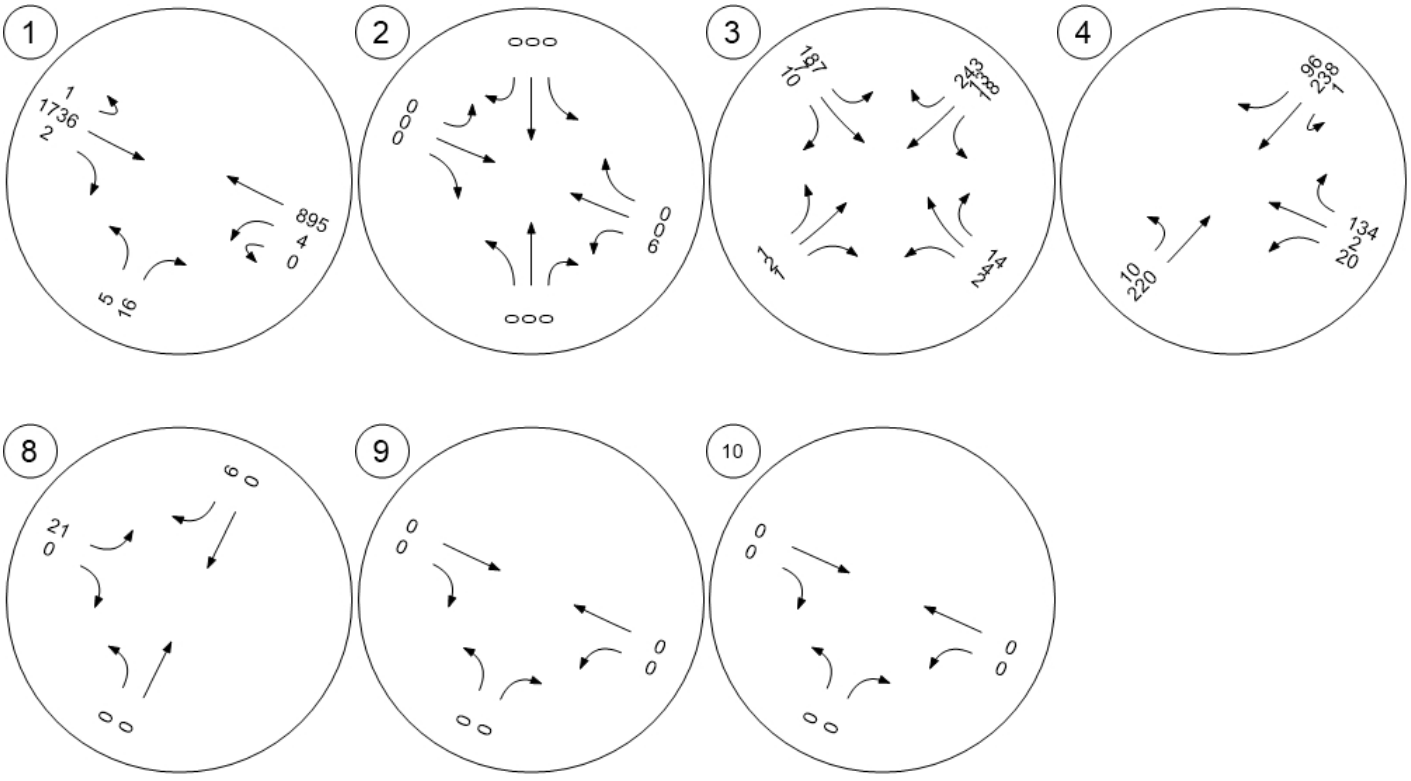
## Lane Configuration and Traffic Control



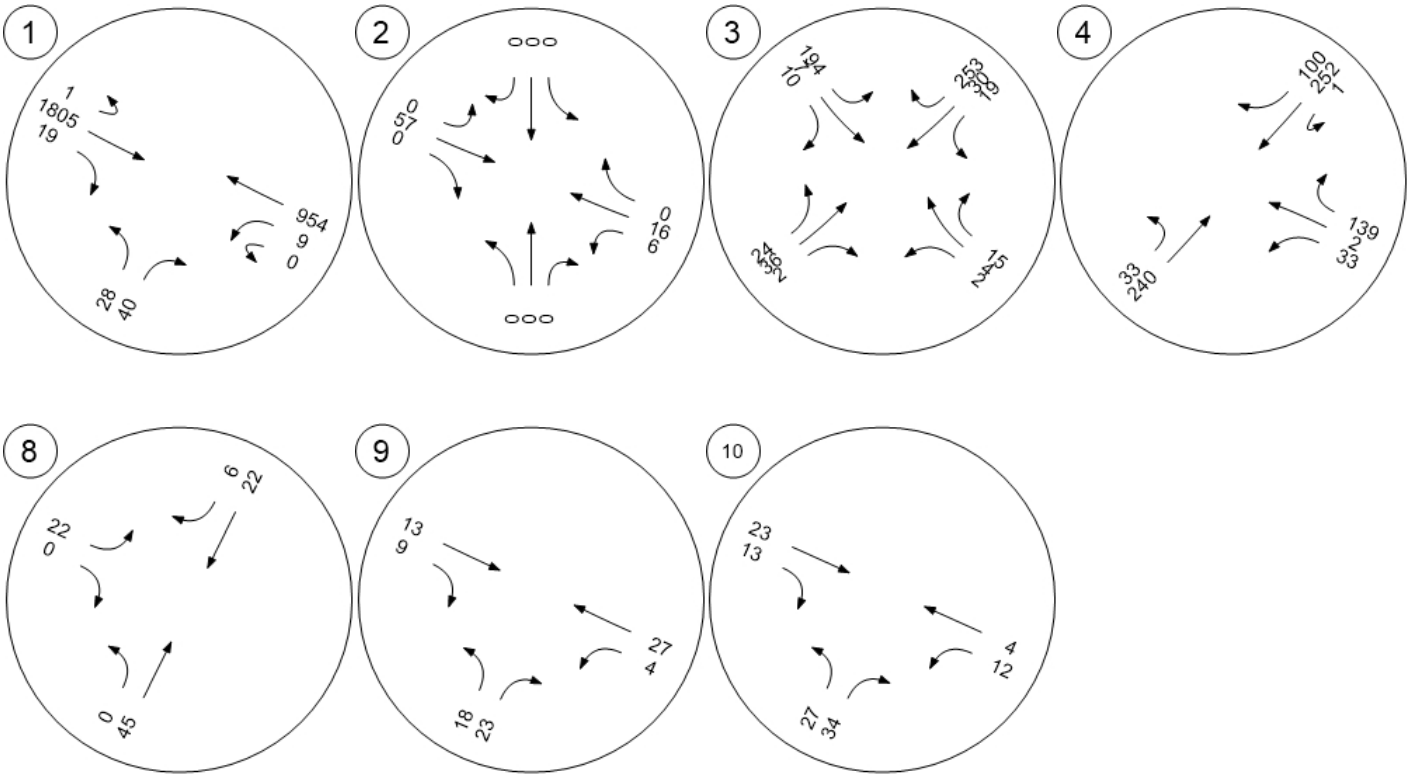
Traffic Volume - Base Volume





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**

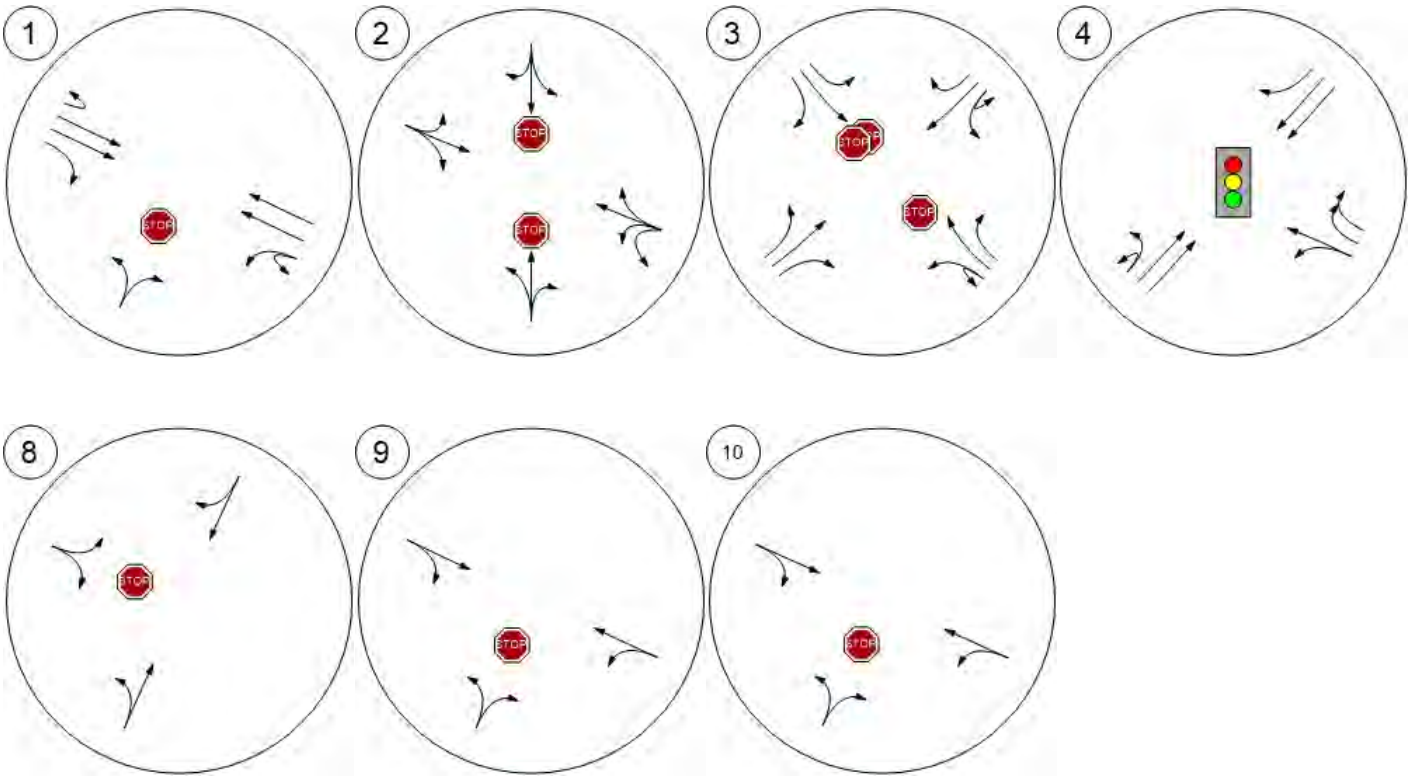
| Priority Scheme | Stop | Free | Free |
|---|---|---|---|
| Flared Lane | No | | |
| Storage Area [veh] | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | No | | |
| Number of Storage Spaces in Median | 0 | 0 | 0 |

**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 | | | | | |

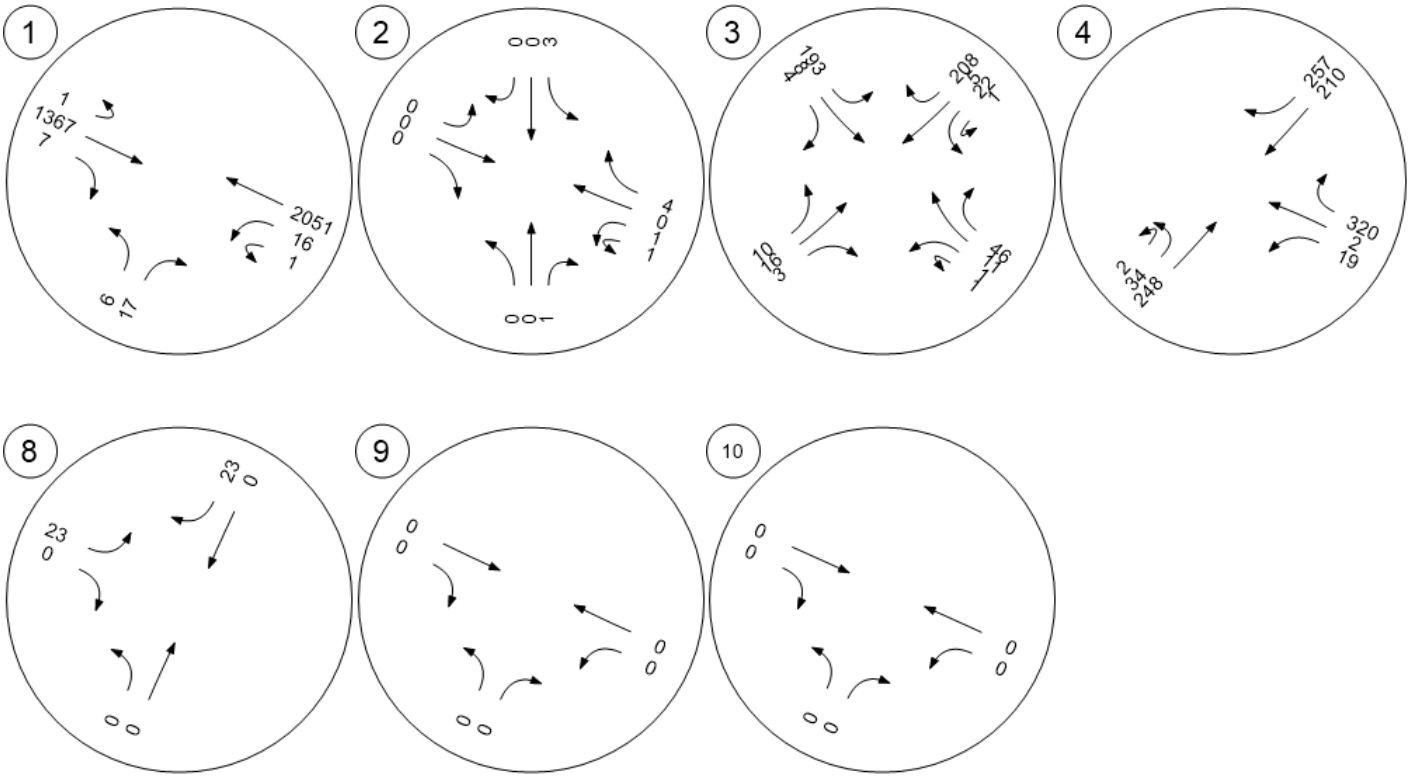
Lane Configuration and Traffic Control



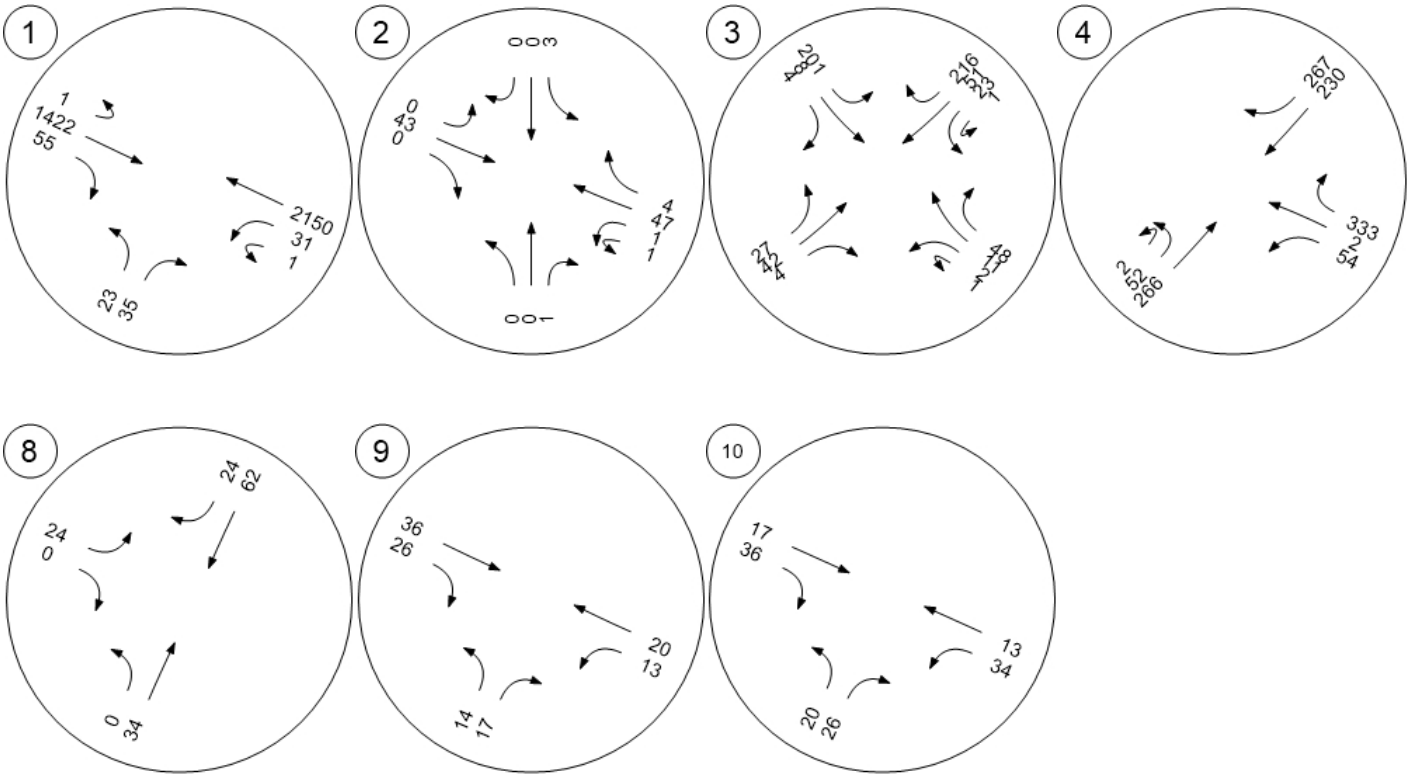
Traffic Volume - Base Volume



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 | | |

Generated with PTV VISTRO
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 | 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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Version 2020 (SP 0-3)

Spack SOLUTIONS

**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 | | | | | | | | | | | |

Generated with PTV VISTRO
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): | 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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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 | 0.02 | 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 | | | |

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 | 0.01 | 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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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): | 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**

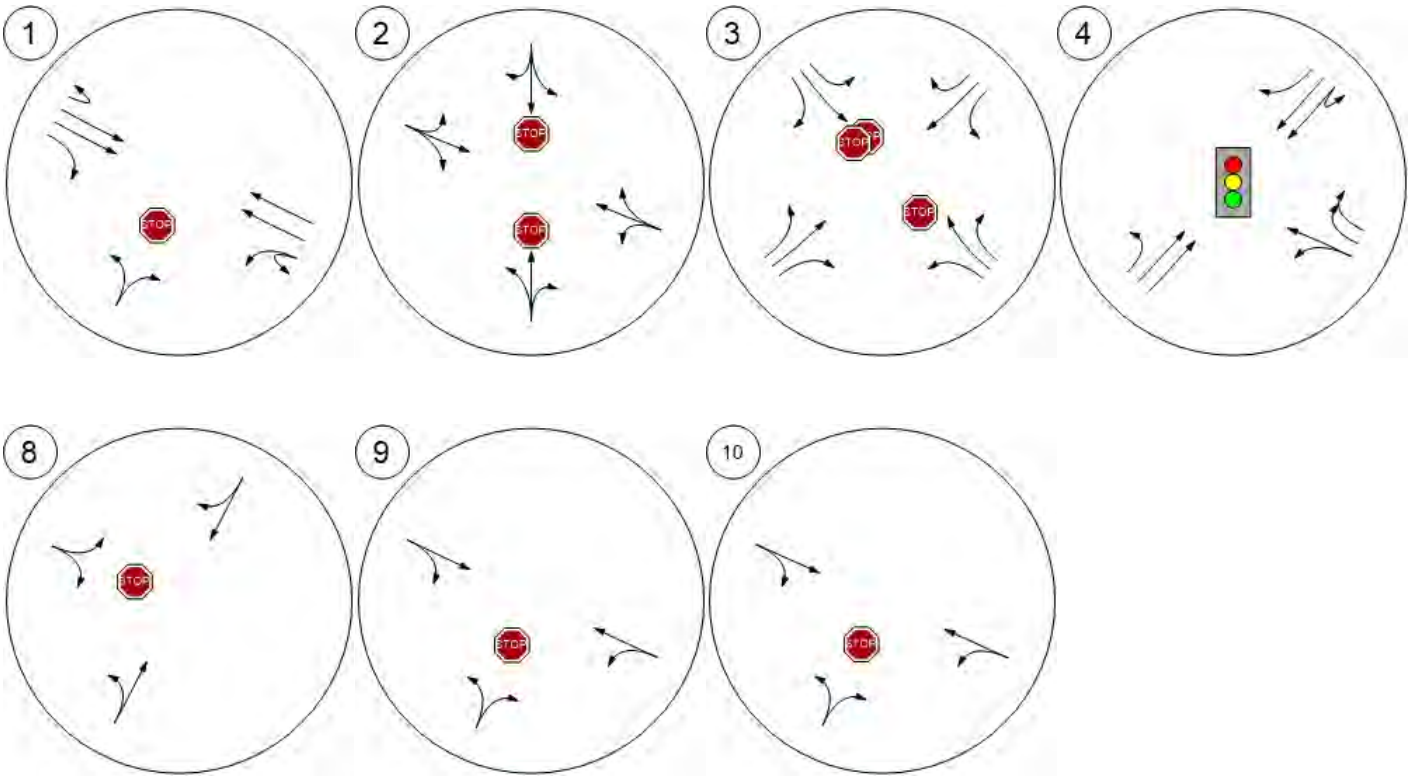
| Priority Scheme | Stop | Free | Free |
|---|---|---|---|
| Flared Lane | No | | |
| Storage Area [veh] | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | No | | |
| Number of Storage Spaces in Median | 0 | 0 | 0 |

**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 | | | | | |

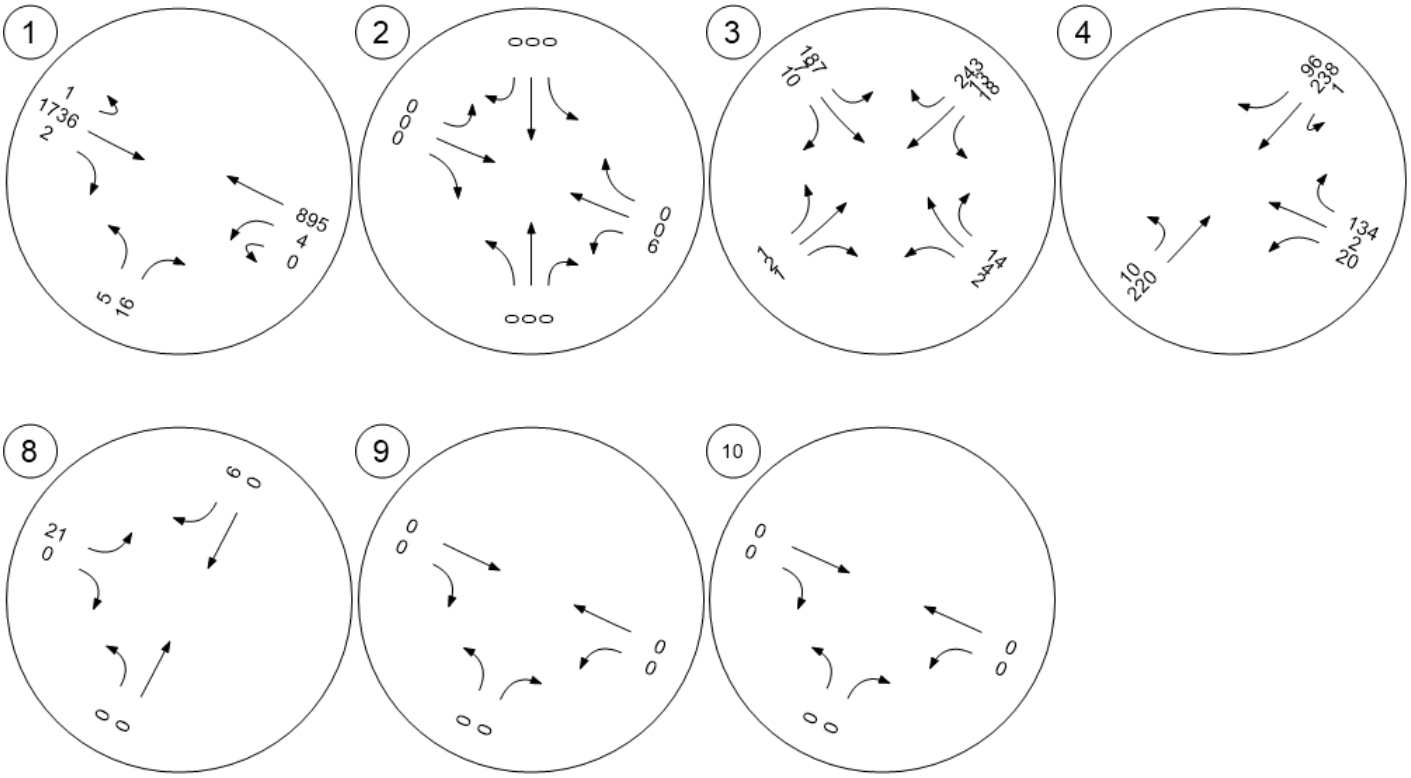
## Lane Configuration and Traffic Control



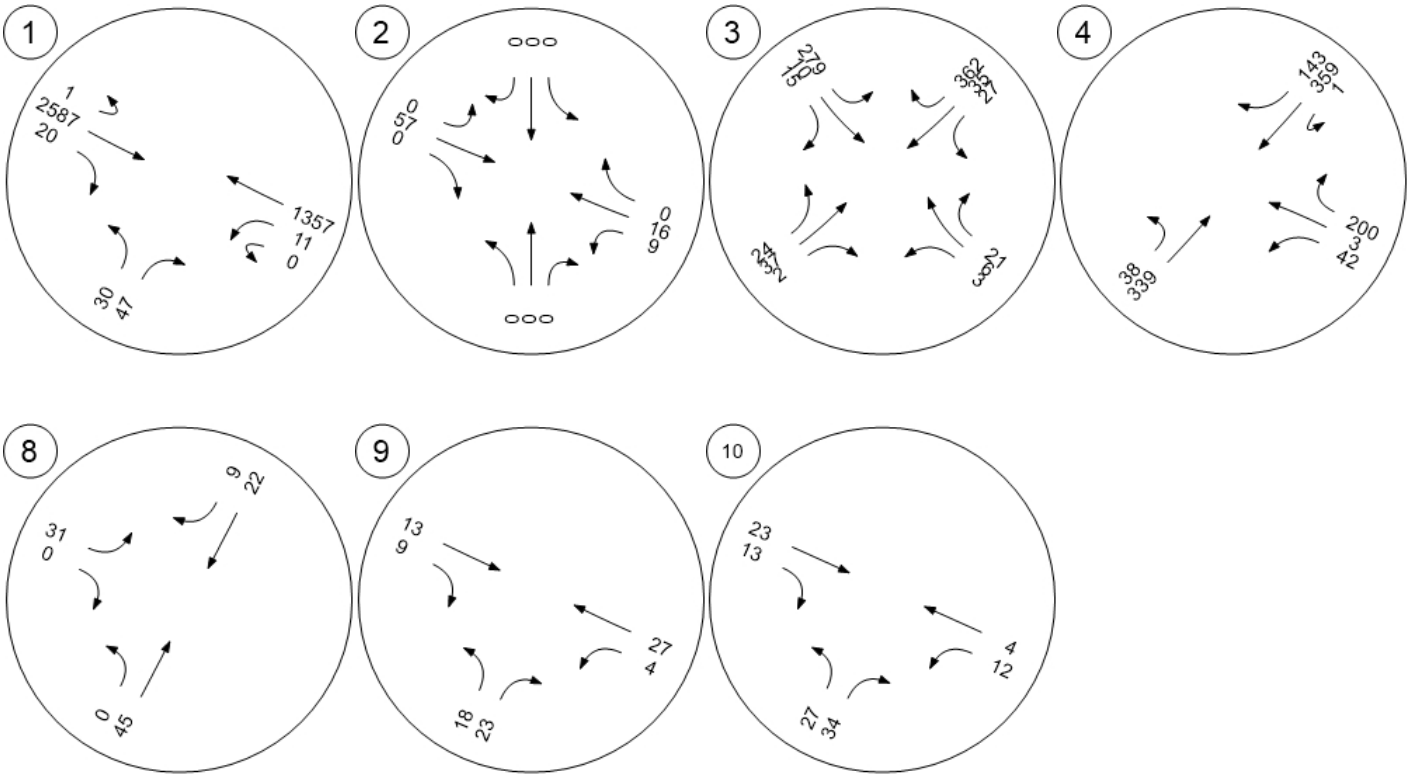
Traffic Volume - Base Volume



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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Version 2020 (SP 0-3)

Spack SOLUTIONS

**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**

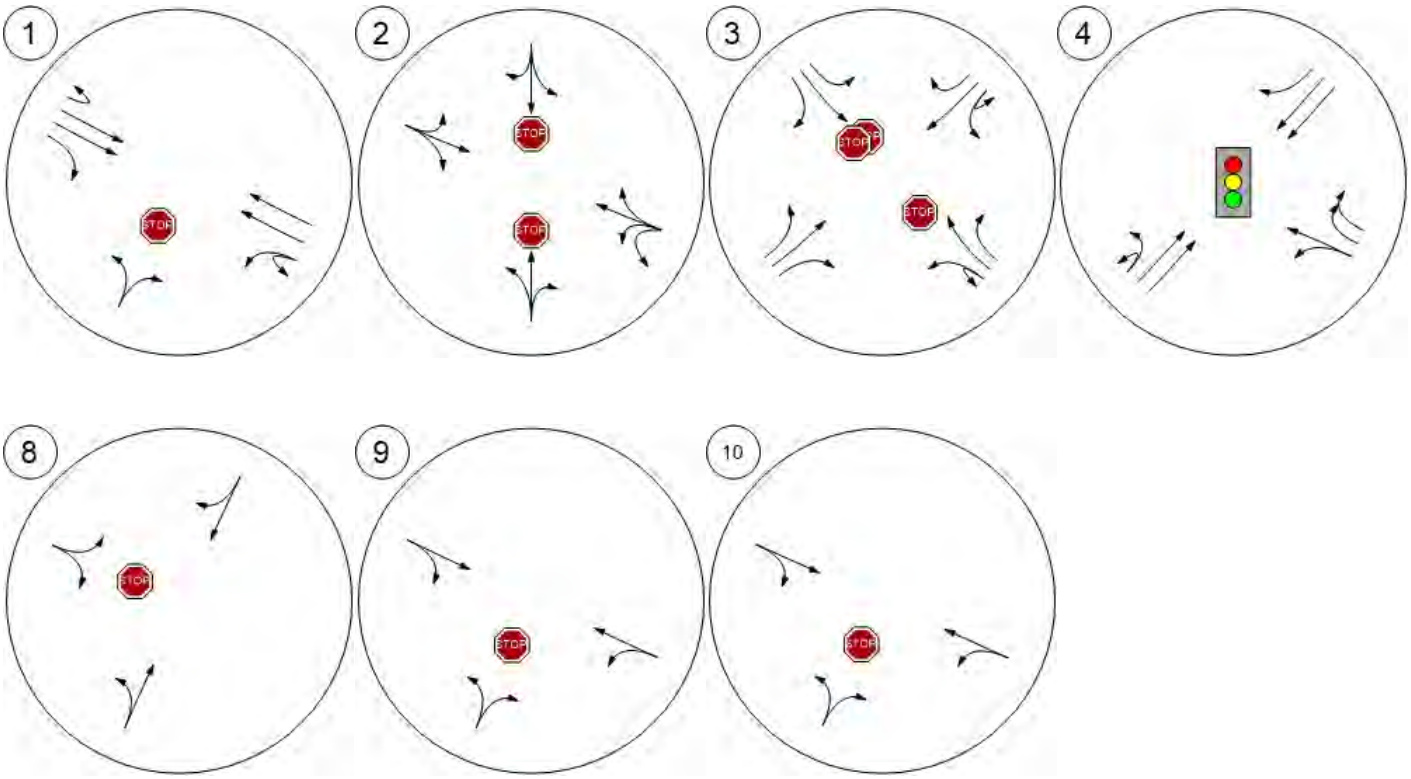
| Priority Scheme | Stop | Free | Free |
|---|---|---|---|
| Flared Lane | No | | |
| Storage Area [veh] | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | No | | |
| Number of Storage Spaces in Median | 0 | 0 | 0 |

**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 | | | | | |

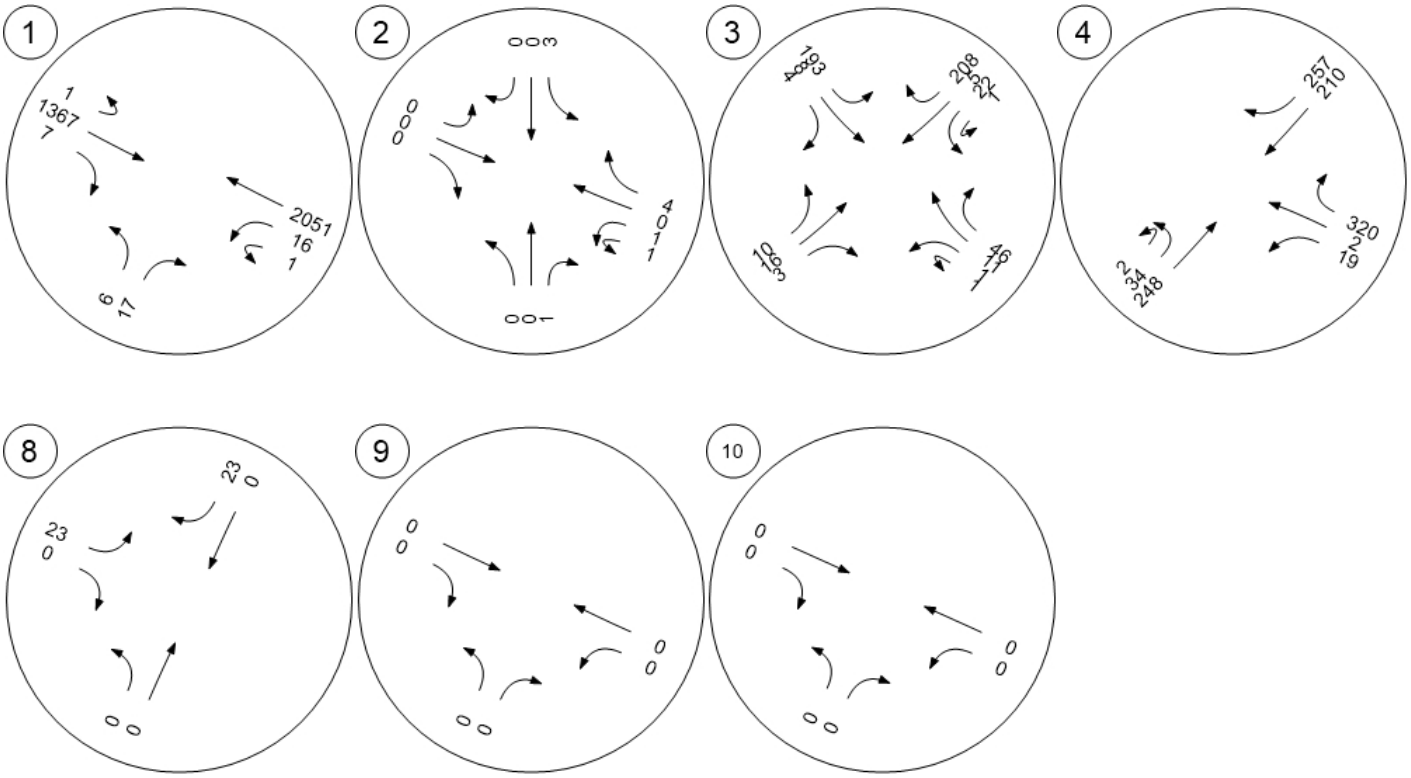
## Lane Configuration and Traffic Control



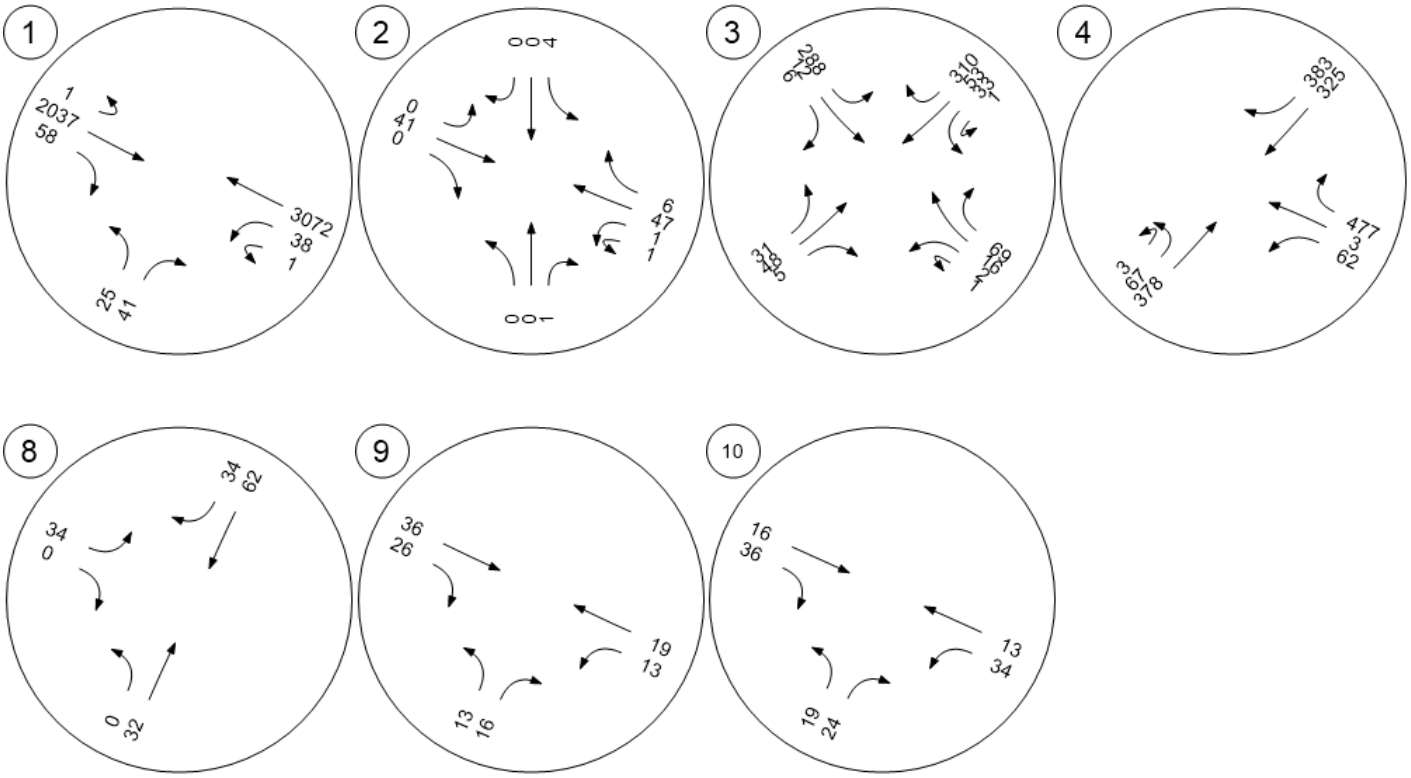
Traffic Volume - Base Volume



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 | | |

Generated with PTV VISTRO
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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Version 2020 (SP 0-3)

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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 | | | | | | | | | | | |

Generated with PTV VISTRO
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)

Spack SOLUTIONS

**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 | | | |

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 | 0.01 | 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)

Spack SOLUTIONS

**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)

Spack SOLUTIONS

**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**

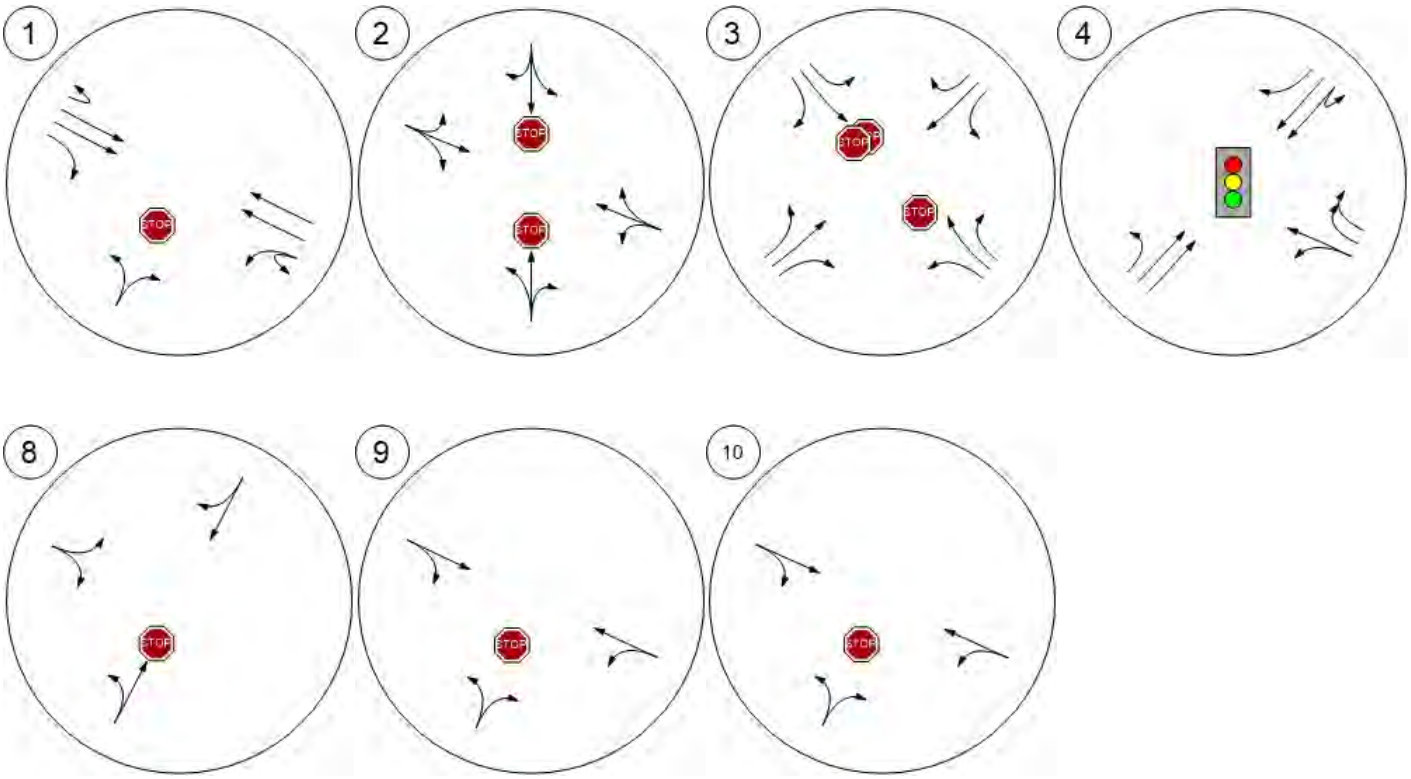
| Priority Scheme | Stop | Free | Free |
|---|---|---|---|
| Flared Lane | No | | |
| Storage Area [veh] | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | No | | |
| Number of Storage Spaces in Median | 0 | 0 | 0 |

**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 | | | | | |

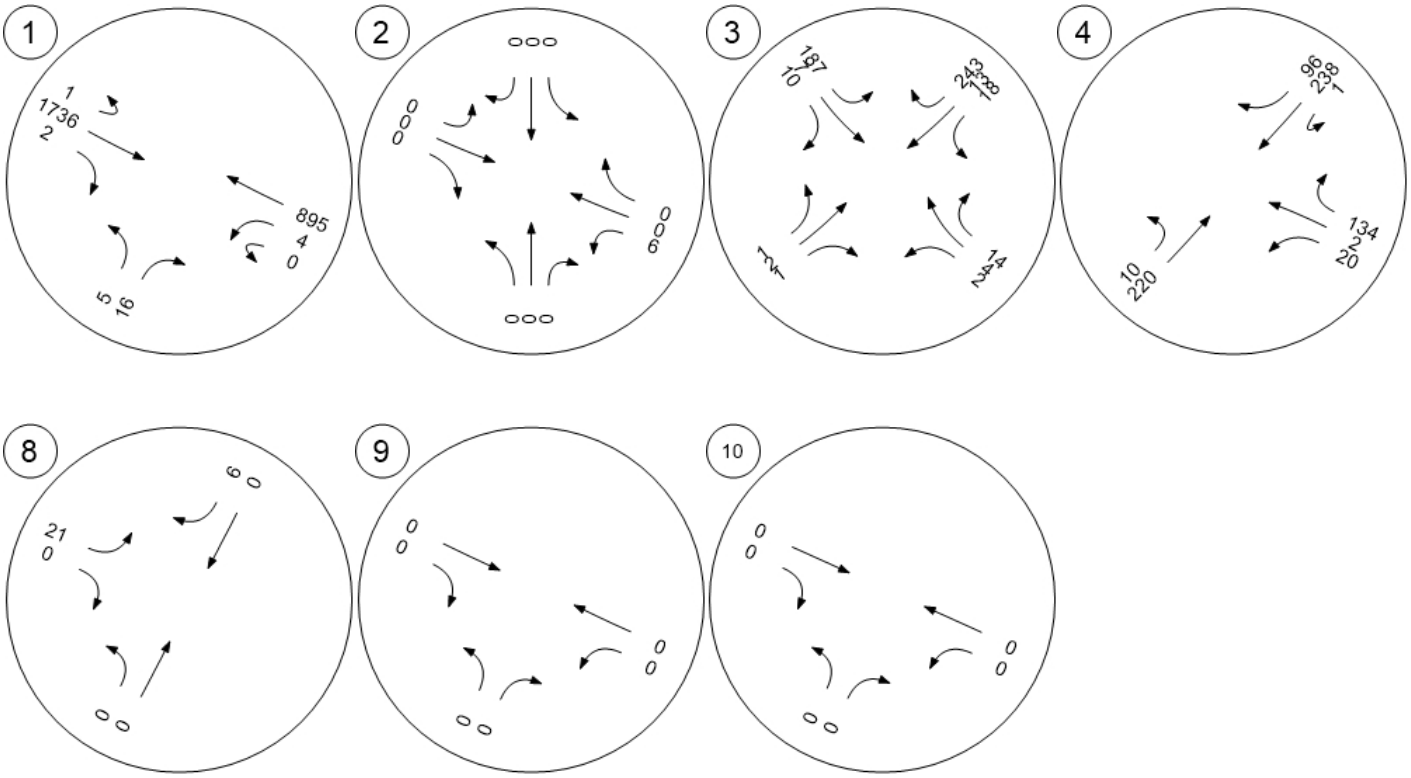
## Lane Configuration and Traffic Control



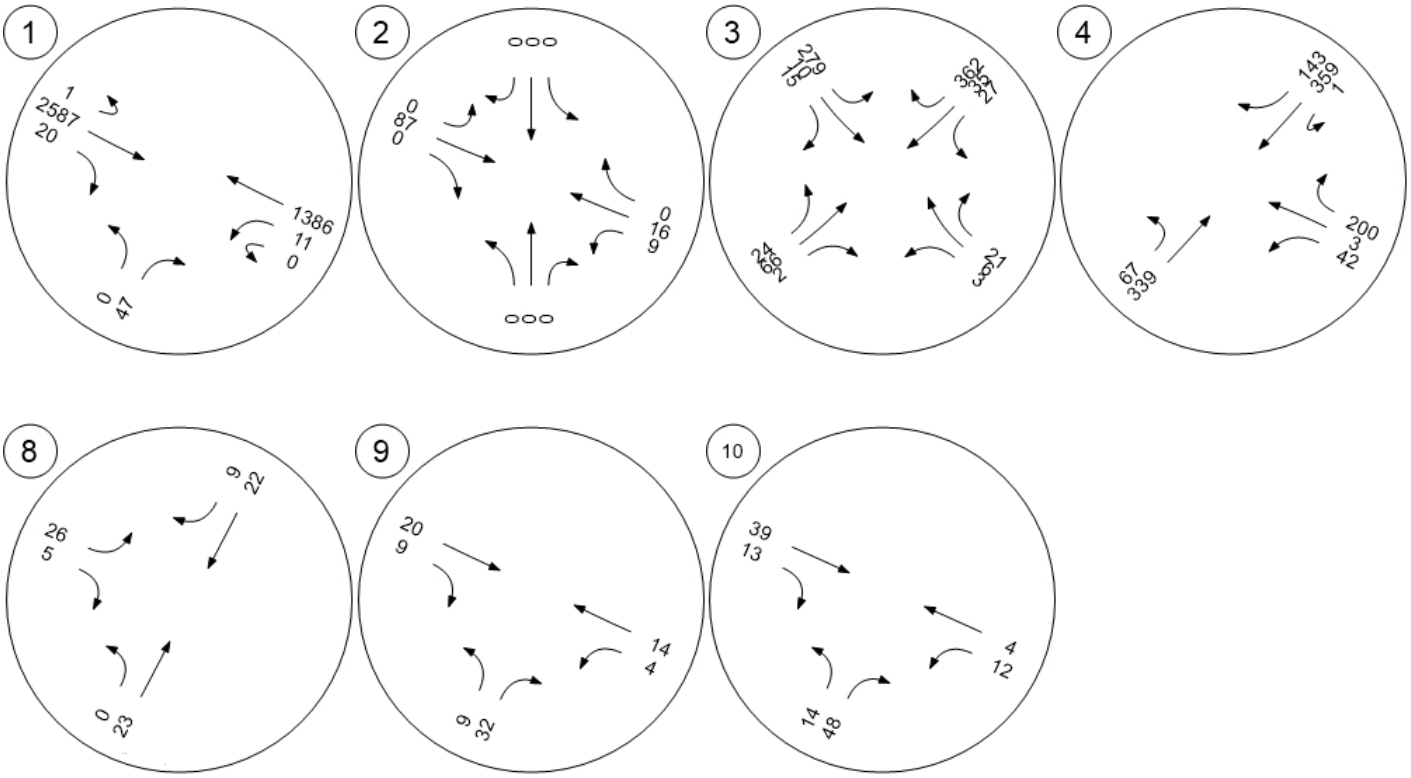
Traffic Volume - Base Volume



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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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 | 0.20 | 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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Version 2020 (SP 0-3)

**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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Version 2020 (SP 0-3)

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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**

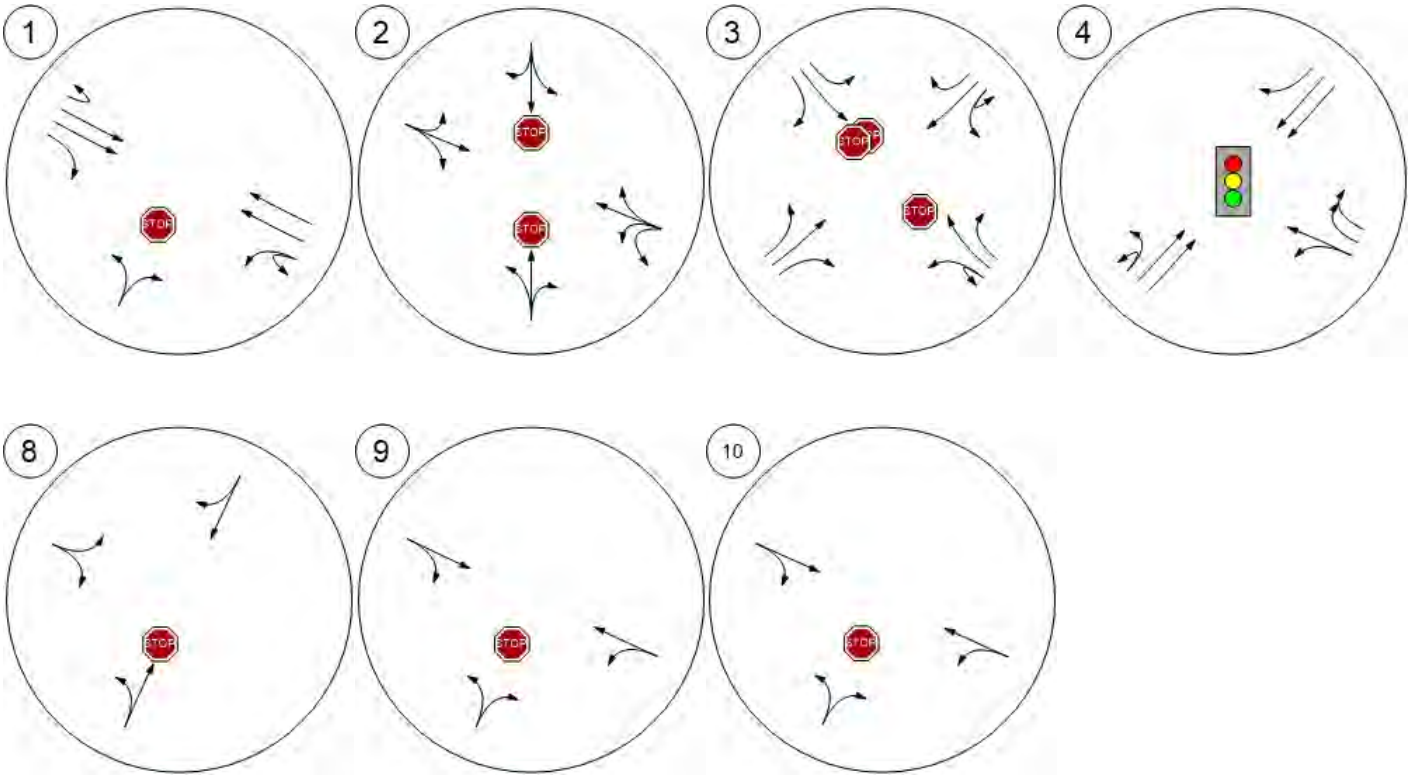
| Priority Scheme | Stop | Free | Free |
|---|---|---|---|
| Flared Lane | No | | |
| Storage Area [veh] | 0 | 0 | 0 |
| Two-Stage Gap Acceptance | No | | |
| Number of Storage Spaces in Median | 0 | 0 | 0 |

**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 | | | | | |

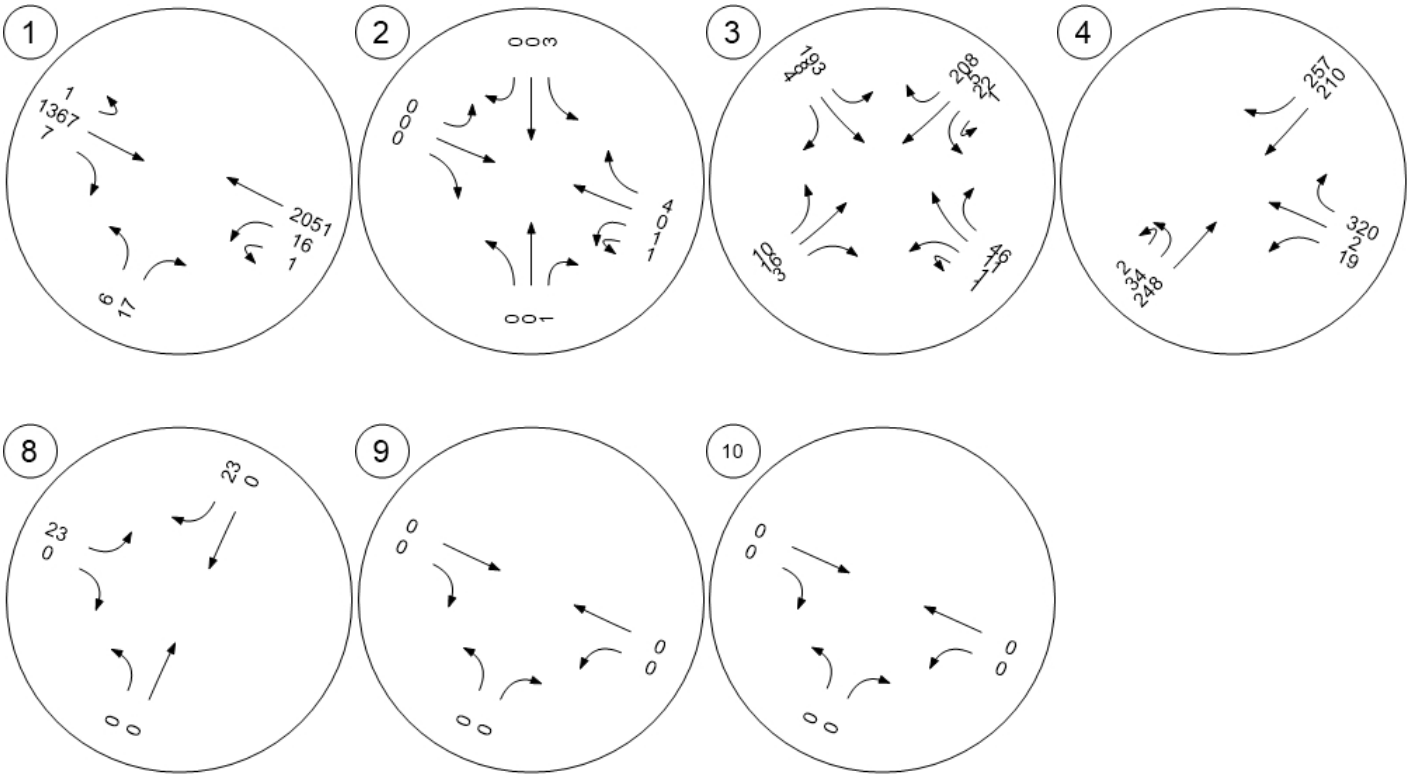
## Lane Configuration and Traffic Control



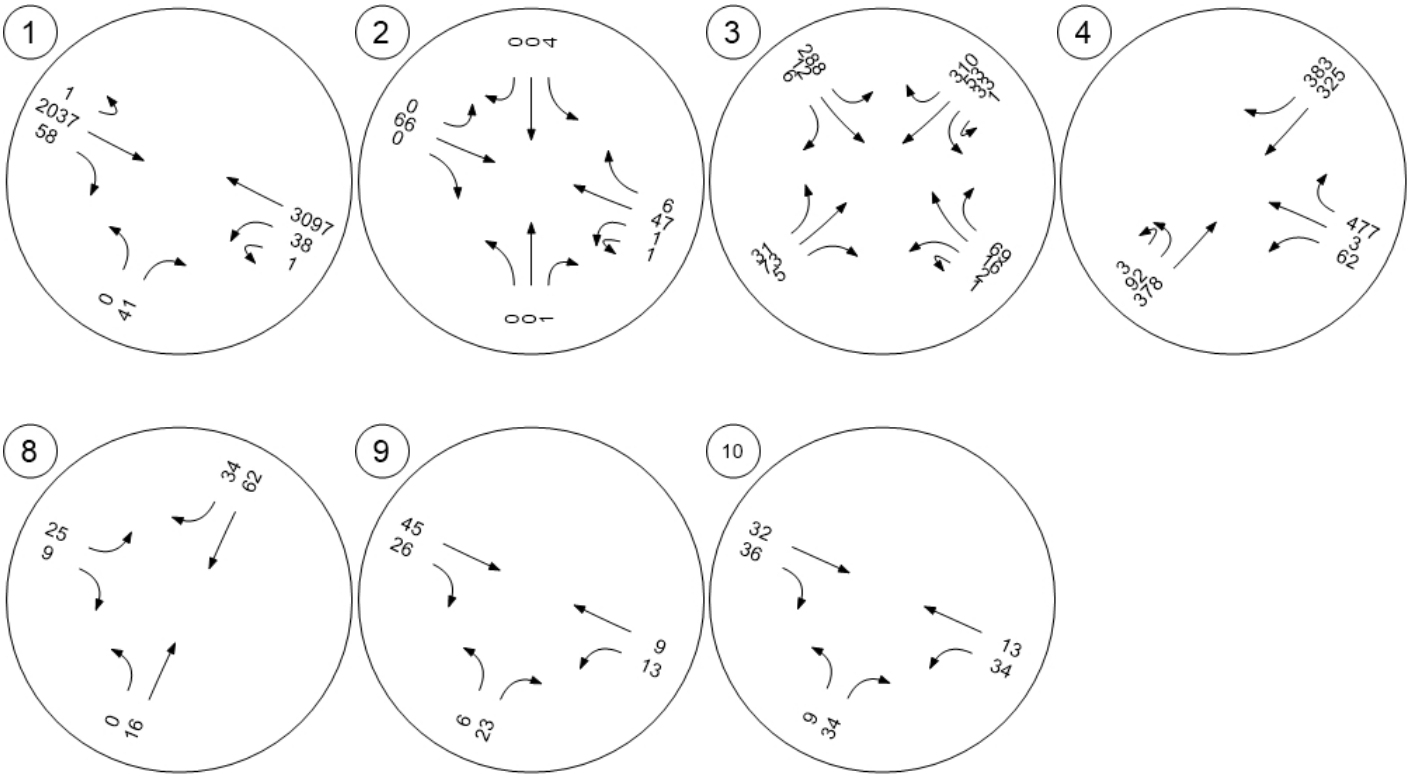
Traffic Volume - Base Volume



Traffic Volume - Future Total Volume



**Environmental Policy Board (EPB)** **5. 2.**

**Meeting Date:** 01/25/2021

**By:** Chris Anderson, Community Development

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**Information**

**Title:**

Review Preliminary Plat and Density Transitioning for Northfork Meadows, Case of Lennar (Project #20-135)

**Purpose/Background:**

The purpose of this case is to review a request from Lennar (the "Applicant") for a Preliminary Plat application for Northfork Meadows. The Subject Property is located east of Puma/Okapi Street and south of Alpine Drive and is approximately thirty-three (33) acres. The Subject Property has a split zoning with R-1 Residential (MUSA - Detached Single Family Homes) (80 foot wide lots) along the eastern and southern boundary, with the remainder of the property zoned R-1 Residential (MUSA - Detached Villas) (65 foot wide lots).

**Notification:**

The City attempted to notify Property Owners, as reflected in the Anoka County Property Records, within 700 feet of the Subject Property of the request.

The Public Hearing Notice was also properly posted in the Anoka County UnionHerald, the City's Official Newsletter.

**Observations/Alternatives:**

**Summary**

This project is a culmination of a few years of work with the property owner and Applicant. Staff worked with the Planning Commission, City Council, and Property Owner to amend the zoning and comprehensive plans to meet the Property Owner's vision for this area. City Staff has worked with the neighborhood directly to the east throughout that time, and this project represents a compromise scenario that both property owner, applicant, City Council, and residents were comfortable with at time of rezoning and preliminary plat.

Below is a summary of the project:

- Site Acreage: Approximately 33 acres
- Proposed Number of Lots: 88 lots (41 80-foot wide lots, 47 65-foot wide lots)
- Current Zoning: R-1 Residential (MUSA - Detached Single Family Homes) 80-foot wide lots (eastern and southern boundary), and R-1 Residential (MUSA - Detached Villa) 65-foot wide lots (remainder)
- Proposed Density: 3.35 units per acre

The Preliminary Plat appears to meet all of the bulk standards of the current zoning districts and does not propose a change to the Comprehensive Plan or approved zoning districts. The proposed plat also falls within the approved density range for low density residential subdivisions, from 1 - 4 units per acre.

**Roads and Access**

The proposed preliminary plat includes public roads with access points off of Puma Street (likely renamed Okapi Street in the future) to the west and an access off Alpine Drive to the north.

**Density Transitioning**

The attached plans show a berm separating the 80 foot wide lots on the eastern edge of the Subject Property from the adjacent, existing residential neighborhood. All adjacent residential units will be buffered with landscaping and a berm; however, as proposed, the plantings are deficient of the minimum requirement in City Code. The minimum

width of the transitioning corridor shall be thirty-five (35) feet (reduced from 45 feet with inclusion of a berm) and it shall contain at least four (4) evergreen trees, four (4) overstory trees, and four (4) ornamental trees (12 trees total) per every 100 feet of common boundary with the existing, adjacent R-1 Residential (Rural Developing) neighborhood.

The Applicant has objected to the required number of plantings within this transitional corridor, stating concerns with mortality, maintenance costs, and aesthetics all related to condensed planting area. They have provided an updated plan sheet with increased plantings, plus included information about existing trees that will be preserved (note that only those preserved trees within the 35 foot corridor shall be credited toward the transitioning requirements). Furthermore, some of the adjacent, existing residential lots have significant tree cover along the rear lot lines, which provides additional buffering (note that the Applicant is not including any 'off-site' existing trees in their tree count calculation). Nonetheless, the proposal is still deficient in terms of required trees.

Density transitioning is a zoning tool. It is intended to help 'transition' between existing, larger lot, lower density neighborhoods and new, smaller lot, higher density development. There are other tools that could be used to satisfy this requirement, such as matching lot sizes along the common boundary line(s). However, landscaping is typically the tool developers opt to use. Different from other, more typical landscape requirements, which are more about aesthetics, stormwater management, traffic calming, etc., landscaping for density transitioning is intentionally designed to be more dense. This helps create a buffer or transition immediately, rather than 10-20 years into the future (as trees grow), for an adjacent, existing neighborhood.

**Next Steps**
Next steps in the platting process include formal approval of the preliminary plat by the City Council, then final platting which allows for building on the property.

**City Code Sections**

- Section 117-110: Residential Development Transitioning
- Section 117-111: R-1 Residential (MUSA - Detached Single Family Homes) and (MUSA - Detached Villa) (Existing and Proposed Zoning)
- Section 117-588: Major Plat
- Section 117-614: Subdivision Design Standards

This is the Environmental Policy Board's (EPB) opportunity to provide input on the density transitioning proposal for this project. While the adjacent neighborhood was generally accepting of the proposed layout (several years back), it was with the understanding that density transitioning would meet and/or exceed the minimum requirements of City Code.

Staff is seeking feedback from the EPB regarding the proposed planting plan for density transitioning. More specifically, should more plantings be incorporated to meet the minimum requirement? Or, does the EPB think the updated plan (attached) is sufficient when considering future growth of the trees?

**Funding Source:**
The Applicant is responsible for all costs associated with project review.

**Recommendation:**
The Planning Commission recommended that the plans be amended to meet the minimum planting requirements for density transitioning.

**Action:**

Motion to recommend plans be amended to provide at least the minimum number of required trees within the transitioning corridor

-or-

Motion to recommend the proposed planting plan be approved for density transitioning

---

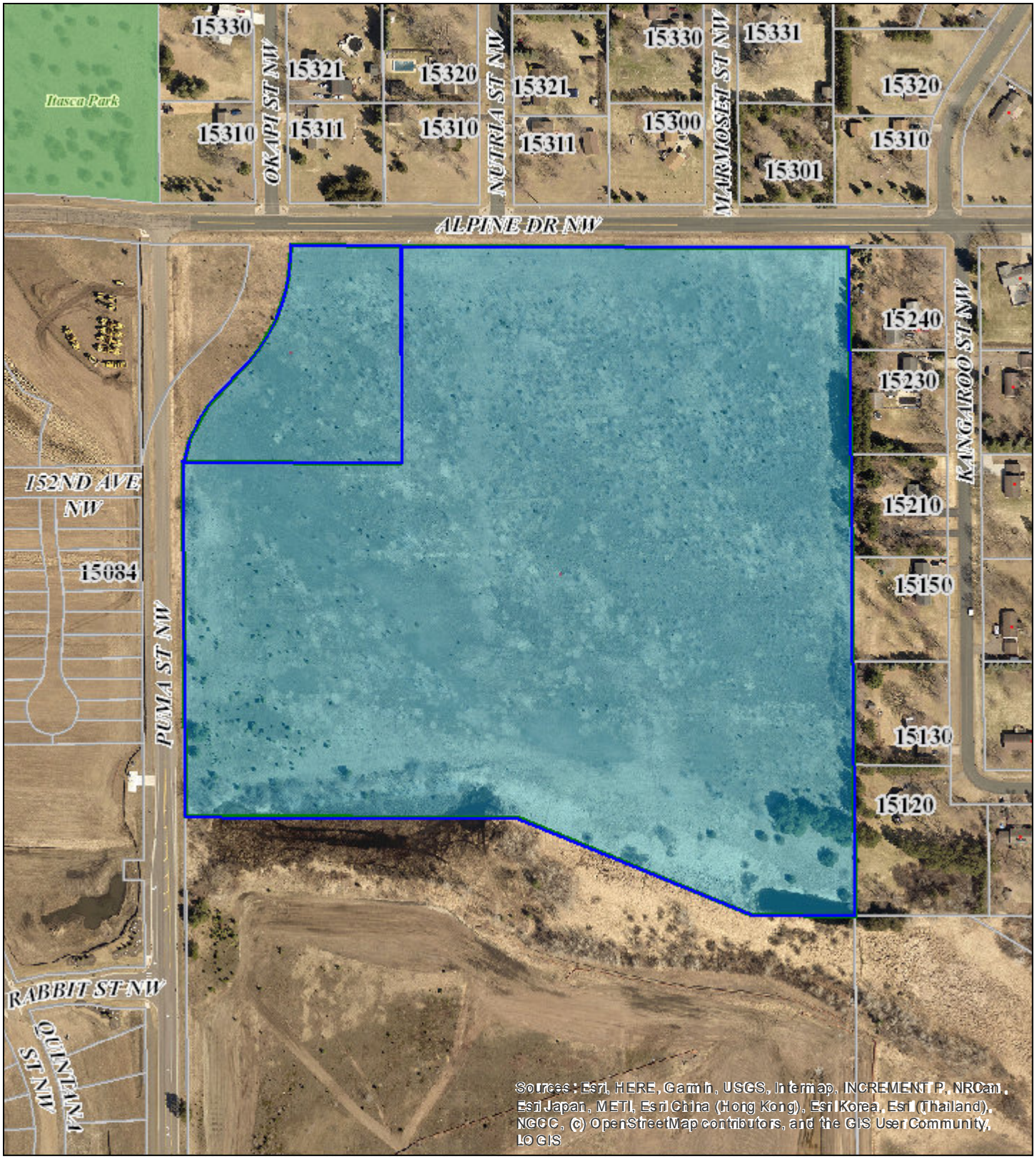
## Attachments

Site Location Map
Preliminary Plat Sheet
Plan Set
Revised Density Transition Plan
Supplemental Planting Information from Applicant

---

## Form Review

| Inbox | Reviewed By | Date |
|---|---|---|
| Tim Gladhill | Tim Gladhill | 01/20/2021 09:53 AM |
| Form Started By: Chris Anderson | | Started On: 01/11/2021 04:12 PM |
| Final Approval Date: 01/20/2021 | | |




# Site Location Map

***Northfork Meadows***

**Legend**

Site

Parcels

N

October 20th, 2020

0 0.075 0.15 mi

# NORTH FORK MEADOWS

**EXISTING LEGAL DESCRIPTION:**
(per client)

Outlot A, ALPHA DEVELOPMENT, Anoka County, Minnesota

AND

Outlot B, ALPHA DEVELOPMENT 2ND ADDITION, Anoka County, Minnesota

**OWNERS / DEVELOPERS:**
Lennar Corporation
16305 36th Avenue North
Plymouth, MN 55446
952-373-0485

**SURVEYOR:**
ISG
7900 International Drive Suite 550
Minneapolis, MN 55425
952-426-0699

**AREA TABLE:**
Outlot A, ALPHA DEVELOPMENT = 1,328,912 sq. ft. - 30.51 acres
Outlot B, ALPHA DEVELOPMENT 2ND ADDITION = 126,690 sq. ft. - 2.91 acres
Total = 1,455,602 sq. ft. - 33.42 acres

**EXISTING PROPERTY:**
ZONED: R-1: MUSA

**DENSITY CALCULATION:**
Area excluding ROW + wetland ~ 26.25 AC
Net Density: 88 units/ 26.25 AC ~ 3.35 units/AC

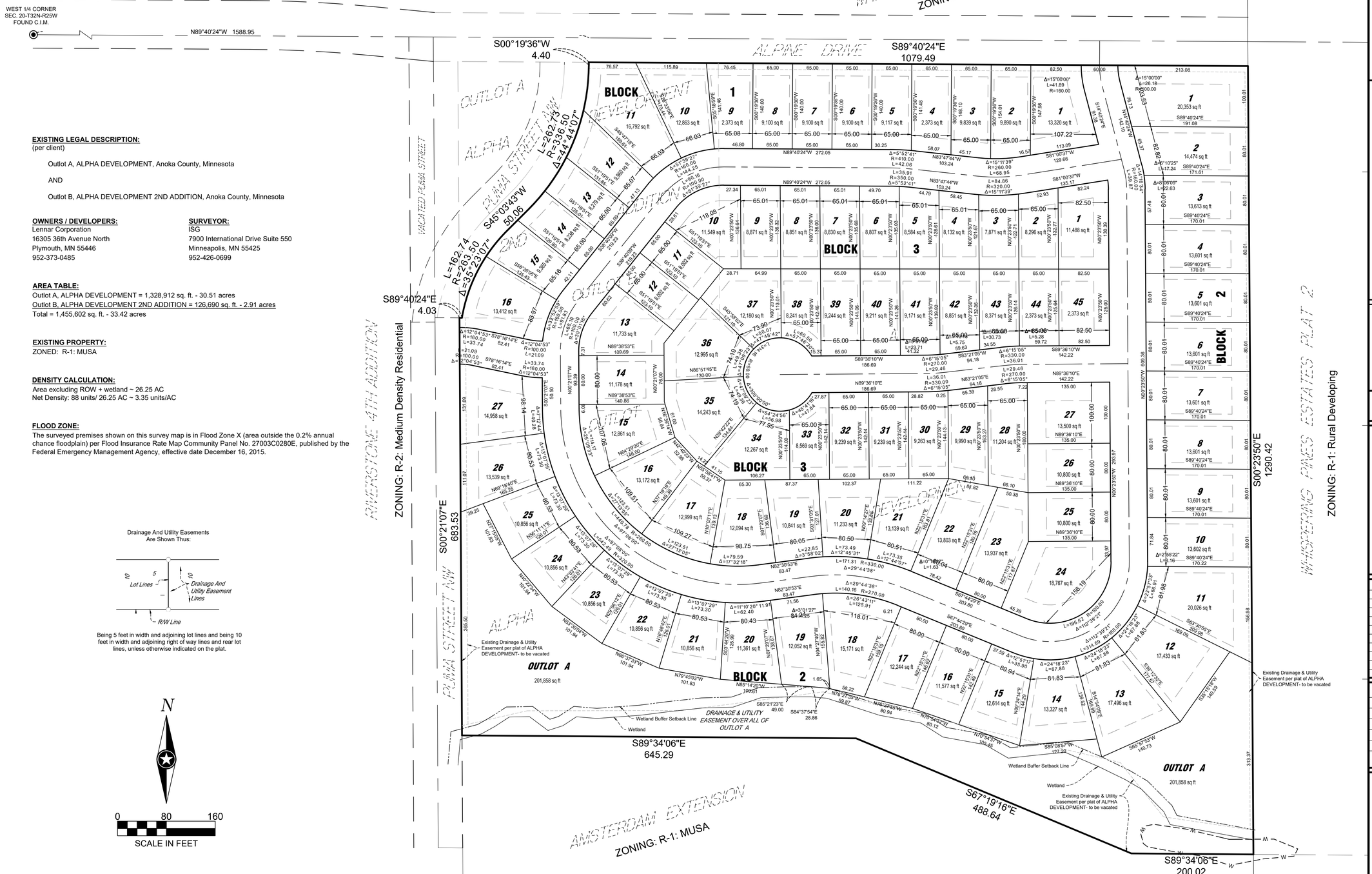
**FLOOD ZONE:**
The surveyed premises shown on this survey map is in Flood Zone X (area outside the 0.2% annual chance floodplain) per Flood Insurance Rate Map Community Panel No. 27003C0280E, published by the Federal Emergency Management Agency, effective date December 16, 2015.

Drainage And Utility Easements
Are Shown Thus:




Being 5 feet in width and adjoining lot lines and being 10 feet in width and adjoining right of way lines and rear lot lines, unless otherwise indicated on the plat.




I HEREBY CERTIFY THAT THIS SURVEY, PLAN, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED LAND SURVEYOR UNDER THE LAWS OF THE STATE OF MINNESOTA.

MARK A. SCHWANZ

DATE _____ LIC. NO. 45817

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PROJECT

**LENNAR HOMES**

**NORTH FORK MEADOWS DEVELOPMENT**

RAMSEY MINNESOTA

REVISION SCHEDULE

| DATE | DESCRIPTION | BY |
|---|---|---|
| | | |

| | |
|---|---|
| PROJECT NO. | 20-24580 |
| FILE NAME | 24580 PRELIM |
| DRAWN BY | MAS |
| DESIGNED BY | |
| REVIEWED BY | MAS |
| ORIGINAL ISSUE DATE | --/--/-- |
| CLIENT PROJECT NO. | - |

TITLE

**PRELIMINARY PLAT**

SHEET

**3**

OF 32

# LENNAR HOMES
# NORTH FORK MEADOWS DEVELOPMENT

**RAMSEY, MINNESOTA**

## PRELIMINARY PLAT

**ISG PROJECT # 20-24580**

## LEGEND

### EXISTING

- CITY LIMITS
- SECTION LINE
- QUARTER SECTION LINE
- RIGHT OF WAY LINE
- PROPERTY / LOTLINE
- EASEMENT LINE
- ACCESS CONTROL
- WATER EDGE
- WETLAND BOUNDARY
- WETLAND / MARSH
- FENCE LINE
- CULVERT
- STORM SEWER
- SANITARY SEWER
- SANITARY SEWER FORCEMAIN
- WATER
- GAS
- OVERHEAD ELECTRIC
- UNDERGROUND ELECTRIC
- UNDERGROUND TELEPHONE
- UNDERGROUND TV
- OVERHEAD UTILITY
- UNDERGROUND UTILITY
- UNDERGROUND FIBER OPTIC
- CONTOUR (MAJOR)
- CONTOUR (MINOR)
- DECIDUOUS TREE
- CONIFEROUS TREE
- TREE LINE
- MANHOLE/STRUCTURE
- CATCH BASIN
- HYDRANT
- VALVE
- CURB STOP
- POWER POLE
- UTILITY PEDESTAL / CABINET

### PROPOSED

- LOT LINE
- RIGHT OF WAY
- EASEMENT
- CULVERT
- STORM SEWER
- STORM SEWER (PIPE WIDTH)
- SANITARY SEWER
- SANITARY SEWER (PIPE WIDTH)
- WATER
- GAS
- OVERHEAD ELECTRIC
- UNDERGROUND ELECTRIC
- UNDERGROUND TV
- CONTOUR
- MANHOLE (STORM, SANITARY)
- CATCH BASIN
- HYDRANT
- VALVE




**LOCATION MAP**

SCALE IN FEET

0 500 1000

## ABBREVIATIONS:

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AC | ACRE | CMP | CORRUGATED METAL PIPE | FDN | FOUNDATION | HR | HOUR | MB | MAIL BOX | PVC | POLYVINYL CHLORIDE | TEL | TELEPHONE |
| ADA | AMERICANS WITH DISABILITIES ACT | CO | CLEANOUT | FFE | FINISHED FLOOR ELEVATION | HWL | HIGH WATER LEVEL | MECH | MECHANICAL | PVMT | PAVEMENT | TEMP | TEMPORARY |
| ADD | ADDENDUM | CONC | CONCRETE | FPM | FEET PER MINUTE | HWY | HIGHWAY | MH | MANHOLE | QTY | QUANTITY | THRU | THROUGH |
| AFF | ABOVE FINISHED FLOOR | CONST | CONSTRUCTION | FPS | FEET PER SECOND | HYD | HYDRANT | MIN | MINIMUM | RAD | RADIUS | TNFH | TOP NUT OF FIRE HYDRANT |
| AGG | AGGREGATE | CONT | CONTINUOUS | FT | FOOT, FEET | I | INVERT | MISC | MISCELLANEOUS | RCP | REINFORCED CONCRETE PIPE | TRANS | TRANSFORMER |
| APPROX | APPROXIMATE | CY | CUBIC YARD | FTG | FOOTING | ID | INSIDE DIAMETER | NO | NUMBER | RD | ROOF DRAIN | TV | TELEVISION |
| ARCH | ARCHITECT, ARCHITECTURAL | C&G | CURB AND GUTTER | GA | GAUGE | IN | INCH | NTS | NOT TO SCALE | REBAR | REINFORCING BAR | T/W | TOP OF WALL |
| BFE | BASEMENT FLOOR ELEVATION | DEMO | DEMOLITION | GAL | GALLON | INV | INVERT | NWL | NORMAL WATER LEVEL | REM | REMOVE | TYP | TYPICAL |
| BIT | BITUMINOUS | DIA | DIAMETER | GALV | GALVANIZED | IP | IRON PIPE | OC | ON CENTER | ROW | RIGHT OF WAY | UT | UTILITY, UNDERGROUND |
| CAD | COMPUTER-AIDED DESIGN | DIM | DIMENSION | GC | GENERAL CONTRACTOR | IPS | IRON PIPE SIZE | OCEW | ON CENTER EACH WAY | R/W | RIGHT OF WAY | | TELEPHONE |
| CB | CATCH BASIN | DS | DOWNSPOUT | GFE | GARAGE FLOOR ELEVATION | J-BOX | JUNCTION BOX | OH | OVERHEAD | SAN | SANITARY | VCP | VITRIFIED CLAY PIPE |
| CFS | CUBIC FEET PER SECOND | EA | EACH | GL | GUTTER LINE | JT | JOINT | OHD | OVERHEAD DOOR | SCH | SCHEDULE | W/O | WITHOUT |
| CF | CUBIC FOOT | ELEC | ELECTRICAL | GPM | GALLONS PER MINUTE | LF | LINEAR FEET | OZ | OUNCE | SF | SQUARE FOOT | W/ | WITH |
| CI | CAST IRON | ELEV | ELEVATION | GV | GATE VALVE | LIN | LINEAR | PED | PEDESTAL, PEDESTRIAN | SPEC | SPECIFICATION | YD | YARD |
| CIP | CAST IRON PIPE | EOF | EMERGENCY OVERFLOW | HDPE | HIGH DENSITY POLYETHYLENE | LPS | LOW PRESSURE STEAM | PERF | PERFORATED | SQ | SQUARE | YR | YEAR |
| CIPC | CAST IN PLACE CONCRETE | EQ | EQUAL | HD | HEAVY DUTY | LS | LUMP SUM | PL | PROPERTY LINE | STA | STATION | | |
| CJ | CONTROL JOINT | EX | EXISTING | HH | HANDHOLE | LSO | LOWEST STRUCTURAL OPENING | PP | POLYPROPYLENE | SY | SQUARE YARD | | |
| CL | CENTERLINE | FDC | FIRE DEPARTMENT CONNECTION | HORIZ | HORIZONTAL | MAX | MAXIMUM | PSI | POUNDS PER SQUARE INCH | T/C | TOP OF CURB | | |

## SHEET INDEX


| | |
|---|---|
| 1 | TITLE SHEET |
| 2 | EXISTING & REMOVALS PLAN |
| 3 | PRELIMINARY PLAT |
| 4 | OVERALL PUD MASTER SITE PLAN |
| 5 | OVERALL GRADING PLAN |
| 6 | GRADING DETAILS |
| 7 | STORMWATER POLLUTION PREVENTION PLAN |
| 8 | SWPPP DETAILS |
| 9-12 | OVERALL UTILITY PLANS |
| 13-22 | ROADWAY PLAN & PROFILES |
| 23 | TYPICAL STREET SECTION |
| 24-27 | SITE DETAILS |
| 28-29 | MnDOT DETAILS |
| 30-32 | SITE RESTORATION PLANS |
| | THIS PLAN SET INCLUDES 32 SHEETS |


## PROJECT GENERAL NOTES

1. ALL WORK SHALL CONFORM TO THE CONTRACT DOCUMENTS, WHICH INCLUDE, BUT ARE NOT LIMITED TO, THE OWNER - CONTRACTOR AGREEMENT, THE PROJECT MANUAL (WHICH INCLUDES GENERAL SUPPLEMENTARY CONDITIONS AND SPECIFICATIONS), DRAWINGS OF ALL DISCIPLINES AND ALL ADDENDA, MODIFICATIONS AND CLARIFICATIONS ISSUED BY THE ARCHITECT/ENGINEER.
2. CONTRACT DOCUMENTS SHALL BE ISSUED TO ALL SUBCONTRACTORS BY THE GENERAL CONTRACTOR IN COMPLETE SETS IN ORDER TO ACHIEVE THE FULL EXTENT AND COMPLETE COORDINATION OF ALL WORK.
3. WRITTEN DIMENSIONS TAKE PRECEDENCE OVER SCALED DIMENSIONS. NOTIFY ARCHITECT/ENGINEER OF ANY DISCREPANCIES OR CONDITIONS REQUIRING INFORMATION OR CLARIFICATION BEFORE PROCEEDING WITH THE WORK.
4. FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS. NOTIFY ARCHITECT/ENGINEER OF ANY DISCREPANCIES OR CONDITIONS REQUIRING INFORMATION OR CLARIFICATION BEFORE PROCEEDING WITH THE WORK.
5. DETAILS SHOWN ARE INTENDED TO BE INDICATIVE OF THE PROFILES AND TYPE OF DETAILING REQUIRED THROUGHOUT THE WORK. DETAILS NOT SHOWN ARE SIMILAR IN CHARACTER TO DETAILS SHOWN. WHERE SPECIFIC DIMENSIONS, DETAILS OR DESIGN INTENT CANNOT BE DETERMINED, NOTIFY ARCHITECT/ENGINEER BEFORE PROCEEDING WITH THE WORK.
6. ALL MANUFACTURED ARTICLES, MATERIALS AND EQUIPMENT SHALL BE APPLIED, INSTALLED, CONNECTED, ERECTED, CLEANED AND CONDITIONED ACCORDING TO MANUFACTURERS' INSTRUCTIONS. IN CASE OF DISCREPANCIES BETWEEN MANUFACTURERS' INSTRUCTIONS AND THE CONTRACT DOCUMENTS, NOTIFY ARCHITECT/ENGINEER BEFORE PROCEEDING WITH THE WORK.
7. ALL DISSIMILAR METALS SHALL BE EFFECTIVELY ISOLATED FROM EACH OTHER TO AVOID GALVANIC CORROSION.
8. THE LOCATION AND TYPE OF ALL INPLACE UTILITIES SHOWN ON THE PLANS ARE FOR GENERAL INFORMATION ONLY AND ARE ACCURATE AND COMPLETE TO THE BEST OF THE KNOWLEDGE OF I & S GROUP, INC. (ISG). NO WARRANTY OR GUARANTEE IS IMPLIED. THE CONTRACTOR SHALL VERIFY THE SIZES, LOCATIONS AND ELEVATIONS OF ALL INPLACE UTILITIES PRIOR TO CONSTRUCTION. CONTRACTOR SHALL IMMEDIATELY NOTIFY ENGINEER OF ANY DISCREPANCIES OR VARIATIONS FROM PLAN.
9. THE CONTRACTOR IS TO CONTACT "GOPHER STATE ONE CALL" FOR UTILITY LOCATIONS, MINIMUM 2 BUSINESS DAYS PRIOR TO ANY EXCAVATION / CONSTRUCTION (1-800-252-1166).

# PROJECT INDEX:

**OWNER:**

**LENNAR HOMES**
**16305 36TH AVENUE NORTH**
**PLYMOUTH, MN 55446**

**PROJECT ADDRESS / LOCATION:**

**SEC. 22/ TOWNSHIP 32N/ RANGE 25W**

**ANOKA COUNTY**
**RAMSEY MINNESOTA**

**MANAGING OFFICE:**


**MANKATO OFFICE**
**115 EAST HICKORY STREET**
**SUITE 300**
**MANKATO, MN 56001**
**PHONE: 507.387.6651**
**FAX: 507.387.3583**

**PROJECT MANAGER: NATHAN HERMER**
**EMAIL: NATHAN.HERMER@ISGINC.COM**


SPECIFICATIONS REFERENCE

ALL CONSTRUCTION SHALL COMPLY WITH THE CITY OF RAMSEY REQUIREMENTS AND MnDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION, 2018 EDITION, AND THE STANDARD SPECIFICATIONS FOR SANITARY SEWER, STORM DRAIN AND WATERMAIN AS PROPOSED BY THE CITY ENGINEERS ASSOCIATION OF MINNESOTA 2013, UNLESS DIRECTED OTHERWISE.

PROJECT DATUM

HORIZONTAL COORDINATES HAVE BEEN REFERENCED TO THE NORTH AMERICAN DATUM OF 1983 (NAD83), 1996 ADJUSTMENT (NAD83(1996)) ON THE ANOKA COUNTY COORDINATE SYSTEM, IN U.S. SURVEY FEET.
ELEVATIONS HAVE BEEN REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
RTK GPS METHODS WERE USED TO ESTABLISH HORIZONTAL AND VERTICAL COORDINATES FOR THIS PROJECT.

**B.M. ELEVATION=888.56**

TNFH SE QUADRANT AT THE INTERSECTION OF PUMA ST NW AND ALPINE DR

TOPOGRAPHIC SURVEY

THIS PROJECT'S TOPOGRAPHIC SURVEY CONSISTS OF DATA COLLECTED IN OCTOBER/2020 BY ISG.

NOTE:
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NATHAN HERMER

DATE XX/XX/XXXX LIC. NO. XXXXX


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PROJECT

**LENNAR HOMES**

**NORTH FORK MEADOWS DEVELOPMENT**

RAMSEY MINNESOTA

REVISION SCHEDULE

| DATE | DESCRIPTION | BY |
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|---|---|
| PROJECT NO. | 20-24580 |
| FILE NAME | 24580 1 TITLE |
| DRAWN BY | EH |
| DESIGNED BY | ART/WMSB |
| REVIEWED BY | NH |
| ORIGINAL ISSUE DATE | --/--/-- |
| CLIENT PROJECT NO. | - |

TITLE

**TITLE SHEET**

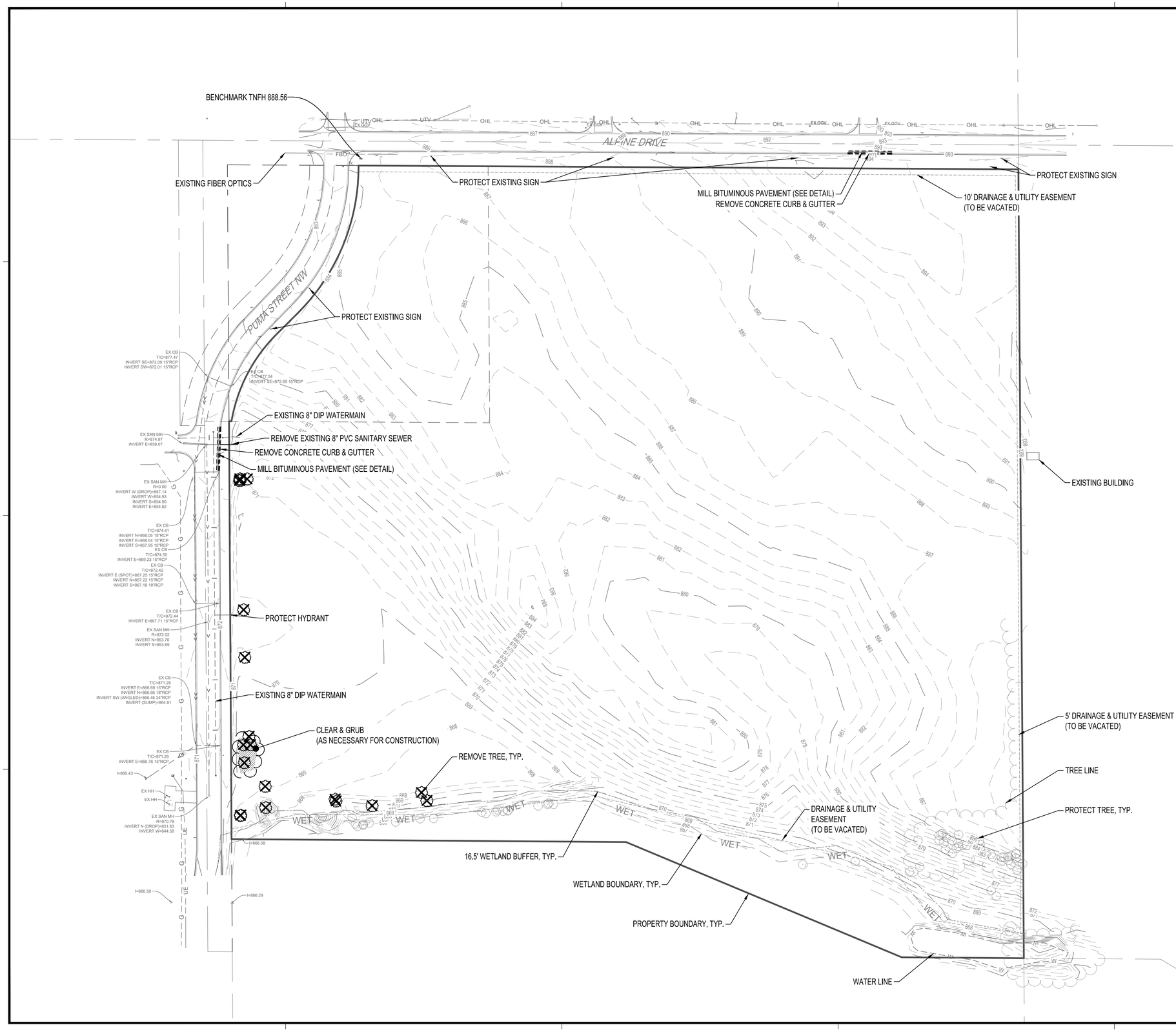
SHEET

**1**

OF 32

PRELIMINARY NOT FOR CONSTRUCTION


PRELIMINARY NOT FOR CONSTRUCTION




## REMOVAL LEGEND

| SYMBOL | DESCRIPTION |
|---|---|
| | REMOVE BITUMINOUS PAVEMENT |
| | CLEAR & GRUB TREES & UNDERBRUSH |
| | REMOVE DECIDUOUS TREE (CLEAR & GRUB) |
| | REMOVE CONIFEROUS TREE (CLEAR & GRUB) |

CONTRACTOR SHALL VERIFY EXISTING PAVEMENT SECTION AND NOTIFY ENGINEER OF ANY DISCREPANCIES.

PAVEMENT REMOVALS SHALL INCLUDE FULL DEPTH SAWCUT & SECTION REMOVAL.

## TREE PRESERVATION NOTES

1. ALL TREES TO REMAIN IN PLACE SHALL BE FENCED OFF WITH SAFETY NETTING AND STEEL STAKES BEYOND THE DRIPLINE OF THE TREE.
2. ALL TREES TO REMAIN SHALL RECEIVE SILT FENCING AROUND THE OUTSIDE OF THE SAFETY NETTING TO ENSURE NO CHEMICAL OR RUNOFF FROM CONSTRUCTION DAMAGES THE TREE OR THE SOIL SURROUNDING THE TREE.
3. PROTECT TREES TO REMAIN FROM ANY DAMAGE, INCLUDING BUT NOT LIMITED TO SOIL COMPACTION, VEHICLE DAMAGE, AND CHEMICAL EXPOSURE TO THE TREE OR THE SOIL SURROUNDING THE TREE.
4. ANY TREES TO REMAIN DAMAGED DURING THE CONSTRUCTION PROCESS SHALL BE REPLACED IN KIND BY THE CONTRACTOR.

TOTAL EXISTING TREES = 82
TOTAL TREES TO BE REMOVED = 19 (23%)
TOTAL TREES TO REMAIN = 63 (77%)

ISG

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NATHAN HERMER

DATE XX/XX/XXXX LIC. NO. XXXXX

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PROJECT

**LENNAR HOMES**

**NORTH FORK MEADOWS DEVELOPMENT**

RAMSEY MINNESOTA

REVISION SCHEDULE

| DATE | DESCRIPTION | BY |
|---|---|---|
| | | |

| | |
|---|---|
| PROJECT NO. | 20-24580 |
| FILE NAME | 24580 4 EXISTING |
| DRAWN BY | EH |
| DESIGNED BY | ART,WMSB |
| REVIEWED BY | NH |
| ORIGINAL ISSUE DATE | --/--/-- |
| CLIENT PROJECT NO. | - |

TITLE

**EXISTING SITE & REMOVALS PLAN**

SHEET

**2**

OF 32

PRELIMINARY NOT FOR CONSTRUCTION

# NORTH FORK MEADOWS

**EXISTING LEGAL DESCRIPTION:**
(per client)

Outlot A, ALPHA DEVELOPMENT, Anoka County, Minnesota

AND

Outlot B, ALPHA DEVELOPMENT 2ND ADDITION, Anoka County, Minnesota

**OWNERS / DEVELOPERS:**
Lennar Corporation
16305 36th Avenue North
Plymouth, MN 55446
952-373-0485

**SURVEYOR:**
ISG
7900 International Drive Suite 550
Minneapolis, MN 55425
952-426-0699

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ZONED: R-1: MUSA

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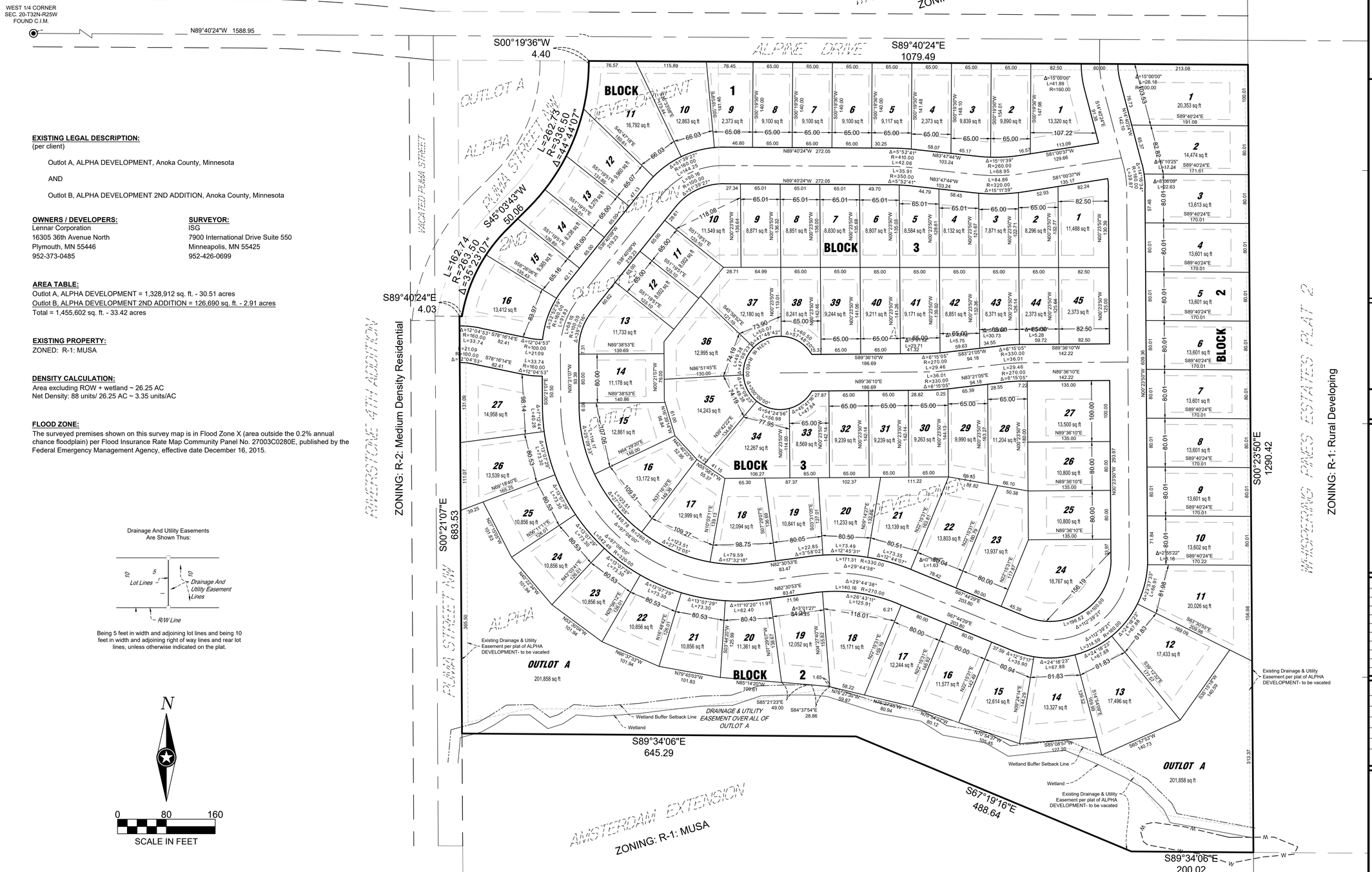
**FLOOD ZONE:**
The surveyed premises shown on this survey map is in Flood Zone X (area outside the 0.2% annual chance floodplain) per Flood Insurance Rate Map Community Panel No. 27003C0280E, published by the Federal Emergency Management Agency, effective date December 16, 2015.

Drainage And Utility Easements
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Being 5 feet in width and adjoining lot lines and being 10 feet in width and adjoining right of way lines and rear lot lines, unless otherwise indicated on the plat.




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MARK A. SCHWANZ

DATE _____ LIC. NO. 45817

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PROJECT

**LENNAR HOMES**

**NORTH FORK MEADOWS DEVELOPMENT**

RAMSEY MINNESOTA

REVISION SCHEDULE

| DATE | DESCRIPTION | BY |
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|---|---|
| PROJECT NO. | 20-24580 |
| FILE NAME | 24580 PRELIM |
| DRAWN BY | MAS |
| DESIGNED BY | |
| REVIEWED BY | MAS |
| ORIGINAL ISSUE DATE | --/--/-- |
| CLIENT PROJECT NO. | - |

TITLE

**PRELIMINARY PLAT**

SHEET

**3**

OF 32

| SITE SUMMARY | | | | |
|---|---|---|---|---|
| LOT TYPES | UNIT COUNT | FULL BASEMENT | LOOKOUT | WALKOUT |
| 60' SINGLE FAMILY LOTS | 88 | 55 | 25 | 8 |

| DEVELOPMENT REGULATIONS (PUD) | |
|---|---|
| SINGLE FAMILY LOTS | |
| FRONT SETBACK | VARIES 25'-30' |
| SIDE SETBACK | VARIES 5'-10' |
| REAR SETBACK | VARIES 20'-30' |
| CORNER SETBACK | VARIES 25'-30' |

| PAVEMENT LEGEND | |
|---|---|
| SYMBOL | DESCRIPTION |
| | BITUMINOUS PAVEMENT |
| | CONCRETE WALK |
| | CONCRETE PAVEMENT |

BENCHMARK TNFH 888.56

ALPINE DRIVE

PUMA STREET NW

ROAD A

ROAD B

ROAD C

ROAD B

BLOCK 1

BLOCK 3

BLOCK 3

BLOCK 2

BLOCK 2

OUTLOT A

ST-1 ST-2 ST-3 ST-4 ST-5 ST-6 ST-7 ST-8 ST-9 ST-10

BASIN A
BOTTOM = 862.60'
MWL= 866.60'
100-YR HWL = 871.79'

WET

UE

DRIVEWAY, TYP.
(BY OTHERS)

SWALE, TYP.

BUILDING SETBACK, TYP.

PROPOSED LOT LINE, TYP.

TREE LINE, TYP.

PROTECTED TREE, TYP.

CONCRETE MAINTENANCE ACCESS
(SEE DETAIL)

16.5' WETLAND SETBACK, TYP.

WETLAND BOUNDARY, TYP.

WETLAND SIGN, TYP.
INSTALLED AT PROPERTY LINE

PROPERTY BOUNDARY, TYP.

WATER LINE, TYP.

N

0 80 160
SCALE IN FEET

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NATHAN HERMER

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PROJECT

**LENNAR HOMES**

**NORTH FORK MEADOWS DEVELOPMENT**

RAMSEY MINNESOTA

REVISION SCHEDULE

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| DRAWN BY | EH |
| DESIGNED BY | ART,WMSB |
| REVIEWED BY | NH |
| ORIGINAL ISSUE DATE | --/--/-- |
| CLIENT PROJECT NO. | - |

TITLE

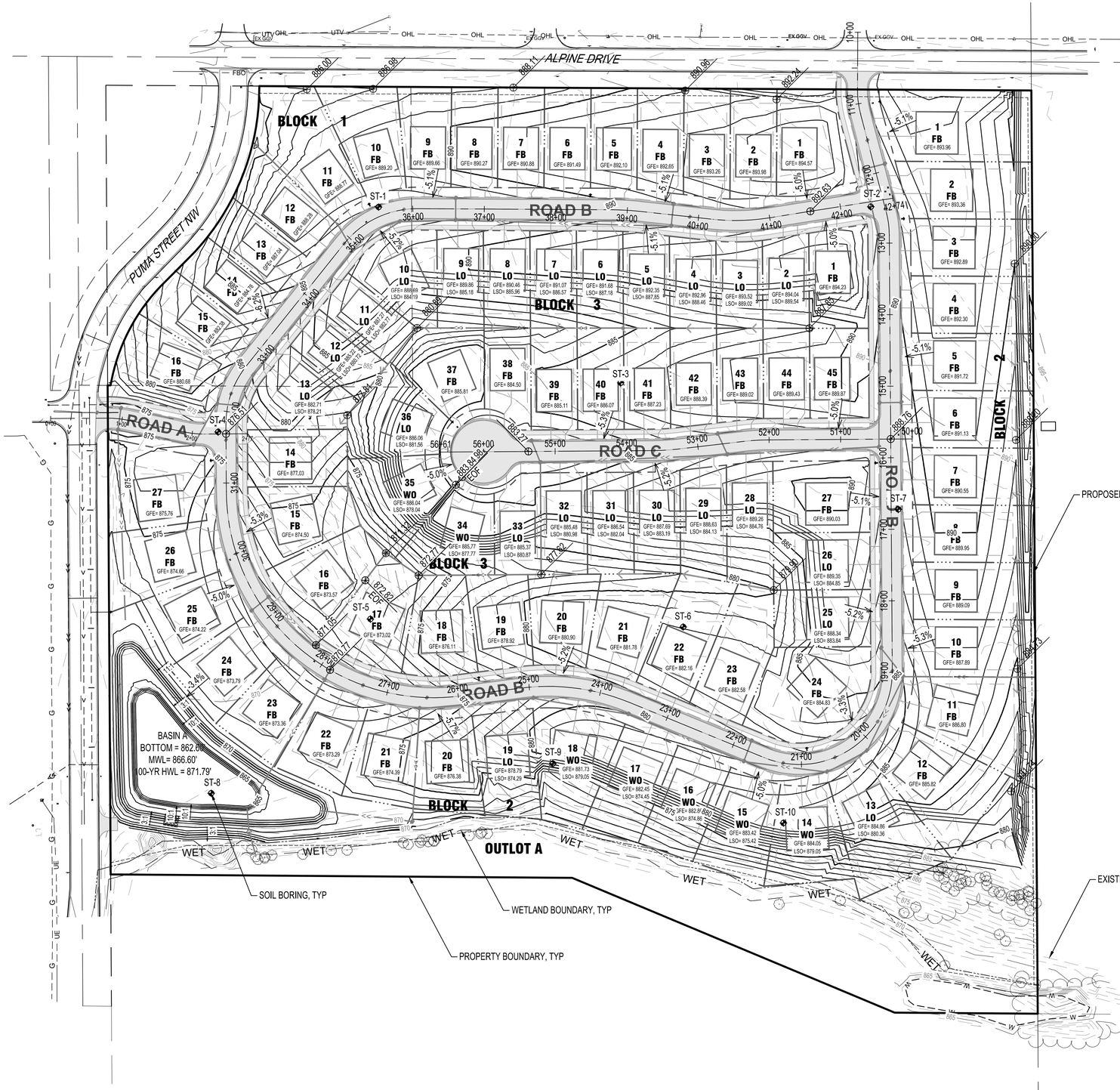
**OVERALL PUD MASTER SITE PLAN**

SHEET

**4**

OF 32

PRELIMINARY NOT FOR CONSTRUCTION

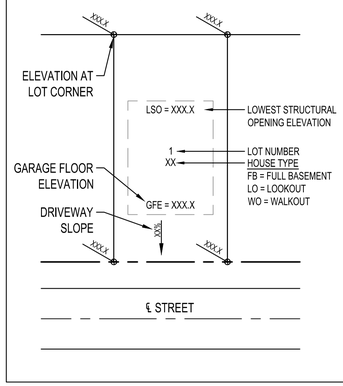



## GRADING LEGEND

| | |
|---|---|
| ·101· | EXISTING CONTOUR (MINOR INTERVAL) |
| 100 | EXISTING CONTOUR (MAJOR INTERVAL) |
| 101 | PROPOSED CONTOUR (MINOR INTERVAL) |
| 100 | PROPOSED CONTOUR (MAJOR INTERVAL) |
| -X.X% | SURFACE GRADE / DIRECTION |

## LOT INFORMATION

(NOT TO SCALE)




NOTE:
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NATHAN HERMER

DATE XX/XX/XXXX LIC. NO. XXXXX

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PROJECT

# LENNAR HOMES

# NORTH FORK MEADOWS DEVELOPMENT

RAMSEY MINNESOTA

REVISION SCHEDULE

| DATE | DESCRIPTION | BY |
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|---|---|
| PROJECT NO. | 20-24580 |
| FILE NAME | 24580 C4-GRADE |
| DRAWN BY | EH |
| DESIGNED BY | ART/WMSB |
| REVIEWED BY | NH |
| ORIGINAL ISSUE DATE | --/--/-- |
| CLIENT PROJECT NO. | - |

TITLE

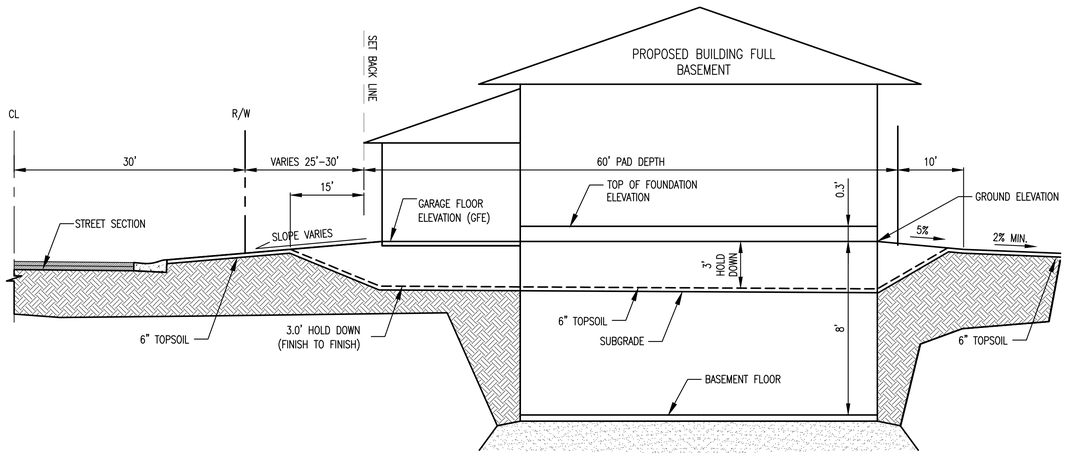
# OVERALL GRADING PLAN

SHEET

5

OF 32

PRELIMINARY NOT FOR CONSTRUCTION




## SINGLE FAMILY FULL BASEMENT (FB)
### 3.0' HOLD DOWN

N.T.S.

NOTE:

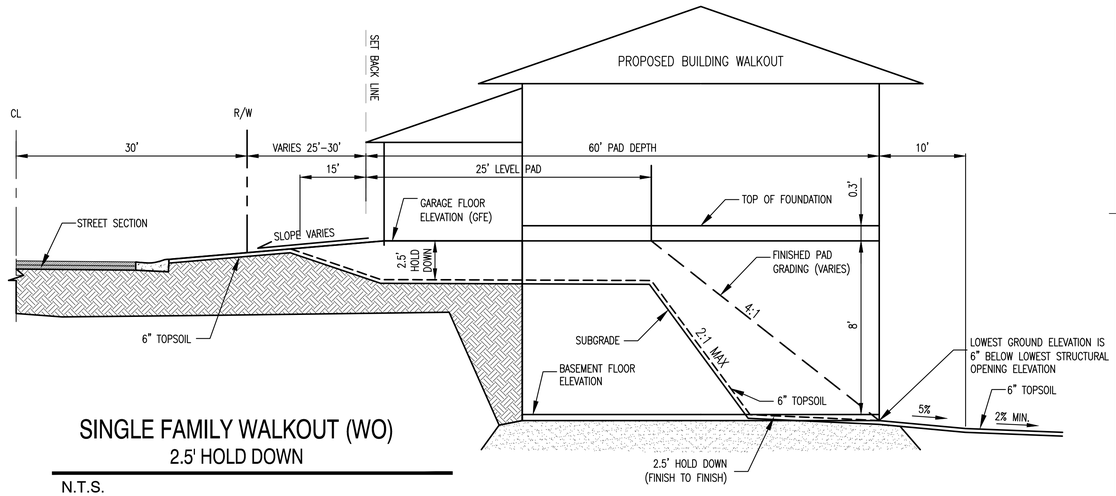
FB = FULL BASEMENT

LO = LOOK OUT BASEMENT

WO = WALKOUT BASEMENT

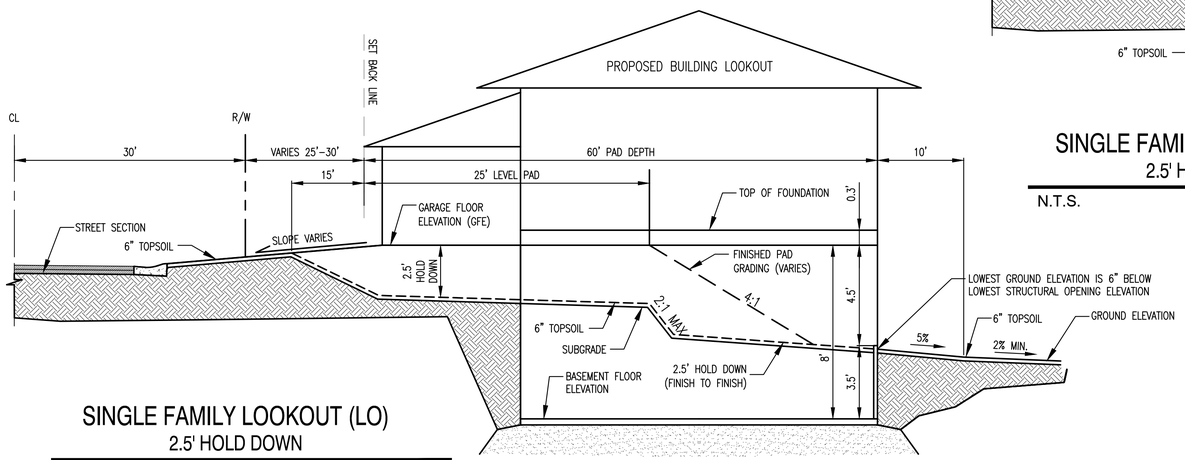
THE FIRST ELEVATION LISTED REFERS TO THE GARAGE FLOOR ELEVATION (GFE). THE SECOND ELEVATION LISTED REFERS TO THE LOWEST STRUCTURAL OPENING (LSO). IF NO SECOND ELEVATION IS LISTED THEN THE PRIMARY ELEVATION IS THE LOWEST STRUCTURAL OPENING.

SEE DETAILS OF EACH TYPE.




## SINGLE FAMILY WALKOUT (WO)
### 2.5' HOLD DOWN

N.T.S.




## SINGLE FAMILY LOOKOUT (LO)
### 2.5' HOLD DOWN

N.T.S.

NOTE:

THESE DETAILS ARE FOR 60-FT WIDE SINGLE FAMILY HOME PRODUCTS.

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NATHAN HERMER

DATE XX/XX/XXXX LIC. NO. XXXXX

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PROJECT

**LENNAR HOMES**

**NORTH FORK MEADOWS DEVELOPMENT**

RAMSEY MINNESOTA

REVISION SCHEDULE

| DATE | DESCRIPTION | BY |
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| PROJECT NO. | 20-24580 |
| FILE NAME | 24580 2 DETAILS |
| DRAWN BY | EH |
| DESIGNED BY | ART/WMSB |
| REVIEWED BY | NH |
| ORIGINAL ISSUE DATE | --/--/-- |
| CLIENT PROJECT NO. | - |

TITLE

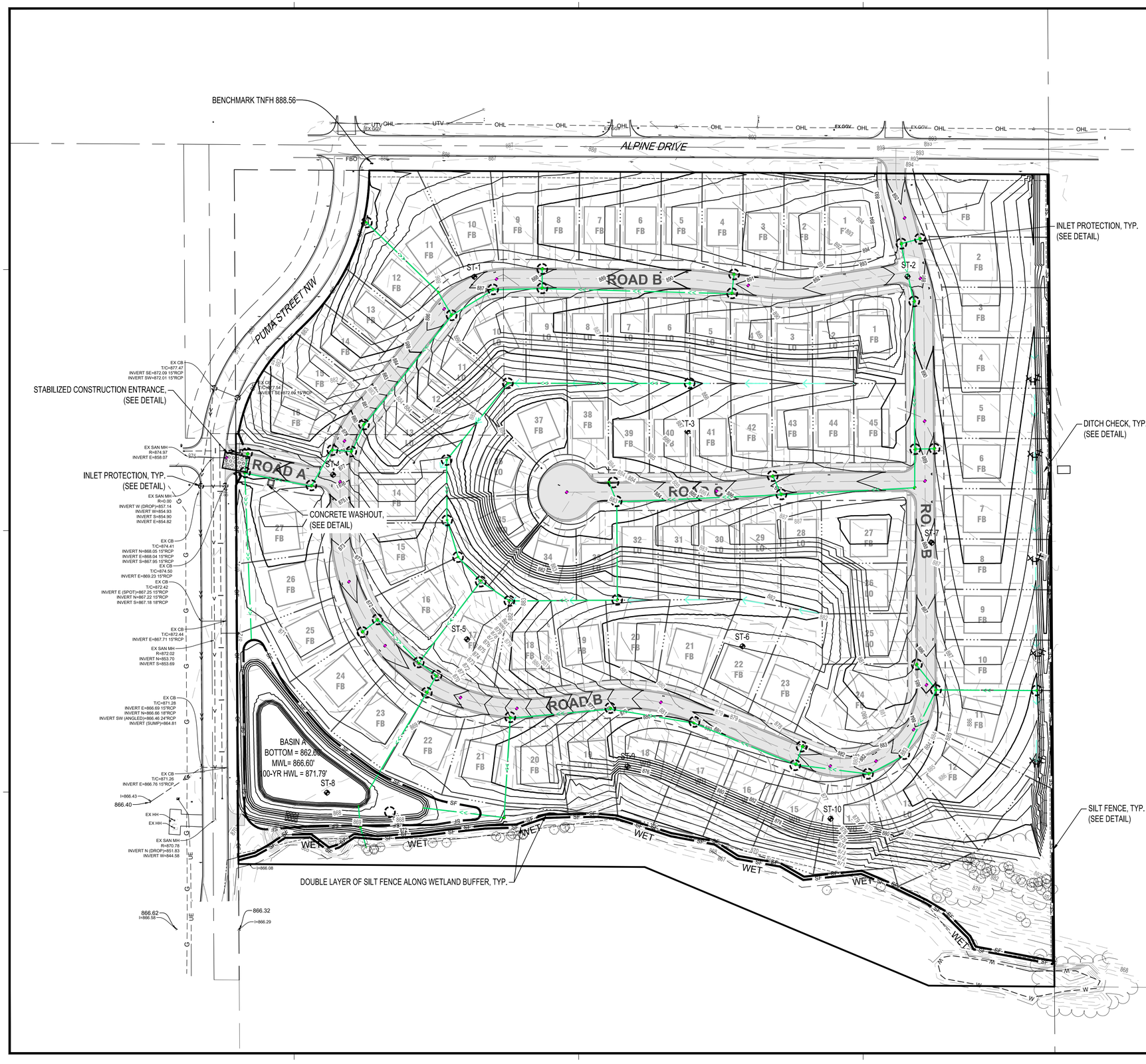
**GRADING DETAILS**

SHEET

**6**

OF 32

PRELIMINARY NOT FOR CONSTRUCTION




## EROSION CONTROL LEGEND

| SYMBOL | DESCRIPTION |
|---|---|
| | RANDOM RIPRAP, CLASS 3 |
| SF | SILT FENCE, PREASSEMBLED |
| | STORM DRAIN INLET PROTECTION |
| | SEDIMENT CONTROL LOG |
| | STABILIZED CONSTRUCTION EXIT |
| | CONCRETE WASHOUT AREA |
| | EXISTING DRAINAGE ARROW |
| | PROPOSED DRAINAGE ARROW |
| 101 | EXISTING CONTOUR (MINOR INTERVAL) |
| 100 | EXISTING CONTOUR (MAJOR INTERVAL) |
| 101 | PROPOSED CONTOUR (MINOR INTERVAL) |
| 100 | PROPOSED CONTOUR (MAJOR INTERVAL) |

PERIMETER CONTROL SHALL BE SILT FENCE.

SEE SITE RESTORATION PLAN FOR FINAL TURF ESTABLISHMENT.

NOTE: SWPPP COVERAGE INCLUDES ELECTRIC, GAS, TELEPHONE, AND CABLE INSTALLATION. EACH COMPANY OR THEIR SUBCONTRACTOR IS RESPONSIBLE TO FOLLOW THE REQUIREMENTS OF THIS SWPPP INCLUDING PROVIDING THEIR OWN RESTORATION IF INSTALLATION OCCURS AFTER PRIMARY INSTALLATION OF SEEDING/SODDING/MULCHING DURING CONSTRUCTION OF EACH UTILITY.

CITY OF RAMSEY TOPSOIL NOTES:

1. INSTALLATION OF 4" OF TOPSOIL IS REQUIRED ACROSS ALL DISTURBED AREAS.
2. TOPSOIL IS DEFINED AS BLACK DIRT COMPOSED OF UNCONSOLIDATED MATERIAL, LARGELY UN-DECOMPOSED ORGANIC MATTER WHICH IS SUITABLE FOUNDATION FOR VEGETATIVE GROWTH.
3. THE COMPOSITION OF TOPSOIL SHOULD CONTAIN NO MORE THAN THIRTY-FIVE (35) PERCENT SAND CONTENT.

N

0 80 160

SCALE IN FEET

ISG

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NATHAN HERMER

DATE XX/XX/XXXX LIC. NO. XXXXX

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PROJECT

# LENNAR HOMES

# NORTH FORK MEADOWS DEVELOPMENT

RAMSEY MINNESOTA

REVISION SCHEDULE

| DATE | DESCRIPTION | BY |
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| PROJECT NO. | 20-24580 |
| FILE NAME | 24580 3 SWPPP |
| DRAWN BY | EH |
| DESIGNED BY | ART/WMSB |
| REVIEWED BY | NH |
| ORIGINAL ISSUE DATE | --/--/-- |
| CLIENT PROJECT NO. | - |

TITLE

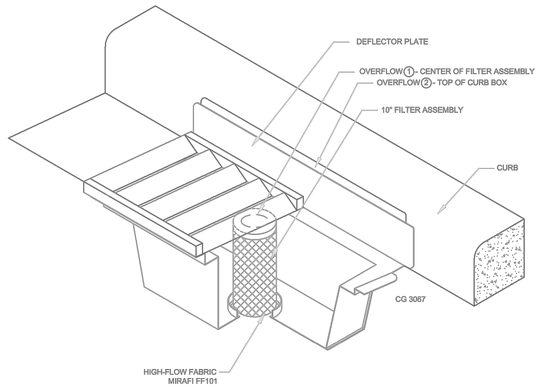
# STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

SHEET

7

OF 32

PRELIMINARY NOT FOR CONSTRUCTION

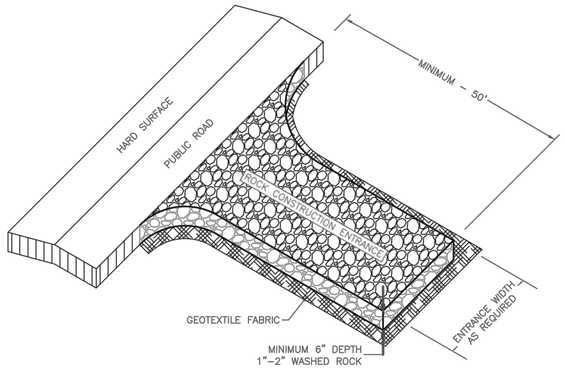



## INLET PROTECTION – WIMCO OR EQUAL

N.T.S.

NOTE:
THIS INLET PROTECTION SHALL BE USED IMMEDIATELY FOLLOWING CURB & GUTTER CONSTRUCTION. INLET PROTECTION SHALL REMAIN INSTALLED AND MAINTAINTED UNTIL ALL HOME CONSTRUCTION IS COMPLETE.

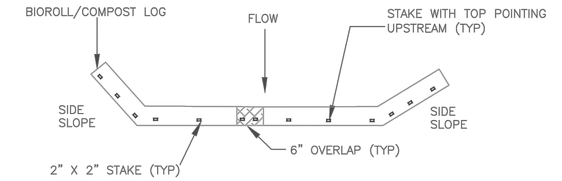
| APPROVED: 1 – 2016 | City of RAMSEY | STANDARD DETAILS: INLET PROTECTION |
|---|---|---|
| | | CITY PLATE No. ERO–2 |



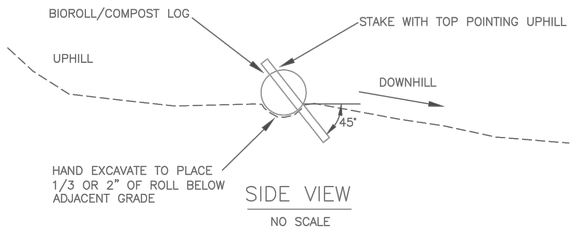

NOTE:
1. MINIMUM CONSTRUCTION ENTRANCE WIDTH EQUAL TO PROPOSED ROADWAY WIDTH.
2. WIDTH OF RADIUS AS REQUIRED TO ENSURE VEHICLES DO NOT TRACK ONTO PUBLIC ROAD.
3. MAINTAINENCE AS REQUIRED TO PREVENT TRACKING ONTO PUBLIC ROADS. THIS MAY REQUIRE TOP DRESSING WITH ADDITIONAL ROCK OR REMOVAL AND REINSTALLATION OF THE ENTRANCE AS NEEDED.

NOT TO SCALE

| APPROVED: 1 – 2016 | City of RAMSEY | STANDARD DETAILS: ROCK CONSTRUCTION ENTRANCE |
|---|---|---|
| | | CITY PLATE No. ERO–5 |




PLAN VIEW

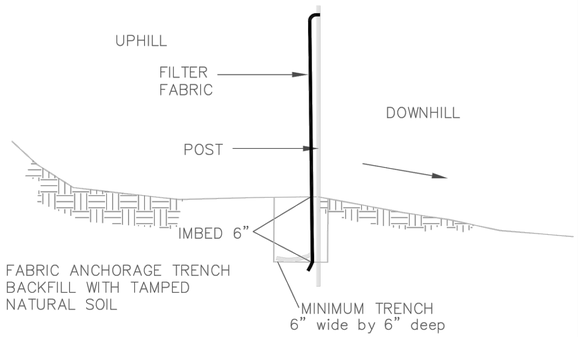



SIDE VIEW

NO SCALE

NOTE:
STAKE INTO GROUND WITH WOOD STAKES DRIVING STAKE 6" INTO GROUND AND PROTRUDING 2" ABOVE LOG
WOOD STAKES ARE A MINIMUM 0.5" X 2" X 16" AND PLACED EVERY 1' UNLESS PRECLUDED BY A ROCK
WHEN MORE THAN 1 BIOROLL/COMPOST LOG IS NEEDED, OVERLAP ENDS A MINIMUM OF 6" AND STAKE
WOOD STAKES ARE DRIVEN THROUGH BACK HALF OF BIOROLL OR COMPOST LOG AT 45° ANGLE WITH TOP OF STAKE POINTING UPHILL

| APPROVED: 3 – 2016 | City of RAMSEY | STANDARD DETAILS: BIO ROLL (COMPOST LOG) |
|---|---|---|
| | | CITY PLATE No. ERO–4 |

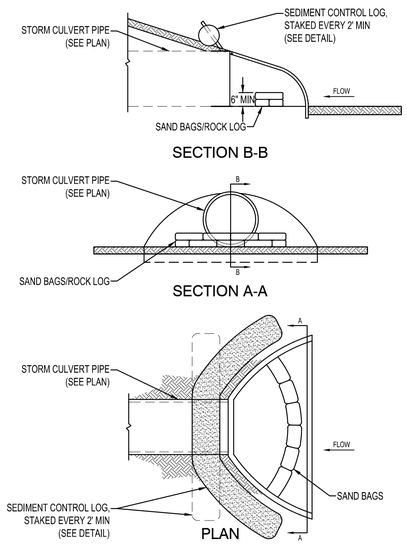



INSTALL AS PER FILTER FABRIC MANUFACTURER'S RECOMMENDATIONS

## SILT FENCE DETAIL

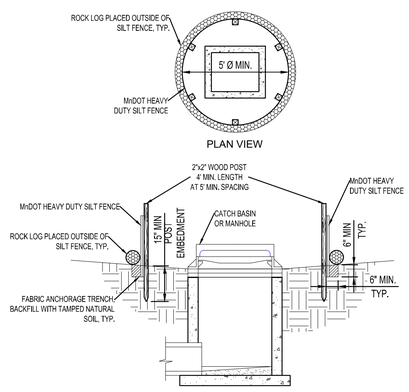
NO SCALE

| APPROVED: 1 – 2016 | City of RAMSEY | STANDARD DETAILS: SILT FENCE |
|---|---|---|
| | | CITY PLATE No. ERO–1 |




## CULVERT PIPE DITCH CHECK

NTS EC350




## SILT FENCE INLET PROTECTION

NTS EC220

PRELIMINARY NOT FOR CONSTRUCTION

ISG

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NATHAN HERMER

DATE XX/XX/XXXX LIC. NO. XXXXX

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PROJECT

**LENNAR HOMES**

**NORTH FORK MEADOWS DEVELOPMENT**

RAMSEY MINNESOTA

REVISION SCHEDULE

| DATE | DESCRIPTION | BY |
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| PROJECT NO. | 20-24580 |
| FILE NAME | 24580 3-1 SWPPP NOTES AND DETAILS |
| DRAWN BY | EH |
| DESIGNED BY | ART/WMSB |
| REVIEWED BY | NH |
| ORIGINAL ISSUE DATE | --/--/-- |
| CLIENT PROJECT NO. | - |

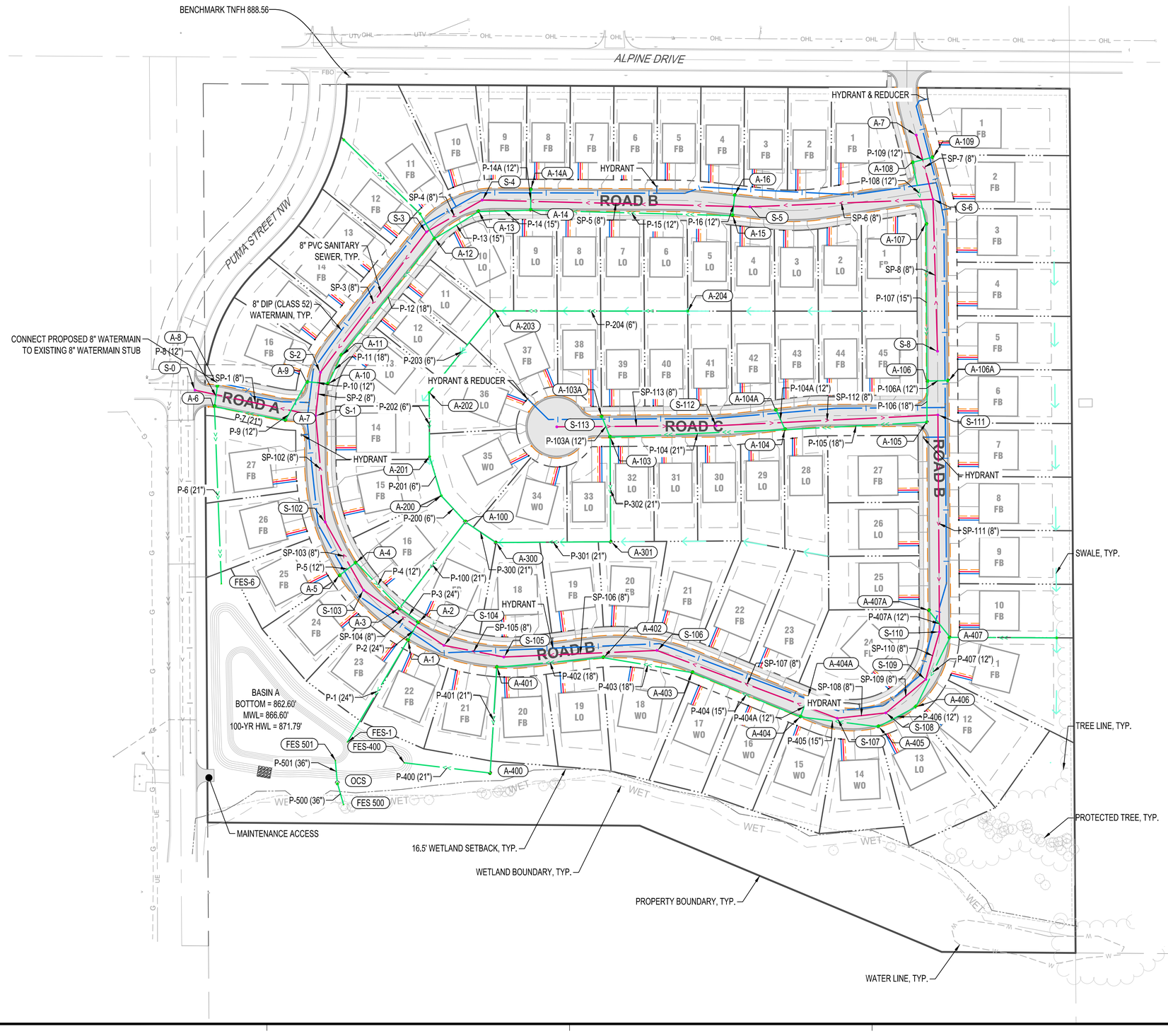
TITLE

**SWPPP DETAILS**

SHEET

**8**

OF 32




## UTILITY LEGEND

| EXISTING | | PROPOSED |
|---|---|---|
| — — — >> — — — | STORM DRAIN | >> |
| — — — > — — — | SANITARY SEWER | > |
| — — — II> — — — | SANITARY SEWER FORCEMAIN | <II |
| — — — I — — — | WATERMAIN | I |
| — — — G — — — | GAS | G |
| — — — OE — — — | OVERHEAD ELECTRIC | OE |
| — — — UE — — — | UNDERGROUND ELECTRIC | UE |
| — — — UT — — — | UNDERGROUND TELEPHONE | UT |
| — — — UTV — — — | UNDERGROUND TV | |
| — — — OHL — — — | OVERHEAD UTILITY | |
| — — — UTL — — — | UNDERGROUND UTILITY | |
| — — — FBO — — — | FIBER OPTIC | |

NOTE:

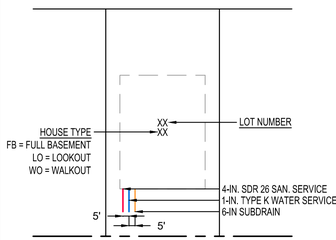
ALL SANITARY SEWER 0-13 FT IN BURY DEPTH SHALL BE PVC CLASS SDR 35. ALL SANITARY SEWER 13-25 FT IN BURY DEPTH SHALL BE SDR 26.

ALL WATERMAIN SHALL BE PLACED AT A MINIMUM BURY DEPTH OF 7.5 FT FROM PROPOSED GROUND ELEVATION TO TOP OF PIPE. WATERMAIN SHALL MAINTAIN A MINIMUM 10 FT HORIZONTAL SEPARATION AND 18 IN VERTICAL SEPARATION FROM ALL SEWER PIPE.

CONTRACTOR SHALL FIELD VERIFY THE LOCATIONS OF ALL EXISTING UTILITIES.

## LOT INFORMATION

(NOT TO SCALE)







ISG

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PROJECT

**LENNAR HOMES**

**NORTH FORK MEADOWS DEVELOPMENT**

RAMSEY MINNESOTA

REVISION SCHEDULE

| DATE | DESCRIPTION | BY |
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| PROJECT NO. | 20-24580 |
| FILE NAME | 24580 5 UTILITY |
| DRAWN BY | EH |
| DESIGNED BY | ART/WMSB |
| REVIEWED BY | NH |
| ORIGINAL ISSUE DATE | --/--/-- |
| CLIENT PROJECT NO. | - |

TITLE

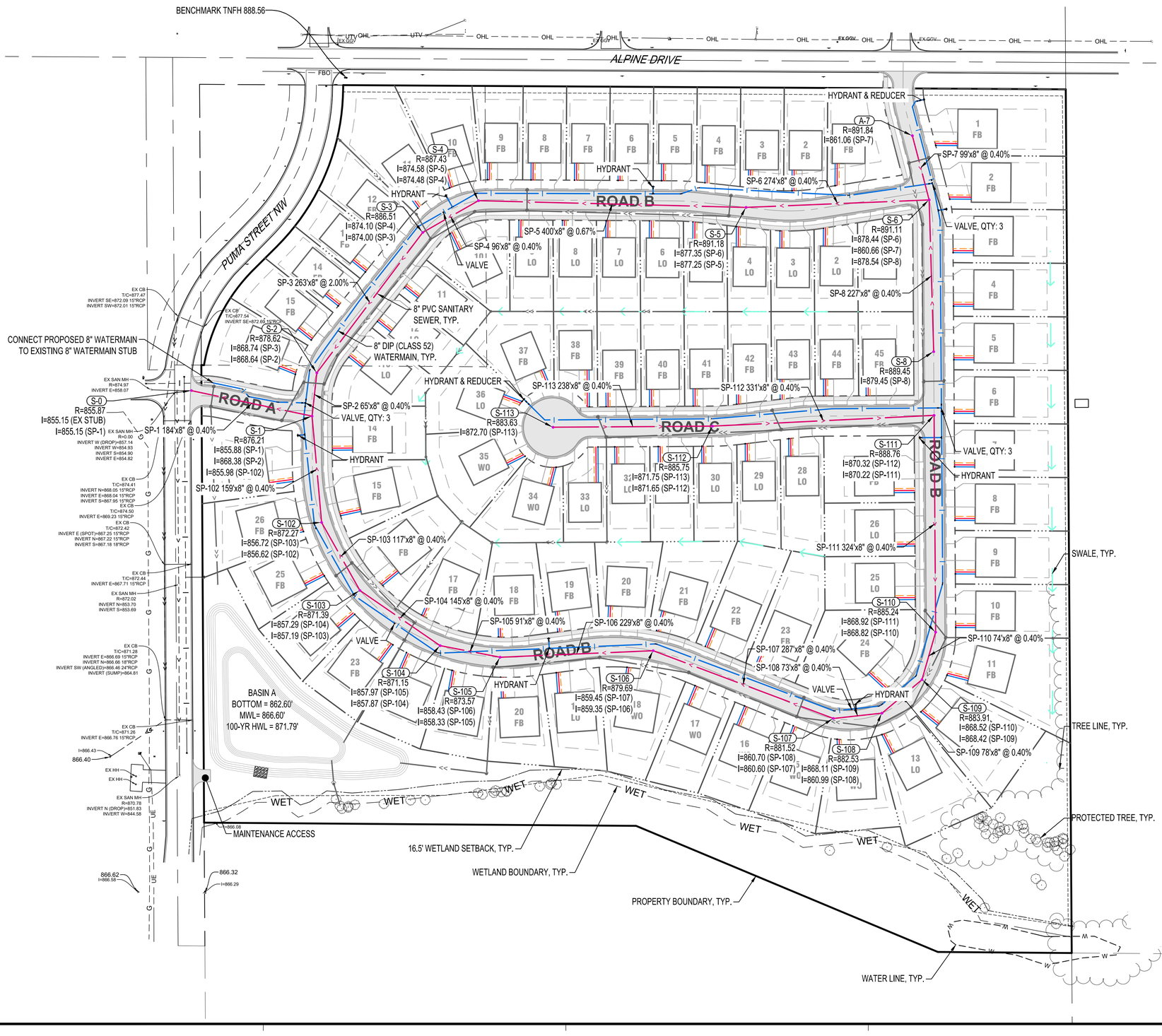
**OVERALL UTILITY PLAN**

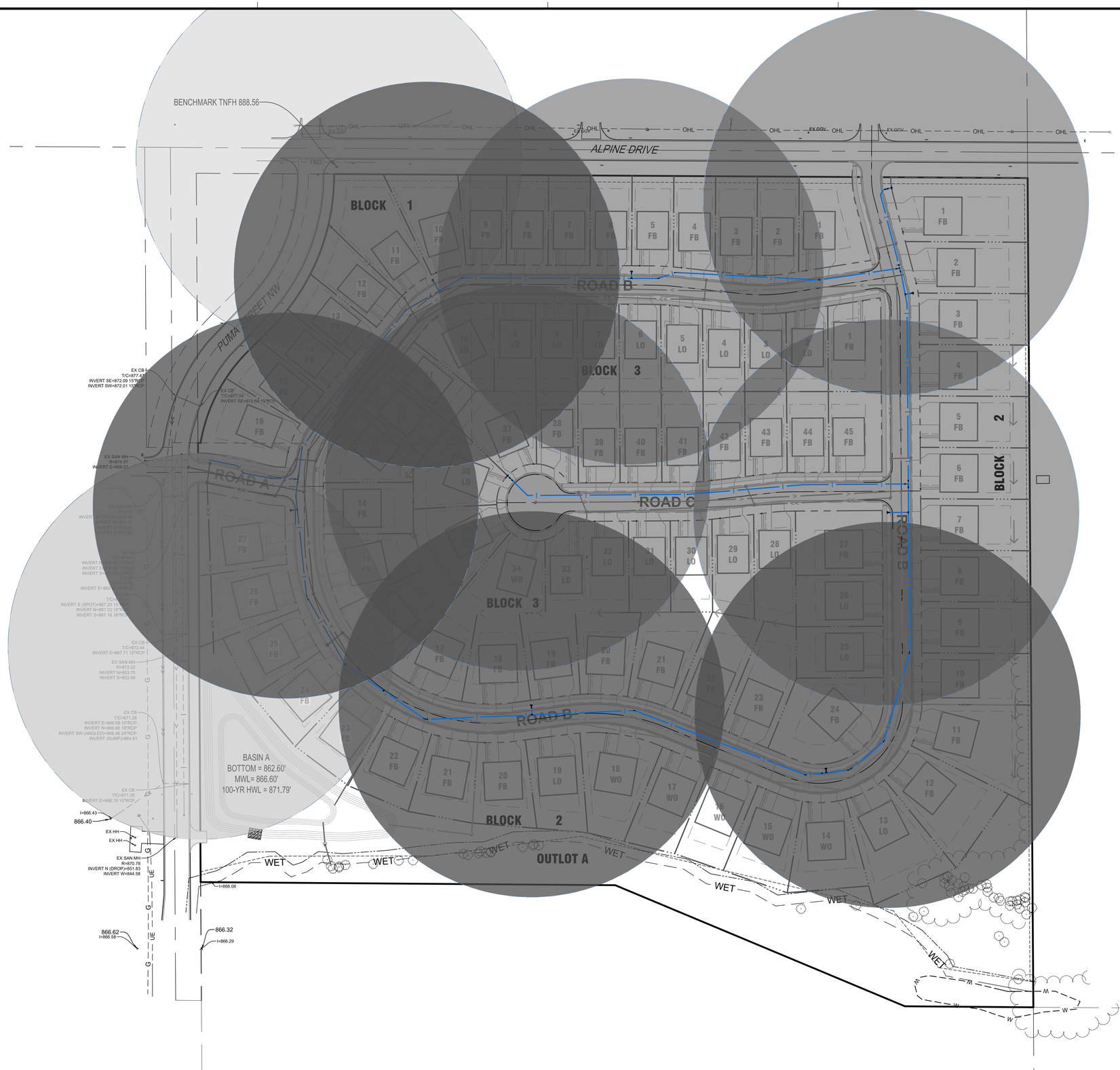
SHEET

**9**

OF 32

PRELIMINARY NOT FOR CONSTRUCTION


BENCHMARK TNFH 888.56
ALPINE DRIVE
PUMA STREET NW
ROAD A
ROAD B
ROAD C
ROAD B
ROAD B
CONNECT PROPOSED 8" WATERMAIN TO EXISTING 8" WATERMAIN STUB
8" PVC SANITARY SEWER, TYP.
8" DIP (CLASS 52) WATERMAIN, TYP.
HYDRANT & REDUCER
HYDRANT
VALVE
VALVE, QTY: 3
SP-1 184'x8" @ 0.40%
SP-2 65'x8" @ 0.40%
SP-3 263'x8" @ 2.00%
SP-4 96'x8" @ 0.40%
SP-5 400'x8" @ 0.67%
SP-6 274'x8" @ 0.40%
SP-7 99'x8" @ 0.40%
SP-8 227'x8" @ 0.40%
SP-102 159'x8" @ 0.40%
SP-103 117'x8" @ 0.40%
SP-104 145'x8" @ 0.40%
SP-105 91'x8" @ 0.40%
SP-106 229'x8" @ 0.40%
SP-107 287'x8" @ 0.40%
SP-108 73'x8" @ 0.40%
SP-109 78'x8" @ 0.40%
SP-110 74'x8" @ 0.40%
SP-111 324'x8" @ 0.40%
SP-112 331'x8" @ 0.40%
SP-113 238'x8" @ 0.40%
S-0 R=855.87 I=855.15 (EX STUB) I=855.15 (SP-1)
S-1 R=876.21 I=855.88 (SP-1) I=868.38 (SP-2) I=855.98 (SP-102)
S-2 R=878.62 I=868.74 (SP-3) I=868.64 (SP-2)
S-3 R=886.51 I=874.10 (SP-4) I=874.00 (SP-3)
S-4 R=887.43 I=874.58 (SP-5) I=874.48 (SP-4)
S-5 R=891.18 I=877.35 (SP-6) I=877.25 (SP-5)
S-6 R=891.11 I=878.44 (SP-6) I=860.66 (SP-7) I=878.54 (SP-8)
A-7 R=891.84 I=861.06 (SP-7)
S-8 R=889.45 I=879.45 (SP-8)
S-102 R=872.27 I=856.72 (SP-103) I=856.62 (SP-102)
S-103 R=871.39 I=857.29 (SP-104) I=857.19 (SP-103)
S-104 R=871.15 I=857.97 (SP-105) I=857.87 (SP-104)
S-105 R=873.57 I=858.43 (SP-106) I=858.33 (SP-105)
S-106 R=879.69 I=859.45 (SP-107) I=859.35 (SP-106)
S-107 R=881.52 I=860.70 (SP-108) I=860.60 (SP-107)
S-108 R=882.53 I=868.11 (SP-109) I=860.99 (SP-108)
S-109 R=883.91 I=868.52 (SP-110) I=868.42 (SP-109)
S-110 R=885.24 I=868.92 (SP-111) I=868.82 (SP-110)
S-111 R=888.76 I=870.32 (SP-112) I=870.22 (SP-111)
S-112 R=885.75 I=871.75 (SP-113) I=871.65 (SP-112)
S-113 R=883.63 I=872.70 (SP-113)
EX CB T/C=877.47 INVERT SE=872.09 15"RCP INVERT SW=872.01 15"RCP
EX CB T/C=877.54 INVERT SE=872.65 15"RCP
EX SAN MH R=874.97 INVERT E=858.07
EX SAN MH R=0.00 INVERT W (DROP)=857.14 INVERT W=854.93 INVERT S=854.90 INVERT E=854.82
EX CB T/C=874.41 INVERT N=868.05 15"RCP INVERT E=868.04 15"RCP INVERT S=867.95 15"RCP
EX CB T/C=874.50 INVERT E=869.23 15"RCP
EX CB T/C=872.42 INVERT E (SPOT)=867.25 15"RCP INVERT N=867.22 15"RCP INVERT S=867.18 18"RCP
EX CB T/C=872.44 INVERT E=867.71 15"RCP
EX SAN MH R=872.02 INVERT N=853.70 INVERT S=853.69
EX CB T/C=871.28 INVERT E=866.69 15"RCP INVERT N=866.66 18"RCP INVERT SW (ANGLED)=866.46 24"RCP INVERT (SUMP)=864.81
EX CB T/C=871.26 INVERT E=866.76 15"RCP
I=866.43
866.40
EX HH
EX HH
EX SAN MH R=870.78 INVERT N (DROP)=851.83 INVERT W=844.58
I=866.08
MAINTENANCE ACCESS
866.62 I=866.58
866.32 I=866.29
BASIN A BOTTOM = 862.60' MWL= 866.60' 100-YR HWL = 871.79'
WET
16.5' WETLAND SETBACK, TYP.
WETLAND BOUNDARY, TYP.
PROPERTY BOUNDARY, TYP.
WATER LINE, TYP.
SWALE, TYP.
TREE LINE, TYP.
PROTECTED TREE, TYP.
UTV OHL EX.GGV FBO
1 FB
2 FB
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24 LO




## HYDRANT COVERAGE LEGEND

R300'

EXISTING HYDRANT

R300'

PROPOSED HYDRANT

ISG

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NATHAN HERMER

DATE XX/XX/XXXX LIC. NO. XXXXX

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PROJECT

**LENNAR HOMES**

**NORTH FORK MEADOWS DEVELOPMENT**

RAMSEY MINNESOTA

REVISION SCHEDULE

| DATE | DESCRIPTION | BY |
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| PROJECT NO. | 20-24580 |
| FILE NAME | 24580 5 UTILITY |
| DRAWN BY | EH |
| DESIGNED BY | ART/WMSB |
| REVIEWED BY | NH |
| ORIGINAL ISSUE DATE | --/--/-- |
| CLIENT PROJECT NO. | - |

TITLE

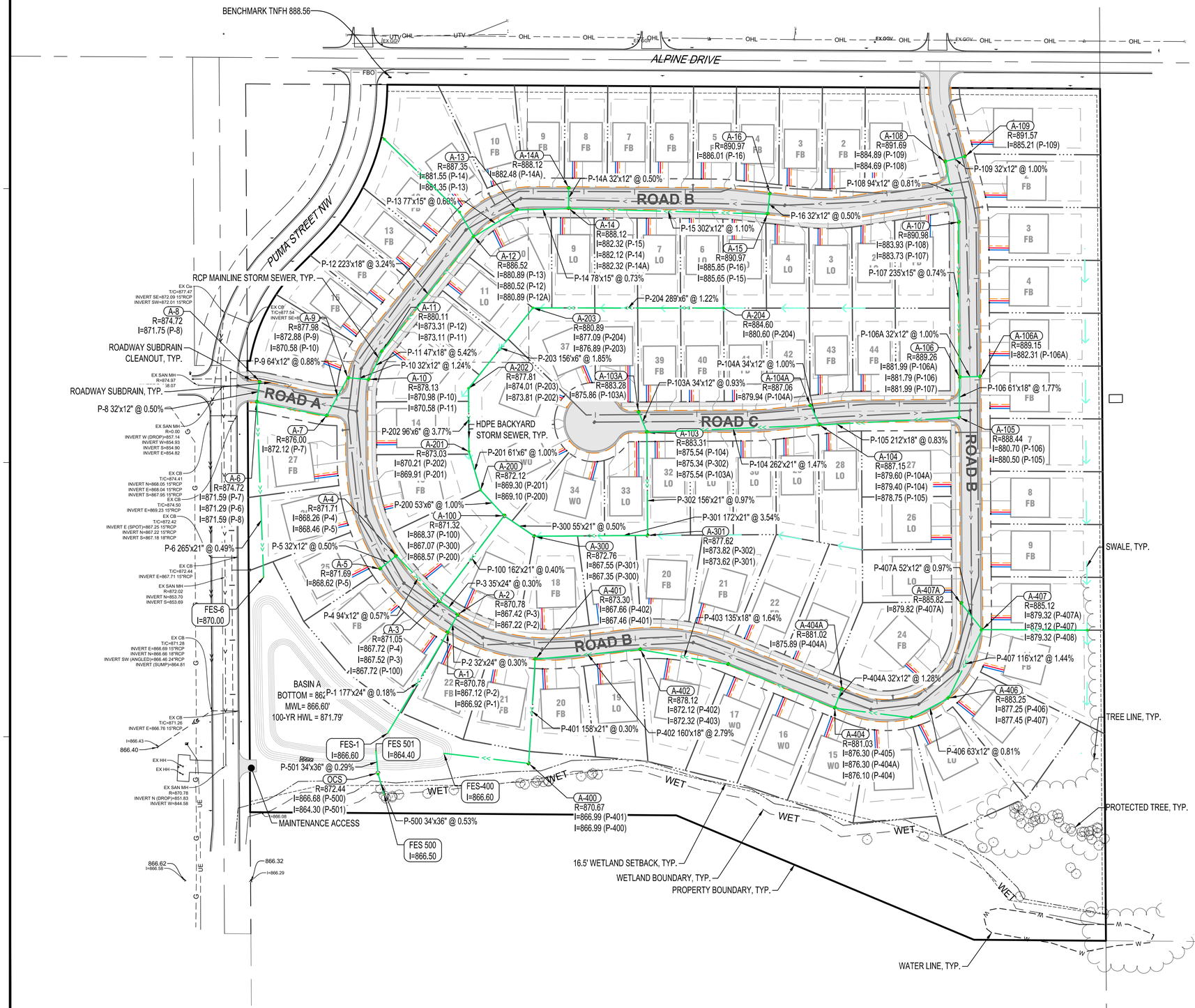
**HYDRANT COVERAGE PLAN**

SHEET

**11**

OF 32

PRELIMINARY NOT FOR CONSTRUCTION




## UTILITY LEGEND

| EXISTING | | PROPOSED |
|---|---|---|
| — — — >> — — — | STORM DRAIN | ——— >> ——— |
| — — — > — — — | SANITARY SEWER | ——— > ——— |
| — — — II> — — — | SANITARY SEWER FORCEMAIN | ——— <II ——— |
| — — — I — — — | WATERMAIN | ——— I ——— |
| — — — G — — — | GAS | ——— G ——— |
| — — — OE — — — | OVERHEAD ELECTRIC | ——— OE ——— |
| — — — UE — — — | UNDERGROUND ELECTRIC | ——— UE ——— |
| — — — UT — — — | UNDERGROUND TELEPHONE | ——— UT ——— |
| — — — UTV — — — | UNDERGROUND TV | |
| — — — OHL — — — | OVERHEAD UTILITY | |
| — — — UTL — — — | UNDERGROUND UTILITY | |
| — — — FBO — — — | FIBER OPTIC | |

NOTE:

ALL SANITARY SEWER 0-13 FT IN BURY DEPTH SHALL BE PVC CLASS SDR 35. ALL SANITARY SEWER 13-25 FT IN BURY DEPTH SHALL BE SDR 26.

ALL WATERMAIN SHALL BE PLACED AT A MINIMUM BURY DEPTH OF 7.5 FT FROM PROPOSED GROUND ELEVATION TO TOP OF PIPE. WATERMAIN SHALL MAINTAIN A MINIMUM 10 FT HORIZONTAL SEPARATION AND 18 IN VERTICAL SEPARATION FROM ALL SEWER PIPE.

CONTRACTOR SHALL FIELD VERIFY THE LOCATIONS OF ALL EXISTING UTILITIES.

## LOT INFORMATION

(NOT TO SCALE)

HOUSE TYPE
FB = FULL BASEMENT
LO = LOOKOUT
WO = WALKOUT

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NATHAN HERMER

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PROJECT

**LENNAR HOMES**

**NORTH FORK MEADOWS DEVELOPMENT**

RAMSEY MINNESOTA

REVISION SCHEDULE

| DATE | DESCRIPTION | BY |
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| PROJECT NO. | 20-24580 |
| FILE NAME | 24580 5 UTILITY |
| DRAWN BY | EH |
| DESIGNED BY | ART/WMSB |
| REVIEWED BY | NH |
| ORIGINAL ISSUE DATE | --/--/-- |
| CLIENT PROJECT NO. | - |

TITLE

**OVERALL STORM SEWER PLAN**

SHEET

**12**

OF 32

PRELIMINARY NOT FOR CONSTRUCTION




| PLANT SCHEDULE | | |
|---|---|---|
| TURF RESTORATION | QTY | COMMON / BOTANICAL NAME |
| | 702,396 sf | MNDOT Seed Mix 25-131<br>Low Maintenance Turf |
| | 12,730 sf | MNDOT Seed Mix 33-261<br>Stormwater South and West |
| | 3,490 sf | MNDOT Seed Mix 34-181<br>Emergent Wetland |
| | 28,927 sf | MNDOT Seed Mix 35-521<br>Dry Prairie Southwest |

N

0 80 160

SCALE IN FEET

ISG

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DANYELLE PIERQUET

DATE XXXX/XX/XX LIC. NO. 49121

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PROJECT

**LENNAR HOMES**

**NORTH FORK MEADOWS DEVELOPMENT**

RAMSEY MINNESOTA

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| PROJECT NO. | 20-24580 |
| FILE NAME | 24580 8 LAND |
| DRAWN BY | EH |
| DESIGNED BY | ART,WMSB |
| REVIEWED BY | NH |
| ORIGINAL ISSUE DATE | --/--/-- |
| CLIENT PROJECT NO. | - |

TITLE

**SITE RESTORATION PLAN**

SHEET

**30**

OF 32

PRELIMINARY NOT FOR CONSTRUCTION




## PLANT SCHEDULE

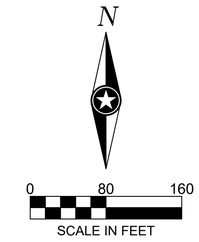
| DECIDUOUS TREE | QTY | COMMON / BOTANICAL NAME | SIZE | ROOT |
|---|---|---|---|---|
| | 14 | New Harmony Elm<br>Ulmus americana `New Harmony` | 2.5" CAL | B & B |
| | 64 | Ohio Buckeye<br>Aesculus glabra | 2.5" CAL | B & B |
| | 48 | Maidenhair Tree<br>Ginkgo biloba `Autumn Gold` | 2.5" CAL | B & B |
| | 23 | Adams Crabapple<br>Malus x `Adams` | 1.5" CAL | B & B |
| | 20 | Swamp White Oak<br>Quercus bicolor | 2.5" CAL | B & B |
| | 21 | Japanese Tree Lilac<br>Syringa reticulata | 2.5" Cal. | B & B |
| **EVERGREEN TREE** | **QTY** | **COMMON / BOTANICAL NAME** | **SIZE** | **ROOT** |
| | 80 | Balsam Fir<br>Abies balsamea | 6` HT MIN | B & B |
| | 42 | Black Hills Spruce<br>Picea glauca `Densata` | 6` HT MIN | B & B |
| | 19 | White Spruce<br>Picea glauca | 6` HT MIN | B & B |
| | 4 | Techny Arborvitae<br>Thuja occidentalis `Techny` | 6` HT MIN | B & B |
| **SHRUBS** | **QTY** | **COMMON / BOTANICAL NAME** | **SIZE** | **ROOT** |
| ⊙ | 18 | Gro-Low Fragrant Sumac<br>Rhus aromatica `Gro-Low` | 5 GAL | CONT |

## TREE PLANTING REQUIREMENTS

TREES PER DWELLING UNIT
- MINIMUM 2 OVERSTORY DECIDUOUS/CONIFEROUS TREES PER DWELLING UNIT
- TOTAL DWELLING UNITS = 88
- MINIMUM REQUIRED TREES = 176
- PROVIDED DWELLING UNIT AND SUPPLEMENTAL SCREENING TREES = 209

BUFFER TREES
- BUFFER B ALONG EAST PROPERTY LINE, 1,289 LINEAR FEET (LF)
- 4 OVERSTORY, 4 ORNAMENTAL, 4 EVERGREEN TREES REQUIRED PER 100 LF
- 1,289 / 100 = 12.89, 13x4 = 52 OVERSTORY, ORNAMENTAL, AND EVERGREEN TREES REQUIRED
- PROVIDED 47 TREES TO SUPPLEMENT EXISTING TREE BUFFER, PRIORITY TO FILL GAPS IN EXISTING BUFFER.

- BUFFER C ALONG NORTH PROPERTY LINE, 1,018 LINEAR FEET (LF)
- 8 OVERSTORY, 8 ORNAMENTAL, 8 EVERGREEN TREES REQUIRED PER 100 LF
- 1,018 / 100 = 10.18, 10x8 = 80 OVERSTORY, ORNAMENTAL, AND EVERGREEN TREES REQUIRED
- PROVIDED 80 TREES




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DANYELLE PIERQUET

DATE XXXX/XX/XX LIC. NO. 49121

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PROJECT

**LENNAR HOMES**

**NORTH FORK MEADOWS DEVELOPMENT**

RAMSEY MINNESOTA

REVISION SCHEDULE

| DATE | DESCRIPTION | BY |
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| PROJECT NO. | 20-24580 |
| FILE NAME | 24580 8 LAND |
| DRAWN BY | EH |
| DESIGNED BY | ART/WMSB |
| REVIEWED BY | NH |
| ORIGINAL ISSUE DATE | --/--/-- |
| CLIENT PROJECT NO. | - |

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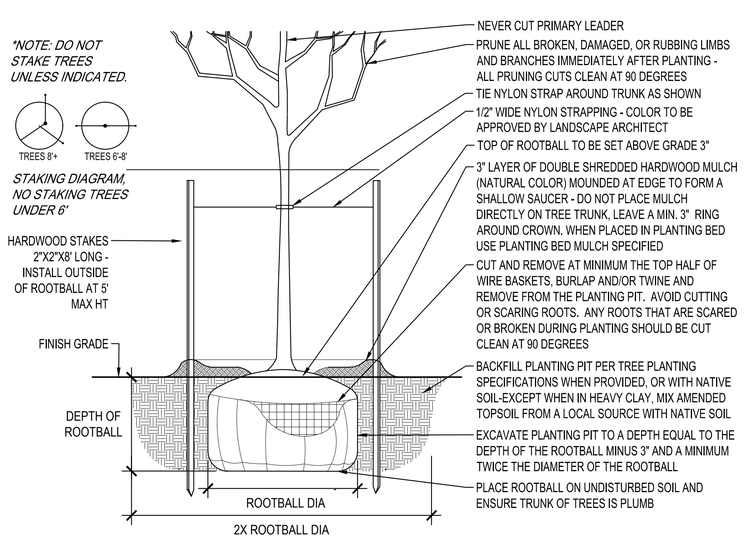
**OVERALL LANDSCAPING PLAN**

SHEET

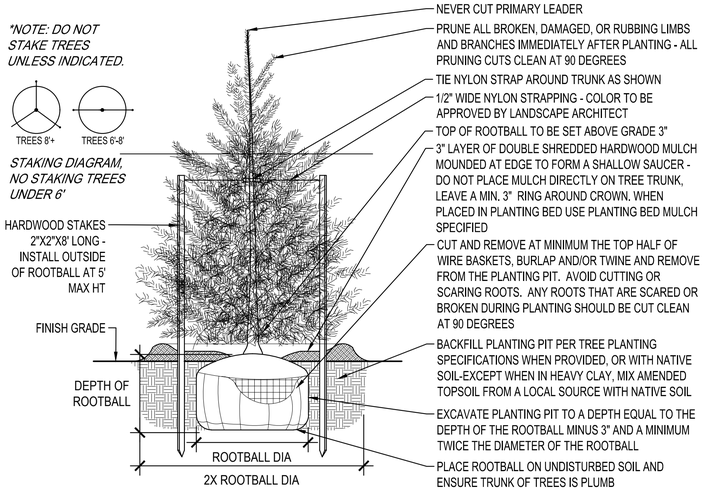
**31**

OF 32

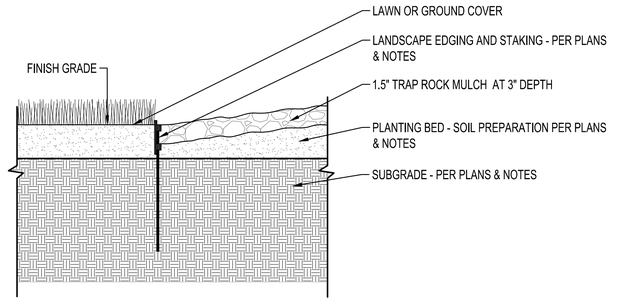
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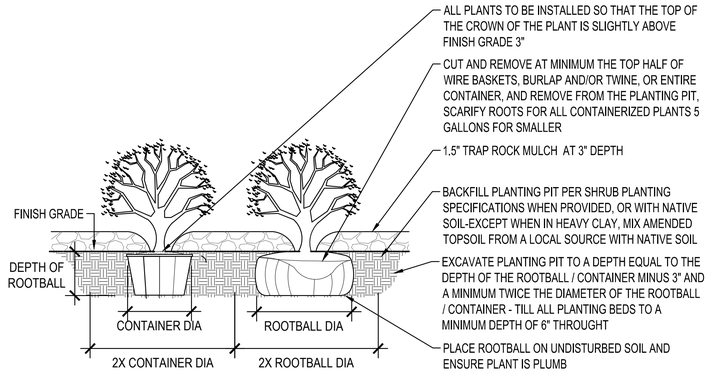

## 1 DECIDUOUS TREE PLANTING DETAIL
SCALE: 1" = 1'-0"




## 2 CONIFER / EVERGREEN TREE PLANTING DETAIL
SCALE: 1" = 1'-0"




## 3 LANDSCAPE EDGING DETAIL
SCALE: 1" = 1'-0"




## 4 SHRUB PLANTING DETAIL
SCALE: 1" = 1'-0"

## GENERAL PLANTING NOTES

1. COORDINATE LOCATION OF ALL UTILITIES (LINES, DUCTS, CONDUITS, SLEEVES, FOOTINGS, ETC.) WITH LOCATIONS OF PROPOSED LANDSCAPE ELEMENTS . CONTRACTOR SHALL REPORT ANY DISCREPANCIES TO OWNER'S REPRESENTATIVE PRIOR TO WORK.
2. SAVE AND PROTECT ALL EXISTING TREES NOT NOTED TO BE REMOVED.
3. REMOVE ALL CONSTRUCTION DEBRIS AND MATERIALS INJURIOUS TO PLANT GROWTH FROM PLANTING PITS AND BEDS PRIOR TO BACKFILLING WITH PLANTING MIX.
4. ANY AREAS OUTSIDE THE LIMIT OF WORK THAT ARE DISTURBED SHALL BE RESTORED TO ITS ORIGINAL CONDITION AT NO ADDITIONAL COST TO OWNER.
5. REFER TO PLANTING DETAILS PLAN FOR AMENDED SOIL DEPTH IN PLANTING BEDS AND SURROUNDING TREES. REFER TO SPECIFICATIONS FOR MIX TYPE.
6. FIELD STAKE PLANTINGS ACCORDING TO PLAN. OWNER'S REPRESENTATIVE SHALL APPROVE ALL PLANT LOCATIONS PRIOR TO INSTALLATION. OWNER RESERVES THE RIGHT TO REVISE PLANTING LAYOUT AT TIME OF INSTALLATION.
7. ALL PLANT MATERIALS SHALL BE TRUE TO THEIR SCIENTIFIC NAME AND SIZE AS INDICATED IN THE PLANT SCHEDULE.
8. IF DISCREPANCIES EXIST BETWEEN THE NUMBER OF PLANTS DRAWN ON THE PLANTING PLAN AND THE NUMBER OF PLANTS IN THE SCHEDULE, THE PLANTING PLAN SHALL GOVERN.
9. OWNER RESERVES THE RIGHT TO REVISE QUANTITIES TO SUIT BUDGET LIMITATIONS. CONTRACTOR'S UNIT BID PRICES SHALL PREVAIL FOR ANY CHANGES IN QUANTITIES.
10. ANY PROPOSED SUBSTITUTIONS OF PLANT SPECIES SHALL BE MADE WITH PLANTS OF EQUIVALENT OVERALL FORM, HEIGHT, BRANCHING HABIT, FLOWER, LEAF, COLOR, FRUIT AND CULTURE, AND ONLY AFTER WRITTEN APPROVAL OF THE OWNER'S REPRESENTATIVE AND OWNER.
11. ALL PLANT MATERIALS MUST CONFORM TO AMERICAN STANDARDS FOR NURSERY STOCK (A.N.S.I.), LATEST EDITION PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN, WASHINGTON D.C. LARGER SIZED PLANT MATERIALS OF THE SPECIES LISTED MAY BE USED IF THE STOCK CONFORMS TO A.N.S.I.
12. ALL PLANT MATERIAL SHALL BE GUARANTEED TO BE IN A LIVE AND HEALTHY GROWING CONDITION FOR ONE FULL GROWING SEASON (ONE YEAR) AFTER FINAL PROJECT ACCEPTANCE OR SHALL BE REPLACED FREE OF CHARGE WITH THE SAME GRADE AND SPECIES. ALL TREES SHALL HAVE A STRONG CENTRAL LEADER.

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PROJECT

**LENNAR HOMES**

**NORTH FORK MEADOWS DEVELOPMENT**

RAMSEY MINNESOTA

REVISION SCHEDULE

| DATE | DESCRIPTION | BY |
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| PROJECT NO. | 20-24580 |
| FILE NAME | 24580 8 LAND |
| DRAWN BY | EH |
| DESIGNED BY | ART,WMSB |
| REVIEWED BY | NH |
| ORIGINAL ISSUE DATE | --/--/-- |
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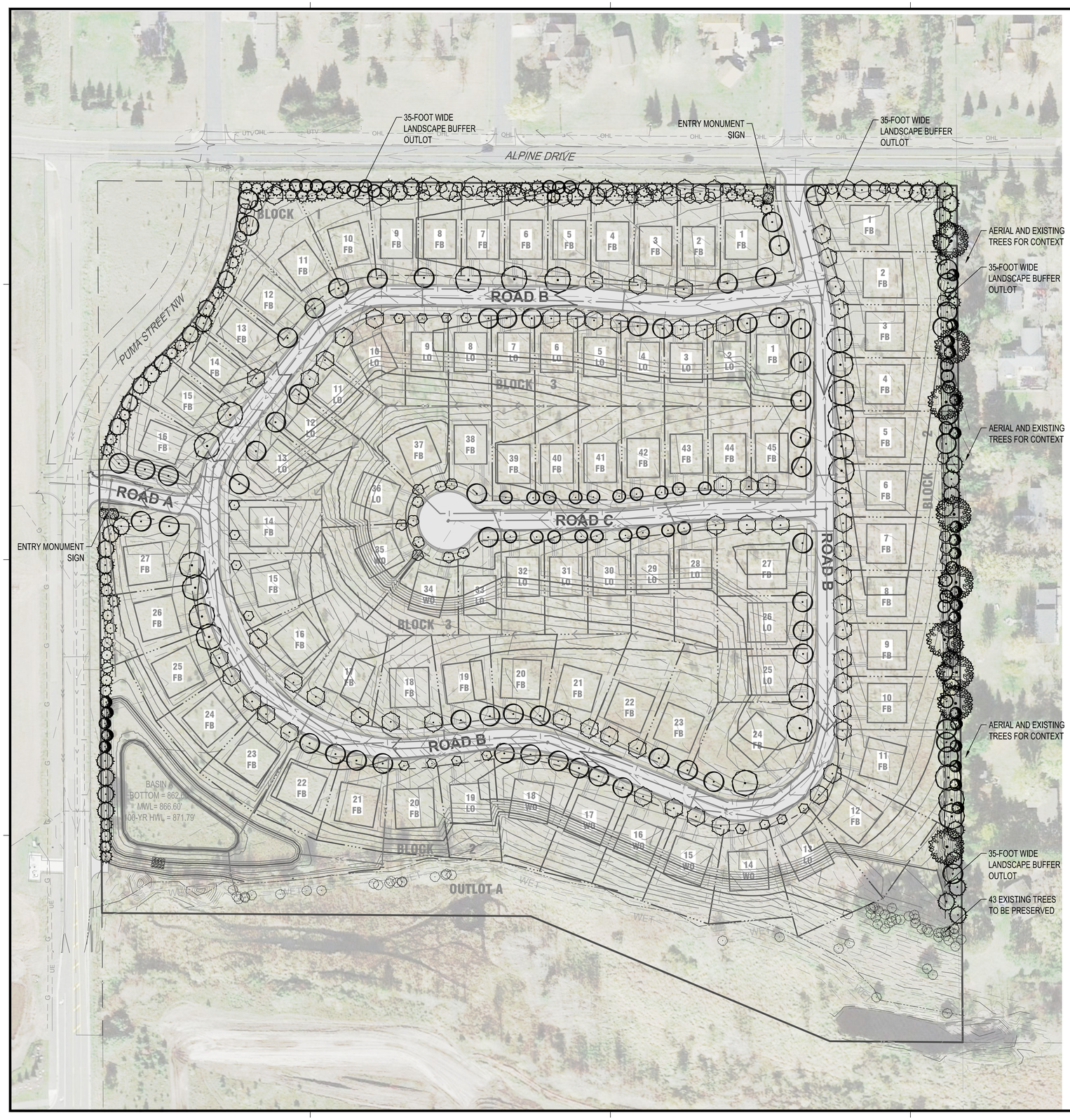
**LANDSCAPING DETAILS & SEEDING NOTES**

SHEET

**32**

OF 32

PRELIMINARY NOT FOR CONSTRUCTION




| PLANT SCHEDULE | | | | |
|---|---|---|---|---|
| DECIDUOUS TREE | QTY | COMMON / BOTANICAL NAME | SIZE | ROOT |
| | 9 | New Harmony Elm<br>Ulmus americana `New Harmony` | 2.5" CAL | B & B |
| | 66 | Ohio Buckeye<br>Aesculus glabra | 2.5" CAL | B & B |
| | 75 | Maidenhair Tree<br>Ginkgo biloba `Autumn Gold` | 2.5" CAL | B & B |
| | 35 | Adams Crabapple<br>Malus x `Adams` | 1.5" CAL | B & B |
| | 21 | Swamp White Oak<br>Quercus bicolor | 2.5" CAL | B & B |
| | 16 | Showy Mountain Ash<br>Sorbus decora | 1.5" Cal. | B & B |
| | 40 | Japanese Tree Lilac<br>Syringa reticulata | 2.5" Cal. | B & B |
| EVERGREEN TREE | QTY | COMMON / BOTANICAL NAME | SIZE | ROOT |
| | 55 | Balsam Fir<br>Abies balsamea | 6` HT MIN | B & B |
| | 46 | Black Hills Spruce<br>Picea glauca `Densata` | 6` HT MIN | B & B |
| | 23 | White Spruce<br>Picea glauca | 6` HT MIN | B & B |
| SHRUBS | QTY | COMMON / BOTANICAL NAME | SIZE | ROOT |
| | 18 | Gro-Low Fragrant Sumac<br>Rhus aromatica `Gro-Low` | 5 GAL | CONT |

## TREE PLANTING REQUIREMENTS

TREES PER DWELLING UNIT
- MINIMUM 2 OVERSTORY DECIDUOUS/CONIFEROUS TREES PER DWELLING UNIT
- TOTAL DWELLING UNITS = 88
- MINIMUM REQUIRED TREES = 176
- PROVIDED DWELLING UNIT AND SUPPLEMENTAL SCREENING TREES = 178

BUFFER TREES
- BUFFER B ALONG EAST PROPERTY LINE, 1,289 LINEAR FEET (LF)
- 4 OVERSTORY, 4 ORNAMENTAL, 4 EVERGREEN TREES REQUIRED PER 100 LF
- 1,108 / 100 = 11.08 11.08 x 12 = 132.96 , 133 OVERSTORY, ORNAMENTAL, AND EVERGREEN TREES REQUIRED
- PROVIDED 75 NEW TREES AND PRESERVED 43 EXISTING TREES (118 TOTAL) TO SUPPLEMENT EXISTING NEIGHBOR TREE BUFFER

- BUFFER C ALONG NORTH PROPERTY LINE, 1,018 LINEAR FEET (LF)
- 8 OVERSTORY, 8 ORNAMENTAL, 8 EVERGREEN TREES REQUIRED PER 100 LF
- 1,020 / 100 = 10.2. 10.2x24= 244.8, 244.8 OVERSTORY, ORNAMENTAL, AND EVERGREEN TREES REQUIRED
- PROVIDED 90 NEW TREES

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0 80 160

SCALE IN FEET

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PROJECT

**LENNAR HOMES**

**NORTH FORK MEADOWS DEVELOPMENT**

RAMSEY MINNESOTA

REVISION SCHEDULE

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| DRAWN BY | EH |
| DESIGNED BY | ART/WMSB |
| REVIEWED BY | NH |
| ORIGINAL ISSUE DATE | --/--/-- |
| CLIENT PROJECT NO. | - |

TITLE

**OVERALL LANDSCAPING PLAN**

SHEET

**31**

OF 32

PRELIMINARY NOT FOR CONSTRUCTION

# Memorandum

North Fork Meadows

| | |
|---|---|
| To: | Josh Metzer |
| From: | Danyelle Pierquet, PLA |
| Date: | January 7, 2021 |
| Subject: | Planting Plan Strategy – North Fork Meadows |
| cc: | Nathan Hermer |

## SUMMARY OF PLANTING STRATEGY

### Trees per Dwelling Unit

The code requires two trees per dwelling unit. With a total of 88 dwelling units, the total required trees for this code section is 176. The proposed plan offers 178 trees along street frontages and the western property boundary.

### Buffer Trees

EAST PROPERTY BOUNDARY

The east property boundary abuts an existing single-family neighborhood. According to a visual survey (analysis of aerial photography) many of the adjacent existing lots along Kangaroo Street NW have existing mature trees. Our aerial analysis tallies approximately 50 existing neighbor trees within 35-feet of the property line. Due to the adjacent land use the Ramsey City Code requires a landscape buffer. Code section 117-110(2) notes buffering utilizes, “existing or newly planted vegetation”.

The southern portion of the project east boundary includes 43 existing preserved trees. The east property boundary proposed design also includes a bermed landform to support screening efforts. The berm distinguishes this boundary as Buffer Type B which by code requires 4 each overstory, ornamental, and evergreen trees per 100 linear feet of boundary. With 1,108 linear feet of boundary with new lots abutting existing lots, the east boundary required trees total 133. The proposed east boundary buffer proposes 75 new trees. As the calculation below presents, the project is 15 trees less than the code requirement. The 15-tree deficiency does not include the estimated 50 neighboring trees.

We believe with the existing neighbor trees the views will be adequately screened. The spatial constraints of fitting the required trees within the 35-foot wide buffer area is also a factor. While young trees will physically fit within the space when the project is built, the trees will crowd each other out in the medium and long term. Evergreen trees crowded together or shaded too much by overstory trees could suffer less effective ground-level branching – negating the intent of the screen. We have placed a variety of tree species, and intermingled the overstory, ornamental and evergreen trees to ensure consistent visual coverage and adequate space for the natural growth of the trees long term.

Estimated neighboring buffer trees = 50

Required trees = 133

Existing project site preserved trees = 43

Proposed new trees = 76

43+76 = 119 existing preserved and new trees

133-119 = 14 trees less than code

**Environmental Policy Board (EPB)** **5. 3.**

**Meeting Date:** 01/25/2021

**By:** Chris Anderson, Community Development

---

**Information**

**Title:**

Update on Water Efficiency Grant Program

**Purpose/Background:**

As the Environmental Policy Board (EPB) knows, the City was awarded $28,000 from the Metropolitan Council to implement a water efficiency grant program between January of 2020 and June 30, 2022. The City rolled out the grant program in May of 2020. To date, thirty-nine (39) households have participated in the program, with the majority of the upgrades focusing on smart irrigation controllers. There is still approximately $21,000 available for reimbursement through June of 2022. A summary of the program costs and reimbursements is attached.

As was expected over the winter, applications for rebates have slowed down. However, Staff will continue to periodically promote the program through the City's social media accounts and will ramp up promotion in the newsletter in the March/April and May/June editions.

**Observations/Alternatives:**

Staff has received an inquiry from a Homeowner's Association (HOA) that is interested in upgrading their irrigation system throughout it's entire neighborhood. According to the HOA, there are multiple, outdated, inefficient controllers providing irrigation for around 115 homes. Obviously, a project of this nature would have a much greater impact in terms of water savings than on a typical residential lot. However, as the rebate program is structured, it would still only be eligible for a maximum rebate of $500.

Staff has contacted the Metropolitan Council, which is the source of the grant funds, to determine whether the City could, if it so desired, make modifications to the rebate program. Since this project is in line with the overall intent of the grant program (reducing water consumption), the City can make program adjustments/modifications if so desired.

Staff is seeking feedback from the EPB on the potential of creating an alternate rebate amount for commercial/multi-family controllers. Not only are these typically more expensive controllers than the standard residential units (some can be upwards of $2,500 per controller), but these systems tend to utilize more water as well, due to larger areas being irrigated and oftentimes, larger infrastructure (e.g. moves more water). Thus, Staff is supportive of creating a separate rebate category for commercial/multi-family controllers with a greater rebate amount per controller and per project to better incentivize owners of these systems to upgrade to more water efficient technology. Rather than focusing on specific dollar amounts, Staff is seeking direction from the EPB on whether they're supportive of creating a separate rebate category for these types of controllers.

**Funding Source:**

Per the grant agreement, the City had to contribute 25%, which is being provided through the City's Water Fund account. The remainder is being reimbursed by the Metropolitan Council.

**Action:**

Motion to recommend modifying the water efficiency rebate program to include a separate rebate for commercial/multi-family irrigation controller upgrades.

---

## Attachments

Grant Program Summary

## Form Review

| Inbox | Reviewed By | Date |
| --- | --- | --- |
| Tim Gladhill | Tim Gladhill | 01/20/2021 09:51 AM |
| Form Started By: Chris Anderson | | Started On: 01/11/2021 09:35 AM |
| Final Approval Date: 01/20/2021 | | |

# 2020-2022 Water Efficiency Rebate Program

May 1, 2020 - 2022

| | | | | | | | | Calculated Totals: | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Row # | Property Street Address and Zip Code | (Select) Property Type: | (Select) Water Device Replaced: | Cost per Device ($): | # of Devices: | $28,000 Rebate or Grant Per Device $ | Est. Annual Water (Gallons) Saved Per Device: | Total Rebate or Grant | Municipality Contribution: | Eligible Grant Amount | Estimated Annual Water Saved (Gallons): |
| 37 | 4980 - 150th Lane NW Ramsey MN 55303 | Resident | Irrigation Controller | $ 229.00 | 1 | $ 200.00 | 15,000 | $ 200.00 | $ 50.00 | $ 150.00 | 15,000 |
| 38 | 14560 Helium Ct NW Ramsey MN 55303 | Resident | Toilet | $ 169.00 | 1 | $ 169.00 | 12,200 | $ 169.00 | $ 42.25 | $ 126.75 | 12,200 |
| 39 | 6324 - 154th Ct NW Ramsey MN 55303 | Resident | Irrigation Controller | $ 238.44 | 1 | $ 200.00 | 15,000 | $ 200.00 | $ 50.00 | $ 150.00 | 15,000 |
| 40 | 7118 - 139th Ave NW Ramsey MN 55303 | Resident | Toilet | $ 229.00 | 1 | $ 200.00 | 12,200 | $ 200.00 | $ 50.00 | $ 150.00 | 12,200 |
| 40 | 7118-139th Ave Ramsey MN 55303 | Resident | Toilet | $ 198.00 | 1 | $ 198.00 | 12,200 | $ 198.00 | $ 49.50 | $ 148.50 | 12,200 |
| 41 | 4970 - 150th Lane NW Ramsey MN 55303 | Resident | Irrigation Controller | $ 212.10 | 1 | $ 197.99 | 15,000 | $ 197.99 | $ 49.50 | $ 148.49 | 15,000 |
| 42 | 14407 Iodine Street NW Ramsey MN 55303 | Resident | Irrigation Controller | $ 201.20 | 1 | $ 200.00 | 15,000 | $ 200.00 | $ 50.00 | $ 150.00 | 15,000 |
| 43 | 7543 - 163rd Avenue NW Ramsey MN 55303 | Resident | Irrigation Controller | $ 238.44 | 1 | $ 200.00 | 15,000 | $ 200.00 | $ 50.00 | $ 150.00 | 15,000 |
| 44 | 7563 - 163rd Avenue NW Ramsey MN 55303 | Resident | Irrigation Controller | $ 201.20 | 1 | $ 200.00 | 15,000 | $ 200.00 | $ 50.00 | $ 150.00 | 15,000 |
| 45 | 7555 - 163rd Avenue NW Ramsey MN 55303 | Resident | Irrigation Controller | $ 201.20 | 1 | $ 200.00 | 15,000 | $ 200.00 | $ 50.00 | $ 150.00 | 15,000 |
| 46 | 7104 - 170th Trail NW Ramsey MN 55303 | Resident | Irrigation Controller | $ 199.99 | 1 | $ 199.99 | 15,000 | $ 199.99 | $ 50.00 | $ 149.99 | 15,000 |
| | | | | | | | | $ - | $ - | $ - | 0 |
| | | | | | | | | $ - | $ - | $ - | 0 |
| | | | | | | | | $ - | $ - | $ - | 0 |
| | | | | | | | | $ - | $ - | $ - | 0 |
| | | | | | | | | $ - | $ - | $ - | 0 |
| | | | | | | | | $ - | $ - | $ - | 0 |
| | | | | | | | | $ - | $ - | $ - | 0 |
| | | | | | | | | $ - | $ - | $ - | 0 |
| 4th Quarter Totals | | 10 Residents | | | | | | $ 2,164.98 | $ 541.25 | $ 1,623.74 | 156,600 |
| 3rd Quarter Totals | | 7 Residents | | | | | | $ 1,987.39 | $ 496.85 | $ 1,490.54 | 141,600 |
| 2nd Quarter Totals | | 22 Residents | | | | | | $ 4,896.48 | $ 1,224.12 | $ 3,672.36 | 430,400 |
| 1st Quarter Totals | | 0 Residents | | | | | | $ - | $ - | $ - | 0 |

| | | $28,000 Grant Rebate Remaining Avail. | Total Rebate or Grant | Municipality Contribution: | Eligible Grant Amount | Estimated Annual Water Saved (Gallons): |
|---|---|---|---|---|---|---|
| Total to date | 39 Residents Participating | **$ 21,213.37** | $ 9,048.85 | $ 2,262.22 | $ 6,786.64 | 728,600 |

| |
|---|
| 10.15.20 Metc Refund $1,490.54 |
| 8.6.20 Metc Refund $3,672.36 |

**Environmental Policy Board (EPB)** **5. 4.**

**Meeting Date:** 01/25/2021

**By:** Mark Riverblood, Engineering/Public Works

---

**Information**

**Title:**

Center Street Area Framework and Policy Plan

**Purpose/Background:**

The primary purpose of this case is to acknowledge and provide comment on this planning document, which will be an update to The COR Design Guidelines and Framework (only for the Downtown District), which is the second attachment. The first attachment, the Draft Center Street Area Framework and Policy Plan details streetscapes, future stormwater elements (water reuse), sidewalks, aspects of Municipal Plaza, the Regional Trail and other pedestrian elements/walkability. The plan also specifies facade improvements to Pumphouse #3. The Park & Recreation Commission acknowledged this plan at their November regular meeting, the Planning Commission on January 7th, 2021, and EDA on January 14, 2021. After consideration by the EPB, this planning document will go to to City Council for adoption.

As indicated, the purpose of this case is to obtain feedback on Center Street Area Framework and Policy Plan, but also to advance the planning activity for several interrelated projects around Center Street—some of which having timelines that require the work to commence soon.

A summary of these projects (and a brief description of the interrelatedness) is as follows:

Center Street sidewalk(s) in front of the Sapphire Apartments

The City has the obligation to construct the Center Street public sidewalk/streetscape improvements for a city-lead construction project. The developer has the Sapphire apartment building substantially complete and ready for these improvements. The specific design work for matching the public realm (sidewalk and streetscape) to the adjoining and parallel private sidewalk and building is underway, and should be constructed in the Spring of 2021.

Center Street Streetscape/Trail (west side) near the interface of the Affinity at Ramsey Senior Apartments and Municipal Plaza:

East of the Affinity building is a narrow area of park, south of a new segment of Ramsey Parkway. This is also the Central Anoka County Regional Trail which consists of a temporary section of bituminous, with the plan to convert it to concrete, (like the finished 10' foot concrete trail immediately to the south, parallel to Center Street). The 2021 Parks Capital Improvement Plan (CIP) includes a proposed project page for this, with some of the preliminary conceptual work done.

Municipal Plaza at the interface with Affinity at Ramsey Senior Apartments:

This area is to grade, with turf established in the Fall of 2020, but with no irrigation or other improvements. The preliminary concept plans for the park, show a plaza-like extension of the streetscape/trail blending into the park for a usable, programmable space. The final design (to include public furniture, hearth, landscape, for the narrow north portion of the park) should be considered for completion in 2021 to match the Affinity project's edge. This project would allow for the irrigation system to be designed for larger area of this park area as well. Additionally, the city

has the obligation to 'take over' the irrigation for the median swale within the Ramsey Parkway, (this city property is presently being served by the Affinity building at their expense). Completing this specific park area would be of benefit to the future residents who will reside on either side of this space as well as other park patrons, including for Happy Days' programming—and improve the marketability of the city-owned vacant lot West of Municipal Plaza.

Municipal Plaza, south of the above (the larger, Happy Days site):

The fill from the 2019 COR Infiltration Basin was placed in the park as referenced above. The city may also consider an underground irrigation for the park as the first phase of development, as large scale park improvements may be a few or more years out. This flat, turfed area would function as a lush park space until the final improvements to the park are funded and complete.

Pump House Plaza:

The area immediately surrounding the small Pump House No. #3 is unimproved and consists of sand-burs and weedy grasses. As part of the 2019 Metropolitan Council Local Community Development grant exploration, the Pump House site was evaluated and found that its grounds can bring significant value to Ramsey's downtown by functioning as a plaza and practical extension of the sidewalk and connected park (especially when Center Street may be closed for public events). The cost and design of adding a public restroom to this site to serve the the area parks and trails will be evaluated as this planning document and process moves forward.

Pump House Exterior completion:

The facade treatment was withheld from the Pump House when it was constructed over a decade and a half ago. This was deliberate, so as to match the building with the municipal architecture at such time as this was known. It is believed that this project is timely, in that the city has made the investments in civic place and architecture, and the other related improvements (Municipal Plaza and the future Waterfront) can be considered along with this endeavor—each informing the other, thus setting forth the civic architecture for establishing the sense of place, in the very center of Ramsey's walkable downtown. Additionally, the Pump House is stark in appearance (without the architectural cladding), and finishing the building will meet with the same standards as other private projects are held to in The COR, raising property values, and at the same time the site's utility (discussed above). The city's Capital Improvement Plan (CIP) shows this project occurring in 2020-21, (with that worksheet as the third attachment).

145th Avenue sidewalk:

As of the Fall of 2020, the Sapphire project site is substantially complete, including a widened sidewalk from Sapphire Street, westerly along 145th Avenue to the Pump House site. The city is required to complete approximately 100' feet of sidewalk on the south side of the Pump House to make the connection to Center Street. The planning for this sidewalk will occur alongside the above Pump House Plaza planning activity.

**Notification:**

**Observations/Alternatives:**

Additional detail will be presented at the meeting.

**Funding Source:**

Funding for the various capital improvements (to be approved outside the scope of this case) are identified within the respective portions of the CIP or other separate Council authorization.

**Recommendation:**

Staff will highlight the ***Center Street Area Framework and Policy Plan*** for the meeting, and welcomes any comments or feedback the Environmental Policy Board may have on the draft plan or its elements.

**Action:**

Provide comment and feedback on the Draft ***Center Street Area Framework and Policy Plan.***

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## Attachments

Center Street Area Framework and Policy Plan
The COR Design Framework
CIP page on pumphouse
Pump House existing conditions
Pages from COR plan
The COR Interim Plan
Site Context

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## Form Review

| Inbox | Reviewed By | Date |
|---|---|---|
| Chris Anderson | Chris Anderson | 01/13/2021 01:00 PM |
| Tim Gladhill | Tim Gladhill | 01/20/2021 09:51 AM |
| Form Started By: Mark Riverblood | | Started On: 01/13/2021 12:42 PM |
| Final Approval Date: 01/20/2021 | | |

# CENTER STREET AREA FRAMEWORK + POLICY PLAN




## Pump House Plaza + Pump House Building + Municipal Plaza + Center Street

City of Ramsey, Minnesota
November, 2020

## ACKNOWLEDGMENTS

This Framework and Policy Plan focuses on the very center of The Center of Ramsey's 320 acre downtown referred to as The COR. The fact that the community is succeeding in the primary vision of having its own downtown and identity cannot be understated. The COR is over half built-out according to plan, with favorable progress continuing even within and through the Great Recession. This is attributable to Ramsey residents, and leadership, holding to the original vision for a pedestrian oriented, successful, vibrant downtown–this Center Street Area Framework and Policy Plan is an implementation strategy that supports the vison and objectives of The COR Design Framework which cites an 'implied responsibility' to carry forth the goals in site planning and design:

*"All participants in the development of The COR recognize the local and regional impacts of this project and the various systems that play an important role. Each parcel and each building must fit within the context of the entire plan. Individual projects must complement, not compete with, adjacent development in terms of public green space, walk and trail connections, stormwater management solutions, street layout, parking strategies, land use mix and building design."* The Center Street Area Framework and Policy Plan does just this, by integrating and interrelating the above tenets.

*The COR Design Framework goes on to list the three Objectives:*

- *Overall COR design (and all new private development within The COR) will accommodate stormwater from new projects and from off-site, and highlight stormwater features as an amenity.*
- *Bikeways and pedestrian routes into The COR from adjacent neighborhoods must be designed for safety and ease of access, suggesting that a person on a bicycle has an equally accessible route to [and within] downtown.*
- *Parks and open space will be easily accessible to all COR residents, visitors, people who work here and also for the citizens of Ramsey and the surrounding area. *This connected green system is reminiscent of the world renowned 'Grand Rounds' of Minneapolis.*

* The above is also mirrored in The Circle of Ramsey Greenway, of which The COR, is an integral part and a destination within.

The COR was an organic, citizen led movement in delivering an urban downtown with its amenities for the whole community, while also 'taking some of the development pressure off' the more rural areas of the city. The success in finding that balance has been due to thoughtful, reasoned residents–unified in mission and vision. Future Ramsey residents can thank today's residents and Planning Commission, Economic Development Authority, the Park and Recreation Commission, and City Council for coming together in their collective service to the community.

Parks & Assist. Public Works Superintendent,
Mark Riverblood

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# Background + Purpose

## Overview

The purpose of the Center Street Area Framework + Policy Plan is to advance the planning activity for several interrelated projects within this district. Several of these project have timelines that require the work to commence as soon as possible. A summary list of current and potential future projects includes:

- Center Street sidewalk(s) in front of the Sapphire building;
- Center Street streetscape/trail (west side) near the interface of the Affinity and Municipal Plaza;
- Municipal Plaza (north) at the interface with Affinity;
- Municipal Plaza (south) the larger Happy Days site;
- Pump House Plaza the area immediately surrounding the small Pump House No. #3;
- Pump House Exterior potential facade improvements;
- 145th Avenue sidewalk connecting to Center Street.

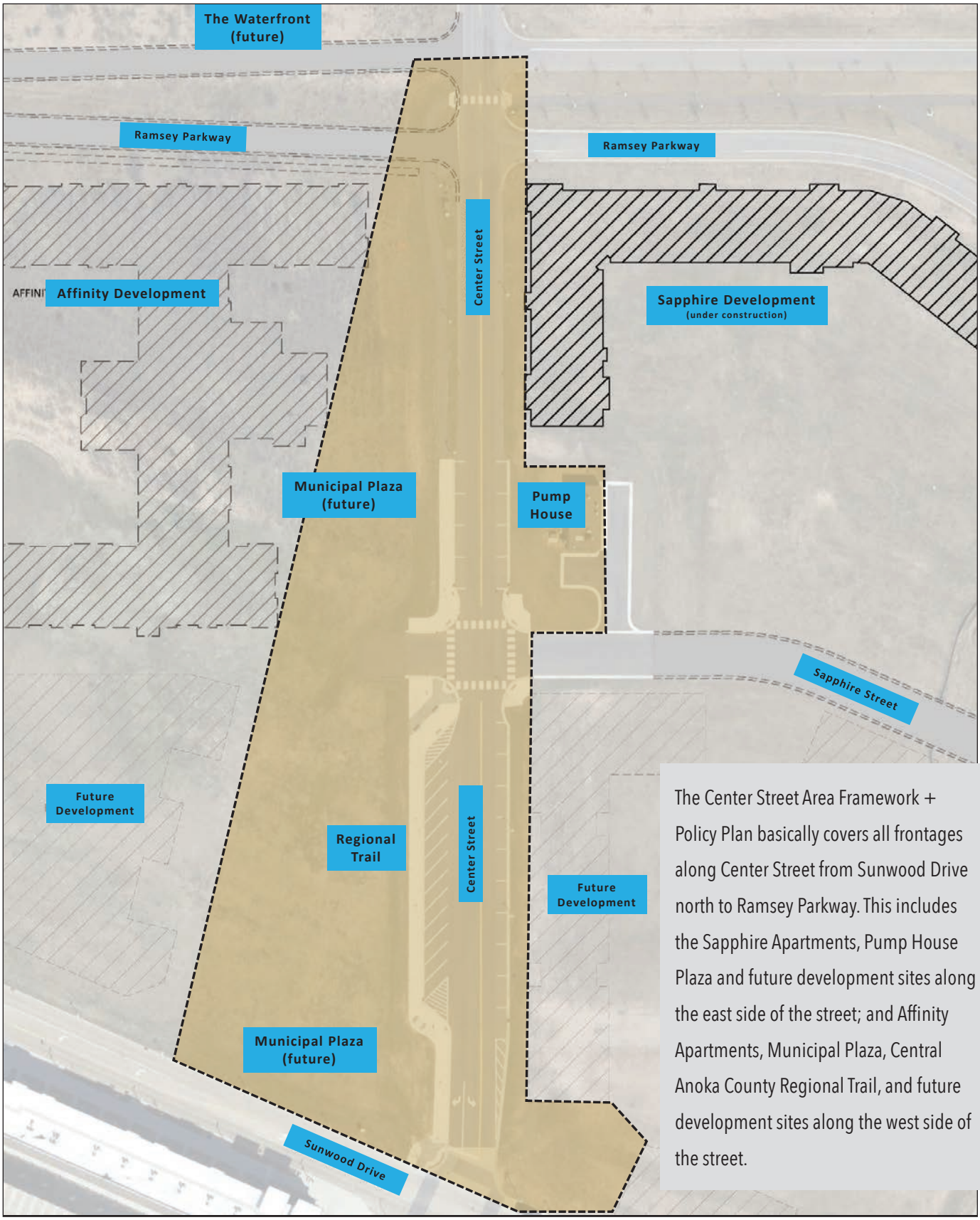



## Outcomes + Deliverables

As indicated, the above project listing is merely a summary outline of the work to be performed; the detailed Scope of Services (provided by the Consultant Team), will result in design guidelines to allow the city to develop specifications (cross-sections with details) such that quotations may be sought for work that must be completed like the sidewalk/streetscape adjoining the Sapphire building. Additionally, the scope and cost of other features may be better understood, and accordingly, will result in the ability to proceed with improvements to Municipal Plaza, and the Pump House site (plaza, concrete, landscaping and conceivably an attached public restroom), at such time it is authorized by City Council, (in 2021 or thereafter).

Further, the above referenced Scope of Services will develop the design for the Pump House facade and related architectural treatments, and result in a Design-build RFP that will provide City Council with the cost and contractor (upon approval) that can complete the 2020 Capital Improvement Project for Municipal Pump House #3.

# Coverage Diagram



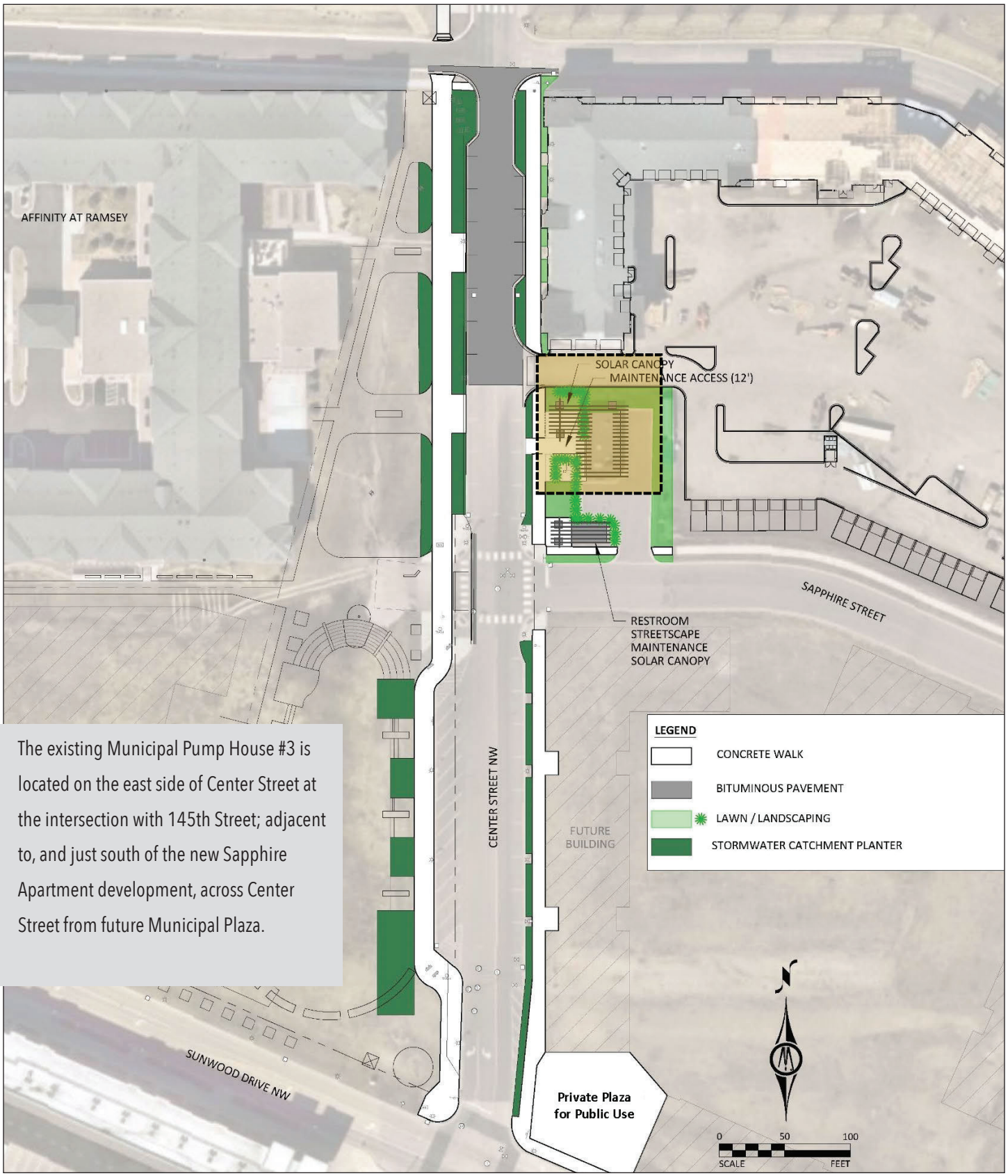

The Center Street Area Framework + Policy Plan basically covers all frontages along Center Street from Sunwood Drive north to Ramsey Parkway. This includes the Sapphire Apartments, Pump House Plaza and future development sites along the east side of the street; and Affinity Apartments, Municipal Plaza, Central Anoka County Regional Trail, and future development sites along the west side of the street.

# Components Diagram



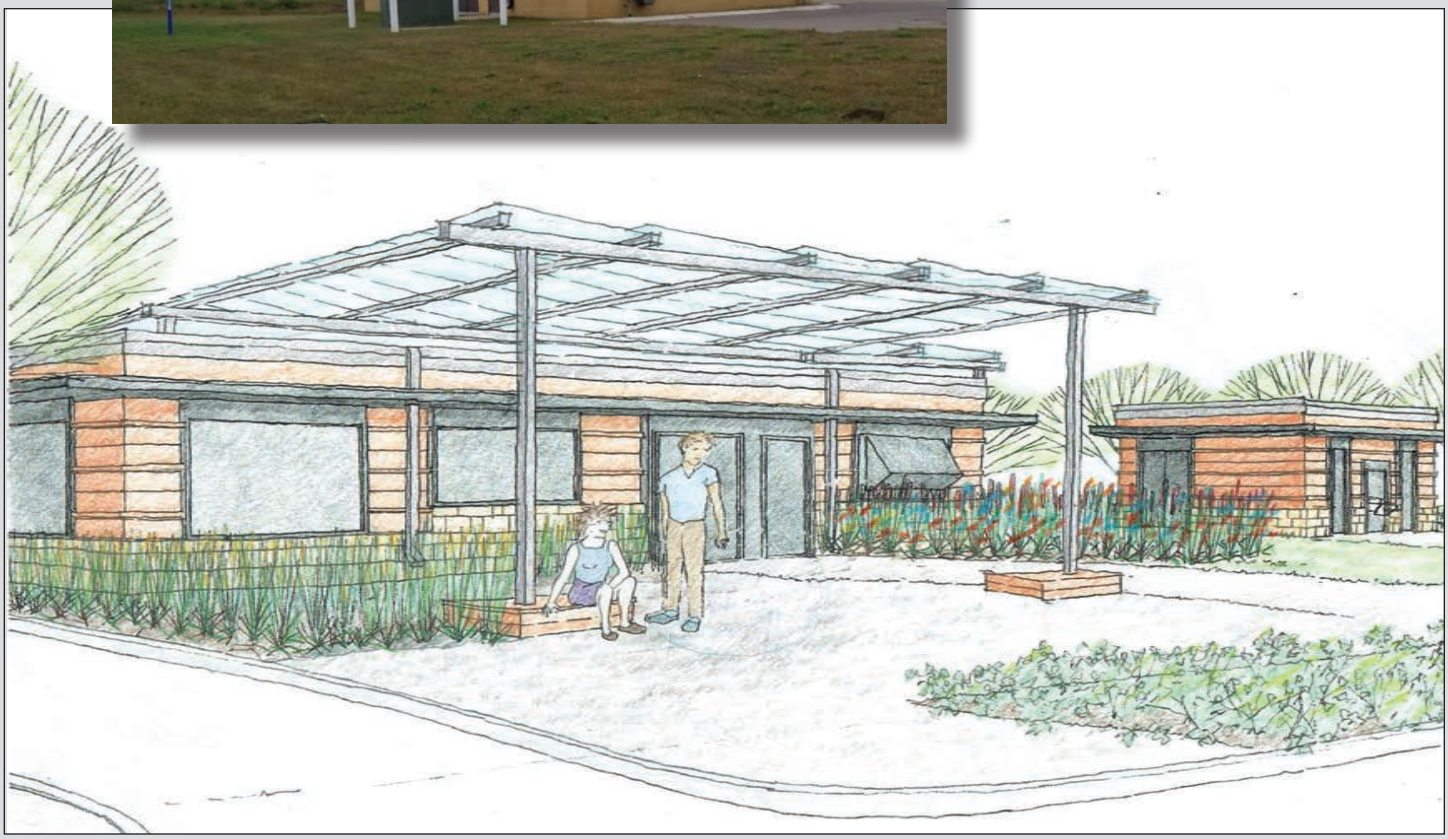

As introduced earlier, the Center Street Area promotes the idea that a variety of individual projects, when designed and built as part of an integrated whole, will create the desired character and connections that make Center Street a crucial crossroads and activity center for the Center of Ramsey. The projects listed on the Components Diagram provide the outline/organization for the rest of this Framework + Policy Plan. Each of the following sections will include project location, site plan, site details, preliminary cost evaluation, and other graphic/narrative description as needed to clarify design intent.

# Pump House Building Location Map




The existing Municipal Pump House #3 is located on the east side of Center Street at the intersection with 145th Street; adjacent to, and just south of the new Sapphire Apartment development, across Center Street from future Municipal Plaza.





# Pump House Building

PROJECT DESCRIPTION

Since the time of its construction, Municipal Pump House #3 has been a simple concrete masonry building. As new development occurs around it, Pump House #3's appearance can contribute to the character of surrounding buildings and the proposed plaza by applying new exterior finishes to the existing building. Stone, wood, and metal finishes and colors compliment other civic buildings in Ramsey Downtown District.

Note: the sequence of project design and construction will begin with Pump House Building facade improvements, followed by Pump House Plaza site and landscape improvements, and then additional project feasibility evaluation and detailed design related to the Rest Room + Maintenance Building.

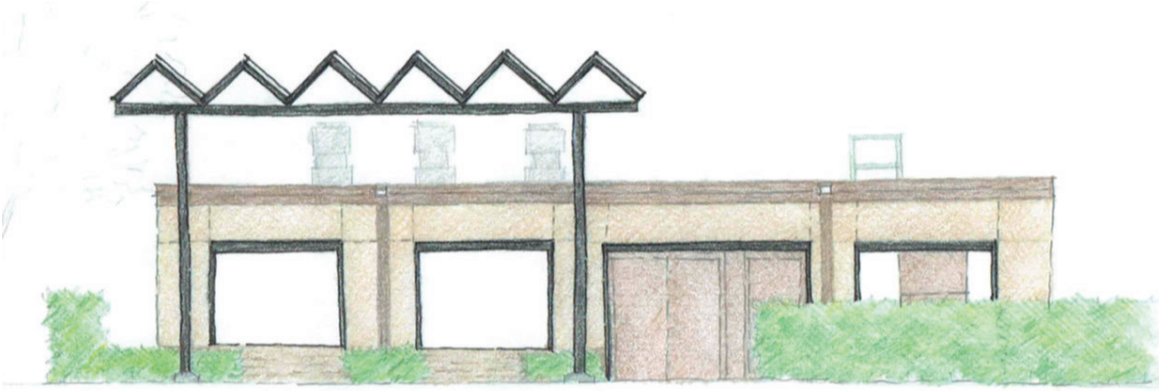
Preliminary estimate of potential construction cost: $175,000 - 190,000



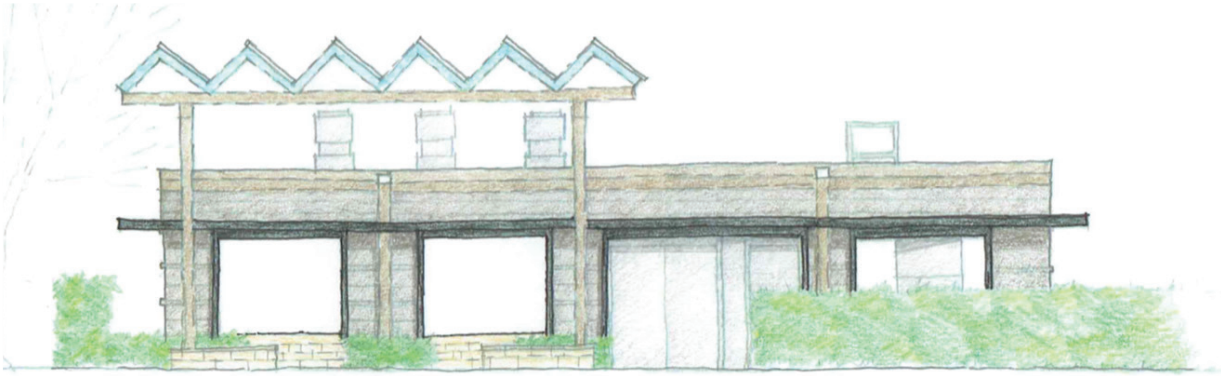
The feasibility of adding photo-voltaic array over Pump House #3 and the adjacent plaza, shall be evaluated based upon additional cost estimates and pay-back timeline.

# Pump House Building Project Elements

Three alternative exterior façade treatments have been considered:



- Concept A: Split-faced concrete masonry & cement board siding



- Concept B: Limestone & wood siding

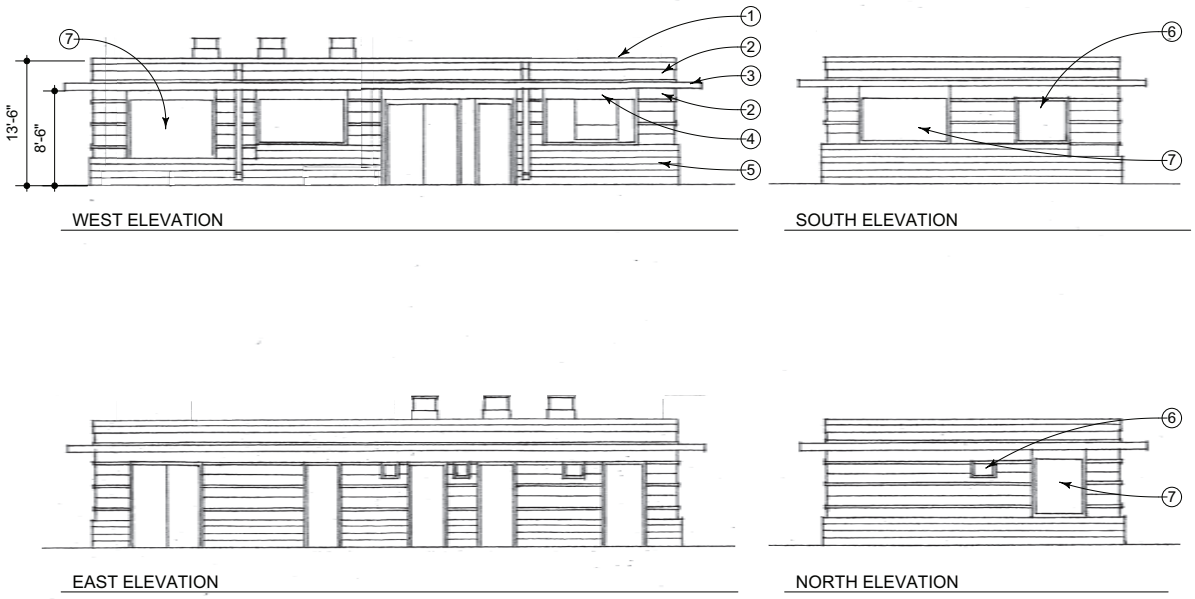


- Concept C: Limestone & brick

Based on design refinements, cost considerations, the limestone and wood siding alternative has been selected for design development.

# Pump House Building Project Elements

Concept B Developed Design.

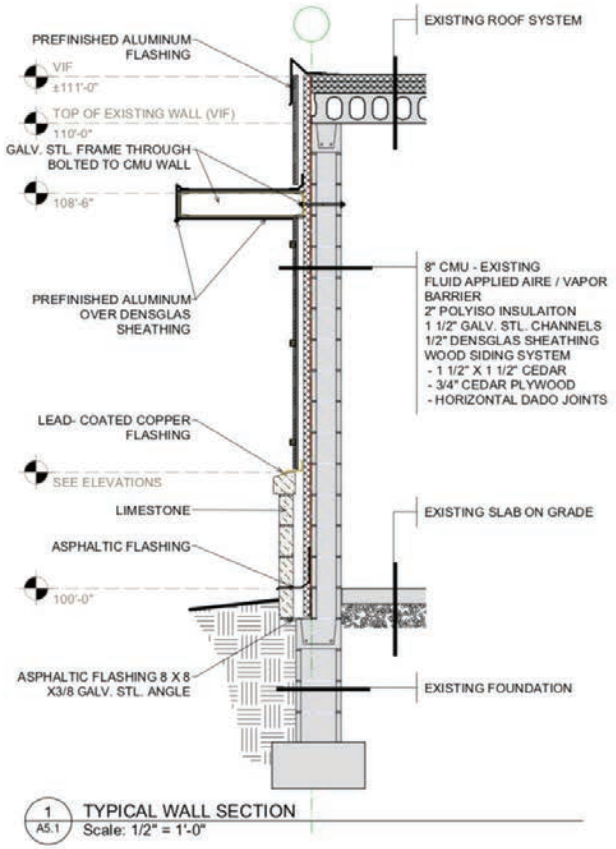



BUILDING ELEVATIONS AT PUMP HOUSE- CONCEPT B.1

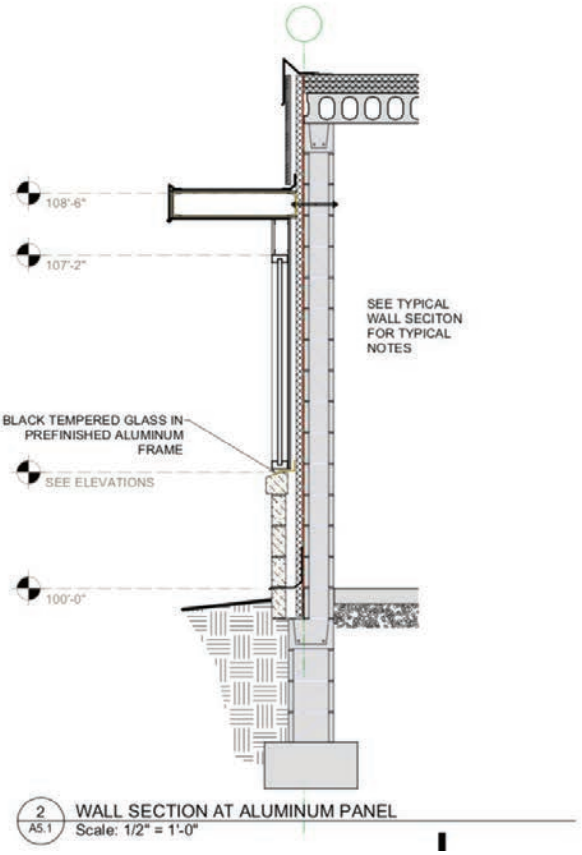
SCALE: 1/8" = 1'-0"

NOTES

1 ALUMNINUM CAP FLASHING
2 WOOD SIDING
3 ALUMINUM EYEBROW
4 ALUMINUM FRAME
5 LIMESTONE BASE
6 EXISTING VENT
7 SMOKED GLASS WITH ALUMINUM FRAME

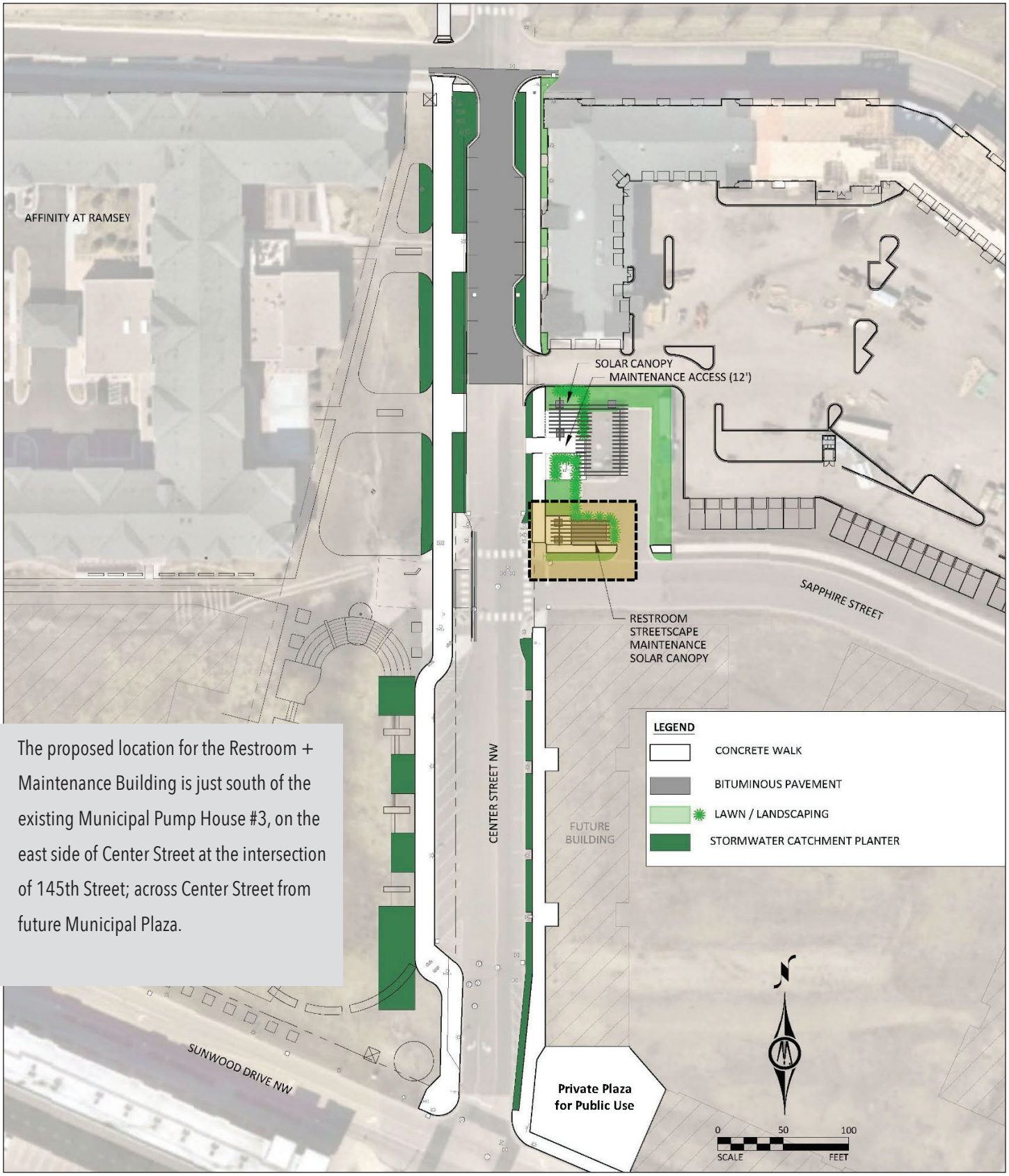



1 A5.1 TYPICAL WALL SECTION
Scale: 1/2" = 1'-0"




2 A5.1 WALL SECTION AT ALUMINUM PANEL
Scale: 1/2" = 1'-0"

# Restroom + Maintenance Building Location Map




The proposed location for the Restroom + Maintenance Building is just south of the existing Municipal Pump House #3, on the east side of Center Street at the intersection of 145th Street; across Center Street from future Municipal Plaza.



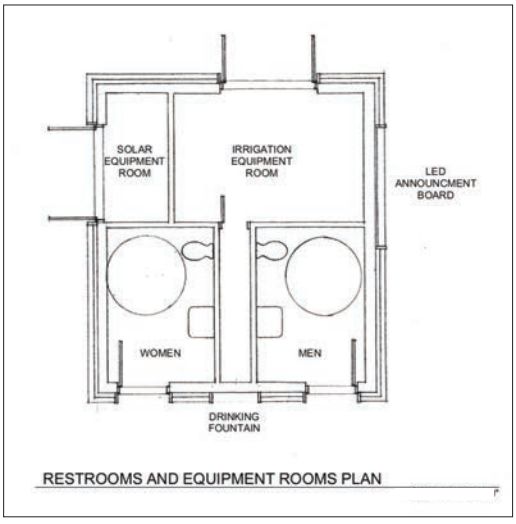
# Restroom + Maintenance Bldg

PROJECT DESCRIPTION

A proposed Restroom + Maintenance Building will be sided with the same materials as the adjacent Pump House #3. This building will support community activities at Center Street's Municipal Plaza. It will also house equipment for the plaza's irrigation system and for the solar array at the Pump House building.

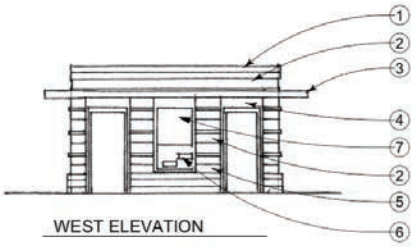
Note: the sequence of project design and construction will begin with Pump House Building facade improvements, followed by Pump House Plaza site and landscape improvements, and then additional project feasibility evaluation and detailed design related to the Rest Room + Maintenance Building.

Potential construction cost included in preliminary estimate for the Stormwater Management System described on page 27.

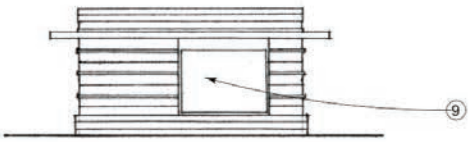



RESTROOMS AND EQUIPMENT ROOMS PLAN

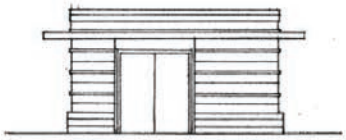
# Restroom + Maintenance Bldg Project Elements



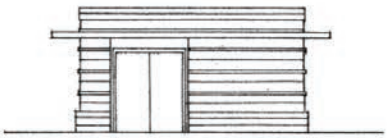

WEST ELEVATION




SOUTH ELEVATION



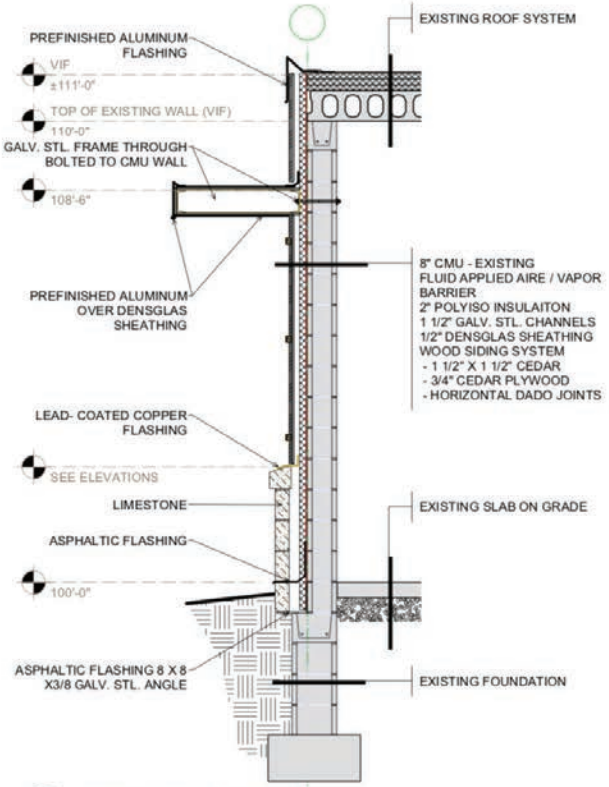
EAST ELEVATION



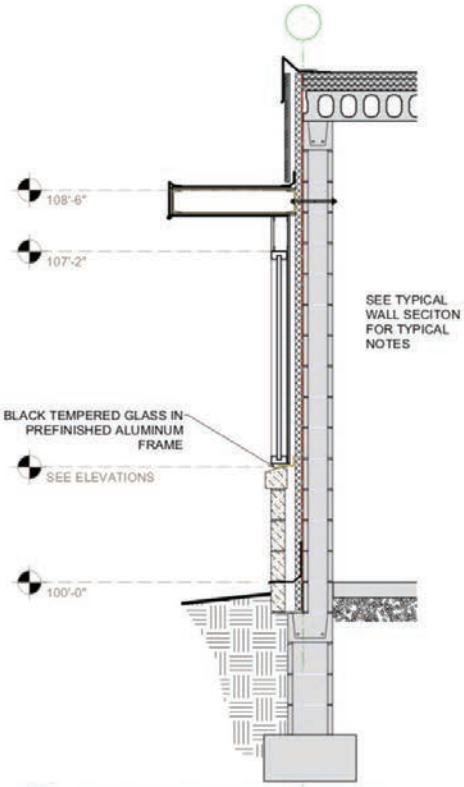
NORTH ELEVATION

NOTES

1 ALUMNINUM CAP FLASHING
2 WOOD SIDING
3 ALUMINUM EYEBROW
4 ALUMINUM FRAME
5 LIMESTONE BASE
6 DRINKING FOUNTAIN
7 LED DISPLAY
8 EXISTING VENT
9 SMOKED GLASS WITH ALUMINUM FRAME




1 A5.1 TYPICAL WALL SECTION
Scale: 1/2" = 1'-0"




2 A5.1 WALL SECTION AT ALUMINUM PANEL
Scale: 1/2" = 1'-0"

# Restroom + Maintenance Bldg Project Elements

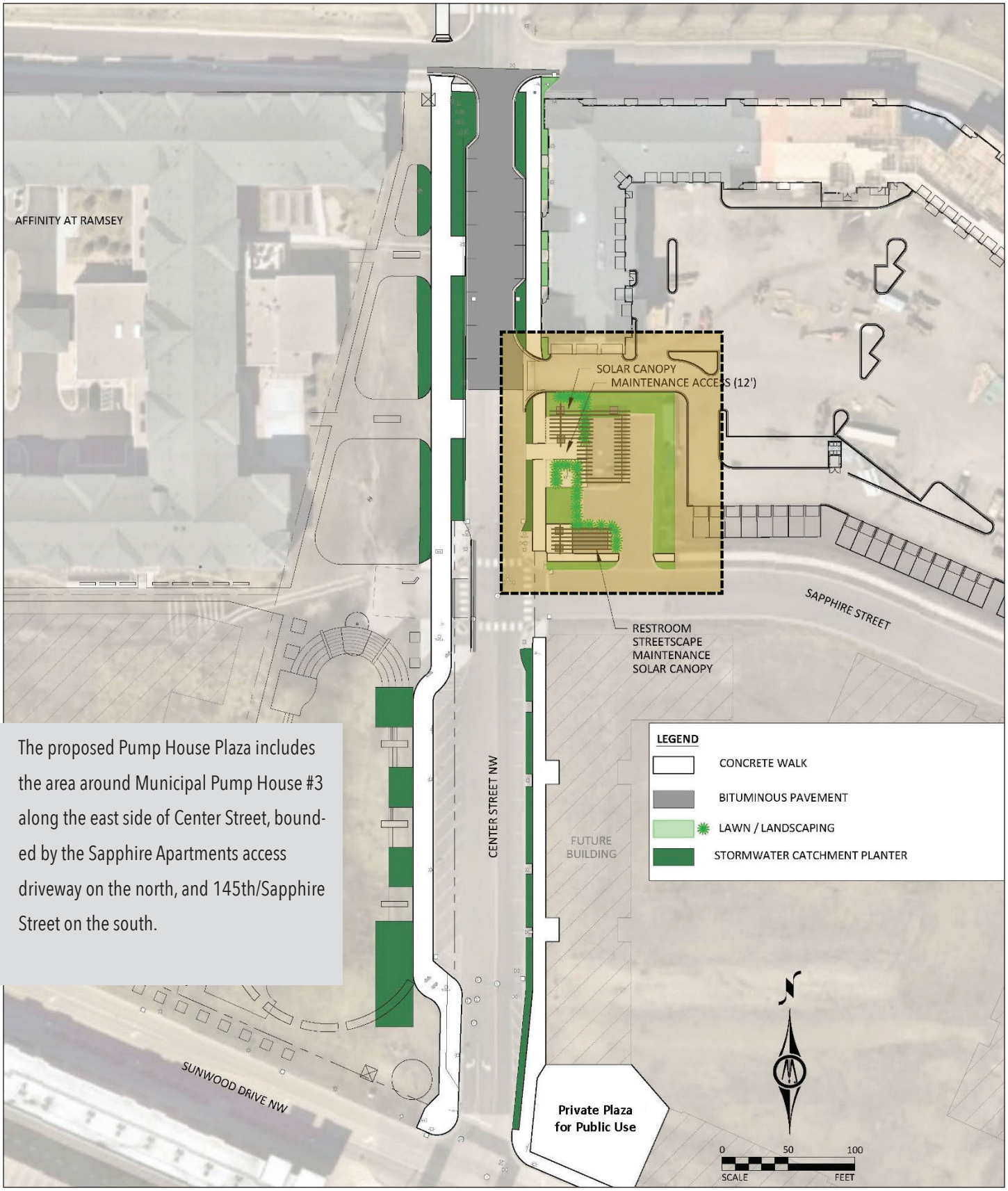




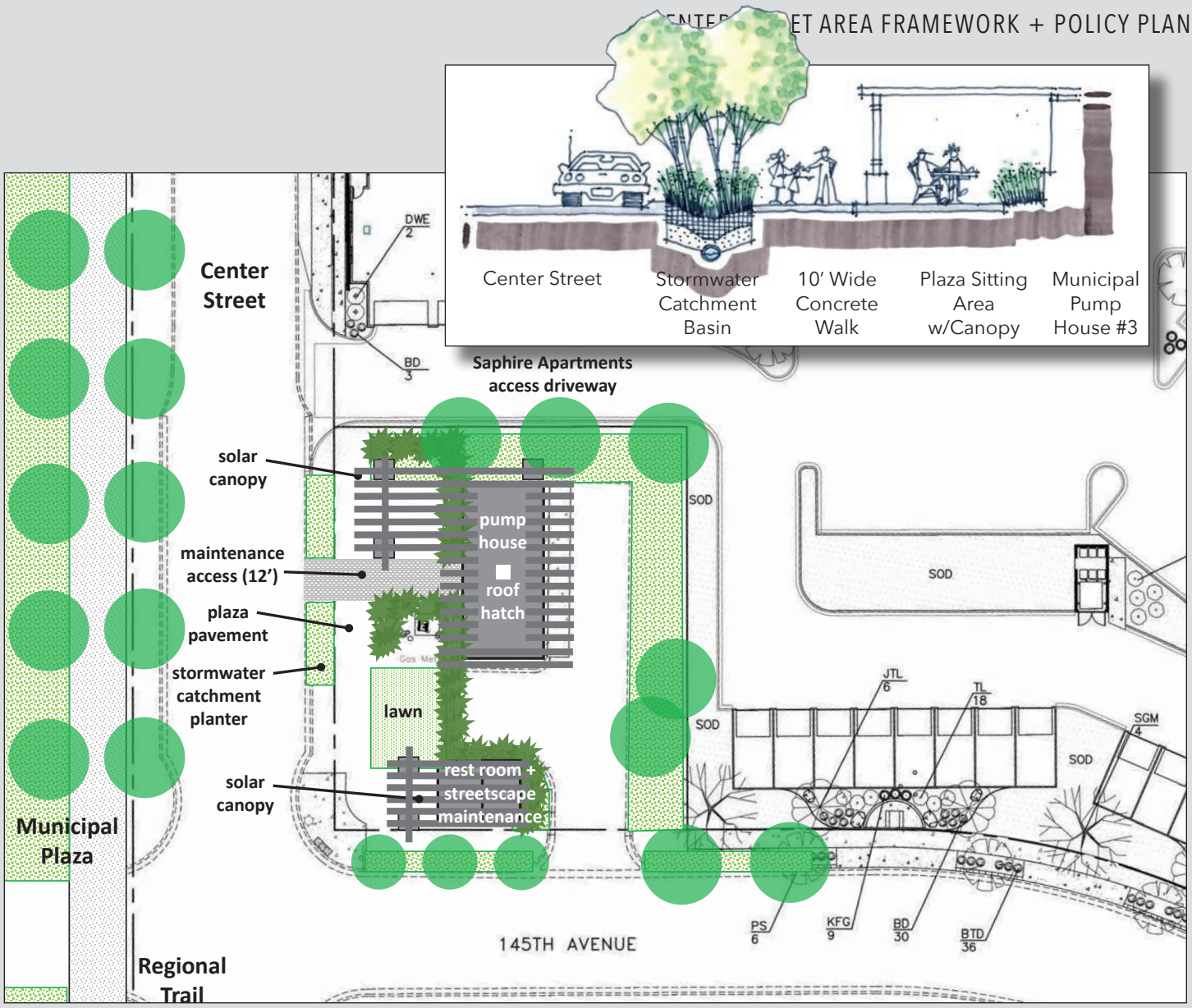



A LED Community Information Board is proposed for the Sapphire Street façade of the Restroom + Maintenance Building. This LED display panel can be used to announce events of community interest, to present the schedule for Municipal Plaza activities, display digital art, etc.(These images shows the capabilities of LED panels.)

# Pump House Plaza Location Map




The proposed Pump House Plaza includes the area around Municipal Pump House #3 along the east side of Center Street, bounded by the Sapphire Apartments access driveway on the north, and 145th/Sapphire Street on the south.




# Pump House Plaza

PROJECT DESCRIPTION

The Conceptual Site Plan for Pump House Plaza includes the following elements:

- Paved plaza/sitting area along east façade of the Pump House Building;
- Solar canopy/shade structure over the plaza/sitting area;
- Paved (10' minimum width) north/south pedestrian walkway;
- Stormwater catchment basin/planters between pedestrian walk and Center Street;
- Small open lawn/flex space for information/crafts/food tent and other uses;
- Variety of landscape plantings to provide shade, color, screening.

Note: the sequence of project design and construction will begin with Pump House Building facade improvements, followed by Pump House Plaza site and landscape improvements, and then additional project feasibility evaluation and detailed design related to the Rest Room + Maintenance Building.

Preliminary estimate of potential construction cost: $70,000 - 90,000

The primary objective is to create a series of smaller, pedestrian-scaled public spaces along the east side of Center Street to complement and enhance Municipal Plaza, especially for various events that include the temporary closure of the street.

All three of these major elements (Municipal Plaza, Center Street, east frontage public spaces) will seamlessly fit together, including consistent materials, finishes and furnishings to create a unique identity and inviting destination crossroads in the heart of the COR District.

# Pump House Plaza Project Elements

## Pavement





Concrete plaza with broom finish and tooled joints to create interesting pattern is preferred; color additives, acid tints or etching, and exposed aggregate are other acceptable options.

## Furniture





Light weight (moveable) and stackable furniture in a variety of colors is preferred; many choices available, but should consider consistent or complimentary 'family' of furniture for all COR public places.

## Stormwater Basins





Curb-cuts on both street side and plaza side of each basin direct surface water flow, but still create a physical/visual separation for pedestrian circulation, snowplowing and other maintenance operations.

# Pump House Plaza Project Elements

## Water Feature

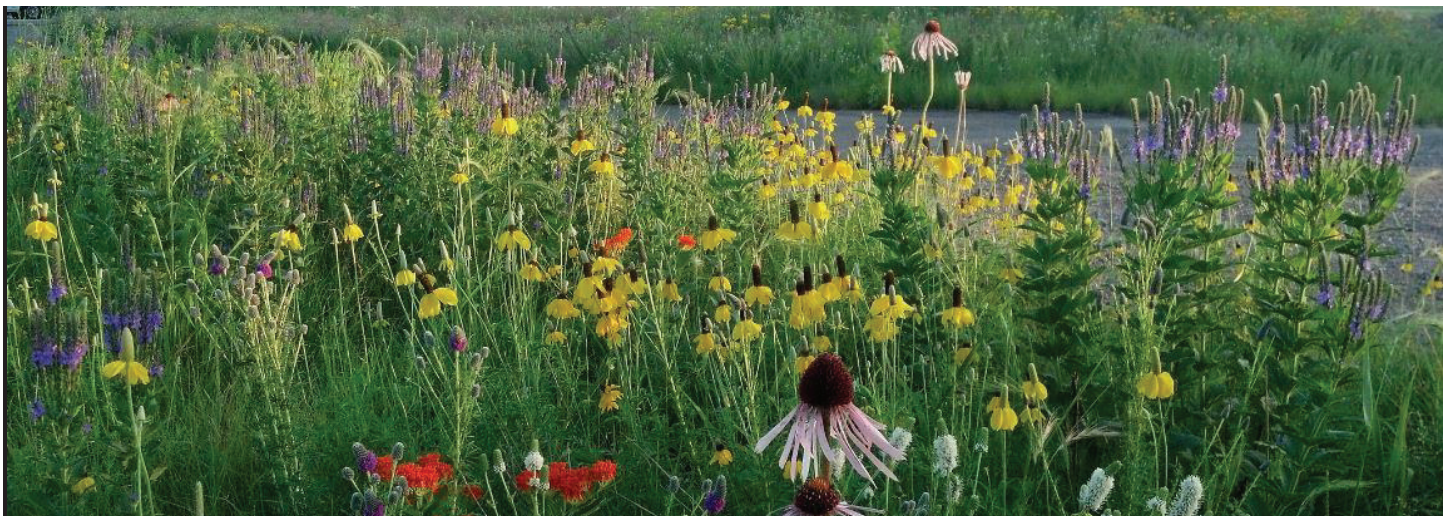




The soothing sound of water can be an important element in the design of public places; small, self-contained water features are preferred, for ease of maintenance, winter shut-down and other considerations.

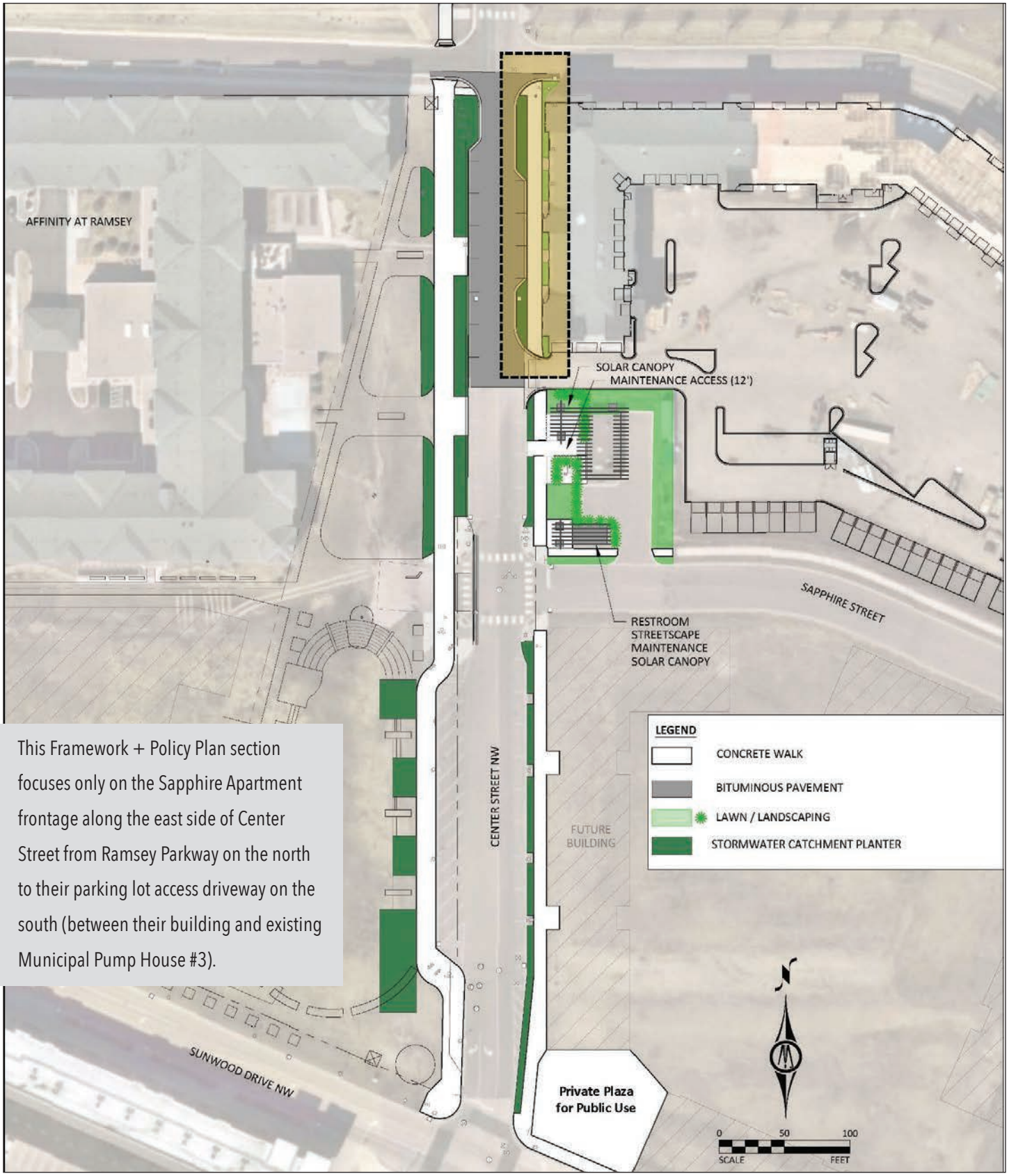
## Landscape



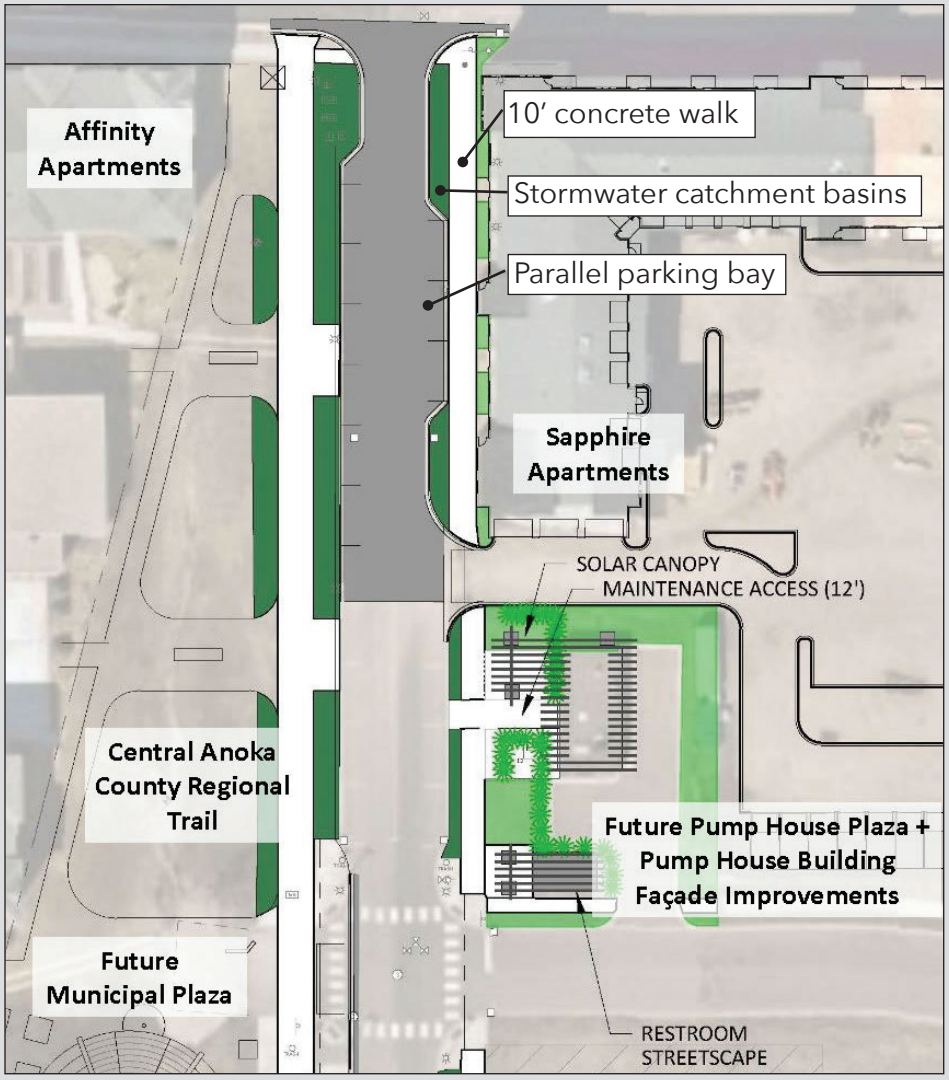



Landscape elements should reflect, or compliment, existing streetscape plantings, and further promote a consistent COR District identity and character; a simple landscape palette provides shade, seasonal color, screening (parking areas/utility boxes), and softens building elevations.

# Sapphire Apartment Frontage Location Map




This Framework + Policy Plan section focuses only on the Sapphire Apartment frontage along the east side of Center Street from Ramsey Parkway on the north to their parking lot access driveway on the south (between their building and existing Municipal Pump House #3).




# Sappphire Apartment Frontage

PROJECT DESCRIPTION

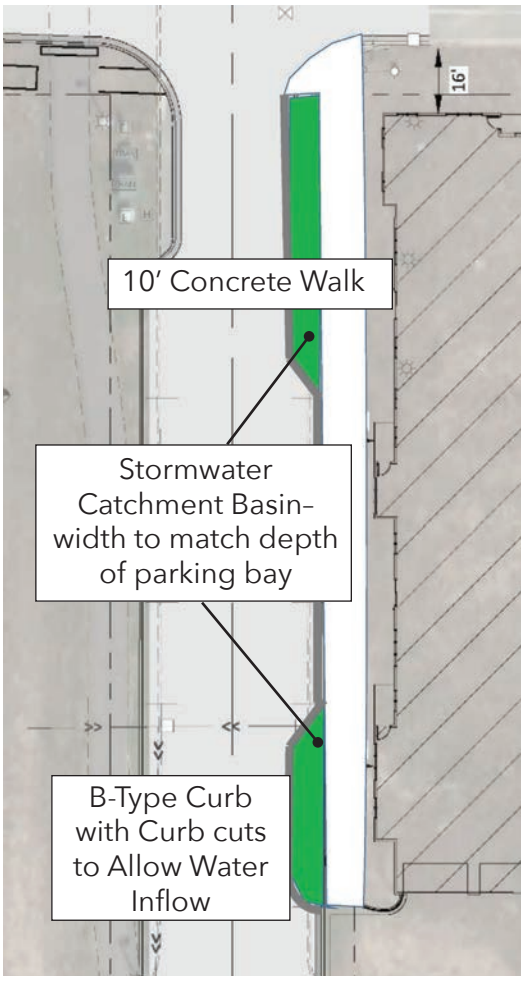
The Concept Site Plan for the Sapphire Apartment Frontage along the east side of Center Street includes three primary elements:

- A 10' wide concrete walk;
- Stormwater catchment basins;
- Parallel parking bay.

Preliminary estimate of potential construction cost: $65,000 - 80,000

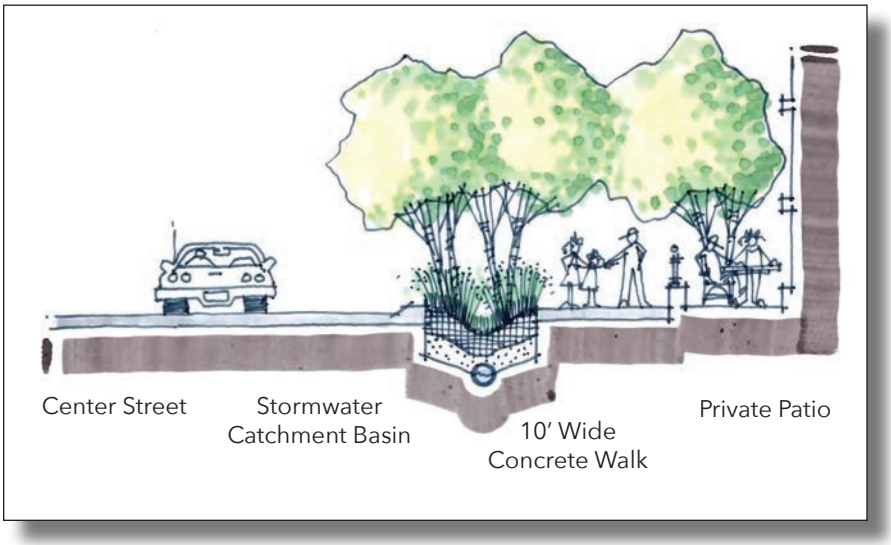
The Sapphire Apartment Frontage will be the first segment of public (pedestrian) realm to be completed, and as such plays an important role in establishing these elements as the benchmark for future projects along the east side of Center Street. A gracious walkway width (10'), connected stormwater basins, and landscape plantings that complement existing streetscape, will not only further enhance the desired Downtown District street character, but also set design expectations for Pump House Plaza and the now-vacant development site at Sunwood Drive.

# Sapphire Apartment Frontage Project Elements



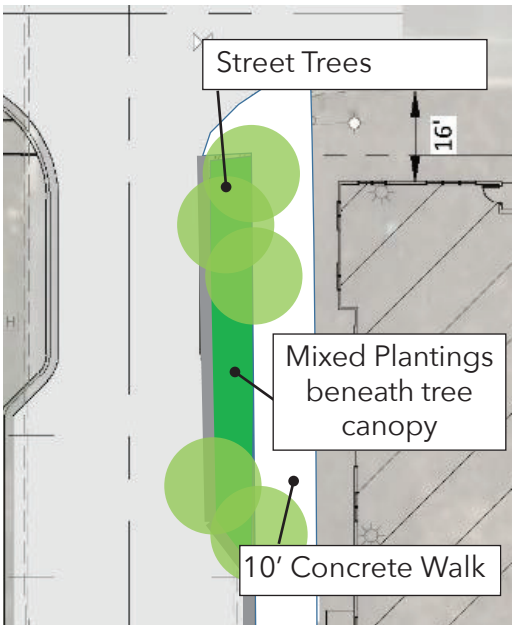

Stormwater catchment basins will be connected to existing storm sewer located in Center Street – future phases will route this water to underground cisterns in Municipal Plaza for irrigation and other re-use purposes.



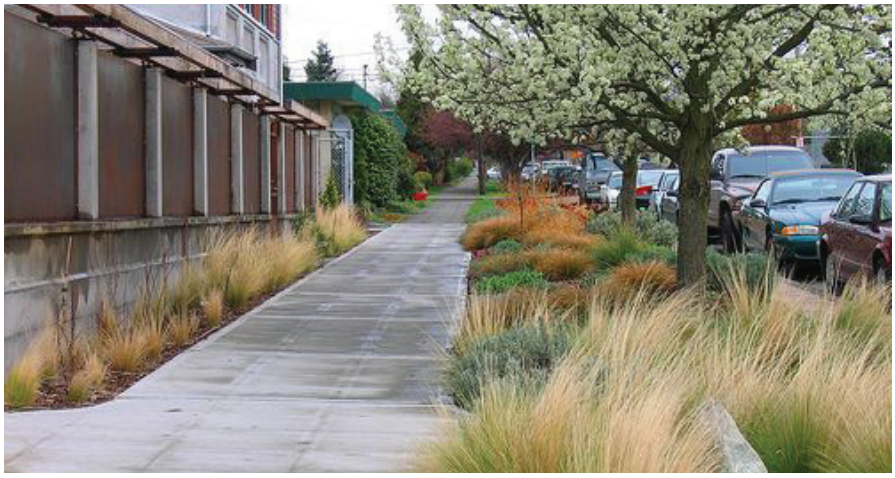


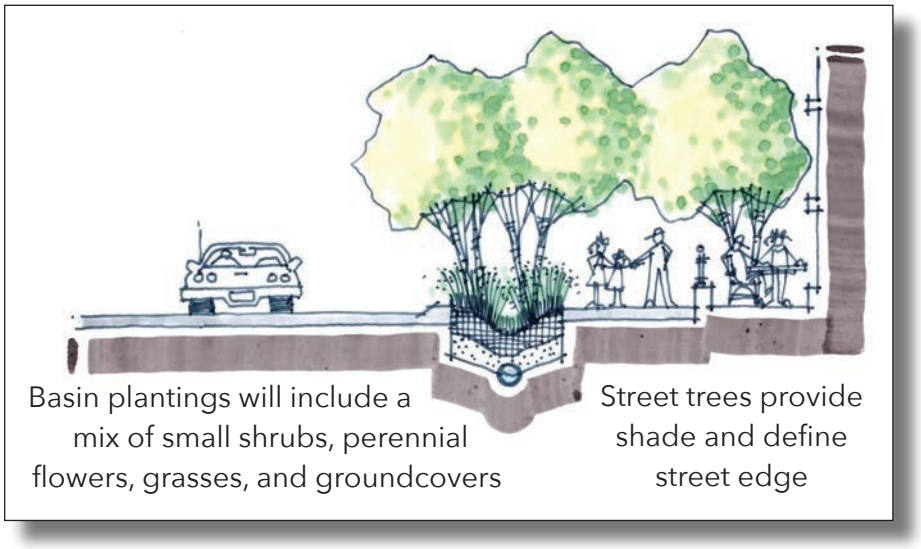



# Sapphire Apartment Frontage Project Elements

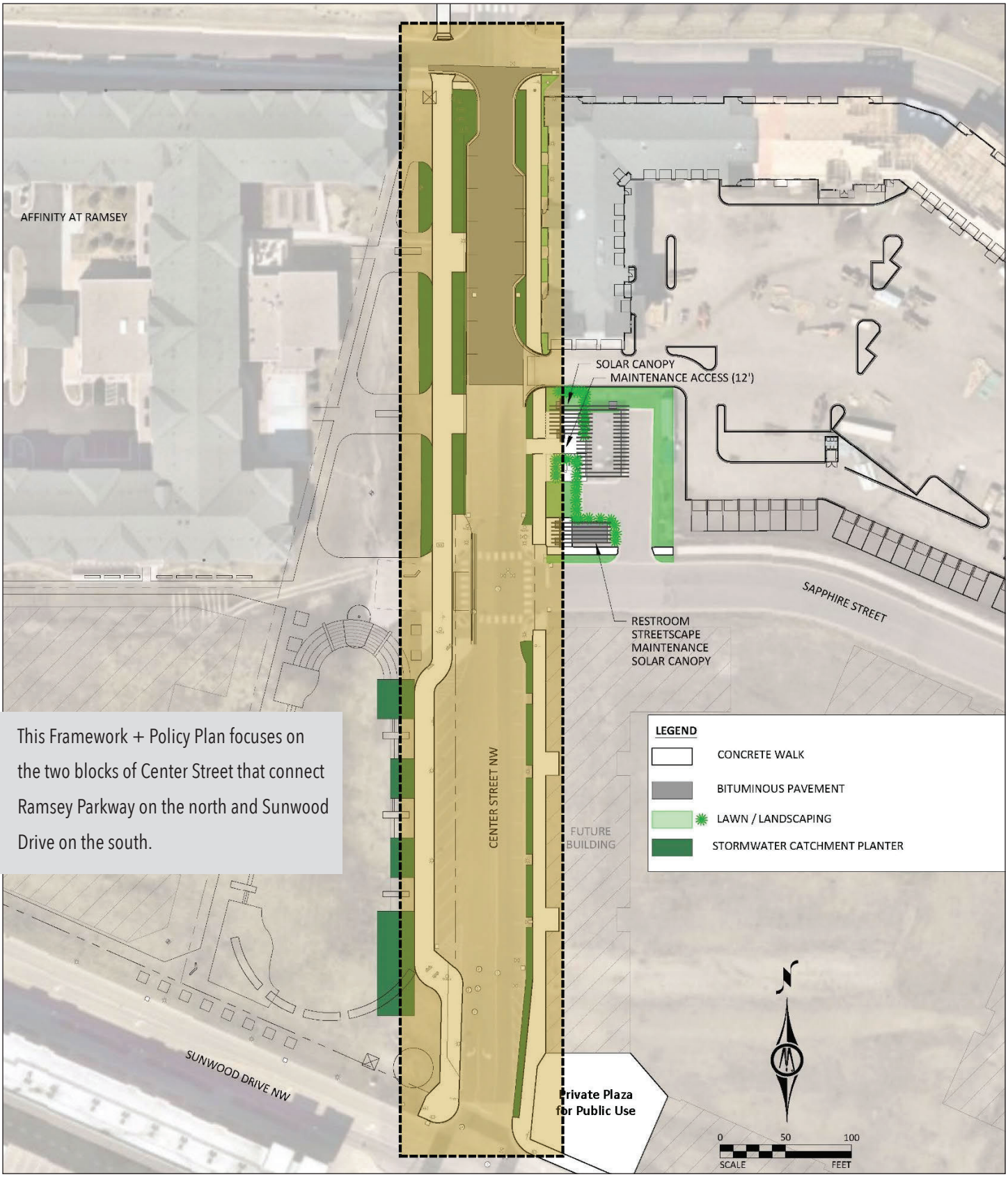




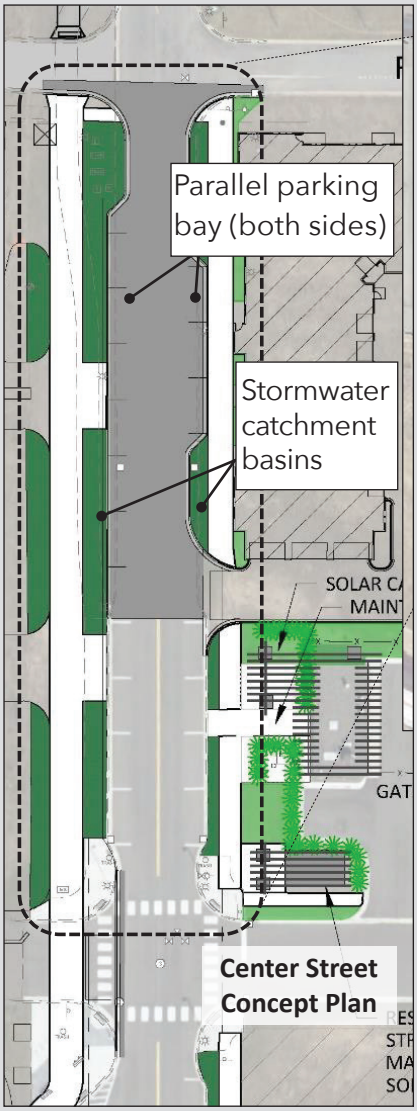



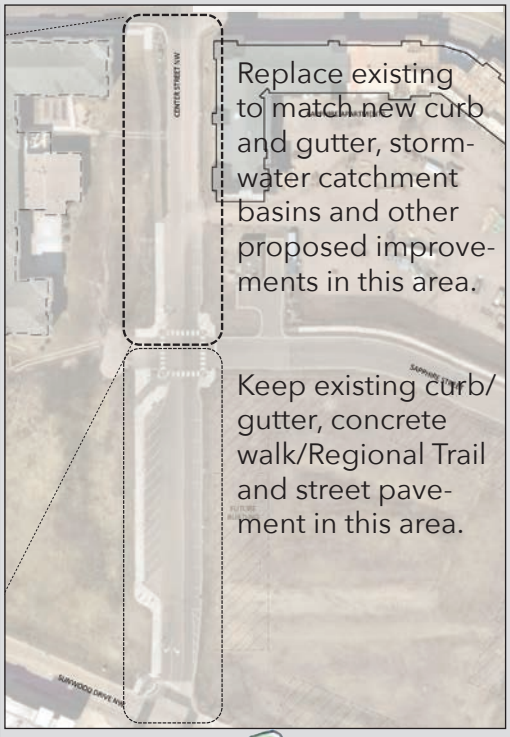


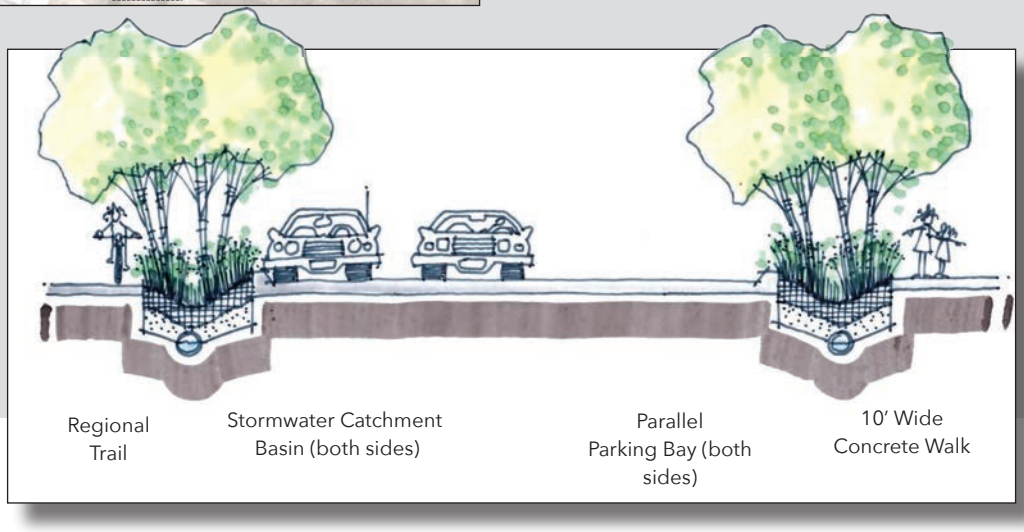
# Center Street Location Map




This Framework + Policy Plan focuses on the two blocks of Center Street that connect Ramsey Parkway on the north and Sunwood Drive on the south.




# Center Street

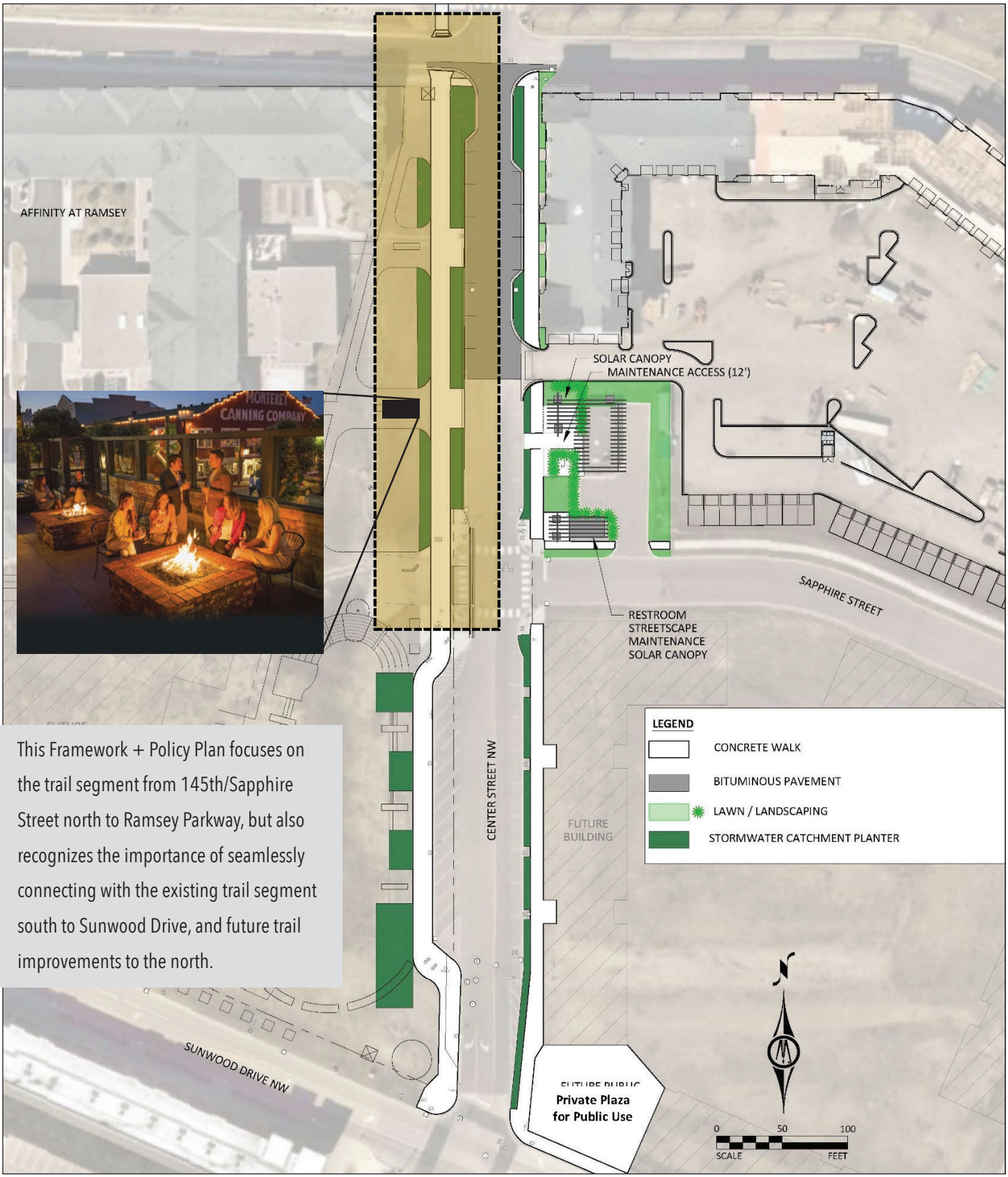
PROJECT DESCRIPTION

The primary purpose of the Conceptual Site Plan for Center Street is to illustrate how this key north/south connector ties together all the other pieces of this Framework + Policy Plan. At the same time, it also promotes various opportunities for innovative district infrastructure as an integral part of current and proposed street, park, trail and private development project design – suggesting shared systems for stormwater capture/reuse, energy production/distribution, waste handling/recycling and other technologies.

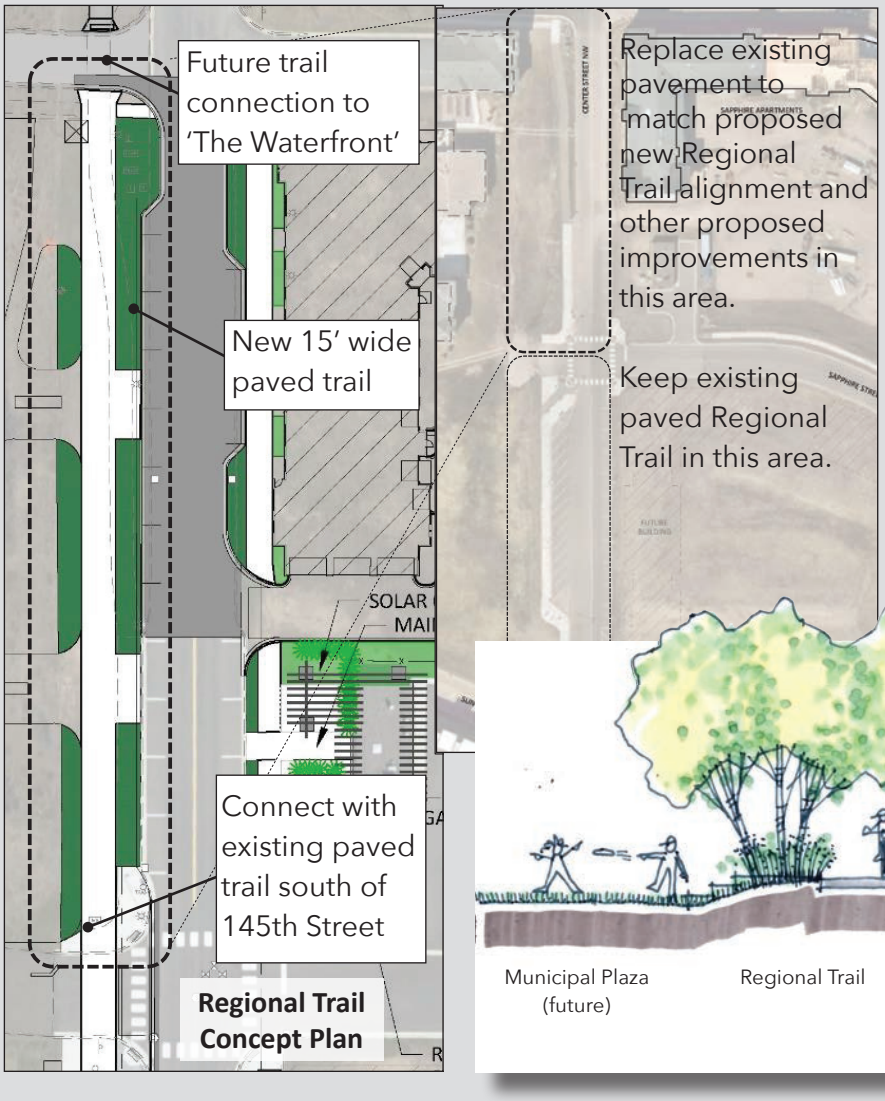
Potential construction cost to be determined as part of other Center Street projects.

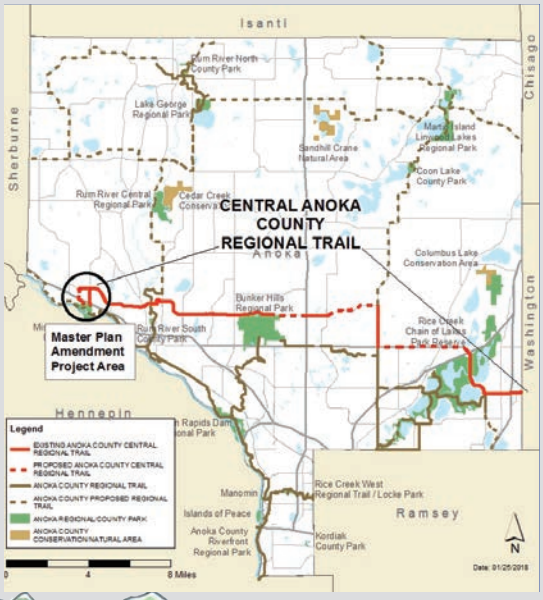
It's important to note however, that this document also presents a somewhat cautious approach, seeking to minimize disruption to existing Center Street improvements. The basic objective is to work with existing curb lines, parking bays and other pavement dimensions as the starting point for completing street construction to Ramsey Parkway and northward to Bunker Lake Boulevard. (Also refer to the Sapphire Apartments Frontage and Central Anoka County Regional Trail information in this Plan)

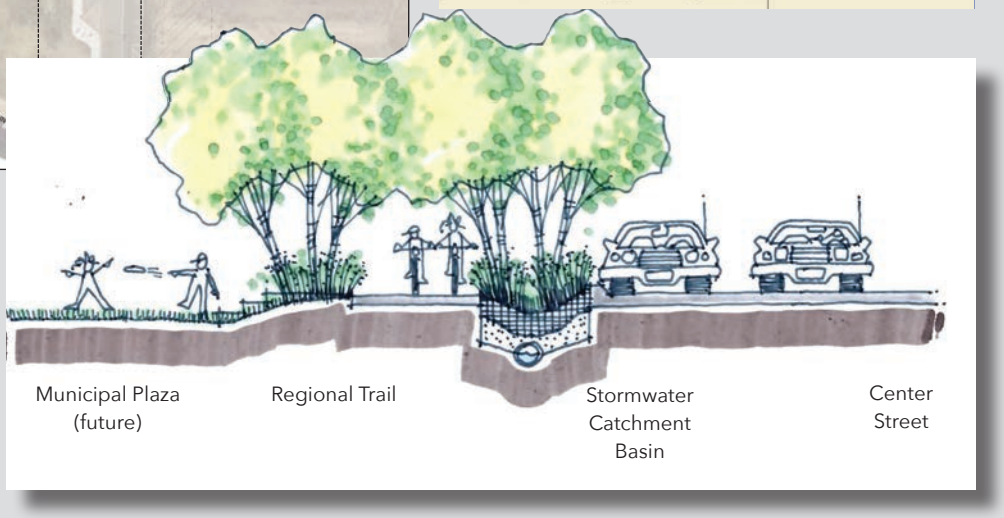
# Regional Trail + Municipal Plaza Location Map




This Framework + Policy Plan focuses on the trail segment from 145th/Sapphire Street north to Ramsey Parkway, but also recognizes the importance of seamlessly connecting with the existing trail segment south to Sunwood Drive, and future trail improvements to the north.




# Regional Trail + Municipal Plaza

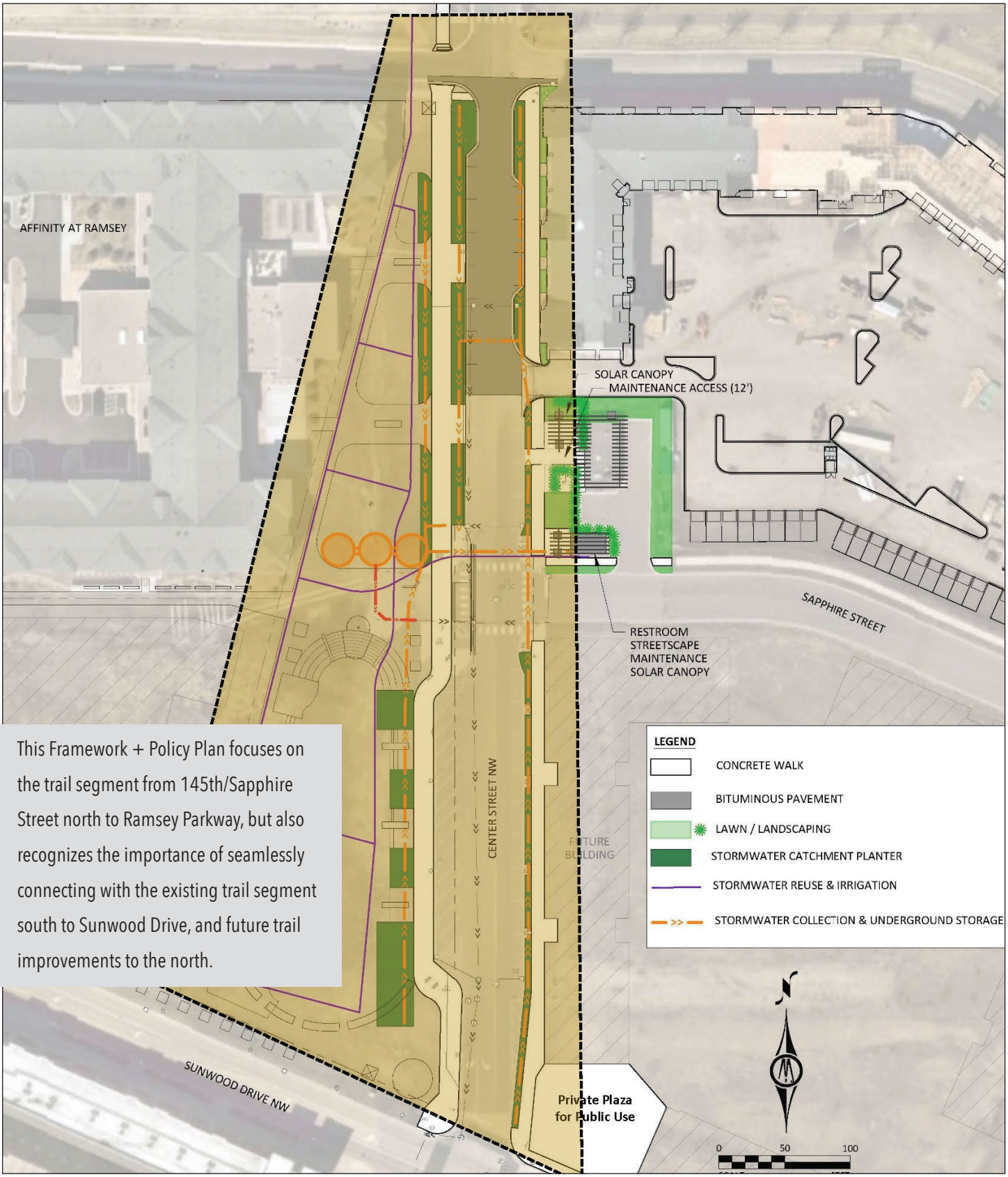
## PROJECT DESCRIPTION

The Central Anoka County Regional Trail is a 26 - mile paved regional trail that traverses the middle of the county connecting Mississippi West Regional Park in Ramsey, to Bunker Lake Regional Park, on to the Rice Creek Chain of Lakes Park Reserve in Lino Lakes and Centerville, MN. All but a portion of this Regional Trail in Ham Lake is off-roadway, in place, and in use today, linking residents and trail users to many different destinations and facilities in the county–recreational, business, schools and residential. The trail will be an important connection to the Mississippi River and Mississippi West Regional Park once the remaining portions of the elevated pedestrian crossing over Hwy #10 are funded and the bridge is in place. This pedestrian and bicycle route links not only the isolated Mississippi Recreation District to the other of the 10 districts (and the rest of the city)–but also welcomes all the residents on the South side of Hwy #10, safely to Ramsey's downtown businesses and related recreational opportunities.

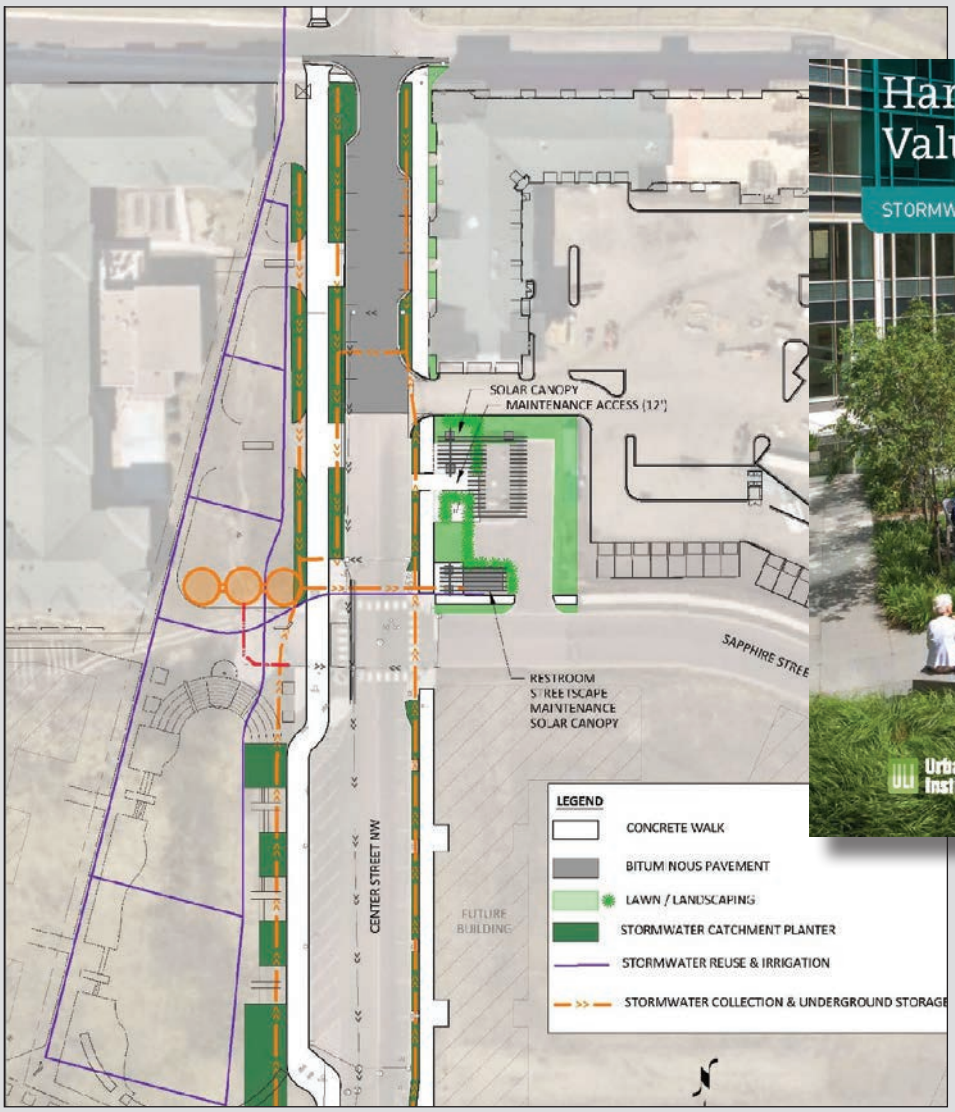
It may be noted, that this trail is an integral part of the Circle of Ramsey Greenway, and accordingly, this downtown area in Ramsey becomes both the nexus of the regional trail system, local trail system, as well as providing non-motorized opportunities in connecting the rest of Ramsey to The COR.

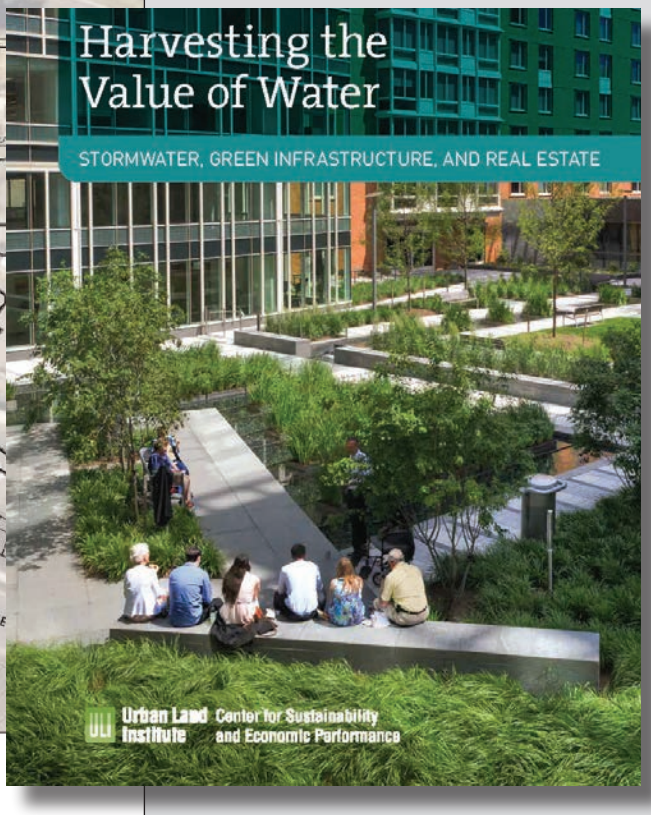
Preliminary estimate of potential construction cost: $80,000 - 100,000

# Stormwater Management System Location Map




This Framework + Policy Plan focuses on the trail segment from 145th/Sapphire Street north to Ramsey Parkway, but also recognizes the importance of seamlessly connecting with the existing trail segment south to Sunwood Drive, and future trail improvements to the north.




# Stormwater Management System

PROJECT DESCRIPTION

Bolton & Menk, has completed a preliminary study that analyzes the feasibility of integrating stormwater reuse for irrigation of the proposed Municipal Plaza and adjacent Center Street landscape improvements. The reuse system envisioned will include best management practices to collect and treat runoff, storage tanks to store the runoff, and a pump station and piping to convey reuse water to irrigation areas and surface water features. Most of the stormwater runoff will be generated from Center Street NW and the sidewalks on either side of the road. Stormwater runoff is proposed to be collected and treated by a combination of tree vaults and rain gardens located within the boulevard and parking 'bump-outs on both sides of the street. It is assumed that the runoff would drain directly into each of the rain gardens and tree vaults through surface capture systems (i.e.. curb cuts).

Water collected and stored within the storage tanks will discharge via gravity flow to the pump house wet well, where it will be filtered and treated. The Metropolitan Council Storm water Reuse Guide Water Balance Tool for Constant Irrigation Demand was used to determine the percent of time the stormwater reuse system would be functioning, and assumed 1" of water over the irrigable area per week is required for adequate vegetation growth and health. Preliminary estimate of potential construction cost: $800,000 - 950,000

# Stormwater Management System Project Elements

| | | | | |
|---|---|---|---|---|
| **SOURCE Site Data** | | | | |
| Impervious Area | 83,417 | square feet | | |
| Impervious Area | 1.91 | acres | | |
| **USE Demand Data** | | | | |
| Irrigation Area | 57,206 | square feet | | |
| Irrigation Area | 1.31 | acres | | |
| Irrigation Season | 13 | 39 | week number | |
| **Storage Data** | | | | |
| Storage Provided | 150,000 | gallons | | |
| Total Storage Required | 454,037 | gallons | | % |
| Weeks that Flows Must be Augmented | 85 | weeks | | 10.2% |
| Weeks that Reuse System will Meet Demand | 752 | weeks | | 89.8% |

*Exhibit 1: Excerpt from the Met Council Reuse Water Balance Tool.*



*Exhibit 2: Example concrete vault storage tank (Storm Trap).*



*Exhibit 3: Example underground fiberglass storage tanks (Xerxes).*

Exhibit 1 summarizes the preliminary reuse system sizing. According to the reuse calculator, there will be enough captured stormwater water in approximately 90% of the pumping season weeks to apply I-inch per week of water over the area to be irrigated (a total of 454,000 gallons required). Since rainfall contributes to that total, as well as stored water in that tank, the total required volume per year does not translate to the size of the tank required. Instead, the volume of the tank can be modified to target an irrigation efficiency.

The storage volume could be a single concrete vault or multiple fiberglass underground units. Given the size of individual cisterns, plastic is not available. Fiberglass tanks generally are available up to 50,000 gallons in size. A 50,000-gallon tank has dimensions of approximately 68 feet long with a 12-foot diameter. Three tanks, with space between, could fill a footprint of approximately 5,000 square feet. Concrete vaults can be sized to fit multiple footprint sizes.

# Stormwater Management System Project Elements

| Rainfall Event | Rainfall Depth (IN) | Runoff Volume (CF) | Runoff Volume (GA) |
|---|---|---|---|
| 1" Event | 1.00 | 5,500 | 41,140 |
| 1-Year | 2.46 | 14,700 | 109,956 |
| 2-Year | 2.86 | 17,600 | 131,648 |
| 5-Year | 3.58 | 22,700 | 169,796 |
| 10-Year | 4.26 | 27,500 | 205,700 |

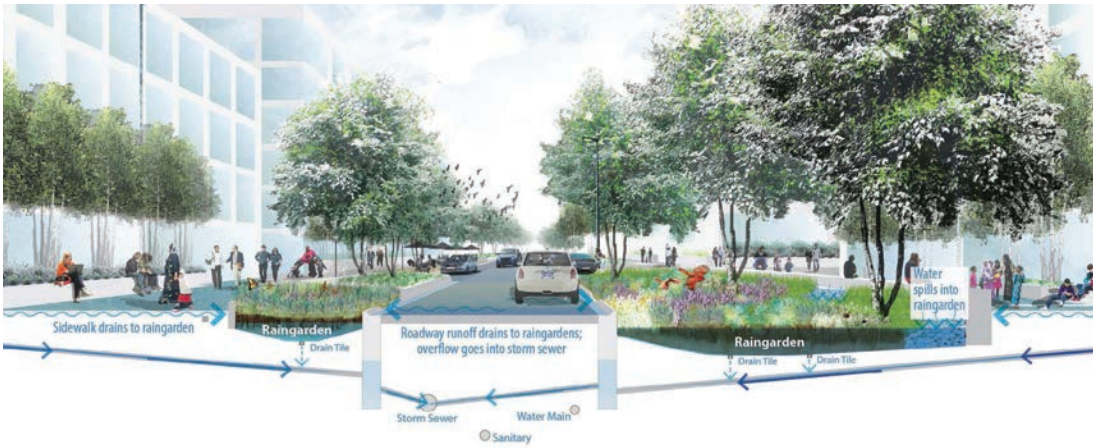
*Table 1: Summary of expected runoff volumes.*

**Additional Considerations**

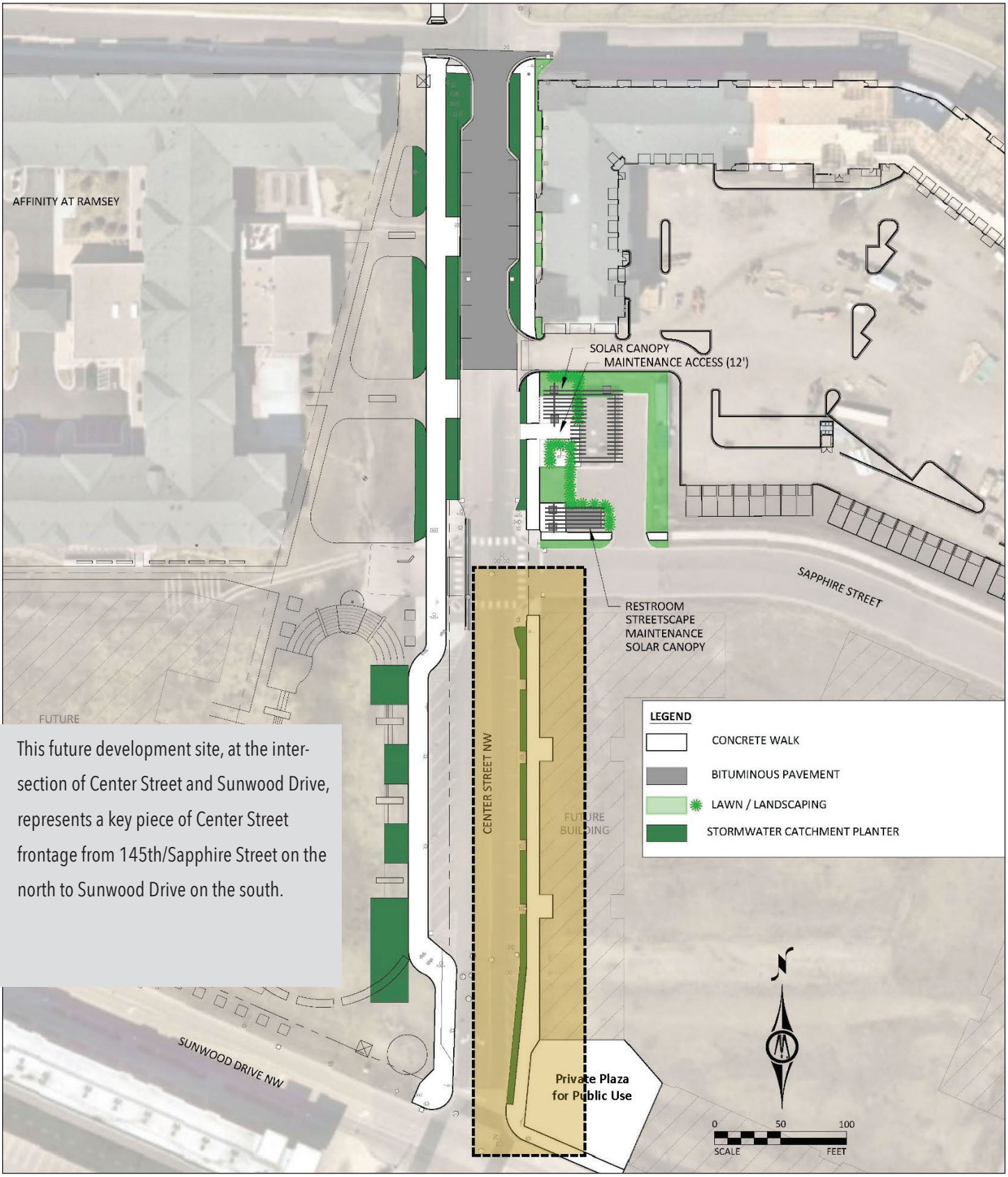
A simplified estimate of stormwater runoff expected from the street section was assembled to ensure the watershed can produce enough runoff to adequately fill the tanks. Table 1 is a summary of expected runoff volumes for a variety of events. A rainfall event producing between 3.6 and 4.3 inches in 24 hours (5-year to IO-year return interval) can completely fill the tank.

During final design, additional hydraulic information will be provided to provide an effective high flow bypass system. In other words, if the tank is full and the City experiences a 100-year rainfall event, there will be adequate bypass capacity to reduce local flooding and protect the tank(s). Also, since the COR trunk storm sewer system is already designed to accommodate a 100-year rainfall event with discharge to regional flood storage areas, the bypass system will effectively mimic the originally designed scenario. In between events when irrigation is occurring, or the tanks is being filled, there will be hydraulic relief on the trunk system and volume control provided.

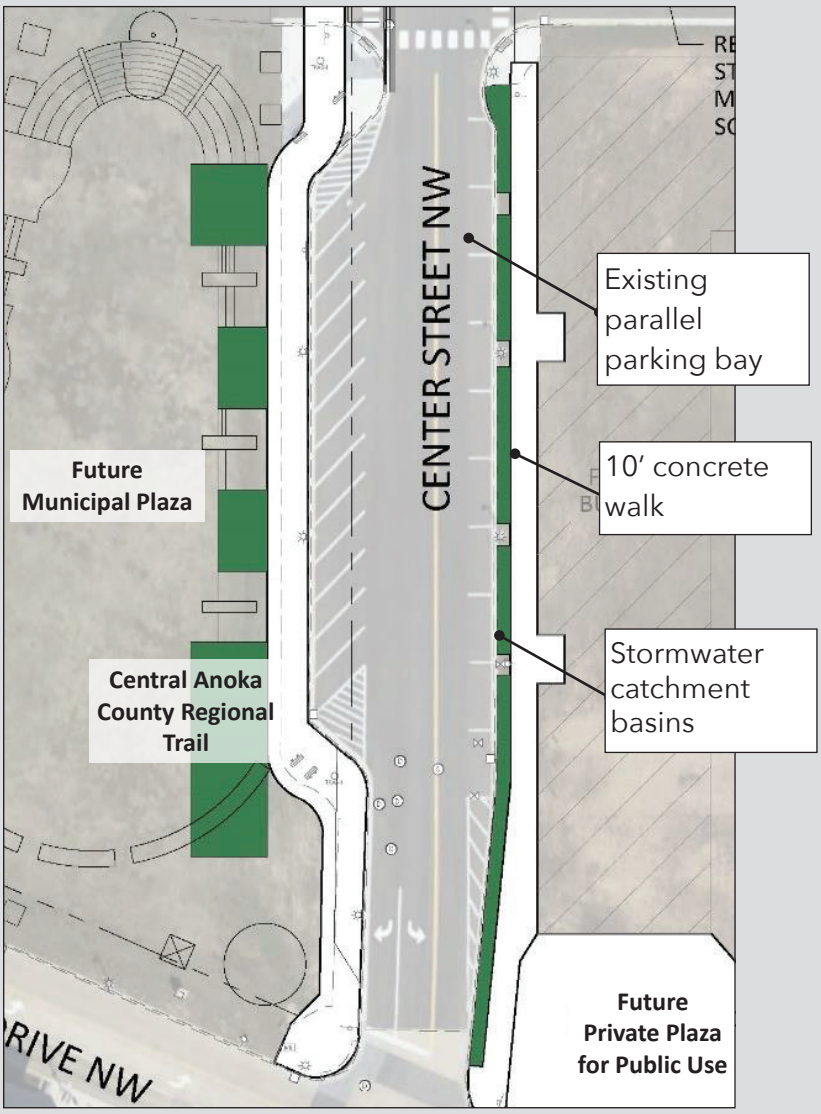
Since the reuse water will pass through a filter and potentially other treatment methods, the impact to groundwater resources through the infiltration of irrigation water is expected to be very minimal. Impacts to groundwater resources in the Downtown District are not anticipated.



# Future Development Site Frontage Location Map




This future development site, at the intersection of Center Street and Sunwood Drive, represents a key piece of Center Street frontage from 145th/Sapphire Street on the north to Sunwood Drive on the south.




# Future Development Site Frontage

PROJECT DESCRIPTION

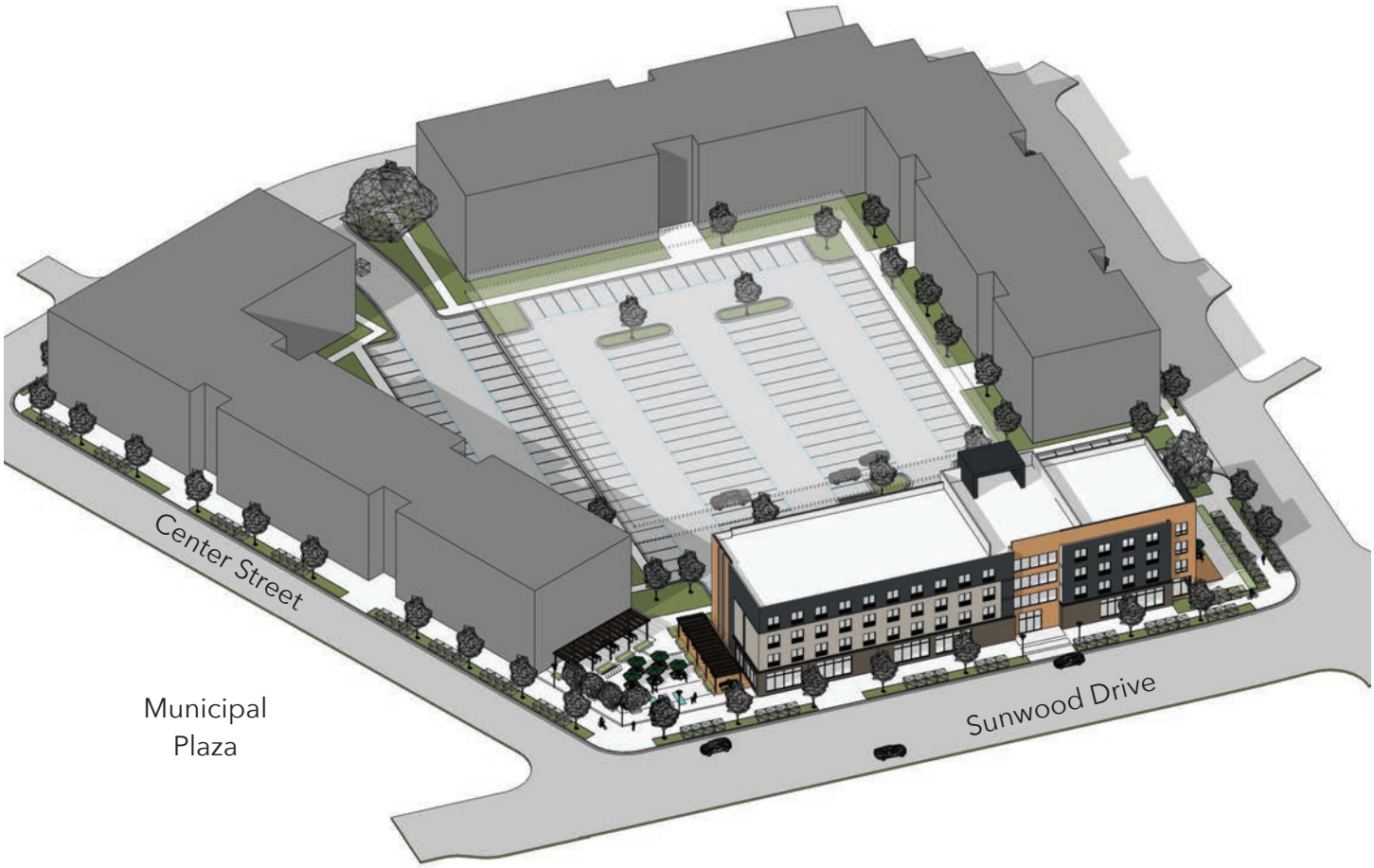
The Concept Site Plan for the Future Development Site Frontage along the east side of Center Street matches recommendations for Sapphire Apartment Frontage and Pump House Plaza to the north, including three primary elements:

- A 10' wide concrete walk;
- Stormwater catchment basins;
- Parallel parking bay.

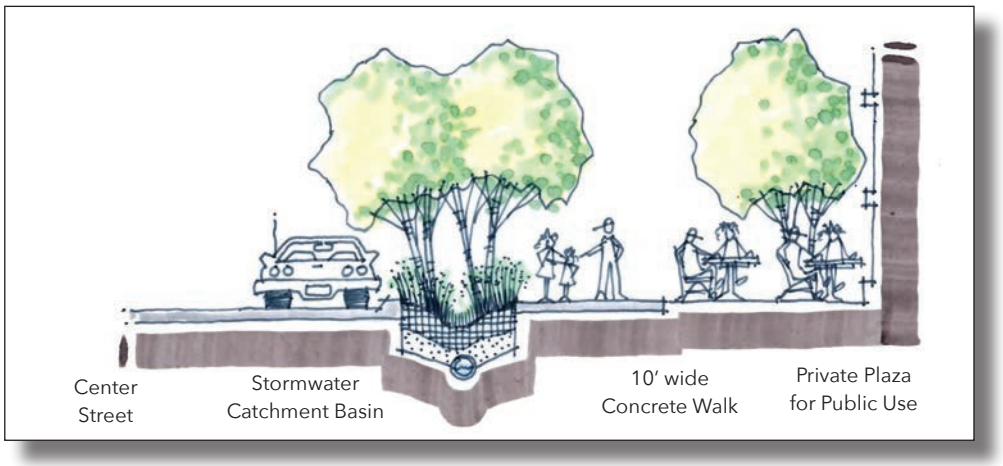
Preliminary estimate of potential construction cost: $80,000 - 100,000

Following in the footsteps of the Sapphire Apartment project, future development of this site will also include a gracious pedestrian walkway (10' width), connected stormwater basins, and landscape plantings that complement existing streetscape, further enhancing the desired Downtown District street character as a welcoming local and regional destination.

# Future Development Site Frontage Project Elements

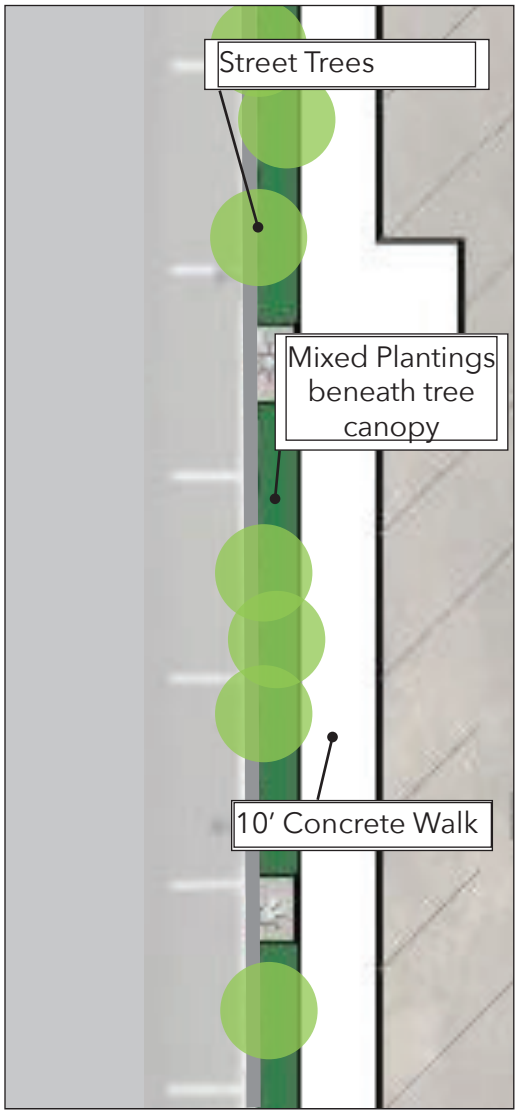



Stormwater catchment basins will be connected to existing storm sewer located in Center Street – future phases will route this water to underground cisterns in Municipal Plaza for irrigation and other re-use purposes.





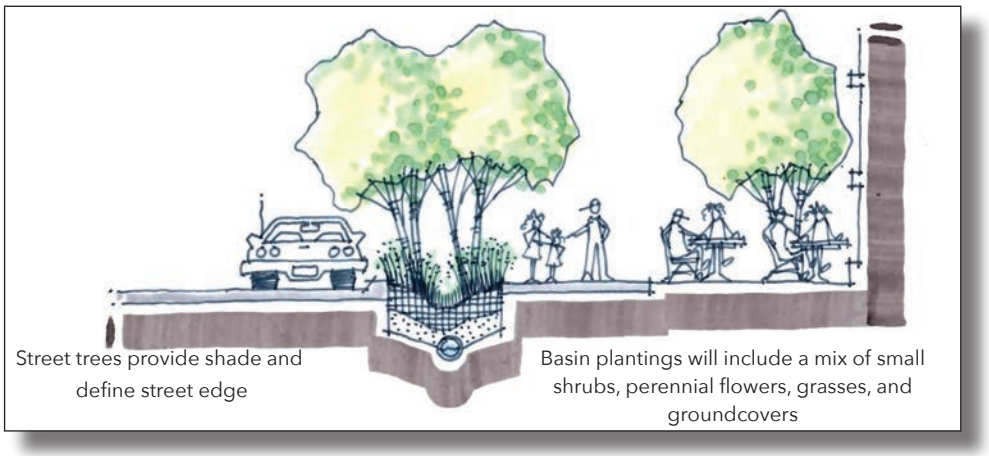

# Future Development Site Frontage Project Elements








Example of private plaza for public use



# Design Framework

THE COR

AT RAMSEY

February 28, 2012

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## Appendix A: Specifications and Details

# Design Framework – The COR

## Purpose

The primary purpose of Design Framework is to set basic parameters, describe preferences and illustrate design intent. These framework standards serve as a framework within which creative design can and should occur – there is no one solution, but many options that meet the basic requirements of this document.

## Application

The format and content of this framework are specifically tailored for use as a supplement to the Zoning Ordinance. This document is organized into two sections. The first section outlines issues and recommendations that apply to the entire COR. The second section highlights specific framework that apply to each sub-district within The COR. The City of Ramsey has adopted Development Plan 5.03 as the Master Plan for The COR. This master plan provides illustrative guidance for building locations and orientation. Any changes to this approved master plan must be reviewed and approved by the City Council as part of the development application. This Development Plan will be updated by the City as changes are approved.

## Implied Responsibility

All participants in the development of The COR recognize the local and regional impacts of this project and the various systems that play an important role. Each parcel and each building must fit within the context of the entire plan. Individual projects must complement, not compete with, adjacent development in terms of public green space, walk and trail connections, stormwater management solutions, street layout, parking strategies, land use mix and building design.

## Part One: Overall Framework

There are a number of framework standards that apply to the entire COR, including recommendations for stormwater management, parks, streets, land use, parking, transit and other development components. Many of these overall COR framework standards overlap, or are integrated with one another. For ease of discussion they are categorized according to the same list of 'layers' that formed the basic structure for the Master Framework:

- Context – local, city, regional
- Street Hierarchy--access, circulation, arrangement
- Streetscape—preferred design, location
- Parking -- quantity, location, type
- Building Design-- preferred uses, horizontal/vertical mixed use, built form, character of development
- Signage—design, location, quantity, type
- Stormwater Management-- surface water features, stormwater management
- Parks/Public Spaces – parks, trails and open space

It is essential that proposed design solutions for development projects and other improvements within The COR demonstrate an understanding of the interplay between these layers.

## Overall Framework - Context

### Overview

The COR is a unique area within the City; but it is a part of, and connected with, a variety of local, city-wide and regional systems (See Figure 1: Development Master Plan 5.03). Each development project, whether a single building, one lot, or a series of blocks, must provide reasonable links to these systems as a primary design objective.

### Guideline Recommendations

To ensure that The COR takes full advantage of local and regional systems, development should:

- Provide safe, easily recognized connections to city, county and state trail corridors
- Make provisions for city and regional transit service and amenities (including the Northstar Line) and encourage their use
- Tie into, and improve, the Ramsey utility network
- Integrate with and complement the existing (and future) street framework
- Become an integral part of the city and county drainage/stormwater management plan

### Objectives

- Overall COR design (and all new private development within The COR) will accommodate stormwater from new projects and from off-site, and highlight stormwater features as an amenity
- Bikeways and pedestrian routes into The COR from adjacent neighborhoods must be designed for safety and ease of access, suggesting that a person on a bicycle has an equally accessible route to downtown.
- Parks and open space will be easily accessible to all COR residents, visitors, people who work here and also for the citizens of Ramsey and the surrounding area. This connected green system is reminiscent of the world renowned 'Grand Rounds' of Minneapolis.

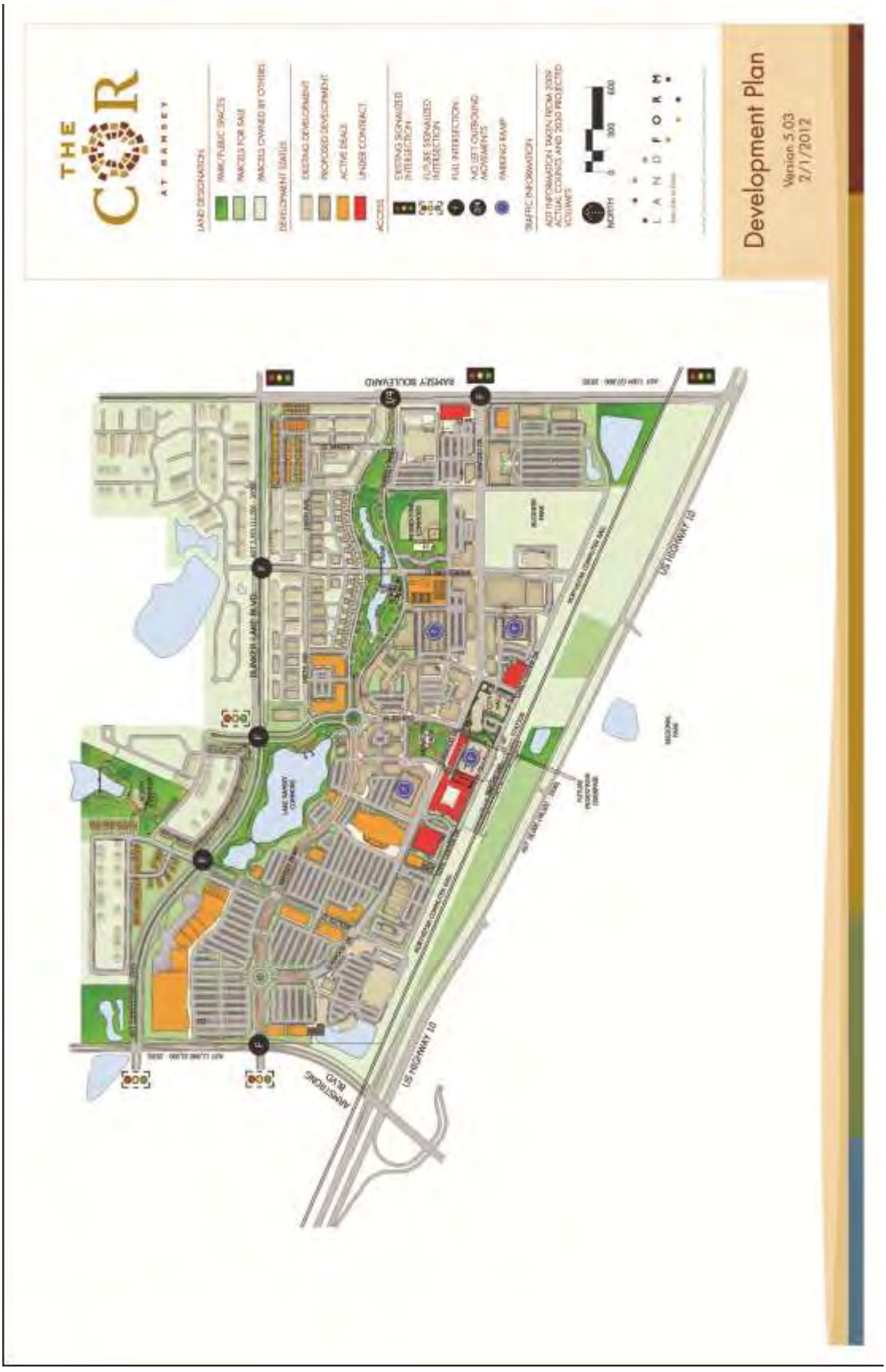



Figure 1: Development Master Plan 5.03

## Overall Framework – Street Hierarchy

### Overview

The Development Master Plan defines a specific strategy for the layout of streets and blocks within, and around The COR. The size, type and configuration of this street hierarchy (See Figure 2: Street Hierarchy) is based on a combination of projected traffic volume, level of service at intersections, proposed adjacent land use (destination commercial, residential, civic, recreation, etc.) and desired aesthetic character.

Great streets are essential components of an attractive and inviting public realm. These guidelines promote a street system that balances pedestrian and vehicular use. Providing streets that support traffic flow is important, but also creating ample space for street-side activities, strolling promenades, pockets of green and other amenities is critical to the success of The COR. Streets will promote convenient access by car – to storefronts, to parking lots and ramps, to entertainment attractions – but will also encourage foot traffic as a primary way to move about and conduct business in the core area.



### Guideline Recommendations

The proposed street and block pattern reflects a compact urban character, not allowing dead end streets or cul-de-sacs, in favor of a traditional grid pattern and connected streets including the following:

- Provide a street network that distributes pedestrian and vehicular traffic throughout the various districts in The COR and encourages a more dispersed and less congested traffic flow (many choices or travel paths).
- Provide a clear hierarchy of streets resulting in a simple and understandable system for movement – easy access and convenient circulation throughout The COR.
- Work with Anoka County to convert primary perimeter streets (arterials such as Ramsey, Armstrong and Bunker Lake Boulevards) to urban street sections, providing sidewalks and street trees to replace roadside ditches.
- Promote improvements that invite pedestrian and bicycle use including wide sidewalks, streetscape amenities and designated bicycle trails (both on and off-street).

### Objectives

Creative design solutions for public realm improvements should reflect these basic street classifications (street hierarchy) including:



- Arterial street – these streets provide the boundary of The COR and all access into The COR will be from one of these three streets:
  - Bunker Lake Boulevard
  - Armstrong Boulevard
  - Ramsey Boulevard
- Destination street – signature addresses for shopping, entertainment, services, work place and other primary amenities
  - Sunwood Drive

- Parkway – premier 'green streets' adjacent to primary public park / green space, with more landscaping than other streets in The COR
  - Ramsey Parkway
  - Center Street (north of the roundabout)
- Connector street – primary routes that link various districts within The COR, usually providing the most direct means of getting from point A to point B
  - Rhinestone Street
  - Zeolite Street
  - Veterans Drive
- Downtown street – the most urban of street sections where high pedestrian traffic is intended and traffic calming measures such as on street parking, bump outs and other methods will be employed
  - Center Street (south of the roundabout)
  - Sapphire Street (north of Sunwood)
  - Other streets as shown on the Street Hierarchy Map
- Local street – neither destination nor primary connector routes, these streets provide much of the rest of the street grid throughout The COR.





These street hierarchy classifications are intended to provide guidance regarding the streetscape, but it should be noted that within a street classification, there may be construction or design distinctions, based on the sub-district classification. For example, Sunwood Drive is defined as a destination street throughout The COR, but the design may be different between the COR1 and COR2 sub-districts. The Master Streetscape Map will provide design direction.

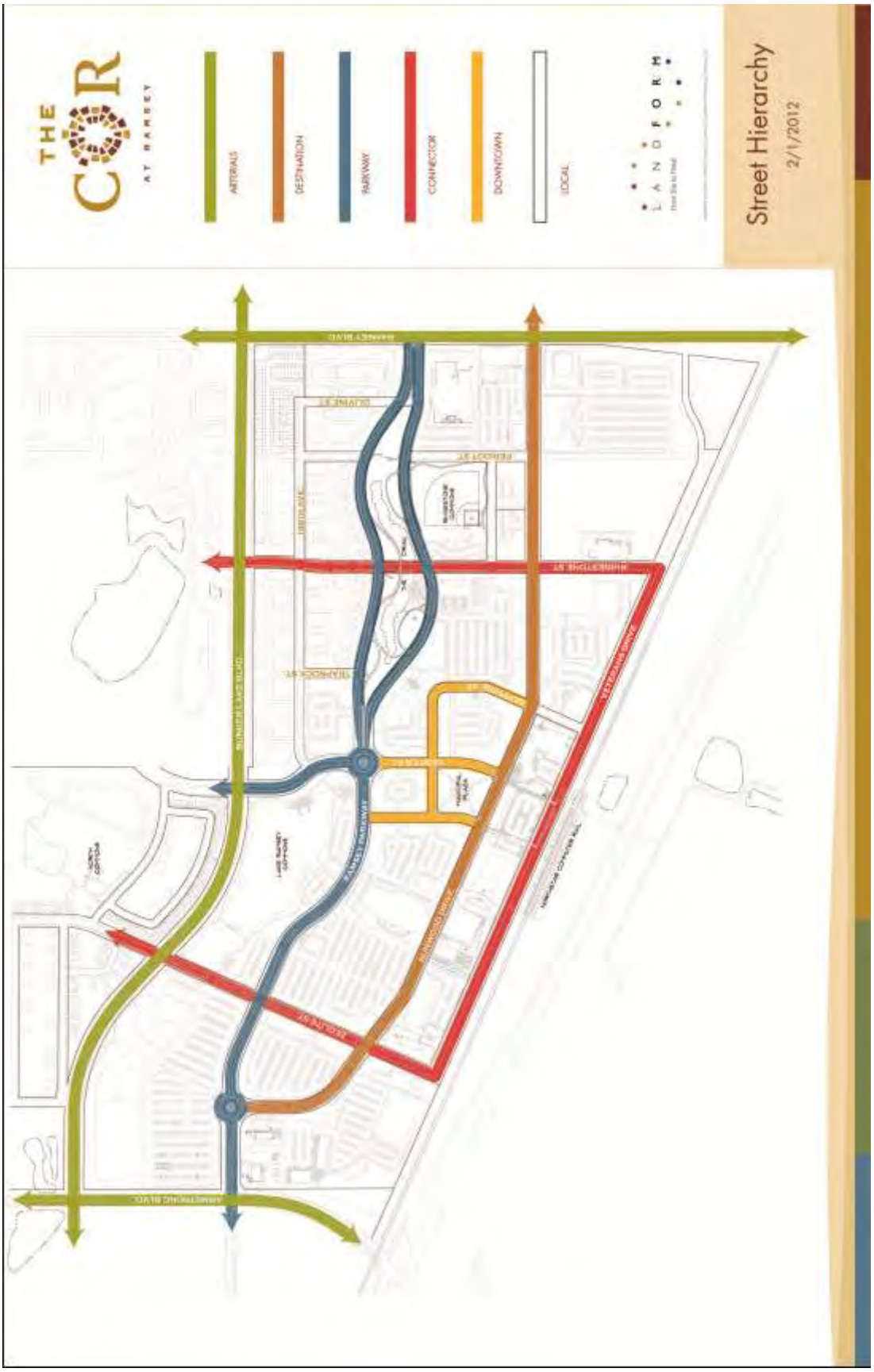



Figure 2: Street Hierarchy Map

### *Transit Overview*

The COR is designed to be a Transit Oriented Development (TOD) in a variety of ways that go beyond providing a walkable public realm and connected street grid. The Master Plan also includes a multimodal transit station, with dedicated commuter parking, integrated with other uses at the heart of the retail, restaurant and entertainment district. This station functions as a hub where local circulator transit comes together with regional transit service and the Northstar Corridor. The COR is the Twin Cities' first and only transit-oriented development along the new Northstar Commuter Rail Line. Ramsey Station at The COR will open for riders boarding the train in November 2012. As Northstar's most visible station, The COR will immediately bolster the ridership on the line and continue to build recognition for this regional service.

Transit components include the following:

- Ramsey Star Express service provides peak period, peak direction bus service between downtown Minneapolis and Ramsey until the Northstar Commuter Rail station stop is complete
- Northstar Commuter Rail provides train service between Big Lake and downtown Minneapolis
- 350 park and ride parking spaces are provided for commuters adjacent to the transit station
- Pedestrian and bicycle connections are emphasized in the Master Plan as major links between the transit station, various districts within The COR and into the surrounding neighborhoods
- The COR can accommodate Metro Mobility, citywide circulator bus or town trolley connections as part of local and regional service to the transit station



The COR also encourages developers to participate in a Travel Demand Management (TDM) program to both assist and encourage residents and visitors to take advantage of the various modes available for their commuting and travel needs. The TDM program draws from incentives and services available through Anoka County and Metro Commuter Services that match riders with carpools and vanpools, provide discounted transit passes and manage work hours among other functions.

- Developers shall submit a TDM plan with their site plan application for new development and work with the City to implement their plans.

### *Transit Guideline Recommendations*

Transit is an important component of the overall plan, with expectations for more ridership, using a greater range of transit options as they become available. More people, together with the mix of activities and amenities in The COR, encourages better designed, better connected transit service. It is a shared responsibility between city, county and developer to promote transit use, with both policy and bricks-and-mortar attention to the following framework:

- Understand and take advantage of opportunities to use existing and proposed transit components

- Provide transit related facilities specifically linked to uses and character within each COR district, including signage and lighting for way-finding and bicycle amenities
- Building future Northstar Commuter Rail riders through the Ramsey Star Express bus service

### *Transit Objectives*

The primary objective is to provide a balance of transit service, bicycle and pedestrian connections and lanes to move traffic. The framework for The COR promotes public transportation as part of the solution and suggests a variety of street improvements and other amenities to invite increased use. Photographs throughout the framework suggest some of the many possibilities.

## Overall Framework - Streetscape

### Overview

The Master Plan defines a specific strategy for the layout of streets and blocks within and around The COR. The amenities within the public right-of-way -and immediately adjacent -play an important role in the aesthetics of The COR. Great streets are essential components of an attractive and inviting public realm. Developing a streetscape that is comfortable and inviting to pedestrians is important to realizing the vision for The COR. The framework will encourage interesting and inviting places for the public.

The Streetscape framework defines the visual character and physical improvements for all public spaces within The COR. The document also provides the general framework and examples for design of proposed quasi-public and private space located within each development parcel.



Public realm/streetscape framework focus on the following elements:

- Parks, plazas and other public gathering spaces
- Street/sidewalk character and streetscape elements
- Bicycle/pedestrian connections (on-street and off-street)
- Residential courts, pocket parks and other private green space

The goal is to foster a safe and interesting public realm that will invite pedestrian activity, promote traffic calming, increase transit use and encourage community gathering. Street trees, lighting and decorative fencing provide the backbone for streetscape improvements. Added detail, such as special pavements, street furniture, public art and layered plantings will highlight specific nodes or uses. The City has developed a series of street cross -sections to illustrate these design expectations. Typical street sections are provided in Appendix A as a reference.

Destination and Connector streets must balance a high level of service for the automobile with attractive and inviting amenities for the pedestrian including:

- Provide gracious sidewalk width to support intensity of pedestrian traffic in the core
- Install street trees to frame the street and provide shade
- Provide street lighting that meets all safety standards and design criteria, while creating a signature character for this district
- Explore a range of options for streetscape improvements including special pavements, interesting concrete tinting or scoring patterns, additional plantings, ornamental fencing and other features (note, however, that simpler is better and too much clutter is a negative)



The COR includes a network of bicycle/pedestrian trails and walkways (both on and off-street) that connect adjacent sub-districts to the Mixed Use Core. As you approach the core, these connections tend to become part of the shared right of way along the major streets, or become part of the urban park spaces. Bicycle riders may choose to share the street with vehicular traffic, or dismount and walk their bicycles along with the other pedestrians using the sidewalks. Providing and maintaining these bicycle and pedestrian connections should be a key component for all development projects in the core.




Figure 3: Master Lighting Plan

## Guideline Recommendations




The proposed street and block pattern reflects a compact urban character, including the following:

- Bike racks interspersed throughout The COR to encourage cycling as an alternative mode of transportation.
- Benches on the public sidewalks to encourage people to linger in The COR
- Trees and planters along the streets to create an inviting space
- Wide sidewalks and both on- and off-street bicycle trails
- Kiosks and other way finding tools for visitors and residents in The COR
- Outdoor dining is encouraged on the street side of buildings within all districts.
- Public plaza space is strongly encouraged to be located adjacent to the streets

## Objectives

Creative design solutions for streetscape improvements should include:

- Streetscape improvements that provide traffic calming, particularly along Destination and Downtown streets
- Inviting streets that draw you into and through The COR
- A marriage of building design and streetscape design that encourages active spaces near the streets



### *Street Trees and Plantings*

Street trees and planter boxes are a critical element in the unique character of The COR and will be used to help distinguish between different street types and sub-districts within The COR. However, there may be variety within the same street when the street crosses into sub-districts.

- Street trees will be chosen to ensure that the species allow for clear pedestrian access along the streets and require minimal maintenance.
- Along Destination, Downtown, Parkway and Local streets, where regularly spaced blocks exists, one (1) tree species shall be provided per block. In order to provide variety and protect against disease, adjacent blocks shall not be allowed the same street tree. Initial development along a block shall establish the tree species for that block, subject to City review and approval.
- Along streets without regular block space or longer blocks, such as Connector and Arterial streets, the City may approve groupings of 3-6 trees of one (1) species in lieu of the regular block spacing.
- Alternatives to the above mentioned planting plan shall be subject to review and approval by the City Council.

#### Destination Street Trees:

- Autumn Blaze Maple (*Acer x freemanii* 'Jeffersed')
- Bicolor Oak (*Quercus bicolor*)
- Sienna Glenn Maple (*Acer x freemanii* 'Sienna')
- Skyline Honeylocust (*Gleditsia triacanthos var. inermis* 'Skyline')
- Ginko (*Gingko biloba)*
- Accolade Elm (*Ulmus x '*Accolade')

### Parkway Street Trees:

- Valley Forge Elm (*Ulmus americana* 'Valley Forge')
- Bitternut Hickory (*Carya cordiformis)*
- Siouxland Poplar (*Populus deltoides* 'Siouxland')
- Sienna Glen Maple (*Acer x freemanii* 'Sienna')
- Boulevard Linden (*Tilia americana* 'Boulevard')
- Northern Catalpa (*Catalpa speciosa)*
- Spring Snow Crabapple (*Malus* 'Spring Snow')
- Kelsey Crabapple (*Malus* 'Kelsey')
- Korean Mountain Ash (*Sorbus alnifolia)*
- Ohio Buckeye (*Aesculus glabra)*
- Ginkgo (*Gingko biloba)*

### Connector Street Trees:

- Bicolor Oak (*Quercus bicolor*)
- Northern Red Oak (*Quercus rubra)*
- Princeton Elm (*Ulmus americana* 'Princeton')
- Accolade Elm (*Ulmus x* 'Accolade')
- Autumn Blaze Maple (*Acer x freemanii* 'Jeffersed')
- Skyline Honeylocust (*Gleditsia triacanthos var. inermis* 'Skyline')
- Kentucky Coffeytree (male) (*Gymnocladus dioicus)*
- River Birch (single stem) (*Betula nigra)*
- Black Alder (*Alnus glutinosa)*
- Black Cherry (*Prunus serotina)*
- Spring Snow Crabapple (*Malus* 'Spring Snow')
- Kelsey Crabapple (*Malus* 'Kelsey')
- Japanese Tree Lilac (*Syringa reticulate)*
- Thornless Cockspur Hawthorne (*Crataegus crus-galli* var. inermis)

### Downtown Street Trees:

- Princeton Elm (*Ulmus americana* 'Princeton')
- Accolade Elm (*Ulmus x* 'Accolade')
- Autumn Blaze Maple (*Acer x freemanii* 'Jeffersed')
- Skyline Honeylocust (*Gleditsia triacanthos var. inermis* 'Skyline')
- Kentucky Coffeytree (male) (*Gymnocladus dioicus)*
- River Birch (single stem) (*Betula nigra)*
- Black Alder (*Alnus glutinosa)*
- Black Cherry (*Prunus serotina)*
- Spring Snow Crabapple (*Malus* 'Spring Snow')
- Kelsey Crabapple (*Malus* 'Kelsey')
- Japanese Tree Lilac(*Syringa reticulate)*
- Thornless Cockspur Hawthorne (*Crataegus crus-galli* var. inermis)

### Local and Arterial Street Trees:

Local and Arterial Street trees may be chosen from any species on the above lists.

### Planter Beds/Boxes/Tree Grates

- Planter beds, tree grates and planters shall be as shown on the Streetscape Master Plan. Details and specification shall be added to Appendix A as developed and approved by the City. Appendix A shall be amended as needed.
- Irrigation shall be provided to ensure survival of plant materials. The City shall provide irrigation systems along the Parkway and Destination streets. Unless otherwise approved, all other irrigation shall be the responsibility of the landowner.

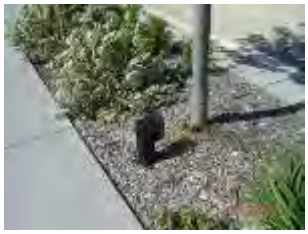
## *Street Furniture*

Bike racks, trash enclosures and benches are encouraged on all streets, but will be required on Destination, Connector and Parkways and other streets as shown conceptually on the Streetscape Master Plan.

Bike racks shall be the standard bike rack (see Appendix A for specifications).

Trash enclosures shall be the standard trash enclosures (see Appendix A for specifications).

Benches shall be the standard bench (See Appendix A for specifications). Benches shall be grouped in twos that face each other and provide an opportunity for an outdoor conversation space.



Alternative bike rack, trash enclosures and bench designs will be considered on a case-by-case basis. The City will review alternative designs as part of the site plan review and will evaluate these alternatives based on the following:



- Does the design maintain the character of the district?
- Does the alternative design maintain the quality of the standard feature?
- Does the design provide a relationship between the public elements of the streetscape and the building that would not otherwise be possible?

## *Sidewalks and Boulevard*

In the design framework, the term “boulevard” is defined as “the space between the sidewalk and the curb.” The boulevard area provides the required space for public features such as street lights, benches, fire hydrants, street signs, etc. The boulevard will have different characteristics based on the street hierarchy.

The street width and layout within different zones may affect the ability of a particular development to provide the minimum boulevard width and the minimum sidewalk width within the existing public right-of-way. In those cases, the landowner shall provide a permanent public easement over the portion of the sidewalk that is located on private property.

### *Street Lights*

Street lights are owned and installed by Connexus Energy. The streetlight design was developed in conjunction with the City of Ramsey and Connexus (See Figure 3: Master Lighting Plan). The standard street lights are designed to accommodate banner arms should banner signage be desired. The banner arms should be the manufacturer's standard break-away banner arms to ensure safety and minimize maintenance costs. Connexus provides street light maintenance for the City. Connexus bills the City of Ramsey for the cost of installation and maintenance.

The choice of street light was intended to emphasis the pedestrian scale of The COR. Light poles within the public right-of-way should be planned to accommodate banners, flowers, hanging artwork and electrical outlets.

There are three (3) different streetlight types within The COR:

- 24-foot high poles at intersections
- 14-foot high poles at mid-block
- 12-foot high poles at The Draw



The City will ensure that the appropriate streetlights are installed on all public streets as described by the Design Framework. Private developers shall provide parking lot or other project lighting that retains these design objectives. All lighting shall comply with City Code performance standards for lighting. All lighting shall be reviewed by City staff to ensure compliance with the Design Framework and City Code standards described above.

### *Standards for Outdoor Dining.*

Outdoor dining is encouraged as an attractive addition to a pedestrian- and retail-friendly, vital COR. Such dining is encouraged subject to the standards in Section 117-118 of the Zoning Ordinance.

## Overall Framework - Parking

### Overview

Balancing the realities of car-related necessities (streets, parking and so on) with future transit service and the desired character of The COR is a significant challenge. The goal is to provide adequate parking; both quantity and location, while promoting new strategies that support the overall needs of The COR. Parking will be provided through a combination of on street spaces, off-street surface lots, underground lots and structured ramps to support the mix of uses at the core.

Parking structures should contribute to the overall character and image of The COR. Ramp design should include elements, colors and materials that reflect, or complement surrounding buildings. Liner stores or other street level uses should be integrated into ramp design along important street frontages. The City also encourages developers to wrap the ramp with multi-story uses that will provide commercial and residential opportunities and help to define the street edge.

### Guideline Recommendations

Parking guidelines encourage the following:

- Locate surface parking lots away from the major streets, either behind or to the side of primary buildings; surface parking lots along major street frontage are not allowed in the core area
- Minimize surface parking lots in favor of other solutions including underground parking to serve residential buildings, on-street parking to serve retail shops and parking ramps
- Provide a combination of fencing, landscaping and landform to screen parking areas from major streets and important views, soften parking area edges, provide shade, integrate native plantings, offset islands and reduce to 'sea of parking' image
- Create strategies for shared parking between adjacent uses, taking advantage of peak and off-peak cycles, business hours, nighttime activities, special events and other needs
- Provide alternative surfaces for secondary (less frequently used) parking areas including porous pavements, green pavements and so on
- Provide facilities or services that respond to and connect with future transit to reduce required parking, including shuttle/circulator bus, bicycle lockers
- Provide flexibility including hours for on-street parking, security and enforcement practices, permit or metering
- Provide parallel parking on both public and private streets throughout The COR, to add parking and create a traffic calming, pedestrian buffer; Bumpouts are encouraged as a traffic calming measure on all streets within the COR.
- Explore options to integrate stormwater management requirements into parking area design
- Provide parking spaces for typical daily use, satisfying both quantity and location needs through a mix of on street, small surface lot, underground and ramped parking solutions
- Provide options for additional/overflow parking to support holiday traffic and special events including porous pavements, turf parking areas (Netlon and other soil amendments) or shuttle service from nearby parking areas
- Encourage shared parking solutions that target around the clock shifts in destination, audience or take advantage of peak/off-peak hours of operation for various uses within the core area

- Promote municipal parking ramps as the primary facility to meet public parking needs within the core area
- Discourage driveway access to parking facilities along Arterial, Destination and Parkway streets, in favor of side streets.

## Objectives



The primary objective is to provide a balance of surface lots, on-street and structured parking, with ample quantities and close proximity to serve the mix of uses in The COR. The Design Framework anticipates the construction of a total of 3 parking structures in COR1 to serve the needs of the area by providing structured parking that can be shared among users, allow developers to maximize the development on each individual lot. As discussed later in this section, sizing and timing of the structured parking will be finalized as the area develops and parking demand grows. In addition to providing adequate space, excellent design is a major factor as well. The framework for The COR encourages creativity, innovation, quality and attention to detail in every aspect of project development, including parking solutions. Photographs throughout the Design Framework suggest some of the many possibilities.

Figure 4: Streetscape Master Plan




Figure 5: Parking District Map

### *Minimum Standards*

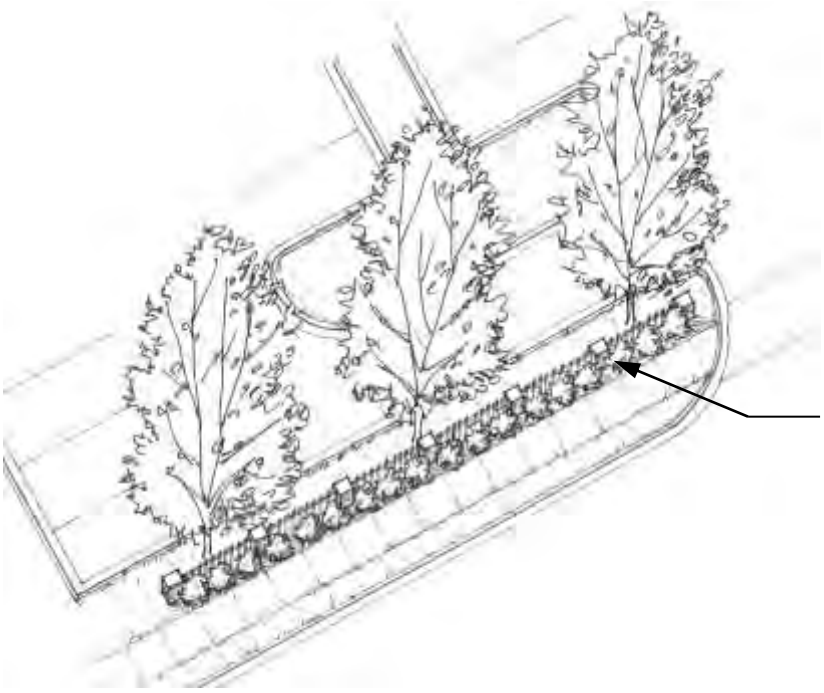
Parking in The COR is intended to be shared to the greatest extent practicable in all mixed-use areas. The parking standards are intended to provide a practical basis for providing adequate parking within the COR District through a careful analysis of uses, shared parking arrangements, use of public street parking and reduction allowances for the proximity to the transit station. A parking plan has been prepared to identify the planned number, location, sharing arrangements and public use (see Figure 4: Streetscape Master Plan and Figure 5: Parking District Map). The parking plan provides information that can be used to help address longer term parking arrangements where the possibility of use conversion or building expansion exists. Parking shall be provided under any of the following arrangements:

A. No parking shall be located between the front of the principal structure and the street on parcels abutting Destination and Downtown streets in COR1.

B. Not more than fifty (50%) percent of the parking shall be located in front of the principal structure and the street on parcels abutting Arterial, Parkway, Connector and Local streets.

    1. In the COR2 district, developments may be allowed more than fifty (50%) percent parking in the front yard, provided all other design standards have been met, including the use of a wall, railing, hedge or combination to create a street edge and screen parking.

C. Wherever a surface parking area faces a street frontage, such frontage shall be screened with a decorative wall, railing, hedge, or a combination of these elements, to a minimum height of three feet (3') and a maximum height of four and one-half feet ($4^1/_2$') above the level of the parking lot, at the build-to line required for the property. The amount of required screening may vary by sub-district and street frontage and is described in Part Two of this document.



Landscaped edge that combines fence with trees, low shrubs and ground cover for parking lot screening and buffering along sidewalk to screen parking

D. No parking spaces shall be located on corner lots at the point of street intersections.

E. Shared parking in COR1 will be accomplished through a Parking Use and Maintenance Agreement (PUMA).

F. Off-street parking in the COR2 and COR3 sub-districts shall be secured for public use through parking easements and other appropriate conveyances. Shared parking arrangements between nearby uses are encouraged in both sub-districts.

1. The City may approve joint parking for one or more businesses where the total number of parking stalls provided for joint use is less than the sum of the total required for each business should they provide them separately. The applicant must demonstrate the feasibility of the arrangement in a written report. Such a permit shall not be granted except when the following conditions are found to exist:
    i. Proximity. The building or use for which application is being made to utilize the off-street parking facilities provided by another building or use shall be located within three hundred (300') feet of such parking facilities, excluding public rights-of-way.
    ii. Conflict in Hours. The applicant shall demonstrate in documented fashion that there is no substantial conflict in the principal operating hours of the two (2) buildings or uses for which joint use of off-street parking facilities is proposed.
    iii. Written Consent and Agreement. A legally binding instrument, executed by the parties concerned, for joint use of off-street parking facilities, duly approved as

to title of grantors or lessors, and in a form and manner of execution approved by the City Attorney, shall be filed with the City Clerk and recorded with the Anoka County Recorder or Registrar of Titles, and a certified copy of the recorded document shall be filed with the City within sixty (60) days after approval of the joint parking use by the City or the interim use permit shall be considered null and void.

G. On-street parking adjacent to buildings shall not be used for the purposes of calculating parking requirements.

H. Within the COR-4 sub-district, parking on individual parcels serving individual uses may be provided if designated and approved as part of the master plan.

I. Within all sub-districts, a minimum driveway length of twenty-five (25') feet is required to limit conflicts between vehicles parked in the driveway and street or sidewalk users.

J. In order to ensure the pedestrian orientation of the COR Districts, minimum/maximum on-site parking standards are set based on the following table:

Table 1

| Use | | Minimum number of parking stalls | Maximum number of parking stalls* |
|---|---|---|---|
| Retail | | 2 per 1,000 sq. ft. | 4 per 1,000 sq. ft. |
| Restaurants | | 3 per 1,000 sq. ft. | 5 per 1,000 sq. ft. |
| Offices | | 2 per 1,000 sq. ft. | 3 per 1,000 sq. ft. |
| Medical offices, clinics | | 2 per 1,000 sq. ft. | 4 per 1,000 sq. ft. |
| Health clubs | | 3 per 1,000 sq. ft. | 5 per 1,000 sq. ft. |
| Theaters, places of assembly | | 1 per 5 seats | 1 per 3 seats |
| Residential | | | |
| | Attached or detached | 1 per unit | 2 per unit |
| | Multifamily units | 1 per unit | 2 per unit |

*If a parking structure is provided on site, maximum parking stalls do not apply.

K. Non-Specified Uses. For uses not specifically listed above, off-street parking requirements shall be computed by the Zoning Administrator on the same basis as required for the most similar listed uses. In such cases, the Zoning Administrator shall also consult off-street parking reference materials including, but not limited to, manuals prepared by the American Planning Association and Institute of Transportation Engineers.

L. Handicap Parking. The size, number, and location of stalls reserved for handicapped parking shall be provided and identified as required by applicable regulations. These spaces are included in the computation for the minimum parking space requirement.

M. Change in Land Use. When the site intensity or use of a building and/or property is increased with consequential effect upon the parking requirements as prescribed in this Section, the

parking requirements as prescribed herein shall be used to provide for such increase in the site intensity and/or use.

N. Use of required parking spaces. Required parking spaces must be available for the use of residents, customers or employees of the use. Fees may be charged for the use of required parking spaces. Required parking spaces may not be assigned in any way to a use on another site, except for joint parking situations. Also, required parking spaces may not be used for the parking of equipment or storage of goods or inoperable vehicles.

O. Transit Service Reduction. The minimum number of parking stalls required on site may be reduced by 10% for any parcel located within ¼ mile of a transit stop. To qualify for this reduction, the transit stop must provide regular service on all days of the week and direct pedestrian access must be provided between the building and the transit stop.

P. Bike Racks. In addition to the bike racks provided as part of the streetscape, individual businesses are encouraged to provide bike racks for customers. Bike rack locations will be reviewed and approved by the City as part of the site plan review.

Q. Increase to Maximum Required Parking. If additional parking is sought to exceed these maximum requirements, a conditional use permit can be sought to increase maximums up to twenty-five (25%) percent.

    1. In the COR-2 sub-district, an increase of twenty-five (25%) percent in the maximum number of parking stalls is permitted without the issuance of a conditional use permit if approved as part of the site plan.

R. In the COR1 sub-district, a PUMA (Parking Use and Maintenance Agreement) shall be applied to all development as follows:

    1. It is the City's intent to maximize development on individual lots. In order to help landowners accomplish this goal, the City will develop public parking ramps, which will be available for public parking within The COR. In order to minimize the amount of the site required for parking, the landowner may choose to enter into the PUMA for utilization of the public parking ramps to meet all or a portion of their minimum parking requirements.

    2. Each development shall be subject to a PUMA that specifies that each property in the COR1 shall be financially responsible for its proportionate share of a shared parking facility. The proportionate share shall be determined on the basis of the property's off-street parking needs, as determined by the parking requirements of Item J above.

3. The City shall establish fees by ordinance. The developer shall be responsible for payment in an amount equal to the value of the required parking on a per-stall price basis for ramp parking through the PUMA. The City will determine the appropriate contribution.

4. Funds collected by the City shall be deposited in a special fund used only to acquire and/or develop off-street parking facilities for the COR. Financial responsibility shall cover the construction and continuing maintenance of the parking facility.

5. The parking facility may be constructed and maintained by the City or by a private management entity acceptable to the City.

### *Private Streets*

Private streets may be allowed within residential subdivisions, subject to the standards in Section 117-112 (e)3.b. of the Zoning Ordinance.

### *Loading Areas*

A. Loading areas and docks shall be located in the rear of the building.

B. Loading areas shall not be located in the front yard and shall be fully screened from public streets, public parks and residential areas through landscaping and building design measures.



## Overall Framework – Building Design

### Overview

The COR Development Plan 5.03 identifies the preferred mix and approximate location of a variety of land use types. Together with the Zoning Code, this Design Framework focuses on the following overall objectives:

- Promote vertical and horizontal mixed use (within a building, within a block, within a district)
- Provide a variety of housing types, styles, pricing
- Encourage increased density in and around the central core area
- Promote an interesting mix of building styles, scales and massing for each sub-district
- Support creative, innovative, high quality design solutions as the benchmark for success
- Integrate mix of uses with public green space within each district
- Provide a variety of commercial types
- Mix residential and commercial uses to promote street-level activity throughout the day

### Guideline Recommendations

The mix of land uses in The COR will encourage activity during the day and into the evening and nighttime hours. As a focus of commerce, employment, recreation and housing, The COR resembles a small to medium size Midwestern downtown in scale and character. Land uses are intentionally mixed, to bring shoppers and workers into the area during the day and attract new residents and visitors to entertainment venues in the evening.

The civic component of The COR, anchored by City Hall, Police Station and variety of public spaces and squares, adds an important element to the land use mix and brings a level of authenticity to the district.

### Objectives

- Encourage vertical mixed-use in the core with housing and office space over retail uses along the street, particularly in the center of the district.
- In residential districts, particularly closer to the core, a limited amount of retail uses will be encouraged to service residents and provide nearby places to gather.
- Promote innovative models for housing that include a mix of townhomes, flats and lofts within single buildings or on the same block.
- Accommodate larger, 'big box' retailing and auto-oriented uses within the COR2 sub-district only if innovative design approaches are used including two story buildings, use of liner stores facing the street, minimal blank walls, creative parking strategies, etc.
- Where similar uses create a 'family' or campus of buildings (e.g. medical campus), buildings should reinforce the street edge and parking should be set within the core of the block.
- Uses shall promote pedestrian friendly streets, contributing to street level activities and overall visual character of each district.
- All uses should reinforce the street edge.





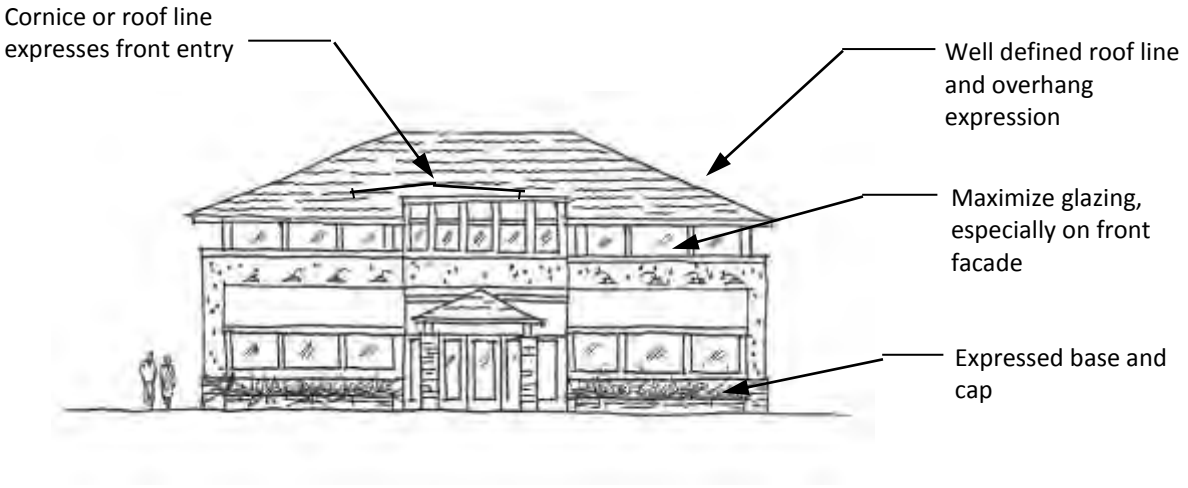
### *Architectural Overview*

High quality architecture is an essential component in fulfilling the objectives of the Design Framework. Rather than prescribing a particular style, these architectural guidelines are intended to encourage an integration of both traditional and contemporary design. Architectural designs should provide a consistent quality, measured, to a great degree, by the pedestrian experience along the street and by an architectural expression that provides character without being thematic, obtrusive, or artificial. Architectural character should strive to be authentic and varied, but not 'thematic'.

### *Architecture Recommendations*

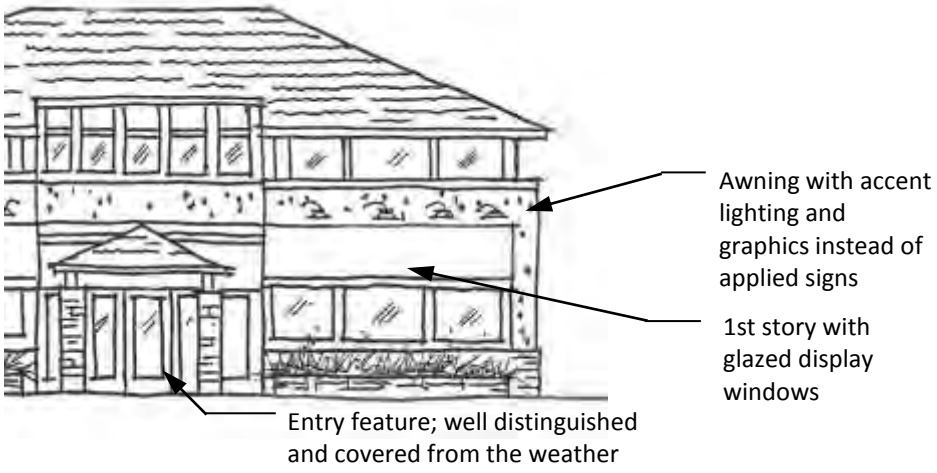
Of all the layers that combine to form The COR Development Plan, architecture will typically be the most prominent development component. Both visually and physically, architecture will play a major role in defining the overall design character and mix of uses for The COR. It is crucial that the design and location of buildings address these architectural guidelines, with specific emphasis on the following:

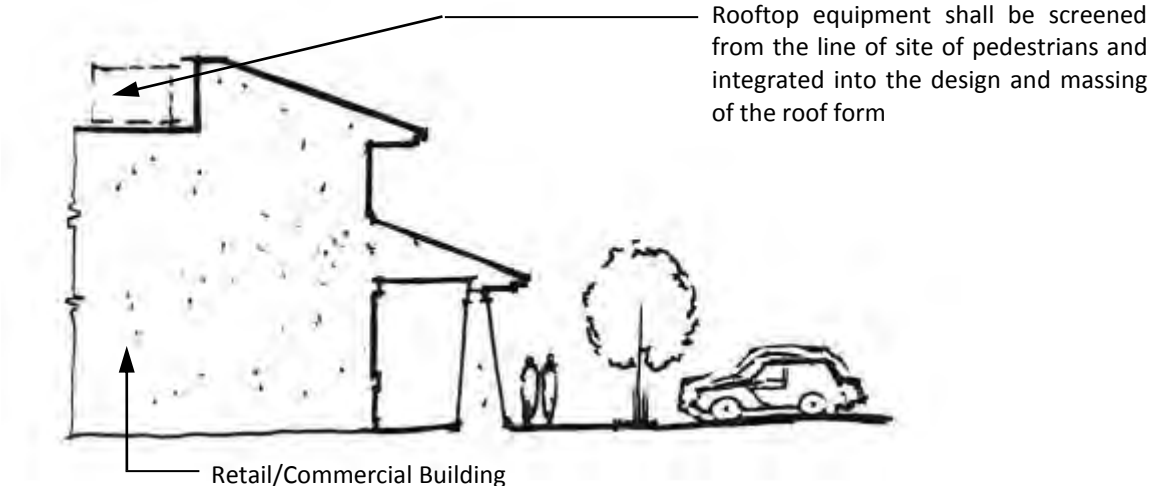
- An animated street presence with a mix of street-level uses, interesting building façades, many doors and windows on the street, careful design of lighting, awnings, signage and other elements that animate the pedestrian experience



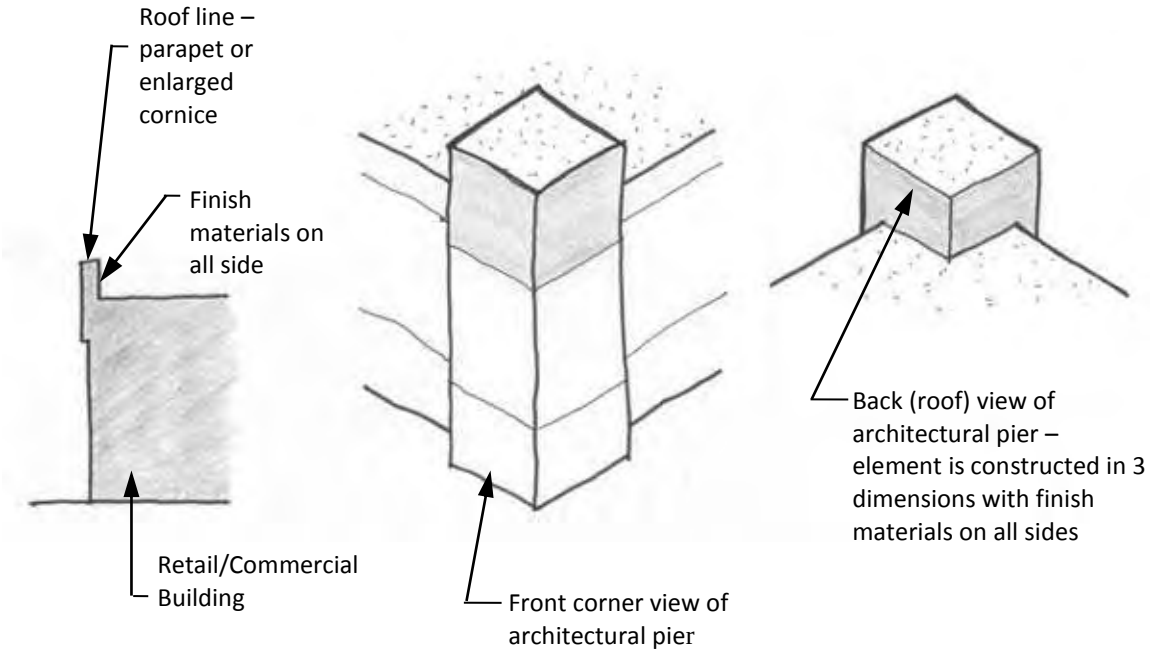

- Variety in building design, character and expression; not one theme or building style, but a thoughtful integration of many design solutions
- Variety of building types including a range of height, scale and proportion, that support an integrated mix of housing options, shopping destinations, entertainment venues, civic structures and other COR uses
- Use of high quality materials, suggesting a preference toward native materials and masonry elements, with respect for local building techniques
- Building location is as important as building style; special architectural elements, character, transparency and a higher level of materials and detailing should be used to highlight key streets and important crossroads throughout The COR
- Buildings should always be located at all four corners of intersections.
    - In the COR2 sub-district, if the City finds that there are unique circumstances where buildings cannot be located on the corner, the City may approve the use of fences, walls or other design elements to create that "street edge"

- Buildings will be located at the street right-of-way line (zero setback), but also allow recessed space for outdoor dining and other street level activities providing some minor deviation for variety
- Greater emphasis should be given to architectural elements, materials and other design features for buildings located at primary intersections, or where streets intersect with parks, such as the streets that front on or end near the Municipal Plaza. These locations can often be seen from several directions, perhaps terminate a view from a distance down the street or sit at a prominent node; They will likely become future landmarks or helpful orientation/wayfinding icons as The COR develops
- Encourage both vertical mixed use (within each building) and horizontal mixed use (within each block) throughout this district
- Include a mix of housing, civic, retail, restaurant, entertainment, performance and other uses that encourage a variety of activities throughout the day.
- Minimize openings between buildings, although limited driveway access and some provision for pedestrian connections through blocks are encouraged – gaps between buildings to accommodate surface parking lots, greater building setbacks or other purposes are discouraged
- Use recessed entries and windows to create street-level interest, variety and enhance pedestrian scale along street frontage



- Equipment, mechanical systems, transformers, etc. must be screened from view in a way that is integral to the architecture of the building. Screening should be accomplished with materials similar to or compatible with materials used on the main structure; metal fencing or mechanical vent screens alone are not sufficient.
- Roof lines and cornice details shall be completed in a 3-dimensional manner so that the back of roof features or similar unfinished areas are not visible.



## Overall Framework - Signage

### Overview

Signage within The COR should provide a system for clear wayfinding for all modes of transportation and should ensure successful business operation while maintaining the design aesthetic of this unique project. These sign standards are intended to allow flexibility and creativity while maintaining the design concepts of The COR. Due to the distinctive nature of The COR, the sign standards from the City Code are not applicable and signage shall be allowed as prescribed by the Design Framework. A Master Sign Plan identifies the location of key sign locations (see Figure 6: Signage Plan).

### Guideline Recommendations

The COR development manager shall prepare a Master Sign Plan for the public elements of the project, which are in compliance with the design framework and will be adopted by reference. The Master Sign Plan will specifically address public signs including:



- The three (3) off-site community signs
- Banner signs on light poles
- Signage for public parks
- Signage for public parking ramps
- Signage for public buildings
- Community kiosks

### Objectives

Signage should be used as a tool to help identify businesses and neighborhoods with The COR and should have elements that are focused on the pedestrian nature of The COR as well as the signage needs for businesses.

- Signage and lighting which is integrated into the design of the building is encouraged.

### *Definitions*

*Awning Sign* means a sign incorporated into or attached to an awning.

*Community sign* means an off-site sign identifying the development name and key tenants. Community signs may also include public information. Reader boards are allowed to be incorporated into community signs within The COR.

*Temporary Sign* means a sign which is erected or displayed for a limited period of time and not affixed to a Minnesota State Building Code approved structure.

*Project sign* means a freestanding area identification sign which identifies a single-family or multifamily residential subdivision, a commercial development or an industrial park or office park and which is located on the same parcel as the development it identifies.

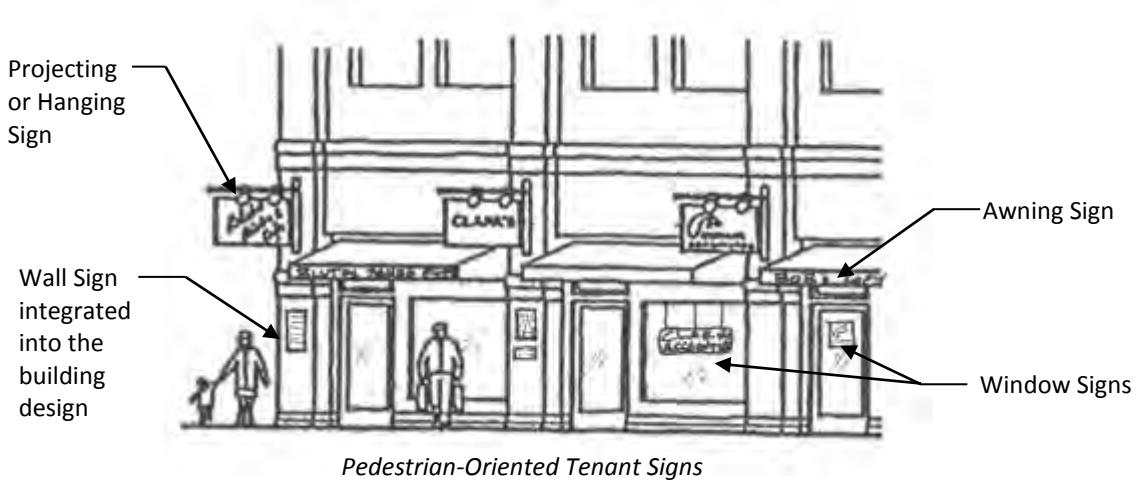
*Projecting sign* means any sign, all or any part of which extends beyond the surface of the building or wall by more than 16 inches.

*Public Realm/Streetscape sign* means any sign erected and maintained by public officials or public agencies, or approved and authorized for use by state or local governmental authorities.

*Sandwich Board Sign*s means a self-supporting, freestanding temporary sign with only two (2) sides that are situated adjacent to a business with the intent to attract pedestrian traffic to businesses. Sandwich board signs are not meant to be read by vehicular traffic.

*Wall sign* means any sign which is affixed to a wall of any building. This definition includes individual letter signs and signs on mansards.

*Window sign* means a sign installed inside a window, or any sign placed within a building for the purpose of being visible from the public right-of-way. This does not include merchandise on display.




*Pedestrian-Oriented Tenant Signs*

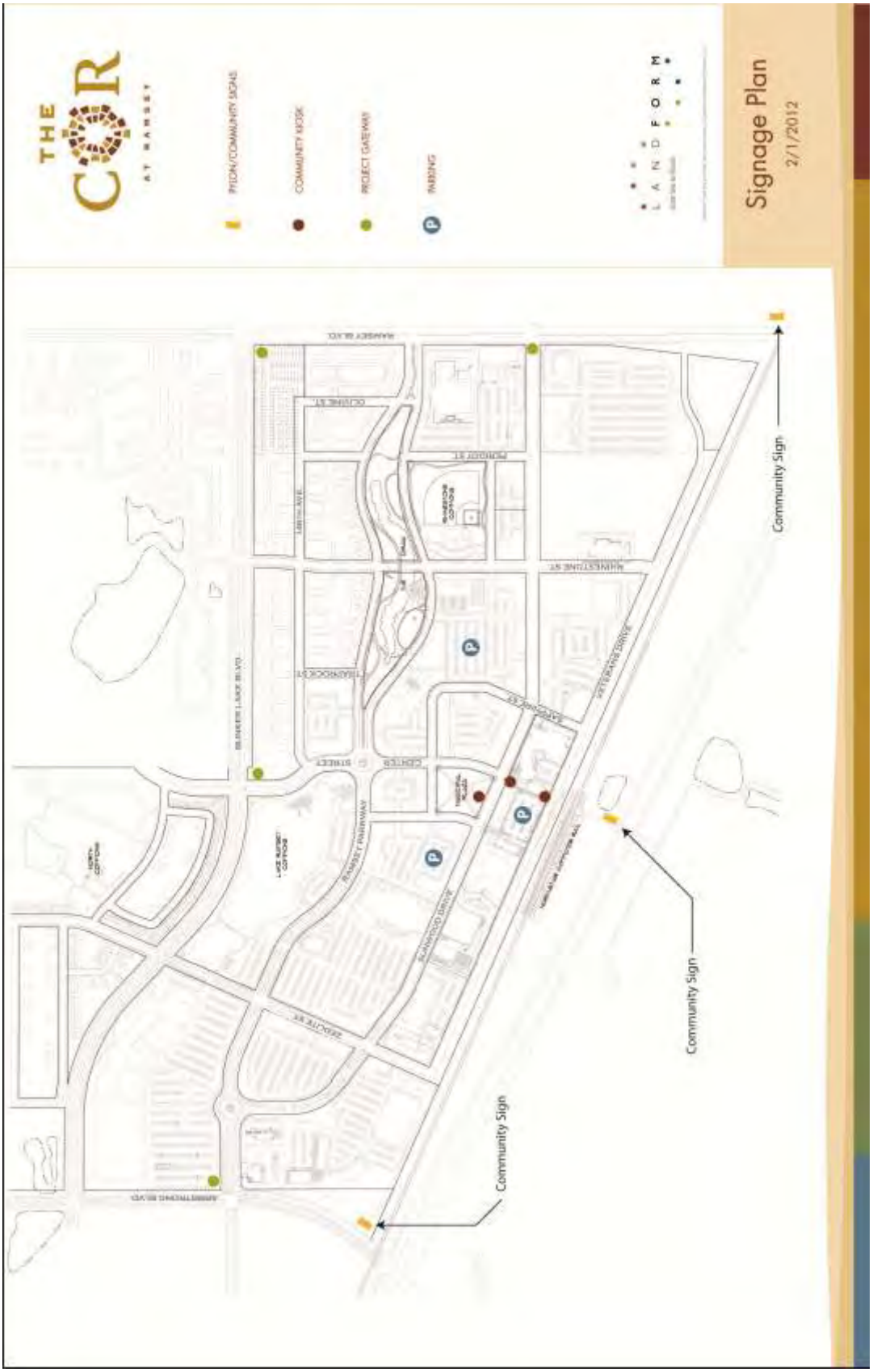



Figure 6: Signage Plan

## *Standards*

### Public Realm/Streetscape Signs

The pedestrian oriented nature of The COR requires unique signage the will build on the design concepts for The COR. These types of signs in include banner signs on the streetlights, kiosks, street signs, wayfinding signs, signage for public parking ramps, etc. As the design concept for The COR has been refined, so has the signage plan. The COR development manager shall develop standards for these public realm signs as part of the Master Sign Plan. The Master Sign Plan shall be incorporated by reference and may be updated from time to time. Such signage shall be allowed on public spaces as needed to provide information and wayfinding. No advertising shall be allowed on Public Realm/Streetscape Signs except for community events.

### Community signs

Community signs include are planned to include three (3) signs on Highway 10, as shown on the Signage Plan (see Figure 6: Signage Plan). The signs include the existing Community Sign near the future transit plaza, the sign at the northwest corner of Highway 10 and Ramsey Boulevard and the planned sign at the northwest corner of Highway 10 and Armstrong Boulevard.

These off-site signs are allowed as shown on the signage plan and shall have consistent materials and colors. The Master Sign Plan shall detail the materials, colors and standards for these three (3) community signs. The Master Sign Plan shall include standards for which tenants shall be allowed on the community signs.




*Desirable signs are designed to be architecturally compatible with buildings within the development and other signage within the development*

### Project Signs

Project signs are permitted within all COR sub-districts.

One (1) freestanding sign is allowed per building, provided that the following standards are met:

A. The building in which the advertising business is located, shall be set back a minimum of six (6) feet from a public street right-of-way.

B. The area of each face of the signboard shall not exceed six (6) square feet and the signboard shall not have more than two (2) readable faces

C. The height of the top of the signboard, or of any posts, brackets, or other supporting elements shall not exceed six (6') feet from the ground.

D. The signboard shall be constructed of wood, acrylic, aluminum or metal and shall be architecturally compatible with the style, composition, materials, colors and details of the building.

E. No part of the sign shall encroach on the right-of-way and its location shall not interfere with pedestrian or vehicular circulation.

F. Limited to one (1) sign per building and shall not be in addition to wall-mounted, applied letter or projecting signs.

G. The readable faces of the sign shall be perpendicular to the adjacent street.

In the COR2 District, the following signage shall be allowed:

A. Ground sign. There shall not be more than one (1) ground sign for each parcel. The gross surface area of a ground sign shall not exceed one hundred (100) square feet for each exposed face nor exceed an aggregate gross surface area of two hundred (200) square feet.

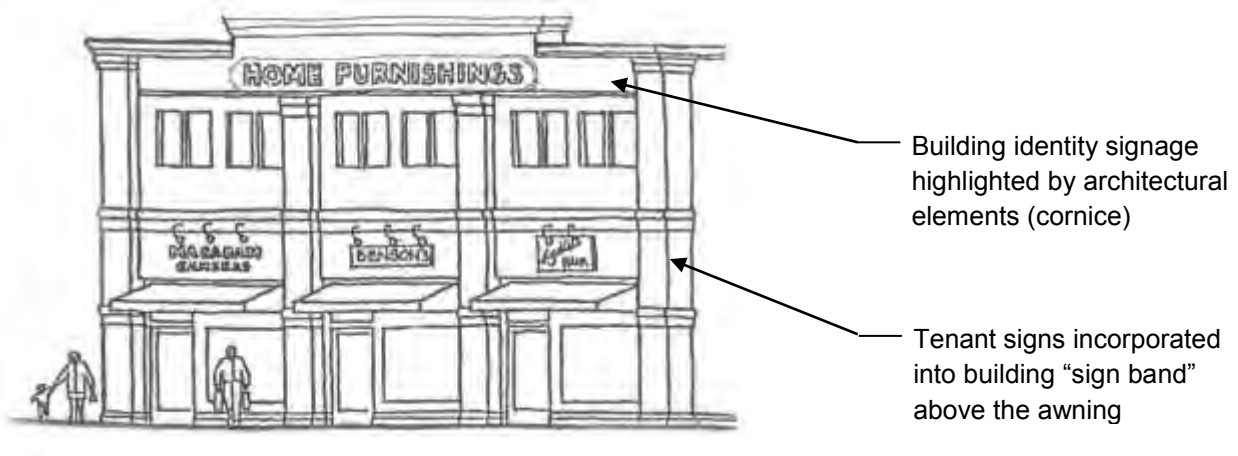
B. Menu board. One (1) on-site menu board per drive-up or walk-up lane of a drive-in restaurant up to a maximum of thirty-two (32) square feet each and a maximum height of three (3) feet. Menu boards are allowed a message on one (1) side only and cannot contain an advertising message.

C. Directional signs.

1. Directional or instructional signs are permitted in accordance with Section 117-463(l).

2. Parking lot directional signs designating parking area entrances and exits are limited to one (1) sign for each entrance and/or exit and shall not exceed four (4) square feet for each exposed face. Parking lot directional signs shall not project higher than five feet (5') in height, as measured from the established grade of the parking area to which such signs are accessory.

3. Parking lot instructional signs designating the conditions of use or identification parking areas shall not exceed eight (8) square feet and shall not project higher than ten (10) feet in height for wall signs and seven (7) feet in height for ground signs, as measured from the established grade of the parking area to which such signs are accessory.




## Wall Signs

Wall signs are permitted within all COR sub-districts.

Wall signs shall be permitted on one (1) wall, except that lots with frontage on more than one (1) street may have signage on one (1) wall per street frontage.

Within the COR1, COR3, COR4 and COR5 districts, the following standards apply:

A. Wall-mounted or painted signs, provided the following standards are met:

1. The sign shall be affixed to the front facade of the building, and shall project outward from the wall to which it is attached no more than six inches (6").

2. Single Tenant Buildings. Each building shall be allowed one (1) wall sign per street frontage. Signage must be located on the street elevation. The area of the sign shall not exceed five (5%) percent of the ground floor building facade area or fifty (50) square feet, whichever is less.

3. Multi-Tenant Buildings.

    a. Each building shall be allowed wall signage on the street frontage elevation. For buildings with multiple street frontages, the allowable signage is per street frontage. Signage must be located on the street elevation.
    b. Each building is allowed wall signage that shall not exceed 5% of the wall area of the building façade adjacent to the street or 50 square feet, whichever is less.
    c. Tenant signage must be located on the tenant lease space.
    d. At least fifty (50%) percent of the allowed signage must be allocated to ground floor tenants and located on the ground floor.
    e. Signage is limited to a maximum of one (1) sign per business/tenant, except that tenants with frontage on multiple streets may be permitted to have signage on each street frontage.
    f. Multi-tenant buildings must have wall signs of similar design. Sign permits for tenants in multi-tenant buildings shall only be permitted by the City after the

building owner has submitted a comprehensive sign plan approved by the Zoning Administrator. The comprehensive sign plan for the building shall include similar design standards including sign material, color, style, spacing and size.

4. Signs for buildings facing Highway 10. Single or multi-tenant buildings that have frontage on Highway 10 or are separated from Highway 10 only by other public right-of-way, shall be allowed to have signage on that street elevation that is up to five (5%) percent of the wall area of that building façade with no maximum square footage.

B. Wall-mounted building directory signs identifying the occupants of a commercial building, including upper story business uses, provided the following standards are met:

1. The sign is located next to the entrance.

2. The sign shall project outward from the wall to which it is attached no more than six inches (6”).

3. The sign shall not extend above the parapet, eave, or building facade.

4. The area of the signboard shall not exceed three (3) square feet, with each tenant limited to one (1) square foot.

5. The height of the lettering, numbers, or graphics shall not exceed four inches (4”).

6. One (1) such sign is allowed per public building entrance and is allowed in addition to other permitted wall signage.

C. Applied letters may substitute for wall-mounted signs, if constructed of painted wood, painted cast metal, bronze, brass, acrylic or black anodized aluminum. The height of applied letters shall not exceed 12 inches.

D. Logos are considered signs and shall be included in the maximum allowable sign area.

E. Window or door signs, provided that the following standards are met:

1. The sign shall not exceed ten percent of the window or door area or four (4) square feet, whichever is less.

2. The sign shall be silk screened, hand painted, applied letters/graphics, neon tubing or other sign technologies that meet these standards.

3. Limited to one (1) sign per business, applied on either the window or the door, but not on both.

4. The sign shall not have an opaque backing of any type although smoked glass is allowed.

5. Window signage (includes graphics) shall be permitted on the same building walls that have, or are allowed to have, wall signage pursuant to Item A above. Window signage shall be deducted from the allowable wall signage area.

Within the COR2 district, where more conventional suburban development is expected, rather than the neo-traditional development planned for the other COR sub-districts, the following standards apply:

A. Wall, canopy or marquee sign. Total sign area may not exceed 15 percent of the front building facade. At least 50 percent of the signage area must be placed on the measured wall with remaining signage area, if desired, distributed on any other wall. Sign height shall not exceed the top of the parapet wall or, if no parapet wall, sign height shall not exceed the height of the eaves. The gross surface area of a wall, canopy or marquee sign may be increased by ten percent if such wall sign:

   1. Consists only of individual, outlined alphabetic, numeric and/or symbolic characters without background except that provided by the building surface to which the sign is to be affixed;

   2. Illumination, if any, is achieved through shielded illumination, shielded silhouette lighting, or shielded spot lighting but not any lighting where the light source is visible or exposed on the face or sides of the characters; and

   3. A wall, canopy or marquee sign may be located on the outermost wall of any principle building but shall not project more than 16 inches from the wall to which the sign is to be affixed. A wall sign shall not project higher than the parapet line of the wall to which the sign is to be affixed.

B. Window signs are restricted to 30 percent of the area of the window in which the sign is to be displayed.

In all COR sub-districts, restaurants and cafes shall be permitted one (1) wall-mounted display featuring the actual menu as used at the dining table, to be contained within a shallow wood or metal case and clearly visible through a glass front. The display case shall be attached to the building wall, next to the main entrance, at a height of approximately five feet (5'), shall not exceed a total area of two square feet, and may be lighted. This signage is allowed in addition to other permitted wall signage.

### Projecting Signs

Projecting signs are permitted within all COR sub-districts.




Projecting signs, including graphics or icon signs, mounted perpendicular to the building wall, are encouraged in all sub-districts, provided the following standards are met:

A. The sign area shall not exceed six (6) square feet.

B. The distance from the ground to the lower edge of the signboard shall be ten feet or greater.

C. The height of the top edge of the signboard shall not exceed the height of the wall from which the sign projects, if attached to a single story building, or the height of the sill or bottom of any second story window, if attached to a multistory building.

D. The distance from the building wall to the signboard shall not exceed six inches (6”).

E. The width of the signboard shall not exceed three (3) feet.

F. Limited to one (1) sign per business. Projecting sign area shall be deducted from the allowable wall signage area.

G. Granted to ground floor commercial uses only.

### Awning Signs

Awning signs are allowed in all COR sub-districts. Awning signs are allowed for ground floor uses only, provided that the following standards are met:

A. If acting as the main business sign, it shall not exceed 24 square feet in area, and the height of the lettering, numbers, or graphics shall not exceed 12 inches.

B. If acting as an auxiliary business sign, it shall be located on the valance only, shall not exceed four (4) square feet in area, and the height of the lettering, numbers, or graphics shall not exceed four inches (4”).

C. Limited to two such signs per business.

D. If acting as the main business sign, it shall not be in addition to a wall-mounted or applied letter sign.

### Sandwich Board Signs



Sandwich board signs are permitted within all COR sub-districts.

A. One (1) sandwich board sign per business is permitted in any business, commercial and mixed use district and shall be located within five feet (5’) of the main building entrance to the business it advertises.

B. Sandwich board signs shall be displayed only during open business hours and must be removed daily.

C. Sandwich board signs shall be no more than a total of two feet (2’) in width and three feet (3’) in height

D. Sandwich board signs must leave a minimum of five feet (5') of clearance for pedestrian access if placed on a public or private sidewalk. Sandwich board signs may not hinder the ability of persons to access vehicles parked at the curb and/or access to a building.

E. Acceptable materials for sandwich board signs shall include the following: metal, wood synthetic materials such as a chalk board and whiteboard. Sandwich board signs shall not be illuminated, nor shall they contain moving parts, or have balloons, streamers, stringers, pennants or similar adornments attached to them. Sandwich board signs shall be maintained in a good appearance at all times.

F. No sandwich board sign shall be secured, tethered or installed on traffic devices, utility equipment, street furniture, street lights, or any other public fixture.

G. Sandwich board signs are temporary signs and shall not be counted towards the total sign area of the site for permanent signage.

### Temporary Signs

Temporary signs are allowed per Section 117-465 (Temporary signs) of the Zoning Ordinance, except as noted below:

A. Freestanding temporary signs shall only be allowed in the COR1 District.

B. In all other COR districts, temporary signs shall be limited to temporary sandwich board signs or temporary wall signage.

### Off-Site Signs

Off-site signs are prohibited except for wayfinding and community signage specifically allowed by the Design Framework.

Table 2

| Sign Standards | | | | | |
|---|---|---|---|---|---|
| Development Standard | **COR1** | **COR2** | **COR3** | **COR4** | **COR5** |
| Project Signs | | | | | |
| Number of signs allowed | 1* | 1* | 1* | 1* | 1* |
| Size of Sign (maximum) | 6 sq. ft./6 feet high | 100 sq. ft./6 feet high | 6 sq. ft./6 feet high | 6 sq. ft./6 feet high | 6 sq. ft./6 feet high |
| Menu Board** | N/A | 1 per drive-through/36 sq. ft. max. | N/A | N/A | N/A |
| Directional Sign | N/A | Per 117-463(I) | N/A | N/A | N/A |
| Wall Sign | | | | | |
| Number of signs allowed | 1* | 1* | 1* | 1* | 1* |
| Size of Sign | | | | | |
| Single Tenant Building | 50 sq. ft. or 5% of the ground floor façade area, whichever is less | 15% of façade area | 50 sq. ft. or 5% of the ground floor façade area, whichever is less | 50 sq. ft. or 5% of the ground floor façade area, whichever is less | 50 sq. ft. or 5% of the ground floor façade area, whichever is less |
| Multi-Tenant Buildings | 50 sq. ft. or 5% of the façade area, whichever is less | 15% of façade area | 50 sq. ft. or 5% of the façade area, whichever is less | 50 sq. ft. or 5% of the façade area, whichever is less | 50 sq. ft. or 5% of the façade area, whichever is less |
| Building Facing Highway 10 | 5% of the façade area | 15% of façade area | 5% of the façade area | 5% of the façade area | 5% of the façade area |
| Window Sign | | | | | |
| Number of signs allowed | 1 | 1 | 1 | 1 | 1 |
| Size of Sign | 10% of area of window or 4 sq. ft., whichever is less. Deducted from allowable wall sign area. | 30% of area of window. Deducted from allowable wall sign area. | 10% of area of window or 4 sq. ft., whichever is less. Deducted from allowable wall sign area. | 10% of area of window or 4 sq. ft., whichever is less. Deducted from allowable wall sign area. | 10% of area of window or 4 sq. ft., whichever is less. Deducted from allowable wall sign area. |
| Directory Sign | | | | | |
| Number of signs allowed | 1 per building entrance | 1 per building entrance | 1 per building entrance | 1 per building entrance | 1 per building entrance |
| Size of Sign | 3 sq. ft. maximum | 3 sq. ft. maximum | 3 sq. ft. maximum | 3 sq. ft. maximum | 3 sq. ft. maximum |
| Projecting Sign | | | | | |
| Number of signs allowed | 1* | 1* | 1* | 1* | 1* |
| Size of Sign | 6 sq. ft./3 feet wide | 6 sq. ft./3 feet wide | 6 sq. ft./3 feet wide | 6 sq. ft./3 feet wide | 6 sq. ft./3 feet wide |
| Awning Sign | | | | | |
| Number of signs allowed | 2 per business | 2 per business | 2 per business | 2 per business | 2 per business |
| Size of Sign | 24 sq. ft./max. letter height 12-inches for main business sign or 4 sq. ft./max letter height 4-inces if auxiliary. Area is deducted from allowable wall sign area. | 24 sq. ft./max. letter height 12-inches for main business sign or 4 sq. ft./max letter height 4-inces if auxiliary. Area is deducted from allowable wall sign area. | 24 sq. ft./max. letter height 12-inches for main business sign or 4 sq. ft./max letter height 4-inces if auxiliary. Area is deducted from allowable wall sign area. | 24 sq. ft./max. letter height 12-inches for main business sign or 4 sq. ft./max letter height 4-inces if auxiliary. Area is deducted from allowable wall sign area. | 24 sq. ft./max. letter height 12-inches for main business sign or 4 sq. ft./max letter height 4-inces if auxiliary. Area is deducted from allowable wall sign area. |

*One (1) sign is allowed per street frontage (either wall or project)

**Restaurants and cafes in all districts are allowed one (1) wall mounted menu board not to exceed 2 sq. ft. in addition to other permitted wall signage.

## Additional standards

A. Businesses with service entrances may identify these with one (1) wall-mounted or applied letter sign not exceeding two square feet.

B. One (1) directional sign, facing a rear parking lot. This sign may be any type of permitted sign other than a freestanding sign, but shall be limited to four (4) square feet in area.

### Creative Sign Standards

A. *Purpose.* This section establishes standards and procedures for the design, review, and approval of creative signs. The purposes of this creative sign program are to:

1. Encourage signs of unique design, and that exhibit a high degree of thoughtfulness, imagination, inventiveness, and spirit; and

2. Provide a process for the application of sign regulations in ways that will allow creatively designed signs that make a positive visual contribution to the overall image of the city, while mitigating the impacts of large or unusually designed signs.

B. *Applicability.* An applicant may request approval of a sign permit for a creative sign to authorize onsite signs that employ standards that differ from the other provisions of this chapter but comply with the provisions of this section.

C. *Application Requirements.* A sign permit application for a creative sign shall include all information and materials required by the City.

D. *Procedure.* A sign permit application for a creative sign shall be subject to review and approval by the City as part of the Site Plan review process. When the creative sign is proposed after site plan review is complete, a creative sign may be approved by the Zoning Administrator when the proposed sign is fifty square feet or less, and shall be approved by the City Council when the sign is larger than fifty square feet.

E. *Design Criteria.* In approving an application for a creative sign, the review authority shall ensure that a proposed sign meets the following design criteria:
   1. Design Quality. The sign shall:
      a. Constitute a substantial aesthetic improvement to the site and shall have a positive visual impact on the surrounding area;
      b. Be of unique design, and exhibit a high degree of thoughtfulness, imagination, inventiveness, and spirit; and
      c. Provide strong graphic character through the imaginative use of graphics, color, texture, quality materials, scale, and proportion.

   2. Contextual Criteria. The sign shall contain at least one (1) of the following elements:
      a. Classic historic design style;
      b. Creative image reflecting current or historic character of the City;
      c. Inventive representation of the use, name, or logo of the structure or business.

3. Architectural Criteria. The sign shall:
    a. Utilize or enhance the architectural elements of the building; and
    b. Be placed in a logical location in relation to the overall composition of the building's façade and not cover any key architectural features and details of the façade.

4. Neighborhood Impacts. The sign shall be located and designed not to cause light and glare impacts on neighboring residential uses.

### Prohibited signs

The following signs are prohibited:

A. Box signs or cabinet signs, whether on a wall, projecting or on canopies are prohibited except for logo signs permitted as part of an overall sign plan.

B. Signs employing mercury vapor, low pressure and high pressure sodium and metal halide lighting; plastic panel rear-lighted signs.

C. Signs on roofs, dormers, and balconies.

D. Billboards.

E. Signs painted or mounted upon the exterior side or rear walls on any principle or accessory building or structure, except as otherwise permitted hereunder.

F. Free standing pylon signs over six (6) feet in height, except community signs.

G. Back-lit awnings.

H. Interchangeable letter boards or panels.

I. Flashing signs.

J. Off-premises signs, except community signs.

## Overall Framework – Stormwater Management

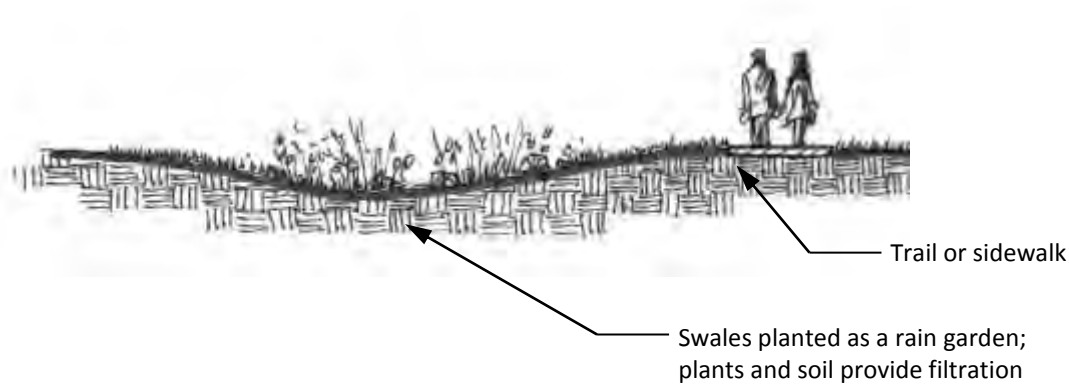
### Overview

Water features and drainage systems are essential components of The COR Master Plan. The mix of ponds, streams, fountains and other water elements will provide focal amenities and year round activities within the framework of an environmentally responsible, visually pleasing strategy to manage stormwater. Because the Mississippi River is a restricted discharge water of the state, and because we are creating a new discharge from this development, each sub-district and each site has a responsibility to utilize 'best management practices' (BMP) to pretreat run-off, reduce erosion and encourage infiltration, with the understanding that regional treatment will be provided. Water elements are not intended to be separate stand-alone features, but instead should be integrated with the variety of parks, trails and public open space proposed for The COR. Water and landscape should be designed and utilized within multipurpose areas that accommodate both active and passive recreational use.

### Objectives

Integration of water and landscape, design creativity, use of high quality materials and safety concerns are the critical objectives to be met – the following examples illustrate only a few of many possibilities:

- Innovative new products, such as special soil systems (Netlon, structural soils), pervious pavements for parking areas, storm ceptors, underground storage and other creative techniques should be used to BMP standards
- 'Green architecture', expressed through green roofs, gray water recycling and other techniques should be included to reduce the impact of new development on stormwater systems
- Water feature design should include both formal elements (such as reflecting pools or fountains) and natural/informal forms (such as ponds, streams, waterfalls) and should explore creative ways to integrate wetland/rain garden landscapes with active, urban spaces.




### Guideline Recommendations

This framework not only defines the overall role and character of The COR, but also encourages each development parcel to address the following:

- **Create** signature water features (ponds, pools, fountains, waterfalls, etc.) as major visual amenities throughout The COR
- **Promote** high quality, creative and appealing aesthetics for all system elements
- **Integrate** stormwater management components (meeting both water quality and quantity requirements)

A great deal of time and effort has gone into the calculation and design of a 'watershed-based' stormwater management plan to support COR development. While this overall strategy addresses the water quantity issue for the entire COR by providing storage and conveyance facilities for storm events, individual development projects (block-by-block) have an equal responsibility to meet water quality standards as a primary goal. Each project should integrate a variety of techniques, materials and methods to promote multiple use, maximum flexibility, improved aesthetics for parking areas, park spaces, drainage swales and other site features.

## Overall Framework – Parks/Public Spaces

### Overview

The overall design framework of The COR is based on a system of linked parks, trails and open space. The City of Ramsey, Anoka County, and to some extent, the State of Minnesota all play a role in local and regional parks programming, design review, construction sequencing, implementation and ultimately maintenance and operation of key public spaces within this framework. The goal is to link existing and proposed parks and trails defined in regional park plans with proposed new parks and trails within The COR. Of equal importance is the contribution from each block and each development project to this network of green, adding a variety of private, semi-private, and perhaps some additional public space throughout The COR. Private development will share the responsibility to provide inviting, innovative and useable green space as integral parts of individual parcel site design.

### Guideline Recommendations

The Design Framework encourages the following:



- Work with the City to create an integrated, comprehensive open space system that links with existing city and county trails and open space networks
- Encourage private development (block-by-block) to share in the responsibility to provide inviting, innovative and useable green space as integral parts of each development project
- Integrate stormwater management components (meeting water quality and quantity requirements) within both public / private park and open space improvements

Together, the system of public and semi-public green space will result in a welcoming public realm throughout the new community.

### Objectives

Based on the Development Master Plan for The COR, a variety of public and private green space is proposed including:

- Each block and each project will provide intentional, creative, innovative, useable green areas as integral components of site development and building design.
- At the individual block scale, small squares and greens will provide places for gathering and relaxation, especially targeted to meet the demands of adjacent, or nearby buildings. Elements such as gardens, gazebos and fountains should characterize these more intimate public spaces.
- At the neighborhood scale, parks will provide space for more active recreation, and should be flexible enough to accommodate a variety of recreational activities.
- Playgrounds, game fields and park buildings are park amenities that will target a wider user demand from the surrounding community.



- The Municipal Plaza will connect with all other parks and open space elements, providing a focal point for activity and a sense of place. Gardens, public pavilions and shelters, play lots and open play fields are amenities that will provide built-in flexibility to meet the demands of both the local population and regional visitors to The COR.

# Part Two: Sub-district Framework

## Overview

The Master Plan and Zoning Ordinance identify five (5) distinct sub-districts within The COR. Each of these sub-districts is defined by a unique mix of uses, specific site development patterns and perhaps a distinctive character or image. The sub-districts complement one another as part of the overall plan. The sub-districts are shown the attached Sub-district Map (Figure 7: Sub-district Map). They include:

- **COR1 Mixed Use Core** – provides the broadest variety, highest density and greatest intensity of development, encouraging both vertical and horizontal mixed use
- **COR2 Commercial** – provides a location for larger scale retail and other auto-orientated commercial uses
- **COR3 Workplace** – provides a location for uses with high concentrations of employees, such as medical/technology related office, and other corporate or institutional uses
- **COR4 Neighborhood** – provides opportunities for a range of housing types from small lot single family to townhouse, to high density senior or rental apartment
- **COR5 Park and Open Space** – preserves environmental features and provides neighborhood/community amenities throughout The COR

Development plans must respond to the overall COR Design Framework described in Part One of this document, but also must address the following detailed framework standards for each sub-district. To further clarify and illustrate proposed features in the Master Plan, these sub-district guidelines are organized under the following categories:

- Public Realm / Streetscape Framework
- Site Design Framework
- Architectural Framework

In all cases, the sub-district framework must be applied in harmony with the overall COR framework and with other existing city, county, state codes, design criteria, plans and studies that support broader goals for regional growth and development. However, within each district, development standards shall be based, in part, on the street hierarchy established in The COR.

### Public Realm/Streetscape

A. The developer shall be responsible for construction of all streetscape improvements along adjacent streets. These improvements include all hardscape improvements, such as trails, sidewalks, benches, bike racks, etc., as well as street trees and other greenscape.

B. The landowner shall be responsible for maintenance of the streetscape improvements along adjacent streets. Such maintenance may be managed as part of a Special Service District (SSD) or similar.

### Plazas

A. All properties with principal buildings in excess of 30,000 square feet shall be required to have a public plaza space.

B. The public plaza space shall include benches, bike racks trash receptacles, lighting fixtures and other amenities to create a welcoming space for tenants of the building and members of the public.

C. These plaza spaces should be visible from the public street.

## Architecture

These architectural framework standards provide an important balance between design continuity, desirable variety and the notion that buildings should complement, and perhaps contrast, but not compete with one another. The lasting appeal of the final outcome must be grounded in the authenticity of the design and the acceptable level of 'messiness' that comes with creating a real downtown over time; 'faux' second floors, stage set or themed solutions, and large faceless buildings are not acceptable.







**Auto Versus Human Design: Providing rear alleys or side loaded garages enables the home to present itself to the street, which promotes sociability and walkability.**

### *Minimum Standards*

## Definitions

**Build to line**: The line at which construction of a building facade is to occur on a lot. The build to line provides a maximum setback for all building facades from the right-of-way or inside edge of the sidewalk, whichever is greater. The build to line applies to all facades abutting a street right of way. Build to line standards are based on the sub-district the parcel is located and the street in which the building is located upon.

**Setback**: The minimum required distance between a parking lot or the vertical wall of a building and a lot line. Setbacks are typically more flexible than build to lines and allow a building to be set further back from the lot line and street right-of-way.

## Requirements:

A. Additional development standards shall be defined within each sub-district.

B. Provide a diverse mix of materials, applied in a variety of proportions, exposures and detailing within a block, or along a street.

C. Buildings should be articulated to break up the mass of the building façade on all elevations. Large blank exterior walls shall be prohibited. Windows are encouraged to be used to break up the mass of the building. Rooflines and building elevations should be articulated to break up the mass of buildings. Buildings must be broken at a minimum of every fifty (50) feet. This variation can be accomplished through one (1) or more of the following:

1. Wall face variations (minimum depth of two (2) feet)
2. Pilasters or columns (minimum depth of two (2) feet)
3. Upper wall break in color and/or materials (minimum of 2/3 up the height of the wall)
4. Wainscot (minimum of four (4) feet high)
5. Canopies (minimum four (4) foot width)
6. Corner and demising wall or building separations



More Desirable

D. Each development application must list building materials, roofing materials and building colors on the plans. Building articulation, mechanical screening by architectural elements and design elements on all building elevations must be identified on the plans. The plans shall be subject to City review and approval to ensure that the design intent of the Framework has been met.



Less Desirable

E. Building materials shall be high-quality durable materials, such as glass, stone, brick, windows, canvas awnings, etc.
   1. Use local sources if available
   2. Siding is not allowed (vinyl, metal, wood) except as a complimentary use
   3. Use clear or lightly tinted glass for all windows and doors – mirrored, reflective or highly tinted glazing is not acceptable
   4. Metal and wood components are acceptable as a complimentary, not primary, building material
   5. COR1 sub-district buildings shall be primarily brick or a comparable alternative and shall comprise a minimum of fifty (50%) percent of the non-glazed wall area

F. Residential development should provide variety within the subdivision to avoid monotony. Developers will include front porches and windows that face all streets. Corner units shall have more than one (1) window per side of building to help create a sense of place in the community and promote safety on the street.

G. Garage forward or “snout houses” are highly discouraged on all residential development as they dominate the view from the street and sidewalk.

H. All sides of buildings shall have an equal finish in terms of materials and general design.

I. The main entrance of each principal building must face the street. On corner lots, the main entrance may face either of the streets or be oriented to the corner. With buildings that have more than one (1) main entrance, only one (1) entrance must meet this requirement.





J. Building massing shall be oriented parallel to the street frontage of the lot.

K. Trash and recycling areas shall be designed internal to the building.

L. Provide recessed entries wherever possible.

M. Buildings shall have a base and top to the architecture.

N. Multi-story buildings are preferred in the COR1 sub-district, but occasional single story buildings are acceptable; single story buildings should not dominate any street frontage and should be a minimum of twenty (20) feet to the roofline.

O. Maximize glass openings for all ground level, street front façades – especially for retail, restaurant and other commercial uses – fifty (50%) minimum of total ground level façade, or demonstrate great design through other means.

P. Provide real window openings for all street facing façades above ground level in all districts–a minimum of forty (40%) percent of total façade.

Residential uses in COR4 and COR5 must also comply with the following:

*A. Location of main entrance*

1. A building must include a front porch or covered balcony/patio at all main entrances that face a street. The porch or stoop shall adjoin the main entrance and the main entrance shall be accessible from the porch.
2. The main entrance of each principal building must face the street. On corner lots, the main entrance may face either of the streets or be oriented to the corner. With buildings that have more than one (1) main entrance, only one (1) entrance must meet this requirement.



B. *Porches*: Porches used to satisfy the design criteria shall comply with the following:

1. Porches shall be covered by a solid roof. The roof shall not be located more than 12 feet above the floor of the porch. If the roof of a required porch is developed as a deck or balcony, it may be flat.
2. The porch shall have minimum dimensions of 6 feet by 6 feet. (6' x 6'). For single-family detached dwelling units, the covered area provided by the porch must be at least

forty-eight (48) square feet and a minimum of eight (8) feet wide. If the main entrance is for more than one (1) dwelling unit, the covered area provided by the porch must be at least sixty-three (63) square feet and a minimum of nine (9) feet wide.



C. *Covered balconies/patio:* The covered area must be at least forty-eight (48) square feet, a minimum of eight (8) feet wide, and no more than fifteen (15) feet above grade. The covered area must be accessible from the interior living space of the house.

D. *Openings between porch floor and ground:* Openings of more than one (1) foot between the porch floor and the ground must be covered with a solid material or lattice.

*E. Roofs*



1. *Slope:* Principal structures must have a roof that is sloped, with a pitch that is no flatter than six (6) units of horizontal run to twelve (12) units of horizontal rise.
2. *Architectural features:* The roof of a principal structure shall include the following architectural details:
   a. At least one (1) dormer facing the street. If only one (1) dormer is included, it shall be at least five (5) feet wide and shall be centered horizontally between each end of the front elevation. If more than one (1) dormer is provided, a dormer at least four (4) feet wide must be provided on each side of the front elevation; or
   b. A gabled end, or a gabled end of a roof projection, facing the street.
3. *Roof eaves:* Roof eaves must project from the building wall at least twelve (12) inches, measured horizontally, on at least the front and side elevations.

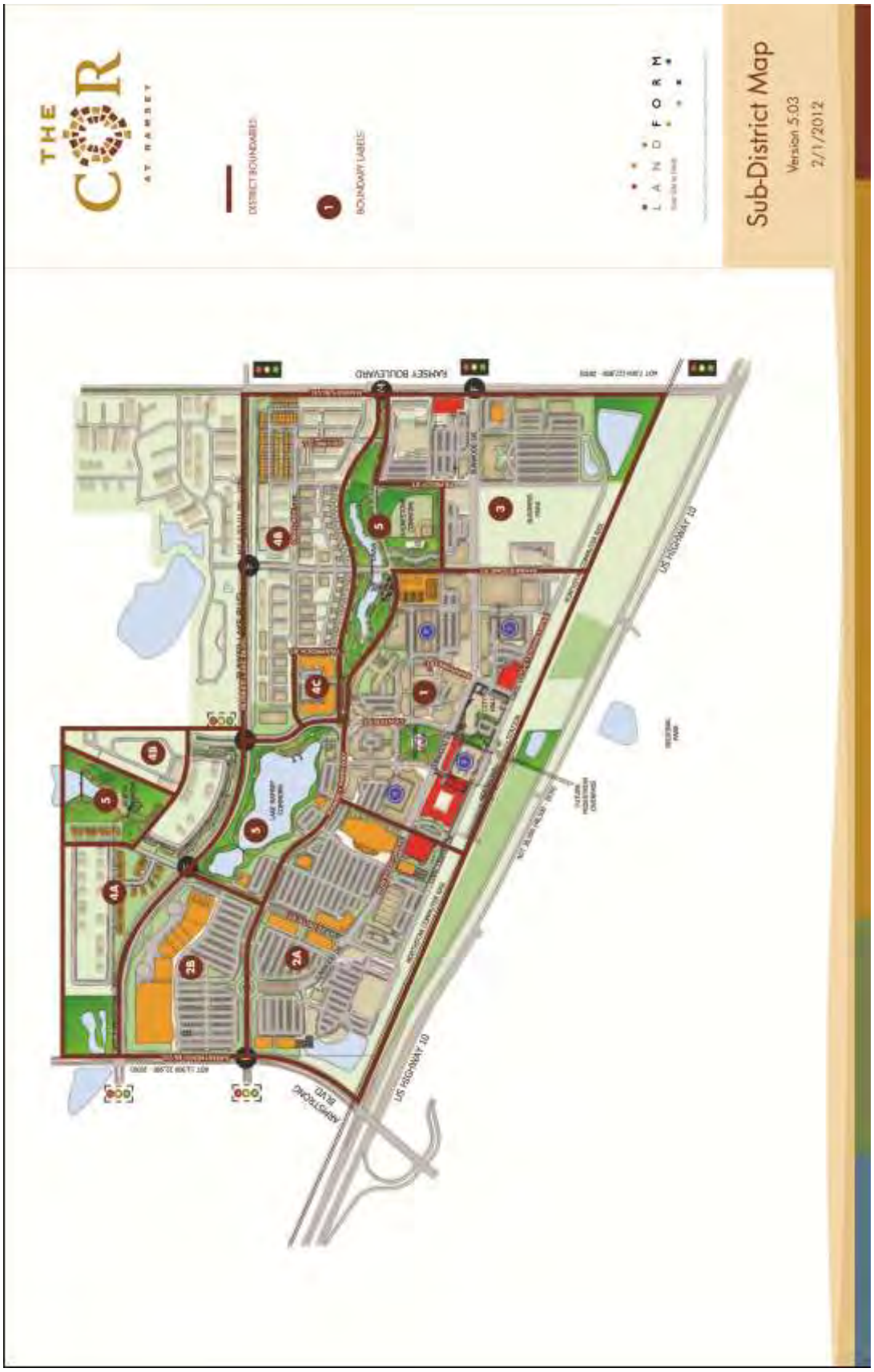



Figure 7: Sub-district Map

## Sub-District Framework - COR1 Mixed Use Core

### Public Realm / Streetscape

Public realm and streetscape improvements define the character of The COR and create a memorable signature for the Mixed Use Core sub-district. This is the most urban of all sub-districts in The COR and will be developed with a very urban pattern. Great parks and great streets, encourage intensified levels of activity, support the proposed mix of uses, invite community gathering and accommodate special events throughout the year.

### Site Development

Framework standards that address building location, organization of space and parking options tend to focus on what can be measured – dimensions, setbacks, number of spaces and so on. But in addition to these issues, the Design Framework also describes the aesthetic qualities and design character of a preferred 'urban form' for the Mixed Use Core. The compact and higher density blocks that define this sub-district encourage a mix of uses, with a continuous built edge along street frontage. Innovative parking strategies support this mix, providing easy access to destination shopping, restaurant and entertainment venues. Together these elements will promote the core area as the center of activity – the place to see and be seen within The COR.

### Architecture

Buildings in the Mixed Use Core will play a major role in defining the overall character of The COR. The proposed mix of uses for this signature destination suggests the potential for a variety of building types, demanding creativity and innovation to highlight unique architecture, while knitting the entire sub-district together as a coherent whole. Overall building design is an important consideration, but emphasis on first floor façade treatments is essential to encourage street-level activity and enhance the pedestrian experience. Architecture to be '4-sided' at all locations visible to public areas. Emphasis will be on great design along public street frontage.

Table 3

| COR1 Development Standards | Arterial Street | Destination Street | Parkway | Connector Street | Downtown Street | Local Street |
|---|---|---|---|---|---|---|
| Minimum lot size | None | None | None | None | None | None |
| Minimum lot width | 20 feet | 20 feet | 20 feet | 20 feet | 20 feet | 20 feet |
| Minimum lot depth | 80 feet | 80 feet | 80 feet | 80 feet | 80 feet | 80 feet |
| Allowable residential density in dwelling units per acre [1] | >15 DU/AC | >15 DU/AC | >15 DU/AC | >15 DU/AC | >15 DU/AC | >15 DU/AC |
| Minimum floor area ratio (FAR) for nonresidential uses/vertically mixed buildings/sites | .75 | .75 | .75 | .75 | .75 | .75 |
| Build to Line | | | | | | |
| Front yard[4] | 30 feet as measured from building front to right-of-way[2][3] (60% of front facade w/in max.) | 5 feet as measured from building front to right-of-way[2] (60% of front facade w/in max.) | 5 feet as measured from building front to right-of-way[2] (60% of front facade w/in max.) | 5 feet as measured from building front to right-of-way[2] (60% of front facade w/in max.) | 5 feet as measured from building front to right-of-way[2] (60% of front facade w/in max.) | 5 feet as measured from building front to right-of-way[2] (60% of front facade w/in max.) |
| Side yard | no req. | no req. | no req. | no req. | no req. | no req. |
| Rear yard | no req. | no req. | no req. | no req. | no req. | no req. |
| Driveway length (minimum) | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units |
| Building height (min. - max.) | 2 - 5 stories. | 2 - 5 stories. | 2 - 5 stories. | 2 - 5 stories. | 2 - 5 stories. | 2 - 5 stories. |
| Planter Style | N/A | Planter Bed | Boulevard Sod | Boulevard Sod | N/A | Boulevard Sod |
| Tree Spacing (on center) | N/A | 35 feet | 35 feet | 35 feet | 35 feet | 35 feet |
| Boulevard Width | N/A | 6 feet | 6 feet | 6 feet | N/A | 6 feet |
| Sidewalk Width | 10 feet | 10 feet | 6 feet | 10 feet | 10 feet | 10 feet |

1. Residential density is based on the net area of the parcel in question for parcels. In the event that public open space that is not dedicated to the City is developed independently of any particular residential project, the land area of the open space shall be divided equally among those abutting projects for purposes of density calculations.
2. Build to line shall be measured from building front to edge of right-of-way, or edge of sidewalk easement as defined by the City and said sidewalk must be encumbered by a sidewalk easement recorded with the office of the Anoka County Recorder.
3. The City may approve up to a 60-foot setback if it finds that topography or other factors require that a building be set back further to achieve acceptable grades or buffer between the street, the site entrance and the building.
4. In order to address vision clearance standards on higher speed roadways, parcels that are located at an intersection with an arterial roadway are allowed a build-to line of 35 feet from both streets.

A. At least sixty (60%) percent of street frontage of any lot shall be occupied by building facades meeting this build-to-line. On lots with more than one (1) street frontage, the build to line shall apply on each side fronting a street. An enclosed open area plaza space or outdoor seating with a decorative wall with a minimum height of three feet (3') and a maximum of four and one-half feet (4 ½') can be used to meet the sixty (60%) percent street frontage requirement.

B. Screening Of Parking Areas: Wherever a surface parking area faces a street frontage, such frontage shall be screened with a decorative wall, railing, hedge, or a combination of these elements, to a minimum height of three feet (3') and a maximum height of four and one-half feet ($4^1/_2$') above the level of the parking lot, at the build-to line. This screening may be broken into sections along the street edge provided it meets the sixty (60%) percent required.

## Sub-District Framework - COR2 Commercial

### Public Realm / Streetscape

While the Commercial Sub-district encourages a mix of large and small floor plates accommodating auto-oriented uses, this suggests even greater attention be paid to public realm and streetscape improvements that not only accommodate vehicles, but also invite bicycle and pedestrian traffic. Surface parking lots provide convenient access to storefronts, but present an additional challenge to the overall visual character and aesthetic appeal of this area. While no large public parks are identified for this sub-district, small pocket parks, squares or other gathering spaces are encouraged. A consistent, attractive streetscape is also essential.

### Site Development

Site Design Framework for this sub-district focus on a unique opportunity to recast typical commercial development patterns into a contemporary and innovative strategy that responds to overall objectives for The COR. Specifically, this suggests that the majority of buildings front on the primary through streets, with parking and service areas on the side or in the back, away from view. However, the market realities suggest that the types of auto-oriented users in this district will have the potential for larger parking fields and drive-throughs that will make a true urban model challenging. The City will hold all users to this design vision while modifying the COR2 standards slightly to accommodate these types of more typical suburban land uses. A mix of uses within individual blocks, including retail, restaurant and residential, further enhances this model, addresses design character/aesthetics and promotes activity throughout much of the day and evening hours.

### Architecture

Buildings in the Commercial Sub-district make a significant contribution to first impressions of The COR. Buildings form gateways at the major entries into the site, architectural elements and choice of materials convey a certain character and the scale or massing of structures begins to define the feel or experience of this place. These are not just 'commodity' buildings, but instead should raise the bar in terms of overall design and specific details that make The COR unique, inviting and memorable. Architecture to be '4-sided' at all locations visible to public areas. Emphasis will be on great design along public street frontage.

Table 4

| COR2 Development Standards | Arterial Street | Destination Street | Parkway | Connector Street | Downtown Street | Local Street |
|---|---|---|---|---|---|---|
| Minimum lot size | None | None | None | None | None | None |
| Minimum lot width | 80 feet | 80 feet | 80 feet | 80 feet | 80 feet | 80 feet |
| Minimum lot depth | 100 feet | 100 feet | 100 feet | 100 feet | 100 feet | 100 feet |
| Allowable residential density in dwelling units per acre [1] | >15 DU/AC | >15 DU/AC | >15 DU/AC | >15 DU/AC | >15 DU/AC | >15 DU/AC |
| Build to Line | | | | | | |
| Front yard[4] | 30 feet as measured from building front to right-of-way[2][3] (40% of front facade w/in max.) | 15 feet as measured from building front to right-of-way[2] (40% of front facade w/in max.) | 30 feet as measured from building front to right-of-way[2][3] (40% of front facade w/in max.) | 15 feet as measured from building front to right-of-way[2] (40% of front facade w/in max.) | 15 feet as measured from building front to right-of-way[2] (40% of front facade w/in max.) | 15 feet as measured from building front to right-of-way[2] (40% of front facade w/in max.) |
| Side yard | no req. | no req. | no req. | no req. | no req. | no req. |
| Rear yard | no req. | no req. | no req. | no req. | no req. | no req. |
| Driveway length (minimum) | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units |
| Building height (min. - max.) | 1-4 stories. | 1-4 stories. | 1-4 stories. | 1-4 stories. | 1-4 stories. | 1-4 stories. |
| Planter Style | N/A | Boulevard Sod | Boulevard Sod | Boulevard Sod | N/A | Boulevard Sod |
| Tree Spacing (on center) | N/A | 35 feet | 35 feet | 35 feet | 35 feet | 35 feet |
| Boulevard Width | N/A | 6 feet | 6 feet | 6 feet | N/A | 6 feet |
| Sidewalk Width | 10 feet | 6 feet | 6 feet | 10 feet | 10 feet | 10 feet |

1. Residential density is based on the net area of the parcel in question for parcels. In the event that public open space that is not dedicated to the City is developed independently of any particular residential project, the land area of the open space shall be divided equally among those abutting projects for purposes of density calculations.
2. Build to line shall be measured from building front to edge of right-of-way, or edge of sidewalk easement as defined by the City and said sidewalk must be encumbered by a sidewalk easement recorded with the office of the Anoka County Recorder.
3. The City may approve up to a 60-foot setback if it finds that topography or other factors require that a building be set back further to achieve acceptable grades or buffer between the street, the site entrance and the building.
4. In order to address vision clearance standards on higher speed roadways, parcels that are located at an intersection with an arterial roadway are allowed a build-to line of 35 feet from both streets.

A. At least forty (40%) percent of street frontage of any lot shall be occupied by building facades meeting this build-to-line. On lots with more than one (1) street frontage, the build to line shall apply only to one (1) street frontage.
   1. An enclosed open area plaza space or outdoor seating with a decorative wall with a minimum height of three feet (3') and a maximum of four and one-half feet (4 ½') can be used to meet the forty (40%) percent street frontage requirement.
   2. The City may approve a variation from the required build to line if the applicant provides a street edge consisting of fencing, decorative wall and/or landscaping with a minimum height of three feet (3') and a maximum of four and one-half feet (4 ½') can be used to meet the forty (40%) percent street frontage requirement.

B. Screening Of Parking Areas: Wherever a surface parking area faces a street frontage, such frontage shall be screened with a decorative wall, railing, hedge, or a combination of these elements, to a minimum height of three feet (3') and a maximum height of four and one-half feet ($4^1/_2$') above the

level of the parking lot, at the build-to line. This screening may be broken into sections along the street edge provided it meets the forty (40%) percent required on all street frontages.

## Sub-District Framework - COR3 Workplace

### Public Realm/Streetscape

The Workplace Sub-district also encourages a mix of large and small floor plate buildings, but instead of commercial or entertainment, this area of The COR is dominated by office and institutional uses. With opportunities for corporate or medical campus development comes the attendant auto-related infrastructure – easy access, bigger streets and large surface parking lots. Once again, this suggests that equal attention be paid to public realm and streetscape improvements that not only accommodate vehicles, but also invite bicycle and pedestrian traffic. The Draw, an active, neighborhood scale, recreational play space has been included in this sub-district, but small pocket parks, squares or other gathering places are also encouraged. In addition, streetscape improvements provide an important public amenity and inviting pedestrian connection to adjacent sub-districts.

### Site Development

The mix of medical, office, institutional and other uses in this sub-district suggest the potential for a campus-like arrangement of buildings on some blocks. These blocks would tend to be more internally oriented than in other districts, with driveways, parking lots, courtyards and walkway connections in the center, ringed by buildings around the outside. Buildings would still face adjacent streets, with both primary and secondary entries provided to animate these important façades, particularly along Ramsey Boulevard, Sunwood Drive and Rhinestone Street. While the Workplace sub-district also encourages mixed use, this desired development objective will likely occur mostly within blocks, not within individual buildings as seen in other districts.

### Architecture

Buildings in the Workplace Sub-district also make a significant contribution to first impressions as people enter The COR via Highway 10, Ramsey Boulevard and Sunwood Drive. Buildings form gateways at the major entries into the site, architectural elements and choice of materials convey quality and permanence, and the scale or massing of structures begins to define the feel and character of this place. The proposed mix of uses within this sub-district suggest a variety of potential building types – blending medical campus with small office, storefront and some housing -- demands design creativity and innovation to highlight unique architecture, and knit the entire sub-district together as a coherent whole. Architecture to be ‘4-sided’ at all locations visible to public areas. Emphasis will be on great design along public street frontage.

Table 5

| COR3 Development Standards | Arterial Street | Destination Street | Parkway | Connector Street | Downtown Street | Local Street |
|---|---|---|---|---|---|---|
| Minimum lot size | None | None | None | None | None | None |
| Minimum lot width | 40 feet | 40 feet | 40 feet | 40 feet | 40 feet | 40 feet |
| Minimum lot depth | 80 feet | 80 feet | 80 feet | 80 feet | 80 feet | 80 feet |
| Allowable residential density in dwelling units per acre [1] | none | none | none | none | none | none |
| Minimum floor area ratio (FAR) for nonresidential uses/vertically mixed buildings/sites | .25 | .25 | .25 | .25 | .25 | .25 |
| Build to Line | | | | | | |
| Front yard[4] | 30 feet as measured from building front to right-of-way[2][3] (60% of front facade w/in max.) | 15 feet as measured from building front to right-of-way[2] (60% of front facade w/in max.) | 15 feet as measured from building front to right-of-way[2] (60% of front facade w/in max.) | 15 feet as measured from building front to right-of-way[2] (60% of front facade w/in max.) | 15 feet as measured from building front to right-of-way[2] (60% of front facade w/in max.) | 15 feet as measured from building front to right-of-way[2] (60% of front facade w/in max.) |
| Side yard | no req. | no req. | no req. | no req. | no req. | no req. |
| Rear yard | no req. | no req. | no req. | no req. | no req. | no req. |
| Driveway length (minimum) | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units |
| Building height (min. - max.) | 2 - 4 stories. | 2 - 4 stories. | 2 - 4 stories. | 2 - 4 stories. | 2 - 4 stories. | 2 - 4 stories. |
| Planter Style | N/A | Planter Bed | Boulevard Sod | Boulevard Sod | N/A | Boulevard Sod |
| Tree Spacing (on center) | N/A | 35 feet | 35 feet | 35 feet | 35 feet | 35 feet |
| Boulevard Width | N/A | 6 feet | 6 feet | 6 feet | N/A | 6 feet |
| Sidewalk Width | 10 feet | 10 feet | 6 feet | 10 feet | 10 feet | 10 feet |

1. Residential density is based on the net area of the parcel in question for parcels. In the event that public open space that is not dedicated to the City is developed independently of any particular residential project, the land area of the open space shall be divided equally among those abutting projects for purposes of density calculations.
2. Build to line shall be measured from building front to edge of right-of-way, or edge of sidewalk easement as defined by the City and said sidewalk must be encumbered by a sidewalk easement recorded with the office of the Anoka County Recorder.
3. The City may approve up to a 60-foot setback if it finds that topography or other factors require that a building be set back further to achieve acceptable grades or buffer between the street, the site entrance and the building.
4. In order to address vision clearance standards on higher speed roadways, parcels that are located at an intersection with an arterial roadway are allowed a build-to line of 35 feet from both streets.

A. At least sixty (60%) percent of street frontage of any lot shall be occupied by building facades meeting this build-to-line. On lots with more than one (1) street frontage, the build to line shall apply on each side fronting a street. An enclosed open area plaza space or outdoor seating with a decorative wall with a minimum height of three feet (3') and a maximum of four and one-half feet (4 ½') can be used to meet the sixty (60%) percent street frontage requirement.

B. Screening Of Parking Areas: Wherever a surface parking area faces a street frontage, such frontage shall be screened with a decorative wall, railing, hedge, or a combination of these elements, to a minimum height of three feet (3') and a maximum height of four and one-half feet ($4^1/_2$') above the level of the parking lot, at the build-to line. This screening may be broken into sections along the street edge provided it meets the sixty (60%) percent required.

## Sub-District Framework - COR4 Neighborhood

### Public Realm/Streetscape

Two prominent public parks supply much of the informal green space for The COR, and more specifically, provide the valuable park frontage and mix of amenities needed to support housing development within the Neighborhood Sub-district. North Commons surrounds an existing wetland and provides open space for year-round activities including a proposed sledding hill. The sub-district is adjacent to The Draw, which is characterized by wetlands, ponds and a meandering stream channel surrounded by gently sloping hills. Other park features include active and passive recreation areas, natural and manicured landscapes, education and interpretation opportunities, pedestrian and bicycle trails and many other amenities. Tree-lined streets connect these parks to surrounding residential neighborhoods and to nearby parks and amenities throughout The COR.

### Site Development

The Neighborhood Sub-district emphasizes residential development. To support the proposed mix of housing, a framework of streets and blocks, based on the traditional grid system, encourages compact development patterns with increasing densities closer to the heart of The COR. Typical blocks either front onto signature parks or include some private green space within the site; many blocks have both. The arterial streets that frame this property, including Ramsey, Armstrong and Bunker Lake Boulevards, provide an important 'face' for this sub-district. Residential front doors will connect with public walks along each of these streets promoting the urban character of The COR.

### Architecture

The largest in terms of overall acreage, the Neighborhood Sub-district will define the character and quality of the entire northern half of The COR property. With prominent street frontage along most of the major thoroughfares that serve this site, the variety of choices for building type, architectural style and design detailing are crucial decisions that together will promote a safe and attractive residential neighborhood. Integrating contemporary and traditional styles is also an important consideration, central to the notion that a unique and creative model for housing development will be a signature for The COR. Architecture to be '4-sided' at all locations visible to public areas. Emphasis will be on great design along public street frontage.

Table 6

| COR4 Development Standards | | | | | | |
|---|---|---|---|---|---|---|
| | **Arterial Street** | **Destination Street** | **Parkway** | **Connector Street** | **Downtown Street** | **Local Street** |
| Minimum lot size | None | None | None | None | None | None |
| Minimum lot width | 20 feet | 20 feet | 20 feet | 20 feet | 20 feet | 20 feet |
| Minimum lot depth | 80 feet | 80 feet | 80 feet | 80 feet | 80 feet | 80 feet |
| Allowable residential density in dwelling units per acre [(1)] | 4-15 DU/AC | 4-15 DU/AC | 4-15 DU/AC | 4-15 DU/AC | 4-15 DU/AC | 4-15 DU/AC |
| Minimum floor area ratio (FAR) for nonresidential uses/vertically mixed buildings/sites | .25 | .25 | .25 | .25 | .25 | .25 |
| Build to Line | | | | | | |
| Front yard[(4)] | 30 feet as measured from building front to right-of-way[(2)(3)] (60% of front facade w/in max.) | 20 feet as measured from building front to right-of-way[(2)] (60% of front facade w/in max.) | 20 feet as measured from building front to right-of-way[(2)] (60% of front facade w/in max.) | 20 feet as measured from building front to right-of-way[(2)] (60% of front facade w/in max.) | 20 feet as measured from building front to right-of-way[(2)] (60% of front facade w/in max.) | 20 feet as measured from building front to right-of-way[(2)] (60% of front facade w/in max.) |
| Side yard | no req. | no req. | no req. | no req. | no req. | no req. |
| Rear yard | no req. | no req. | no req. | no req. | no req. | no req. |
| Driveway length (minimum) | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units |
| Building height (min. - max.) | 1-4 stories. | 1-4 stories. | 1-4 stories. | 1-4 stories. | 1-4 stories. | 1-4 stories. |
| Planter Style | N/A | Planter Bed | Boulevard Sod | Boulevard Sod | N/A | Boulevard Sod |
| Tree Spacing (on center) | N/A | 35 feet | 35 feet | 35 feet | 35 feet | 35 feet |
| Boulevard Width | N/A | 6 feet | 6 feet | 6 feet | N/A | 6 feet |
| Sidewalk Width | 10 feet | 10 feet | 6 feet | 10 feet | 10 feet | 10 feet |

1. Residential density is based on the net area of the parcel in question for parcels. In the event that public open space that is not dedicated to the City is developed independently of any particular residential project, the land area of the open space shall be divided equally among those abutting projects for purposes of density calculations.
2. Build to line shall be measured from building front to edge of right-of-way, or edge of sidewalk easement as defined by the City and said sidewalk must be encumbered by a sidewalk easement recorded with the office of the Anoka County Recorder.
3. The City may approve up to a 60-foot setback if it finds that topography or other factors require that a building be set back further to achieve acceptable grades or buffer between the street, the site entrance and the building.
4. In order to address vision clearance standards on higher speed roadways, parcels that are located at an intersection with an arterial roadway are allowed a build-to line of 35 feet from both streets.

A. Screening Of Parking Areas: Wherever a surface parking area faces a street frontage, such frontage shall be screened with a decorative wall, railing, hedge, or a combination of these elements, to a minimum height of three feet (3') and a maximum height of four and one-half feet ($4^1/_2$') above the level of the parking lot, at the build-to line. This screening may be broken into sections along the street edge provided it meets the sixty (60%) percent required.

## Sub-District Framework - COR5 Parks & Open Space

### Public Realm/Streetscape

The overall structure of The COR is based on a system of linked parks, trails and open space. This includes existing and proposed parks and trails defined in city and regional parks plans, joined with new parks and trails within The COR. Of equal importance is the contribution from each block and each development project to this green structure, adding a variety of private, semi-private and perhaps some additional public space throughout each sub-district. Great strolling streets provide connections between commercial, workplace, entertainment and residential neighborhoods and encourage shared use for cars, pedestrians and bicycles.

### Site Development

The COR Master Plan illustrates a strong framework of green space, including a mix of public parks, destination amenities, courtyards, commons and other features. As a key component of the overall plan, this integrated system of parks, trails and open space provides the framework around which all other land uses are organized. Placemaking and connectivity are important site development considerations, linking each block and each sub-district with major public spaces nearby and with many other amenities and attractions in The COR.

### Architecture

There are numerous opportunities to include buildings and other structures as significant design features within the proposed parks, trails and open space system for The COR. These could range from simple picnic shelters and landscaped arbors to more complex park buildings that might contain meeting rooms, rest rooms, storage areas and other facilities. Design of these important buildings should respond to the specific setting and landscape features in each park, and complement the overall character and quality of buildings located within surrounding blocks.  Additionally, limited retail is planned along the perimeter of the park.

Table 7

| COR5 Development Standards | Arterial Street | Destination Street | Parkway | Connector Street | Downtown Street | Local Street |
|---|---|---|---|---|---|---|
| Minimum lot size | 0.5 | N/A | 0.5 | 0.5 | 0.5 | 0.5 |
| Minimum lot width | N/A | N/A | N/A | N/A | N/A | N/A |
| Minimum lot depth | N/A | N/A | N/A | N/A | N/A | N/A |
| Allowable residential density in dwelling units per acre [(1)] | N/A | N/A | N/A | N/A | N/A | N/A |
| Minimum floor area ratio (FAR) for nonresidential uses/vertically mixed buildings/sites | N/A | N/A | N/A | N/A | N/A | N/A |
| Build to Line | | | | | | |
| Front yard[(4)] | 30 feet as measured from building front to right-of-way[(2)(3)] (60% of front facade w/in max.) | N/A | 10 feet as measured from building front to right-of-way[(2)] (60% of front facade w/in max.) | 10 feet as measured from building front to right-of-way[(2)] (60% of front facade w/in max.) | 10 feet as measured from building front to right-of-way[(2)] (60% of front facade w/in max.) | 10 feet as measured from building front to right-of-way[(2)] (60% of front facade w/in max.) |
| Side yard | no req. | N/A | no req. | no req. | no req. | no req. |
| Rear yard | no req. | N/A | no req. | no req. | no req. | no req. |
| Driveway length (minimum) | 25 feet | N/A | 25 feet | 25 feet | 25 feet | 25 feet |
| Building height (min. - max.) | 1-2 stories. | N/A | 1-2 stories. | 1-2 stories. | 1-2 stories. | 1-2 stories. |
| Planter Style | N/A | N/A | Boulevard Sod | Boulevard Sod | N/A | Boulevard Sod |
| Tree Spacing (on center) | N/A | N/A | 35 feet | 35 feet | 35 feet | 35 feet |
| Boulevard Width | N/A | N/A | 6 feet | 6 feet | N/A | 6 feet |
| Sidewalk Width | 10 feet | N/A | 6 feet | 10 feet | 10 feet | 10 feet |

1. Residential density is based on the net area of the parcel in question for parcels. In the event that public open space that is not dedicated to the City is developed independently of any particular residential project, the land area of the open space shall be divided equally among those abutting projects for purposes of density calculations.
2. Build to line shall be measured from building front to edge of right-of-way, or edge of sidewalk easement as defined by the City and said sidewalk must be encumbered by a sidewalk easement recorded with the office of the Anoka County Recorder.
3. The City may approve up to a 60-foot setback if it finds that topography or other factors require that a building be set back further to achieve acceptable grades or buffer between the street, the site entrance and the building.
4. In order to address vision clearance standards on higher speed roadways, parcels that are located at an intersection with an arterial roadway are allowed a build-to line of 35 feet from both streets.

A. Where commercial buildings are planned, at least sixty (60%) percent of street frontage of any lot shall be occupied by building facades meeting this build-to-line. On lots with more than one (1) street frontage, the build to line shall apply on each side fronting a street. An enclosed open area plaza space or outdoor seating with a decorative wall with a minimum height of three feet (3') and a maximum of four and one-half feet (4 ½') can be used to meet the sixty (60%) percent street frontage requirement.

B. Screening Of Parking Areas: Wherever a surface parking area faces a street frontage, such frontage shall be screened with a decorative wall, railing, hedge, or a combination of these elements, to a minimum height of three feet (3') and a maximum height of four and one-half feet ($4^1/_2$') above the level of the parking lot, at the build-to line. This screening may be broken into sections along the street edge provided it meets the sixty (60%) percent required.

# Implementation

## Introduction

This framework provides distinct strategies for guiding The COR's form and appearance. This framework's vision for the COR will take several years to implement. Successful implementation will require consistent application of the Design Framework by City staff. Zoning enforcement and design framework standards will not succeed without the cooperation and commitment of landowners, development interests, and the rest of the community.

## Design Review

The Design Framework will be administered by staff as part of the development review process. Staff will incorporate design review to ensure compliance with the Design Framework as a standard step in the development review process.

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# APPENDIX A:
# SPECIFICATIONS AND DETAILS

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## Appendix A: Specifications and Details

# Design Framework – The COR

## Purpose

The primary purpose of Design Framework is to set basic parameters, describe preferences and illustrate design intent. These framework standards serve as a framework within which creative design can and should occur – there is no one solution, but many options that meet the basic requirements of this document.

## Application

The format and content of this framework are specifically tailored for use as a supplement to the Zoning Ordinance. This document is organized into two sections. The first section outlines issues and recommendations that apply to the entire COR. The second section highlights specific framework that apply to each sub-district within The COR. The City of Ramsey has adopted Development Plan 5.03 as the Master Plan for The COR. This master plan provides illustrative guidance for building locations and orientation. Any changes to this approved master plan must be reviewed and approved by the City Council as part of the development application. This Development Plan will be updated by the City as changes are approved.

## Implied Responsibility

All participants in the development of The COR recognize the local and regional impacts of this project and the various systems that play an important role. Each parcel and each building must fit within the context of the entire plan. Individual projects must complement, not compete with, adjacent development in terms of public green space, walk and trail connections, stormwater management solutions, street layout, parking strategies, land use mix and building design.

## Part One: Overall Framework

There are a number of framework standards that apply to the entire COR, including recommendations for stormwater management, parks, streets, land use, parking, transit and other development components. Many of these overall COR framework standards overlap, or are integrated with one another. For ease of discussion they are categorized according to the same list of 'layers' that formed the basic structure for the Master Framework:

- Context – local, city, regional
- Street Hierarchy--access, circulation, arrangement
- Streetscape—preferred design, location
- Parking -- quantity, location, type
- Building Design-- preferred uses, horizontal/vertical mixed use, built form, character of development
- Signage—design, location, quantity, type
- Stormwater Management-- surface water features, stormwater management
- Parks/Public Spaces – parks, trails and open space

It is essential that proposed design solutions for development projects and other improvements within The COR demonstrate an understanding of the interplay between these layers.

## Overall Framework - Context

### Overview

The COR is a unique area within the City; but it is a part of, and connected with, a variety of local, city-wide and regional systems Each development project, whether a single building, one lot, or a series of blocks, must provide reasonable links to these systems as a primary design objective.

### Guideline Recommendations

To ensure that The COR takes full advantage of local and regional systems, development should:

- Provide safe, easily recognized connections to city, county and state trail corridors
- Make provisions for city and regional transit service and amenities (including the Northstar Line) and encourage their use
- Tie into, and improve, the Ramsey utility network
- Integrate with and complement the existing (and future) street framework
- Become an integral part of the city and county drainage/stormwater management plan

### Objectives

- Overall COR design (and all new private development within The COR) will accommodate stormwater from new projects and from off-site, and highlight stormwater features as an amenity
- Bikeways and pedestrian routes into The COR from adjacent neighborhoods must be designed for safety and ease of access, suggesting that a person on a bicycle has an equally accessible route to downtown.
- Parks and open space will be easily accessible to all COR residents, visitors, people who work here and also for the citizens of Ramsey and the surrounding area. This connected green system is reminiscent of the world renowned 'Grand Rounds' of Minneapolis.

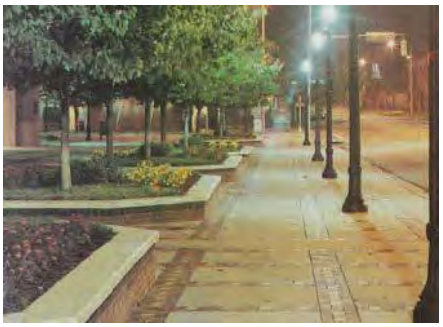
THE COR
RAMSEY, MINNESOTA
DEVELOPMENT STATUS
EXISTING DEVELOPMENT
PROPOSED DEVELOPMENT
ACTIVE DEALS
UNDER CONTRACT
COMPLETED
ACCESS
EXISTING SIGNALIZED INTERSECTION
FUTURE SIGNALIZED INTERSECTION
FULL INTERSECTION
NO LEFT OUTBOUND MOVEMENTS
PARKING RAMP
TRAFFIC INFORMATION
ADT INFORMATION TAKEN FROM 2009 ACTUAL COUNTS AND 2030 PROJECTED VOLUMES
NORTH
0
300
600
LANDFORM
From Site to Finish
DEVELOPMENT PLAN 6.1
09.06.2012
RAMSEY BOULEVARD
BUNKER LAKE BLVD.
ARMSTRONG BLVD
US HIGHWAY 10
NORTHSTAR COMMUTER RAIL
SUNWOOD DR.
RHINESTONE COMMONS
BUSINESS PARK
CITY HALL
REGIONAL PARK
FUTURE PEDESTRIAN OVERPASS
LAKE RAMSEY COMMONS
LEGACY CHRISTIAN ACADEMY
PAGE No. 1 of 1

## Overall Framework – Street Hierarchy

### Overview

The Development Master Plan defines a specific strategy for the layout of streets and blocks within, and around The COR. The size, type and configuration of this street hierarchy (See Figure 1: Street Hierarchy) is based on a combination of projected traffic volume, level of service at intersections, proposed adjacent land use (destination commercial, residential, civic, recreation, etc.) and desired aesthetic character.

Great streets are essential components of an attractive and inviting public realm. These guidelines promote a street system that balances pedestrian and vehicular use. Providing streets that support traffic flow is important, but also creating ample space for street-side activities, strolling promenades, pockets of green and other amenities is critical to the success of The COR. Streets will promote convenient access by car – to storefronts, to parking lots and ramps, to entertainment attractions – but will also encourage foot traffic as a primary way to move about and conduct business in the core area.



### Guideline Recommendations

The proposed street and block pattern reflects a compact urban character, not allowing dead end streets or cul-de-sacs, in favor of a traditional grid pattern and connected streets including the following:

- Provide a street network that distributes pedestrian and vehicular traffic throughout the various districts in The COR and encourages a more dispersed and less congested traffic flow (many choices or travel paths).
- Provide a clear hierarchy of streets resulting in a simple and understandable system for movement – easy access and convenient circulation throughout The COR.
- Work with Anoka County to convert primary perimeter streets (arterials such as Ramsey, Armstrong and Bunker Lake Boulevards) to urban street sections, providing sidewalks and street trees to replace roadside ditches.
- Promote improvements that invite pedestrian and bicycle use including wide sidewalks, streetscape amenities and designated bicycle trails (both on and off-street).

### Objectives

Creative design solutions for public realm improvements should reflect these basic street classifications (street hierarchy) including:




- Arterial street – these streets provide the boundary of The COR and all access into The COR will be from one of these three streets:
  - Bunker Lake Boulevard
  - Armstrong Boulevard
  - Ramsey Boulevard
- Destination street – signature addresses for shopping, entertainment, services, work place and other primary amenities
  - Sunwood Drive

- Parkway – premier 'green streets' adjacent to primary public park / green space, with more landscaping than other streets in The COR
  - Ramsey Parkway
  - Center Street (north of the roundabout)
- Connector street – primary routes that link various districts within The COR, usually providing the most direct means of getting from point A to point B
  - Rhinestone Street
  - Zeolite Street
  - Veterans Drive
- Downtown street – the most urban of street sections where high pedestrian traffic is intended and traffic calming measures such as on street parking, bump outs and other methods will be employed
  - Center Street (south of the roundabout)
  - Sapphire Street (north of Sunwood)
  - Other streets as shown on the Street Hierarchy Map
- Local street – neither destination nor primary connector routes, these streets provide much of the rest of the street grid throughout The COR.





These street hierarchy classifications are intended to provide guidance regarding the streetscape, but it should be noted that within a street classification, there may be construction or design distinctions, based on the sub-district classification. For example, Sunwood Drive is defined as a destination street throughout The COR, but the design may be different between the COR1 and COR2 sub-districts. The Master Streetscape Map will provide design direction.




Figure 1: Street Hierarchy Map

### *Transit Overview*

The COR is designed to be a Transit Oriented Development (TOD) in a variety of ways that go beyond providing a walkable public realm and connected street grid. The Master Plan also includes a multimodal transit station, with dedicated commuter parking, integrated with other uses at the heart of the retail, restaurant and entertainment district. This station functions as a hub where local circulator transit comes together with regional transit service and the Northstar Corridor. The COR is the Twin Cities' first and only transit-oriented development along the new Northstar Commuter Rail Line. Ramsey Station at The COR will open for riders boarding the train in November 2012. As Northstar's most visible station, The COR will immediately bolster the ridership on the line and continue to build recognition for this regional service.

Transit components include the following:

- Ramsey Star Express service provides peak period, peak direction bus service between downtown Minneapolis and Ramsey until the Northstar Commuter Rail station stop is complete
- Northstar Commuter Rail provides train service between Big Lake and downtown Minneapolis
- 350 park and ride parking spaces are provided for commuters adjacent to the transit station
- Pedestrian and bicycle connections are emphasized in the Master Plan as major links between the transit station, various districts within The COR and into the surrounding neighborhoods
- The COR can accommodate Metro Mobility, citywide circulator bus or town trolley connections as part of local and regional service to the transit station



The COR also encourages developers to participate in a Travel Demand Management (TDM) program to both assist and encourage residents and visitors to take advantage of the various modes available for their commuting and travel needs. The TDM program draws from incentives and services available through Anoka County and Metro Commuter Services that match riders with carpools and vanpools, provide discounted transit passes and manage work hours among other functions.

- Developers shall submit a TDM plan with their site plan application for new development and work with the City to implement their plans.

### *Transit Guideline Recommendations*

Transit is an important component of the overall plan, with expectations for more ridership, using a greater range of transit options as they become available. More people, together with the mix of activities and amenities in The COR, encourages better designed, better connected transit service. It is a shared responsibility between city, county and developer to promote transit use, with both policy and bricks-and-mortar attention to the following framework:

- Understand and take advantage of opportunities to use existing and proposed transit components

- Provide transit related facilities specifically linked to uses and character within each COR district, including signage and lighting for way-finding and bicycle amenities
- Building future Northstar Commuter Rail riders through the Ramsey Star Express bus service

### *Transit Objectives*

The primary objective is to provide a balance of transit service, bicycle and pedestrian connections and lanes to move traffic. The framework for The COR promotes public transportation as part of the solution and suggests a variety of street improvements and other amenities to invite increased use. Photographs throughout the framework suggest some of the many possibilities.

## Overall Framework - Streetscape

### Overview

The Master Plan defines a specific strategy for the layout of streets and blocks within and around The COR. The amenities within the public right-of-way -and immediately adjacent -play an important role in the aesthetics of The COR. Great streets are essential components of an attractive and inviting public realm. Developing a streetscape that is comfortable and inviting to pedestrians is important to realizing the vision for The COR. The framework will encourage interesting and inviting places for the public.

The Streetscape framework defines the visual character and physical improvements for all public spaces within The COR. The document also provides the general framework and examples for design of proposed quasi-public and private space located within each development parcel.



Public realm/streetscape framework focus on the following elements:

- Parks, plazas and other public gathering spaces
- Street/sidewalk character and streetscape elements
- Bicycle/pedestrian connections (on-street and off-street)
- Residential courts, pocket parks and other private green space

The goal is to foster a safe and interesting public realm that will invite pedestrian activity, promote traffic calming, increase transit use and encourage community gathering. Street trees, lighting and decorative fencing provide the backbone for streetscape improvements. Added detail, such as special pavements, street furniture, public art and layered plantings will highlight specific nodes or uses. The City has developed a series of street cross -sections to illustrate these design expectations. Typical street sections are provided in Appendix A as a reference.

Destination and Connector streets must balance a high level of service for the automobile with attractive and inviting amenities for the pedestrian including:

- Provide gracious sidewalk width to support intensity of pedestrian traffic in the core
- Install street trees to frame the street and provide shade
- Provide street lighting that meets all safety standards and design criteria, while creating a signature character for this district
- Explore a range of options for streetscape improvements including special pavements, interesting concrete tinting or scoring patterns, additional plantings, ornamental fencing and other features (note, however, that simpler is better and too much clutter is a negative)



The COR includes a network of bicycle/pedestrian trails and walkways (both on and off-street) that connect adjacent sub-districts to the Mixed Use Core. As you approach the core, these connections tend to become part of the shared right of way along the major streets, or become part of the urban park spaces. Bicycle riders may choose to share the street with vehicular traffic, or dismount and walk their bicycles along with the other pedestrians using the sidewalks. Providing and maintaining these bicycle and pedestrian connections should be a key component for all development projects in the core.

Figure 2: Master Lighting Plan

## Guideline Recommendations




The proposed street and block pattern reflects a compact urban character, including the following:

- Bike racks interspersed throughout The COR to encourage cycling as an alternative mode of transportation.
- Benches on the public sidewalks to encourage people to linger in The COR
- Trees and planters along the streets to create an inviting space
- Wide sidewalks and both on- and off-street bicycle trails
- Kiosks and other way finding tools for visitors and residents in The COR
- Outdoor dining is encouraged on the street side of buildings within all districts.
- Public plaza space is strongly encouraged to be located adjacent to the streets

## Objectives

Creative design solutions for streetscape improvements should include:

- Streetscape improvements that provide traffic calming, particularly along Destination and Downtown streets
- Inviting streets that draw you into and through The COR
- A marriage of building design and streetscape design that encourages active spaces near the streets



### *Street Trees and Plantings*

Street trees and planter boxes are a critical element in the unique character of The COR and will be used to help distinguish between different street types and sub-districts within The COR. However, there may be variety within the same street when the street crosses into sub-districts.

- Street trees will be chosen to ensure that the species allow for clear pedestrian access along the streets and require minimal maintenance.
- Along Destination, Downtown, Parkway and Local streets, where regularly spaced blocks exists, one (1) tree species shall be provided per block. In order to provide variety and protect against disease, adjacent blocks shall not be allowed the same street tree. Initial development along a block shall establish the tree species for that block, subject to City review and approval.
- Along streets without regular block space or longer blocks, such as Connector and Arterial streets, the City may approve groupings of 3-6 trees of one (1) species in lieu of the regular block spacing.
- Alternatives to the above mentioned planting plan shall be subject to review and approval by the City Council.

#### Destination Street Trees:

- Autumn Blaze Maple (*Acer x freemanii* 'Jeffersed')
- Bicolor Oak (*Quercus bicolor*)
- Sienna Glenn Maple (*Acer x freemanii* 'Sienna')
- Skyline Honeylocust (*Gleditsia triacanthos var. inermis* 'Skyline')
- Ginko (*Gingko biloba)*
- Accolade Elm (*Ulmus x '*Accolade')

### Parkway Street Trees:

- Valley Forge Elm (*Ulmus americana* 'Valley Forge')
- Bitternut Hickory (*Carya cordiformis)*
- Siouxland Poplar (*Populus deltoides* 'Siouxland')
- Sienna Glen Maple (*Acer x freemanii* 'Sienna')
- Boulevard Linden (*Tilia americana* 'Boulevard')
- Northern Catalpa (*Catalpa speciosa)*
- Spring Snow Crabapple (*Malus* 'Spring Snow')
- Kelsey Crabapple (*Malus* 'Kelsey')
- Korean Mountain Ash (*Sorbus alnifolia)*
- Ohio Buckeye (*Aesculus glabra)*
- Ginkgo (*Gingko biloba)*

### Connector Street Trees:

- Bicolor Oak (*Quercus bicolor*)
- Northern Red Oak (*Quercus rubra)*
- Princeton Elm (*Ulmus americana* 'Princeton')
- Accolade Elm (*Ulmus x* 'Accolade')
- Autumn Blaze Maple (*Acer x freemanii* 'Jeffersed')
- Skyline Honeylocust (*Gleditsia triacanthos var. inermis* 'Skyline')
- Kentucky Coffeytree (male) (*Gymnocladus dioicus)*
- River Birch (single stem) (*Betula nigra)*
- Black Alder (*Alnus glutinosa)*
- Black Cherry (*Prunus serotina)*
- Spring Snow Crabapple (*Malus* 'Spring Snow')
- Kelsey Crabapple (*Malus* 'Kelsey')
- Japanese Tree Lilac (*Syringa reticulate)*
- Thornless Cockspur Hawthorne (*Crataegus crus-galli* var. inermis)

### Downtown Street Trees:

- Princeton Elm (*Ulmus americana* 'Princeton')
- Accolade Elm (*Ulmus x* 'Accolade')
- Autumn Blaze Maple (*Acer x freemanii* 'Jeffersed')
- Skyline Honeylocust (*Gleditsia triacanthos var. inermis* 'Skyline')
- Kentucky Coffeytree (male) (*Gymnocladus dioicus)*
- River Birch (single stem) (*Betula nigra)*
- Black Alder (*Alnus glutinosa)*
- Black Cherry (*Prunus serotina)*
- Spring Snow Crabapple (*Malus* 'Spring Snow')
- Kelsey Crabapple (*Malus* 'Kelsey')
- Japanese Tree Lilac(*Syringa reticulate)*
- Thornless Cockspur Hawthorne (*Crataegus crus-galli* var. inermis)

### Local and Arterial Street Trees:

Local and Arterial Street trees may be chosen from any species on the above lists.

### Planter Beds/Boxes/Tree Grates

- Planter beds, tree grates and planters shall be as shown on the Streetscape Master Plan. Details and specification shall be added to Appendix A as developed and approved by the City. Appendix A shall be amended as needed.
- Irrigation shall be provided to ensure survival of plant materials. The City shall provide irrigation systems along the Parkway and Destination streets. Unless otherwise approved, all other irrigation shall be the responsibility of the landowner.

## *Street Furniture*

Bike racks, trash enclosures and benches are encouraged on all streets, but will be required on Destination, Connector and Parkways and other streets as shown conceptually on the Streetscape Master Plan.

Bike racks shall be the standard bike rack (see Appendix A for specifications).

Trash enclosures shall be the standard trash enclosures (see Appendix A for specifications).

Benches shall be the standard bench (See Appendix A for specifications). Benches shall be grouped in twos that face each other and provide an opportunity for an outdoor conversation space.



Alternative bike rack, trash enclosures and bench designs will be considered on a case-by-case basis. The City will review alternative designs as part of the site plan review and will evaluate these alternatives based on the following:



- Does the design maintain the character of the district?
- Does the alternative design maintain the quality of the standard feature?
- Does the design provide a relationship between the public elements of the streetscape and the building that would not otherwise be possible?

## *Sidewalks and Boulevard*

In the design framework, the term “boulevard” is defined as “the space between the sidewalk and the curb.” The boulevard area provides the required space for public features such as street lights, benches, fire hydrants, street signs, etc. The boulevard will have different characteristics based on the street hierarchy.

The street width and layout within different zones may affect the ability of a particular development to provide the minimum boulevard width and the minimum sidewalk width within the existing public right-of-way. In those cases, the landowner shall provide a permanent public easement over the portion of the sidewalk that is located on private property.

### *Street Lights*

Street lights are owned and installed by Connexus Energy. The streetlight design was developed in conjunction with the City of Ramsey and Connexus (See Figure 2: Master Lighting Plan). The standard street lights are designed to accommodate banner arms should banner signage be desired. The banner arms should be the manufacturer's standard break-away banner arms to ensure safety and minimize maintenance costs. Connexus provides street light maintenance for the City. Connexus bills the City of Ramsey for the cost of installation and maintenance.

The choice of street light was intended to emphasis the pedestrian scale of The COR. Light poles within the public right-of-way should be planned to accommodate banners, flowers, hanging artwork and electrical outlets.

There are three (3) different streetlight types within The COR:

- 24-foot high poles at intersections
- 14-foot high poles at mid-block
- 12-foot high poles at The Draw



The City will ensure that the appropriate streetlights are installed on all public streets as described by the Design Framework. Private developers shall provide parking lot or other project lighting that retains these design objectives. All lighting shall comply with City Code performance standards for lighting. All lighting shall be reviewed by City staff to ensure compliance with the Design Framework and City Code standards described above.

### *Standards for Outdoor Dining.*

Outdoor dining is encouraged as an attractive addition to a pedestrian- and retail-friendly, vital COR. Such dining is encouraged subject to the standards in Section 117-118 of the Zoning Ordinance.

## Overall Framework - Parking

### Overview

Balancing the realities of car-related necessities (streets, parking and so on) with future transit service and the desired character of The COR is a significant challenge. The goal is to provide adequate parking; both quantity and location, while promoting new strategies that support the overall needs of The COR. Parking will be provided through a combination of on street spaces, off-street surface lots, underground lots and structured ramps to support the mix of uses at the core.

Parking structures should contribute to the overall character and image of The COR. Ramp design should include elements, colors and materials that reflect, or complement surrounding buildings. Liner stores or other street level uses should be integrated into ramp design along important street frontages. The City also encourages developers to wrap the ramp with multi-story uses that will provide commercial and residential opportunities and help to define the street edge.

### Guideline Recommendations

Parking guidelines encourage the following:

- Locate surface parking lots away from the major streets, either behind or to the side of primary buildings; surface parking lots along major street frontage are not allowed in the core area
- Minimize surface parking lots in favor of other solutions including underground parking to serve residential buildings, on-street parking to serve retail shops and parking ramps
- Provide a combination of fencing, landscaping and landform to screen parking areas from major streets and important views, soften parking area edges, provide shade, integrate native plantings, offset islands and reduce to 'sea of parking' image
- Create strategies for shared parking between adjacent uses, taking advantage of peak and off-peak cycles, business hours, nighttime activities, special events and other needs
- Provide alternative surfaces for secondary (less frequently used) parking areas including porous pavements, green pavements and so on
- Provide facilities or services that respond to and connect with future transit to reduce required parking, including shuttle/circulator bus, bicycle lockers
- Provide flexibility including hours for on-street parking, security and enforcement practices, permit or metering
- Provide parallel parking on both public and private streets throughout The COR, to add parking and create a traffic calming, pedestrian buffer; Bumpouts are encouraged as a traffic calming measure on all streets within the COR.
- Explore options to integrate stormwater management requirements into parking area design
- Provide parking spaces for typical daily use, satisfying both quantity and location needs through a mix of on street, small surface lot, underground and ramped parking solutions
- Provide options for additional/overflow parking to support holiday traffic and special events including porous pavements, turf parking areas (Netlon and other soil amendments) or shuttle service from nearby parking areas
- Encourage shared parking solutions that target around the clock shifts in destination, audience or take advantage of peak/off-peak hours of operation for various uses within the core area

- Promote municipal parking ramps as the primary facility to meet public parking needs within the core area
- Discourage driveway access to parking facilities along Arterial, Destination and Parkway streets, in favor of side streets.

## Objectives



The primary objective is to provide a balance of surface lots, on-street and structured parking, with ample quantities and close proximity to serve the mix of uses in The COR. The Design Framework anticipates the construction of a total of 3 parking structures in COR1 to serve the needs of the area by providing structured parking that can be shared among users, allow developers to maximize the development on each individual lot. As discussed later in this section, sizing and timing of the structured parking will be finalized as the area develops and parking demand grows. In addition to providing adequate space, excellent design is a major factor as well. The framework for The COR encourages creativity, innovation, quality and attention to detail in every aspect of project development, including parking solutions. Photographs throughout the Design Framework suggest some of the many possibilities.

Figure 3: Streetscape Master Plan

Figure 4: Parking District Map

### *Minimum Standards*

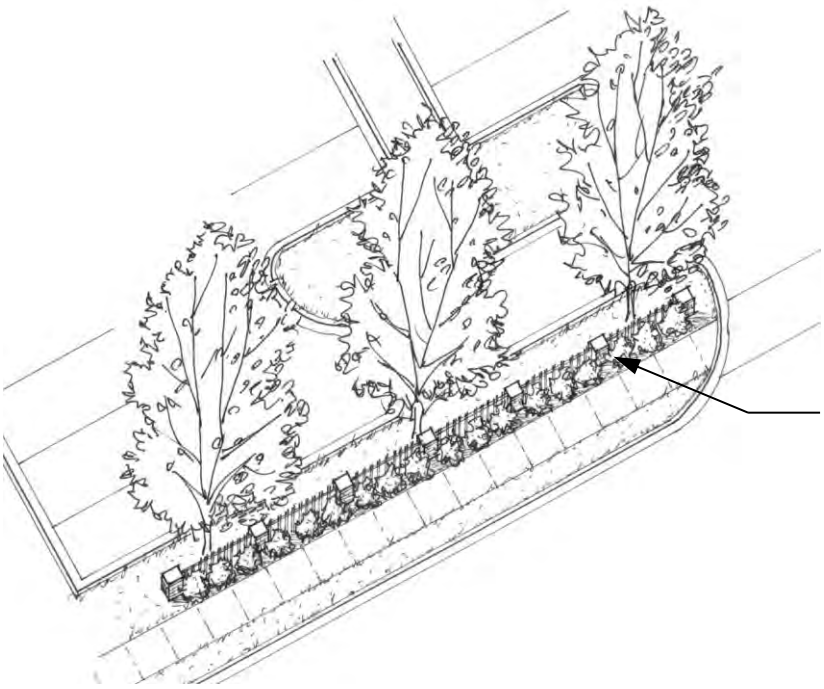
Parking in The COR is intended to be shared to the greatest extent practicable in all mixed-use areas. The parking standards are intended to provide a practical basis for providing adequate parking within the COR District through a careful analysis of uses, shared parking arrangements, use of public street parking and reduction allowances for the proximity to the transit station. A parking plan has been prepared to identify the planned number, location, sharing arrangements and public use (see Figure 3: Streetscape Master Plan and Figure 4: Parking District Map). The parking plan provides information that can be used to help address longer term parking arrangements where the possibility of use conversion or building expansion exists. Parking shall be provided under any of the following arrangements:

A. No parking shall be located between the front of the principal structure and the street on parcels abutting Destination and Downtown streets in COR1.

B. Not more than fifty (50%) percent of the parking shall be located in front of the principal structure and the street on parcels abutting Arterial, Parkway, Connector and Local streets.

    1. In the COR2 district, developments may be allowed more than fifty (50%) percent parking in the front yard, provided all other design standards have been met, including the use of a wall, railing, hedge or combination to create a street edge and screen parking.

C. Wherever a surface parking area faces a street frontage, such frontage shall be screened with a decorative wall, railing, hedge, or a combination of these elements, to a minimum height of three feet (3') and a maximum height of four and one-half feet ($4^1/_2$') above the level of the parking lot, at the build-to line required for the property. The amount of required screening may vary by sub-district and street frontage and is described in Part Two of this document.



Landscaped edge that combines fence with trees, low shrubs and ground cover for parking lot screening and buffering along sidewalk to screen parking

D. No parking spaces shall be located on corner lots at the point of street intersections.

E. Shared parking in COR1 will be accomplished through a Parking Use and Maintenance Agreement (PUMA).

F. Off-street parking in the COR2 and COR3 sub-districts shall be secured for public use through parking easements and other appropriate conveyances. Shared parking arrangements between nearby uses are encouraged in both sub-districts.

1. The City may approve joint parking for one or more businesses where the total number of parking stalls provided for joint use is less than the sum of the total required for each business should they provide them separately. The applicant must demonstrate the feasibility of the arrangement in a written report. Such a permit shall not be granted except when the following conditions are found to exist:
    i. Proximity. The building or use for which application is being made to utilize the off-street parking facilities provided by another building or use shall be located within three hundred (300') feet of such parking facilities, excluding public rights-of-way.
    ii. Conflict in Hours. The applicant shall demonstrate in documented fashion that there is no substantial conflict in the principal operating hours of the two (2) buildings or uses for which joint use of off-street parking facilities is proposed.
    iii. Written Consent and Agreement. A legally binding instrument, executed by the parties concerned, for joint use of off-street parking facilities, duly approved as

to title of grantors or lessors, and in a form and manner of execution approved by the City Attorney, shall be filed with the City Clerk and recorded with the Anoka County Recorder or Registrar of Titles, and a certified copy of the recorded document shall be filed with the City within sixty (60) days after approval of the joint parking use by the City or the interim use permit shall be considered null and void.

G. On-street parking adjacent to buildings shall not be used for the purposes of calculating parking requirements.

H. Within the COR-4 sub-district, parking on individual parcels serving individual uses may be provided if designated and approved as part of the master plan.

I. Within all sub-districts, a minimum driveway length of twenty-five (25') feet is required to limit conflicts between vehicles parked in the driveway and street or sidewalk users.

J. In order to ensure the pedestrian orientation of the COR Districts, minimum/maximum on-site parking standards are set based on the following table:

Table 1

| Use | | Minimum number of parking stalls | Maximum number of parking stalls* |
|---|---|---|---|
| Retail | | 2 per 1,000 sq. ft. | 4 per 1,000 sq. ft. |
| Restaurants | | 1 per each 2 seats | 1 per each 1 seats. |
| Offices | | 2 per 1,000 sq. ft. | 3 per 1,000 sq. ft. |
| Medical offices, clinics | | 2 per 1,000 sq. ft. | 4 per 1,000 sq. ft. |
| Health clubs | | 3 per 1,000 sq. ft. | 5 per 1,000 sq. ft. |
| Theaters, places of assembly | | 1 per 5 seats | 1 per 3 seats |
| Residential | | | |
| | Attached or detached | 1 per unit | 2 per unit |
| | Multifamily units | 1 per unit | 2 per unit |

*If a parking structure is provided on site, maximum parking stalls do not apply.

K. Non-Specified Uses. For uses not specifically listed above, off-street parking requirements shall be computed by the Zoning Administrator on the same basis as required for the most similar listed uses. In such cases, the Zoning Administrator shall also consult off-street parking reference materials including, but not limited to, manuals prepared by the American Planning Association and Institute of Transportation Engineers.

L. Handicap Parking. The size, number, and location of stalls reserved for handicapped parking shall be provided and identified as required by applicable regulations. These spaces are included in the computation for the minimum parking space requirement.

M. Change in Land Use. When the site intensity or use of a building and/or property is increased with consequential effect upon the parking requirements as prescribed in this Section, the

parking requirements as prescribed herein shall be used to provide for such increase in the site intensity and/or use.

N. Use of required parking spaces. Required parking spaces must be available for the use of residents, customers or employees of the use. Fees may be charged for the use of required parking spaces. Required parking spaces may not be assigned in any way to a use on another site, except for joint parking situations. Also, required parking spaces may not be used for the parking of equipment or storage of goods or inoperable vehicles.

O. Transit Service Reduction. The minimum number of parking stalls required on site may be reduced by 10% for any parcel located within ¼ mile of a transit stop. To qualify for this reduction, the transit stop must provide regular service on all days of the week and direct pedestrian access must be provided between the building and the transit stop.

P. Bike Racks. In addition to the bike racks provided as part of the streetscape, individual businesses are encouraged to provide bike racks for customers. Bike rack locations will be reviewed and approved by the City as part of the site plan review.

Q. Increase to Maximum Required Parking. If additional parking is sought to exceed these maximum requirements, a conditional use permit can be sought to increase maximums up to twenty-five (25%) percent.

    1. In the COR-2 sub-district, an increase of twenty-five (25%) percent in the maximum number of parking stalls is permitted without the issuance of a conditional use permit if approved as part of the site plan.

R. In the COR1 sub-district, a PUMA (Parking Use and Maintenance Agreement) shall be applied to all development as follows:

    1. It is the City's intent to maximize development on individual lots. In order to help landowners accomplish this goal, the City will develop public parking ramps, which will be available for public parking within The COR. In order to minimize the amount of the site required for parking, the landowner may choose to enter into the PUMA for utilization of the public parking ramps to meet all or a portion of their minimum parking requirements.

    2. Each development shall be subject to a PUMA that specifies that each property in the COR1 shall be financially responsible for its proportionate share of a shared parking facility. The proportionate share shall be determined on the basis of the property's off-street parking needs, as determined by the parking requirements of Item J above.

3. The City shall establish fees by ordinance. The developer shall be responsible for payment in an amount equal to the value of the required parking on a per-stall price basis for ramp parking through the PUMA. The City will determine the appropriate contribution.

4. Funds collected by the City shall be deposited in a special fund used only to acquire and/or develop off-street parking facilities for the COR. Financial responsibility shall cover the construction and continuing maintenance of the parking facility.

5. The parking facility may be constructed and maintained by the City or by a private management entity acceptable to the City.

### *Private Streets*

Private streets may be allowed within residential subdivisions, subject to the standards in Section 117-112 (e)3.b. of the Zoning Ordinance.

### *Loading Areas*

A. Loading areas and docks shall be located in the rear of the building.

B. Loading areas shall not be located in the front yard and shall be fully screened from public streets, public parks and residential areas through landscaping and building design measures.



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## Overall Framework – Building Design

### Overview

The COR Development Plan 5.03 identifies the preferred mix and approximate location of a variety of land use types. Together with the Zoning Code, this Design Framework focuses on the following overall objectives:

- Promote vertical and horizontal mixed use (within a building, within a block, within a district)
- Provide a variety of housing types, styles, pricing
- Encourage increased density in and around the central core area
- Promote an interesting mix of building styles, scales and massing for each sub-district
- Support creative, innovative, high quality design solutions as the benchmark for success
- Integrate mix of uses with public green space within each district
- Provide a variety of commercial types
- Mix residential and commercial uses to promote street-level activity throughout the day

### Guideline Recommendations

The mix of land uses in The COR will encourage activity during the day and into the evening and nighttime hours. As a focus of commerce, employment, recreation and housing, The COR resembles a small to medium size Midwestern downtown in scale and character. Land uses are intentionally mixed, to bring shoppers and workers into the area during the day and attract new residents and visitors to entertainment venues in the evening.

The civic component of The COR, anchored by City Hall, Police Station and variety of public spaces and squares, adds an important element to the land use mix and brings a level of authenticity to the district.

### Objectives

- Encourage vertical mixed-use in the core with housing and office space over retail uses along the street, particularly in the center of the district.
- In residential districts, particularly closer to the core, a limited amount of retail uses will be encouraged to service residents and provide nearby places to gather.
- Promote innovative models for housing that include a mix of townhomes, flats and lofts within single buildings or on the same block.
- Accommodate larger, 'big box' retailing and auto-oriented uses within the COR2 sub-district only if innovative design approaches are used including two story buildings, use of liner stores facing the street, minimal blank walls, creative parking strategies, etc.
- Where similar uses create a 'family' or campus of buildings (e.g. medical campus), buildings should reinforce the street edge and parking should be set within the core of the block.
- Uses shall promote pedestrian friendly streets, contributing to street level activities and overall visual character of each district.
- All uses should reinforce the street edge.





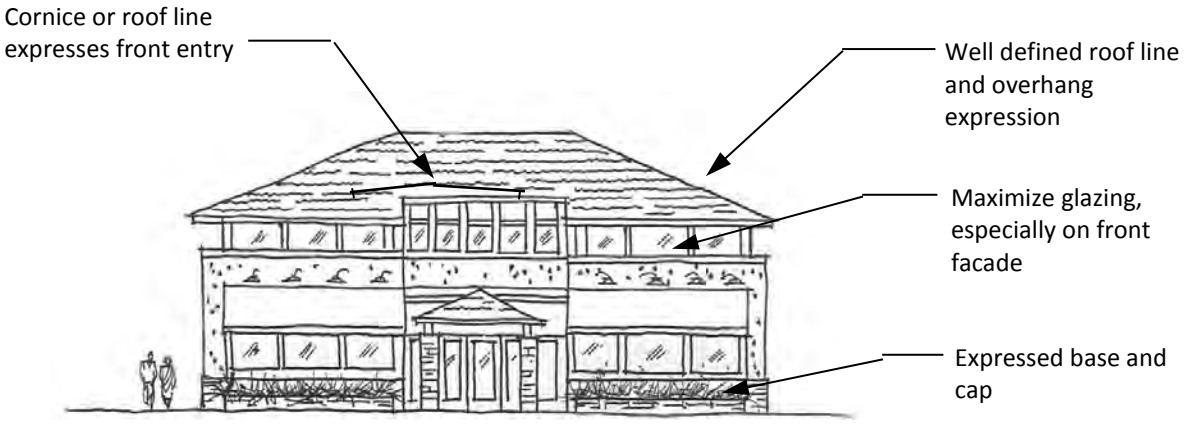
### *Architectural Overview*

High quality architecture is an essential component in fulfilling the objectives of the Design Framework. Rather than prescribing a particular style, these architectural guidelines are intended to encourage an integration of both traditional and contemporary design. Architectural designs should provide a consistent quality, measured, to a great degree, by the pedestrian experience along the street and by an architectural expression that provides character without being thematic, obtrusive, or artificial. Architectural character should strive to be authentic and varied, but not 'thematic'.

### *Architecture Recommendations*

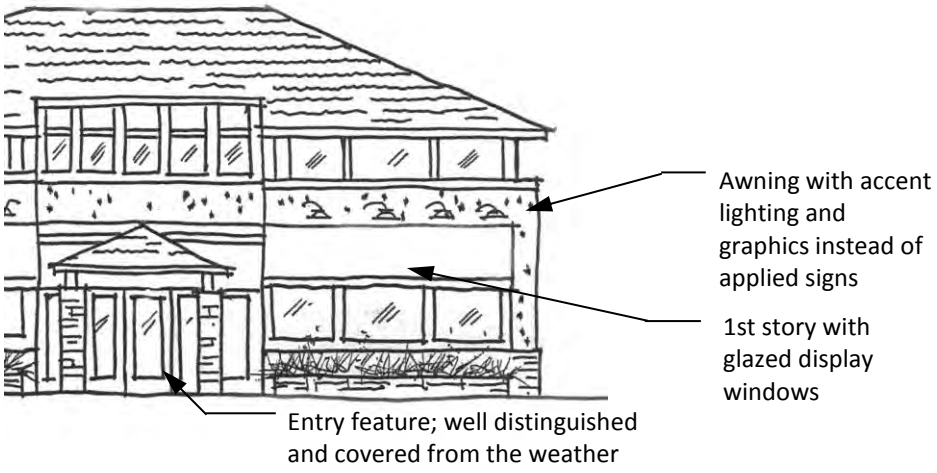
Of all the layers that combine to form The COR Development Plan, architecture will typically be the most prominent development component. Both visually and physically, architecture will play a major role in defining the overall design character and mix of uses for The COR. It is crucial that the design and location of buildings address these architectural guidelines, with specific emphasis on the following:

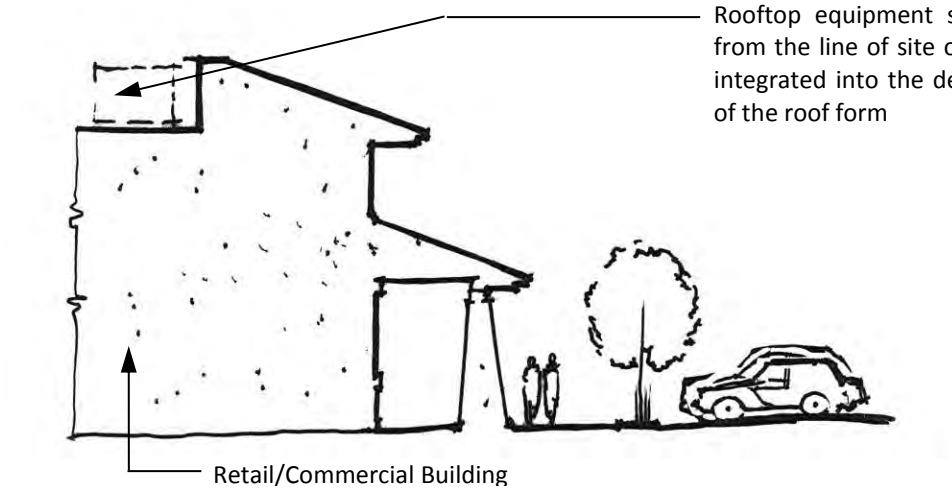
- An animated street presence with a mix of street-level uses, interesting building façades, many doors and windows on the street, careful design of lighting, awnings, signage and other elements that animate the pedestrian experience



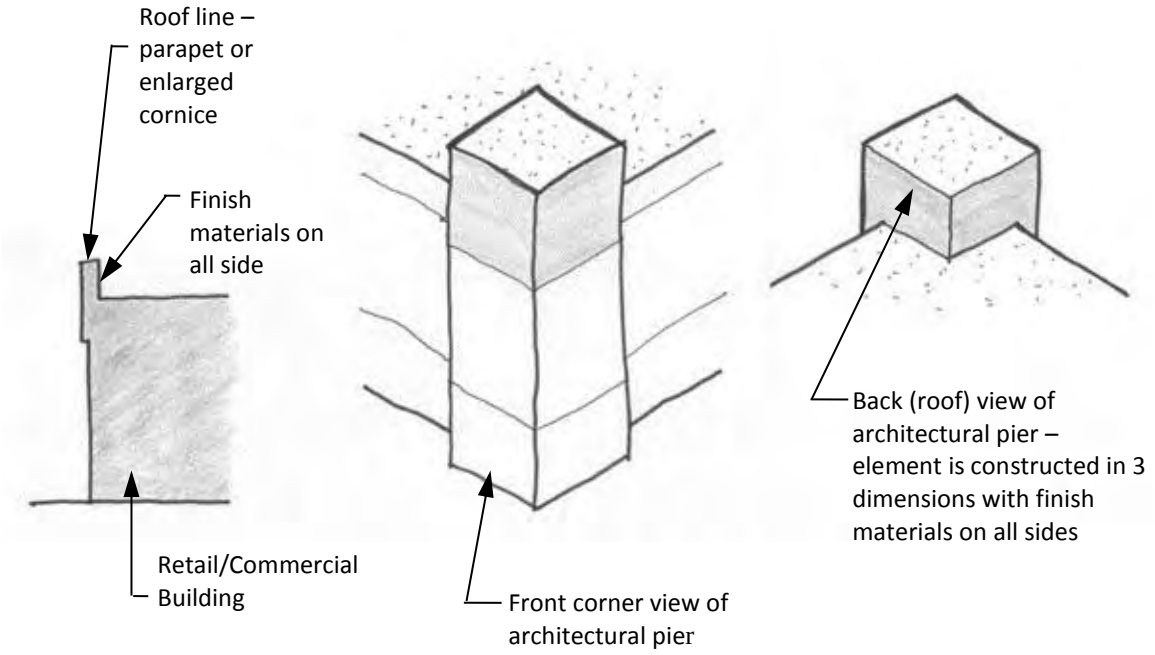

- Variety in building design, character and expression; not one theme or building style, but a thoughtful integration of many design solutions
- Variety of building types including a range of height, scale and proportion, that support an integrated mix of housing options, shopping destinations, entertainment venues, civic structures and other COR uses
- Use of high quality materials, suggesting a preference toward native materials and masonry elements, with respect for local building techniques
- Building location is as important as building style; special architectural elements, character, transparency and a higher level of materials and detailing should be used to highlight key streets and important crossroads throughout The COR
- Buildings should always be located at all four corners of intersections.
    - In the COR2 sub-district, if the City finds that there are unique circumstances where buildings cannot be located on the corner, the City may approve the use of fences, walls or other design elements to create that "street edge"

- Buildings will be located at the street right-of-way line (zero setback), but also allow recessed space for outdoor dining and other street level activities providing some minor deviation for variety
- Greater emphasis should be given to architectural elements, materials and other design features for buildings located at primary intersections, or where streets intersect with parks, such as the streets that front on or end near the Municipal Plaza. These locations can often be seen from several directions, perhaps terminate a view from a distance down the street or sit at a prominent node; They will likely become future landmarks or helpful orientation/wayfinding icons as The COR develops
- Encourage both vertical mixed use (within each building) and horizontal mixed use (within each block) throughout this district
- Include a mix of housing, civic, retail, restaurant, entertainment, performance and other uses that encourage a variety of activities throughout the day.
- Minimize openings between buildings, although limited driveway access and some provision for pedestrian connections through blocks are encouraged – gaps between buildings to accommodate surface parking lots, greater building setbacks or other purposes are discouraged
- Use recessed entries and windows to create street-level interest, variety and enhance pedestrian scale along street frontage



- Equipment, mechanical systems, transformers, etc. must be screened from view in a way that is integral to the architecture of the building. Screening should be accomplished with materials similar to or compatible with materials used on the main structure; metal fencing or mechanical vent screens alone are not sufficient.
- Roof lines and cornice details shall be completed in a 3-dimensional manner so that the back of roof features or similar unfinished areas are not visible.



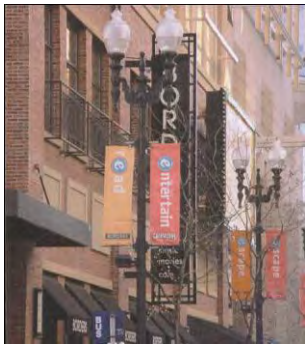
## Overall Framework - Signage

### Overview

Signage within The COR should provide a system for clear wayfinding for all modes of transportation and should ensure successful business operation while maintaining the design aesthetic of this unique project. These sign standards are intended to allow flexibility and creativity while maintaining the design concepts of The COR. Due to the distinctive nature of The COR, the sign standards from the City Code are not applicable and signage shall be allowed as prescribed by the Design Framework. A Master Sign Plan identifies the location of key sign locations (see Figure 5: Signage Plan).

### Guideline Recommendations

The COR development manager shall prepare a Master Sign Plan for the public elements of the project, which are in compliance with the design framework and will be adopted by reference. The Master Sign Plan will specifically address public signs including:



- The three (3) off-site community signs
- Banner signs on light poles
- Signage for public parks
- Signage for public parking ramps
- Signage for public buildings
- Community kiosks

### Objectives

Signage should be used as a tool to help identify businesses and neighborhoods with The COR and should have elements that are focused on the pedestrian nature of The COR as well as the signage needs for businesses.

- Signage and lighting which is integrated into the design of the building is encouraged.

### *Definitions*

*Awning Sign* means a sign incorporated into or attached to an awning.

*Community sign* means an off-site sign identifying the development name and key tenants. Community signs may also include public information. Reader boards are allowed to be incorporated into community signs within The COR. Gateway and kiosk signs are part of this category.

*Temporary Sign* means a sign which is erected or displayed for a limited period of time and not affixed to a Minnesota State Building Code approved structure.

*Project sign* means a freestanding area identification sign which identifies a single-family or multifamily residential subdivision, a commercial development or an industrial park or office park and which is located on the same site as the development it identifies. A site shall be identified as the block in which the use is located.

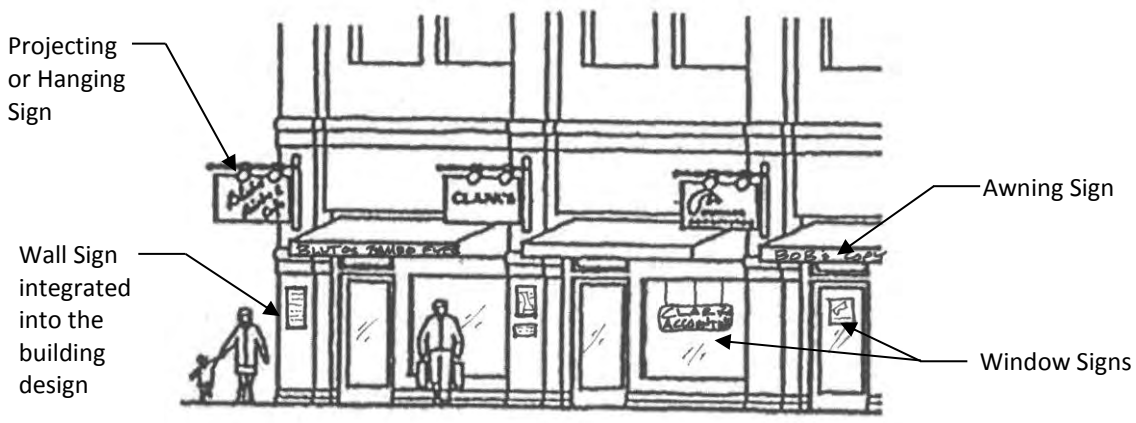
*Projecting sign* means any sign, all or any part of which extends beyond the surface of the building or wall by more than 16 inches.

*Public Realm/Streetscape sign* means any sign erected and maintained by public officials or public agencies, or approved and authorized for use by state or local governmental authorities.

*Sandwich Board Sign*s means a self-supporting, freestanding temporary sign with only two (2) sides that are situated adjacent to a business with the intent to attract pedestrian traffic to businesses. Sandwich board signs are not meant to be read by vehicular traffic.

*Wall sign* means any sign which is affixed to a wall of any building. This definition includes individual letter signs and signs on mansards.

*Window sign* means a sign installed inside a window, or any sign placed within a building for the purpose of being visible from the public right-of-way. This does not include merchandise on display.




*Pedestrian-Oriented Tenant Signs*

Figure 5: Signage Plan

### *Standards*

#### Public Realm/Streetscape Signs

The pedestrian oriented nature of The COR requires unique signage the will build on the design concepts for The COR. These types of signs in include banner signs on the streetlights, kiosks, street signs, wayfinding signs, signage for public parking ramps, etc. As the design concept for The COR has been refined, so has the signage plan. The Master Sign Plan is included as Appendix B. Size, location, and construction specifications of these signs shall be determined by the Master Sign Plan, which must be approved by the City Council, after a recommendation by the Planning Commission. Careful foresight has been given to size of signs based on needs of the adjacent roadways in order to maintain adequate safety standards that may otherwise be compromised by poor design. Roadways with higher speeds warrant larger lettering to maintain safe travel.

#### Community and Gateway signs

Community signs include are planned to include three (3) signs on Highway 10, as shown on the Signage Plan (see Figure 5: Signage Plan). The signs include the existing Community Sign near the future transit plaza, the sign at the northwest corner of Highway 10 and Ramsey Boulevard and the planned sign at the northwest corner of Highway 10 and Armstrong Boulevard.

Gateway signs are planned at multiple locations at entrances to The COR from major roadways, as shown on the Signage Plan. General gateway signs may identify The COR only. Retail Gateway signs may include provisions for off-premise, tenant sign panels.

These off-site signs, part of a unified development, are allowed as shown on the signage plan and shall have consistent materials and colors. Community and Gateway Signs shall conform to the design of the Master Sign Plan. Tenants within the unified development shall be allowed to utilize tenant panels on the Community and Retail Gateway Signs.

Amendments to the Master Sign Plan and Approved Community Signs. As the Master Sign Plan is adopted as part of the zoning ordinance, and has the effect of being a zoning ordinances, amendments to the Master Sign Plan must be processed by Ordinance and approved by City Council after review and recommendation by the Planning Commission.

| Sign Type | Allowable Size | Architecture | Allowable Height |
|---|---|---|---|
| Community Sign | 300 Square Feet | Per Appendix B | 30 Feet * |
| Gateway Sign | 50 Square Feet | Per Appendix B | 10 Feet |
| Retail Gateway Sign | 150 Square Feet | Per Appendix B | 12 Feet |
| Community Kiosk | 32 Square Feet | Per Appendix B | 10 Feet* |
| Parking Ramp Signage | 100 Square Feet | Per Appendix B | (Wall Signage) |

* From highest point of adjacent road centerline




*Desirable signs are designed to be architecturally compatible with buildings within the development and other signage within the development*

## Project Signs

Project signs are permitted within all COR sub-districts.

One (1) freestanding sign is allowed per building, provided that the following standards are met:

A. The building in which the advertising business is located, shall be set back a minimum of six (6) feet from a public street right-of-way.

B. The area of each face of the signboard shall not exceed six (6) square feet and the signboard shall not have more than two (2) readable faces. The signboard may exceed six (6) square feet, but not more than 32 square feet, provided that the sign consists of individual letters, without internally illuminated box letters. Lighting may be achieved through 'halo' lighting effects.

C. The height of the top of the signboard, or of any posts, brackets, or other supporting elements shall not exceed six (6') feet from the ground.

D. The signboard shall be constructed of wood, acrylic, aluminum or metal and shall be architecturally compatible with the style, composition, materials, colors and details of the building.

E. No part of the sign shall encroach on the right-of-way and its location shall not interfere with pedestrian or vehicular circulation.

F. Limited to one (1) sign per building and shall not be in addition to wall-mounted, applied letter or projecting signs.

G. The readable faces of the sign shall be perpendicular to the adjacent street.

In the COR2 District, the following signage shall be allowed:

A. Ground sign. There shall not be more than one (1) ground sign for each parcel. The gross surface area of a ground sign shall not exceed one hundred (100) square feet for each exposed face nor exceed an aggregate gross surface area of two hundred (200) square feet. Ground signs may be shared and combined at areas of shared entrances for multiple users. Shared ground signs shall not exceed 150 square feet. A shared sign shall be allowed for each entrance to the site (defined as bordered by public streets).

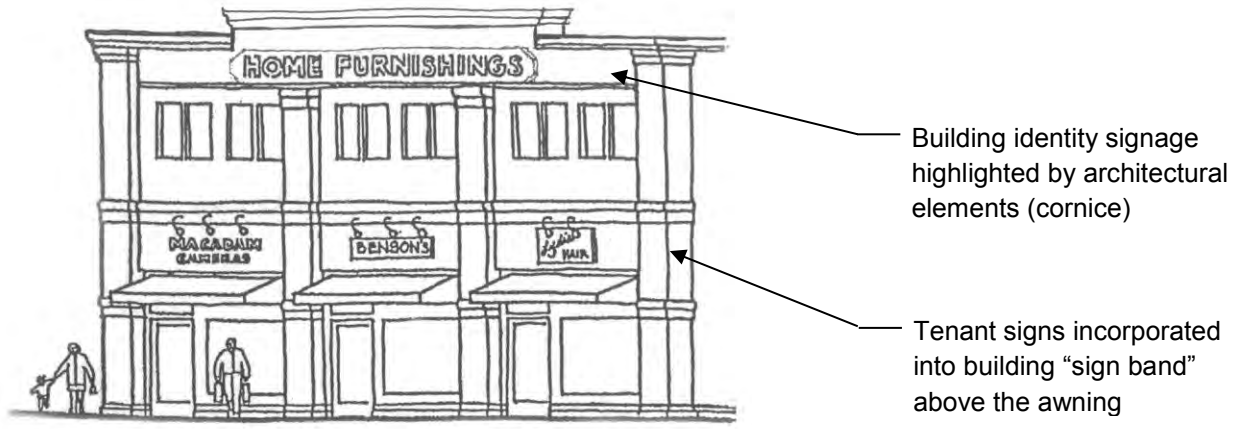
B. Menu board. One (1) on-site menu board per drive-up or walk-up lane of a drive-in restaurant up to a maximum of thirty-two (32) square feet each and a maximum height of three (3) feet. Menu boards are allowed a message on one (1) side only and cannot contain an advertising message.

C. Directional signs.

1. Directional or instructional signs are permitted in accordance with Section 117-463(l).

2. Parking lot directional signs designating parking area entrances and exits are limited to one (1) sign for each entrance and/or exit and shall not exceed four (4) square feet for each exposed face. Parking lot directional signs shall not project higher than five feet (5') in height, as measured from the established grade of the parking area to which such signs are accessory.

3. Parking lot instructional signs designating the conditions of use or identification parking areas shall not exceed eight (8) square feet and shall not project higher than ten (10) feet in height for wall signs and seven (7) feet in height for ground signs, as measured from the established grade of the parking area to which such signs are accessory.




## Wall Signs

Wall signs are permitted within all COR sub-districts.

Wall signs shall be permitted on one (1) wall, except that lots with frontage on more than one (1) street may have signage on one (1) wall per street frontage.

Within the COR1, COR3, COR4 and COR5 districts, the following standards apply:

A. Wall-mounted or painted signs, provided the following standards are met:

1. The sign shall be affixed to the front facade of the building, and shall project outward from the wall to which it is attached no more than six inches (6").

2. Single Tenant Buildings. Each building shall be allowed one (1) wall sign per street frontage. Signage must be located on the street elevation. The area of the sign shall not exceed fifteen (15%) percent of the ground floor building facade area. Individual signs may not exceed.

3. Multi-Tenant Buildings.

    a. Each building shall be allowed wall signage on the street frontage elevation. For buildings with multiple street frontages, the allowable signage is per street frontage. Signage must be located on the street elevation.
    b. Each building is allowed wall signage that shall not exceed 5% of the wall area of the building façade adjacent to the street. Individual signs may not exceed 50 square feet.
    c. Tenant signage must be located on the tenant lease space.
    d. At least fifty (50%) percent of the allowed signage must be allocated to ground floor tenants and located on the ground floor.
    e. Signage is limited to a maximum of one (1) sign per business/tenant, except that tenants with frontage on multiple streets may be permitted to have signage on each street frontage.
    f. Multi-tenant buildings must have wall signs of similar design. Sign permits for

tenants in multi-tenant buildings shall only be permitted by the City after the building owner has submitted a comprehensive sign plan approved by the Zoning Administrator. The comprehensive sign plan for the building shall include similar design standards including sign material, color, style, spacing and size.

4. Signs for buildings facing Highway 10. Single or multi-tenant buildings that have frontage on Highway 10 or are separated from Highway 10 only by other public right-of-way, shall be allowed to have signage on that street elevation that is up to fifteen (15%) percent of the wall area of that building façade with no maximum square footage.

B. Wall-mounted building directory signs identifying the occupants of a commercial building, including upper story business uses, provided the following standards are met:

1. The sign is located next to the entrance.

2. The sign shall project outward from the wall to which it is attached no more than six inches (6").

3. The sign shall not extend above the parapet, eave, or building facade.

4. The height of the lettering, numbers, or graphics shall not exceed twelve inches (12").

5. One (1) such sign is allowed per public building entrance and is allowed in addition to other permitted wall signage.

C. Applied letters may substitute for wall-mounted signs, if constructed of painted wood, painted cast metal, bronze, brass, acrylic or black anodized aluminum. The height of applied letters shall not exceed 12 inches.

D. Logos are considered signs and shall be included in the maximum allowable sign area.

E. Window or door signs, provided that the following standards are met:

1. The sign shall not exceed ten percent of the window or door area or four (4) square feet, whichever is less.

2. The sign shall be silk screened, hand painted, applied letters/graphics, neon tubing or other sign technologies that meet these standards.

3. Limited to one (1) sign per business, applied on either the window or the door, but not on both.

4. The sign shall not have an opaque backing of any type although smoked glass is allowed.

5. Window signage (includes graphics) shall be permitted on the same building walls that have, or are allowed to have, wall signage pursuant to Item A above. Window signage

shall be deducted from the allowable wall signage area.

Within the COR2 district, where more conventional suburban development is expected, rather than the neo-traditional development planned for the other COR sub-districts, the following standards apply:

A. Wall, canopy or marquee sign. Total sign area may not exceed 15 percent of the front building facade. At least 50 percent of the signage area must be placed on the measured wall with remaining signage area, if desired, distributed on any other wall. Sign height shall not exceed the top of the parapet wall or, if no parapet wall, sign height shall not exceed the height of the eaves. The gross surface area of a wall, canopy or marquee sign may be increased by ten percent if such wall sign:

    1. Consists only of individual, outlined alphabetic, numeric and/or symbolic characters without background except that provided by the building surface to which the sign is to be affixed;

    2. Illumination, if any, is achieved through shielded illumination, shielded silhouette lighting, or shielded spot lighting but not any lighting where the light source is visible or exposed on the face or sides of the characters; and

    3. A wall, canopy or marquee sign may be located on the outermost wall of any principle building but shall not project more than 16 inches from the wall to which the sign is to be affixed. A wall sign shall not project higher than the parapet line of the wall to which the sign is to be affixed.

B. Window signs are restricted to 30 percent of the area of the window in which the sign is to be displayed.

In all COR sub-districts, restaurants and cafes shall be permitted one (1) wall-mounted display featuring the actual menu as used at the dining table, to be contained within a shallow wood or metal case and clearly visible through a glass front. The display case shall be attached to the building wall, next to the main entrance, at a height of approximately five feet (5’), shall not exceed a total area of two square feet, and may be lighted. This signage is allowed in addition to other permitted wall signage.

### Projecting Signs

Projecting signs are permitted within all COR sub-districts.

Projecting signs, including graphics or icon signs, mounted perpendicular to the building wall, are encouraged in all sub-districts, provided the following standards are met:




A. The sign area shall not exceed thirty-two (32) square feet.

B. The distance from the ground to the lower edge of the signboard shall be ten feet or greater.

C. The height of the top edge of the signboard shall not exceed the height of the wall from which the sign projects, if attached to a single story building, or the

height of the sill or bottom of any second story window, if attached to a multistory building.

D. The distance from the building wall to the signboard shall not exceed six inches (6”).

E. The width of the signboard shall not exceed three (3) feet.

F. Limited to one (1) sign per business. Projecting sign area shall be deducted from the allowable wall signage area.

G. Granted to ground floor commercial uses only.

### Awning Signs

Awning signs are allowed in all COR sub-districts. Awning signs are allowed for ground floor uses only, provided that the following standards are met:

A. If acting as the main business sign, it shall not exceed 24 square feet in area.

B. If acting as an auxiliary business sign, it shall be located on the valance only, shall not exceed four (4) square feet in area, and the height of the lettering, numbers, or graphics shall not exceed four inches (4”).

C. Limited to two such signs per business, per frontage.

D. If acting as the main business sign, it shall not be in addition to a wall-mounted or applied letter sign.

### Sandwich Board Signs

Sandwich board signs are permitted within all COR sub-districts.




A. One (1) sandwich board sign per business is permitted in any business, commercial and mixed use district and shall be located within five feet (5’) of the main building entrance to the business it advertises.

B. Sandwich board signs shall be displayed only during open business hours and must be removed daily.

C. Sandwich board signs shall be no more than a total of two feet (2’) in width and three feet (3’) in height

D. Sandwich board signs must leave a minimum of five feet (5') of clearance for pedestrian access if placed on a public or private sidewalk. Sandwich board signs may not hinder the ability of persons to access vehicles parked at the curb and/or access to a building.

E. Acceptable materials for sandwich board signs shall include the following: metal, wood synthetic materials such as a chalk board and whiteboard. Sandwich board signs shall not be illuminated, nor shall they contain moving parts, or have balloons, streamers, stringers, pennants or similar adornments attached to them. Sandwich board signs shall be maintained in a good appearance at all times.

F. No sandwich board sign shall be secured, tethered or installed on traffic devices, utility equipment, street furniture, street lights, or any other public fixture.

G. Sandwich board signs are temporary signs and shall not be counted towards the total sign area of the site for permanent signage.

### Temporary Signs

Temporary signs are allowed per Section 117-465 (Temporary signs) of the Zoning Ordinance, except as noted below:

A. Freestanding temporary signs shall only be allowed in the COR2 and COR3 Districts.

B. In all other COR districts, temporary signs shall be limited to temporary sandwich board signs or temporary wall signage, without interchangeable letters.

C. Real estate and leasing signs shall be exempt from temporary and permanent sign regulations, provided that these signs do not exceed thirty-two (32) square feet.

### Off-Site Signs

Off-site signs are prohibited except for wayfinding and community signage specifically allowed by the Design Framework.

**Table 2**

| Sign Standards | | | | | |
|---|---|---|---|---|---|
| Development Standard | **COR1** | **COR2** | **COR3** | **COR4** | **COR5** |
| Project Signs | | | | | |
| Number of signs allowed | 1* | 1* | 1* | 1* | 1* |
| Size of Sign (maximum) | 6 sq. ft./6 feet high*** | 100 sq. ft./6 feet high | 6 sq. ft./6 feet high*** | 6 sq. ft./6 feet high | 6 sq. ft./6 feet high |
| Menu Board** | N/A | 1 per drive-through lane/40 sq. ft. max. | N/A | N/A | N/A |
| Directional Sign | N/A | Per 117-463(I) | N/A | N/A | N/A |
| Wall Sign | | | | | |
| Number of signs allowed | 1* | 1* | 1* | 1* | 1* |
| Size of Sign | | | | | |
| Single Tenant Building | 15% of the ground floor façade area, -or- 15% of the front façade area when facing Highway 10. | 15% of façade area | 15% of the ground floor façade area, | 5% of the ground floor façade area, | 5% of the ground floor façade area, |
| Multi-Tenant Buildings | 15% of the façade area, | 15% of façade area | 15% of the façade area, | 15% of the façade area, | 15% of the façade area, |
| Building Facing Highway 10 | 15% of the façade area | 15% of façade area | 15% of the façade area | 15% of the façade area | 15% of the façade area |
| Window Sign | | | | | |
| Number of signs allowed | 1 | 1 | 1 | 1 | 1 |
| Size of Sign | 10% of area of window or 4 sq. ft., whichever is less. Deducted from allowable wall sign area. | 30% of area of window. Deducted from allowable wall sign area. | 10% of area of window or 4 sq. ft., whichever is less. Deducted from allowable wall sign area. | 10% of area of window or 4 sq. ft., whichever is less. Deducted from allowable wall sign area. | 10% of area of window or 4 sq. ft., whichever is less. Deducted from allowable wall sign area. |
| Directory Sign | | | | | |
| Number of signs allowed | 1 per building entrance | 1 per building entrance | 1 per building entrance | 1 per building entrance | 1 per building entrance |
| Size of Sign | 3 sq. ft. maximum | 3 sq. ft. maximum | 3 sq. ft. maximum | 3 sq. ft. maximum | 3 sq. ft. maximum |
| Projecting Sign | | | | | |
| Number of signs allowed | 1* | 1* | 1* | 1* | 1* |
| Size of Sign | 6 sq. ft./3 feet wide | 6 sq. ft./3 feet wide | 6 sq. ft./3 feet wide | 6 sq. ft./3 feet wide | 6 sq. ft./3 feet wide |
| Awning Sign | | | | | |
| Number of signs allowed | 2 per business | 2 per business | 2 per business | 2 per business | 2 per business |
| Size of Sign | 24 sq. ft./max. letter height 12-inches for main business sign or 4 sq. ft./max letter height 4-inces if auxiliary. Area is deducted from allowable wall sign area. | 24 sq. ft./max. letter height 12-inches for main business sign or 4 sq. ft./max letter height 4-inces if auxiliary. Area is deducted from allowable wall sign area. | 24 sq. ft./max. letter height 12-inches for main business sign or 4 sq. ft./max letter height 4-inces if auxiliary. Area is deducted from allowable wall sign area. | 24 sq. ft./max. letter height 12-inches for main business sign or 4 sq. ft./max letter height 4-inces if auxiliary. Area is deducted from allowable wall sign area. | 24 sq. ft./max. letter height 12-inches for main business sign or 4 sq. ft./max letter height 4-inces if auxiliary. Area is deducted from allowable wall sign area. |

*One (1) sign is allowed per street frontage (either wall or project)

**Restaurants and cafes in all districts are allowed one (1) wall mounted menu board not to exceed 2 sq. ft. in addition to other permitted wall signage.

***See Page 32, 'Project Signs' for allowances up to 32 square feet.

## Additional standards

A. Businesses with service entrances may identify these with one (1) wall-mounted or applied letter sign not exceeding two square feet.

B. One (1) directional sign, facing a rear parking lot. This sign may be any type of permitted sign other than a freestanding sign, but shall be limited to four (4) square feet in area.

## Creative Sign Standards

A. *Purpose.* This section establishes standards and procedures for the design, review, and approval of creative signs. The purposes of this creative sign program are to:

1. Encourage signs of unique design, and that exhibit a high degree of thoughtfulness, imagination, inventiveness, and spirit; and

2. Provide a process for the application of sign regulations in ways that will allow creatively designed signs that make a positive visual contribution to the overall image of the city, while mitigating the impacts of large or unusually designed signs.

B. *Applicability.* An applicant may request approval of a sign permit for a creative sign to authorize onsite signs that employ standards that differ from the other provisions of this chapter but comply with the provisions of this section.

C. *Application Requirements.* A sign permit application for a creative sign shall include all information and materials required by the City.

D. *Procedure.* A sign permit application for a creative sign shall be subject to review and approval by the City as part of the Site Plan review process. When the creative sign is proposed after site plan review is complete, a creative sign may be approved by the Zoning Administrator when the proposed sign is fifty square feet or less, and shall be approved by the City Council when the sign is larger than fifty square feet.

E. *Design Criteria.* In approving an application for a creative sign, the review authority shall ensure that a proposed sign meets the following design criteria:

1. Design Quality. The sign shall:
    a. Constitute a substantial aesthetic improvement to the site and shall have a positive visual impact on the surrounding area;
    b. Be of unique design, and exhibit a high degree of thoughtfulness, imagination, inventiveness, and spirit; and
    c. Provide strong graphic character through the imaginative use of graphics, color, texture, quality materials, scale, and proportion.

2. Contextual Criteria. The sign shall contain at least one (1) of the following elements:
    a. Classic historic design style;

b. Creative image reflecting current or historic character of the City;
c. Inventive representation of the use, name, or logo of the structure or business.

3. Architectural Criteria. The sign shall:
   a. Utilize or enhance the architectural elements of the building; and
   b. Be placed in a logical location in relation to the overall composition of the building's façade and not cover any key architectural features and details of the façade.

4. Neighborhood Impacts. The sign shall be located and designed not to cause light and glare impacts on neighboring residential uses.

### Prohibited signs

The following signs are prohibited:

A. Box signs or cabinet signs, whether on a wall, projecting or on canopies are prohibited except for logo signs permitted as part of an overall sign plan.

B. Signs employing mercury vapor, low pressure and high pressure sodium and metal halide lighting; plastic panel rear-lighted signs.

C. Signs on roofs, dormers, and balconies.

D. Billboards.

E. Signs painted or mounted upon the exterior side or rear walls on any principle or accessory building or structure, except as otherwise permitted hereunder.

F. Free standing pylon signs over six (6) feet in height, except community signs.

G. Back-lit awnings.

H. Interchangeable letter boards or panels.

I. Flashing signs.

J. Off-premises signs, except community signs.

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## Overall Framework – Stormwater Management

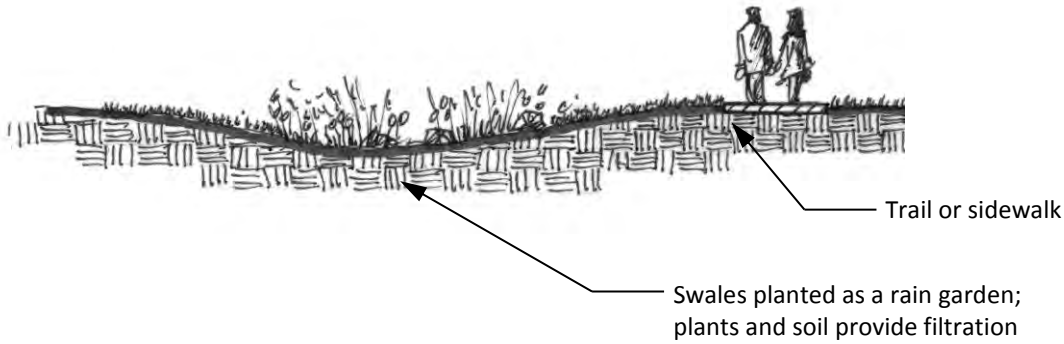
### Overview

Water features and drainage systems are essential components of The COR Master Plan. The mix of ponds, streams, fountains and other water elements will provide focal amenities and year round activities within the framework of an environmentally responsible, visually pleasing strategy to manage stormwater. Because the Mississippi River is a restricted discharge water of the state, and because we are creating a new discharge from this development, each sub-district and each site has a responsibility to utilize 'best management practices' (BMP) to pretreat run-off, reduce erosion and encourage infiltration, with the understanding that regional treatment will be provided. Water elements are not intended to be separate stand-alone features, but instead should be integrated with the variety of parks, trails and public open space proposed for The COR. Water and landscape should be designed and utilized within multipurpose areas that accommodate both active and passive recreational use.

### Objectives

Integration of water and landscape, design creativity, use of high quality materials and safety concerns are the critical objectives to be met – the following examples illustrate only a few of many possibilities:

- Innovative new products, such as special soil systems (Netlon, structural soils), pervious pavements for parking areas, storm ceptors, underground storage and other creative techniques should be used to BMP standards
- 'Green architecture', expressed through green roofs, gray water recycling and other techniques should be included to reduce the impact of new development on stormwater systems
- Water feature design should include both formal elements (such as reflecting pools or fountains) and natural/informal forms (such as ponds, streams, waterfalls) and should explore creative ways to integrate wetland/rain garden landscapes with active, urban spaces.




### Guideline Recommendations

This framework not only defines the overall role and character of The COR, but also encourages each development parcel to address the following:

- **Create** signature water features (ponds, pools, fountains, waterfalls, etc.) as major visual amenities throughout The COR
- **Promote** high quality, creative and appealing aesthetics for all system elements
- **Integrate** stormwater management components (meeting both water quality and quantity requirements)

A great deal of time and effort has gone into the calculation and design of a 'watershed-based' stormwater management plan to support COR development. While this overall strategy addresses the water quantity issue for the entire COR by providing storage and conveyance facilities for storm events, individual development projects (block-by-block) have an equal responsibility to meet water quality standards as a primary goal. Each project should integrate a variety of techniques, materials and methods to promote multiple use, maximum flexibility, improved aesthetics for parking areas, park spaces, drainage swales and other site features.

## Overall Framework – Parks/Public Spaces

### Overview

The overall design framework of The COR is based on a system of linked parks, trails and open space. The City of Ramsey, Anoka County, and to some extent, the State of Minnesota all play a role in local and regional parks programming, design review, construction sequencing, implementation and ultimately maintenance and operation of key public spaces within this framework. The goal is to link existing and proposed parks and trails defined in regional park plans with proposed new parks and trails within The COR. Of equal importance is the contribution from each block and each development project to this network of green, adding a variety of private, semi-private, and perhaps some additional public space throughout The COR. Private development will share the responsibility to provide inviting, innovative and useable green space as integral parts of individual parcel site design.

### Guideline Recommendations

The Design Framework encourages the following:



- Work with the City to create an integrated, comprehensive open space system that links with existing city and county trails and open space networks
- Encourage private development (block-by-block) to share in the responsibility to provide inviting, innovative and useable green space as integral parts of each development project
- Integrate stormwater management components (meeting water quality and quantity requirements) within both public / private park and open space improvements

Together, the system of public and semi-public green space will result in a welcoming public realm throughout the new community.

### Objectives

Based on the Development Master Plan for The COR, a variety of public and private green space is proposed including:

- Each block and each project will provide intentional, creative, innovative, useable green areas as integral components of site development and building design.
- At the individual block scale, small squares and greens will provide places for gathering and relaxation, especially targeted to meet the demands of adjacent, or nearby buildings. Elements such as gardens, gazebos and fountains should characterize these more intimate public spaces.
- At the neighborhood scale, parks will provide space for more active recreation, and should be flexible enough to accommodate a variety of recreational activities.
- Playgrounds, game fields and park buildings are park amenities that will target a wider user demand from the surrounding community.

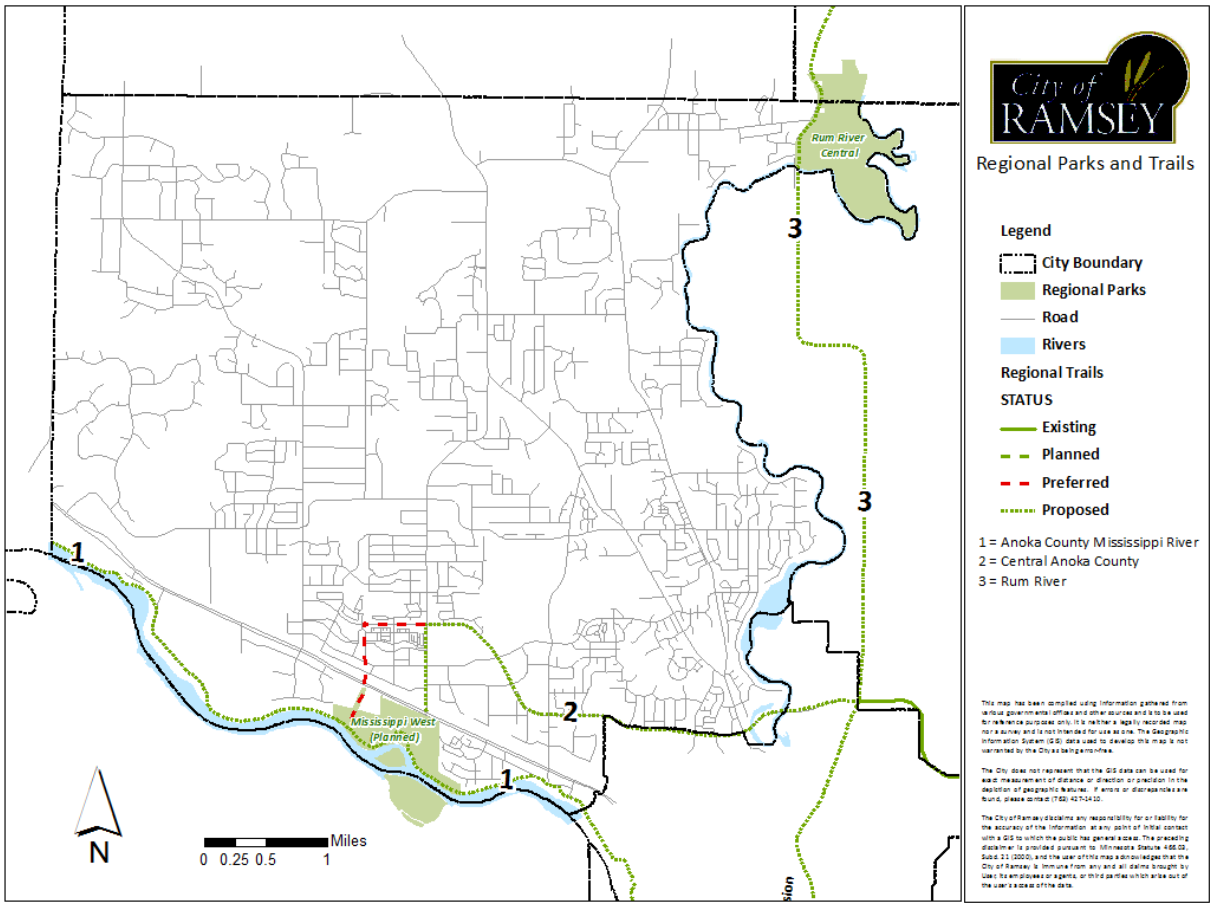


- The Municipal Plaza will connect with all other parks and open space elements, providing a focal point for activity and a sense of place. Gardens, public pavilions and shelters, play lots and open play fields are amenities that will provide built-in flexibility to meet the demands of both the local population and regional visitors to The COR.

## Regional Systems

The COR is the heart of several regional systems that are either located within or adjacent to The COR. These regional systems include the Northstar Commuter Rail, the Central Anoka County Regional Trail, the Mississippi West Regional Park, and the Mississippi River Trail.

A number of these systems have a pedestrian component. As such, Ramsey desires to locate the future Central Anoka County Regional Trail through the heart of The COR, along Center Street. The map below indicates Ramsey's preferred route for this trail. As this trail requires crossing Highway 10, it is imperative that a safe, grade-separated crossing is realized. This pedestrian overpass is envisioned to be connected to the Northstar Commuter Rail – Ramsey Station, and has been named the 'Mississippi Skyway'.



# Part Two: Sub-district Framework

## Overview

The Master Plan and Zoning Ordinance identify five (5) distinct sub-districts within The COR. Each of these sub-districts is defined by a unique mix of uses, specific site development patterns and perhaps a distinctive character or image. The sub-districts complement one another as part of the overall plan. The sub-districts are shown the attached Sub-district Map (**Error! Reference source not found.**). They include:

- **COR1 Mixed Use Core** – provides the broadest variety, highest density and greatest intensity of development, encouraging both vertical and horizontal mixed use
- **COR2 Commercial** – provides a location for larger scale retail and other auto-orientated commercial uses
- **COR3 Workplace** – provides a location for uses with high concentrations of employees, such as medical/technology related office, and other corporate or institutional uses
- **COR4 Neighborhood** – provides opportunities for a range of housing types from small lot single family to townhouse, to high density senior or rental apartment
- **COR5 Park and Open Space** – preserves environmental features and provides neighborhood/community amenities throughout The COR

Development plans must respond to the overall COR Design Framework described in Part One of this document, but also must address the following detailed framework standards for each sub-district. To further clarify and illustrate proposed features in the Master Plan, these sub-district guidelines are organized under the following categories:

- Public Realm / Streetscape Framework
- Site Design Framework
- Architectural Framework

In all cases, the sub-district framework must be applied in harmony with the overall COR framework and with other existing city, county, state codes, design criteria, plans and studies that support broader goals for regional growth and development. However, within each district, development standards shall be based, in part, on the street hierarchy established in The COR.

### Public Realm/Streetscape

A. The developer shall be responsible for construction of all streetscape improvements along adjacent streets. These improvements include all hardscape improvements, such as trails, sidewalks, benches, bike racks, etc., as well as street trees and other greenscape.

B. The landowner shall be responsible for maintenance of the streetscape improvements along adjacent streets. Such maintenance may be managed as part of a Special Service District (SSD) or similar.

### Plazas

A. All properties with principal buildings in excess of 30,000 square feet shall be required to have a public plaza space.

B. The public plaza space shall include benches, bike racks trash receptacles, lighting fixtures and other amenities to create a welcoming space for tenants of the building and members of the public.

C. These plaza spaces should be visible from the public street.

### Architecture

These architectural framework standards provide an important balance between design continuity, desirable variety and the notion that buildings should complement, and perhaps contrast, but not compete with one another. The lasting appeal of the final outcome must be grounded in the authenticity of the design and the acceptable level of 'messiness' that comes with creating a real downtown over time; 'faux' second floors, stage set or themed solutions, and large faceless buildings are not acceptable.




**Auto Versus Human Design: Providing rear alleys or side loaded garages enables the home to present itself to the street, which promotes sociability and walkability.**

## *Minimum Standards*

### Definitions

**Build to line**: The line at which construction of a building facade is to occur on a lot. The build to line provides a maximum setback for all building facades from the right-of-way or inside edge of the sidewalk, whichever is greater. The build to line applies to all facades abutting a street right of way. Build to line standards are based on the sub-district the parcel is located and the street in which the building is located upon.

**Setback**: The minimum required distance between a parking lot or the vertical wall of a building and a lot line. Setbacks are typically more flexible than build to lines and allow a building to be set further back from the lot line and street right-of-way.

### Requirements:

A. Additional development standards shall be defined within each sub-district.

B. Provide a diverse mix of materials, applied in a variety of proportions, exposures and detailing within a block, or along a street.

C. Buildings should be articulated to break up the mass of the building façade on all elevations. Large blank exterior walls shall be prohibited. Windows are encouraged to be used to break up the mass of the building. Rooflines and building elevations should be articulated to break up the mass of buildings. Buildings must be broken at a minimum of every fifty (50) feet. This variation can be accomplished through one (1) or more of the following:

1. Wall face variations (minimum depth of two (2) feet)
2. Pilasters or columns (minimum depth of two (2) feet)
3. Upper wall break in color and/or materials (minimum of 2/3 up the height of the wall)
4. Wainscot (minimum of four (4) feet high)
5. Canopies (minimum four (4) foot width)
6. Corner and demising wall or building separations



More Desirable

D. Each development application must list building materials, roofing materials and building colors on the plans. Building articulation, mechanical screening by architectural elements and design elements on all building elevations must be identified on the plans. The plans shall be subject to City review and approval to ensure that the design intent of the Framework has been met.



Less Desirable

E. Building materials shall be high-quality durable materials, such as glass, stone, brick, windows, canvas awnings, etc.

1. Use local sources if available
2. Siding is not allowed (vinyl, metal, wood) except as a complimentary use
3. Use clear or lightly tinted glass for all windows and doors – mirrored, reflective or highly tinted glazing is not acceptable
4. Metal and wood components are acceptable as a complimentary, not primary, building material
5. COR1 sub-district buildings shall be primarily brick or a comparable alternative and shall comprise a minimum of fifty (50%) percent of the non-glazed wall area

F. Residential development should provide variety within the subdivision to avoid monotony. Developers will include front porches and windows that face all streets. Corner units shall have more than one (1) window per side of building to help create a sense of place in the community and promote safety on the street.

G. Garage forward or “snout houses” are highly discouraged on all residential development as they dominate the view from the street and sidewalk.

H. All sides of buildings shall have an equal finish in terms of materials and general design.

I. The main entrance of each principal building must face the street. On corner lots, the main entrance may face either of the streets or be oriented to the corner. With buildings that have more than one (1) main entrance, only one (1) entrance must meet this requirement.



J. Building massing shall be oriented parallel to the street frontage of the lot.



K. Trash and recycling areas shall be designed internal to the building.

L. Provide recessed entries wherever possible.

M. Buildings shall have a base and top to the architecture.

N. Multi-story buildings are preferred in the COR1 sub-district, but occasional single story buildings are acceptable; single story buildings should not dominate any street frontage and should be a minimum of twenty (20) feet to the roofline.

O. Maximize glass openings for all ground level, street front façades – especially for retail, restaurant and other commercial uses – fifty (50%) minimum of total ground level façade, or demonstrate great design through other means.

P. Provide real window openings for all street facing façades above ground level in all districts–a minimum of forty (40%) percent of total façade.

Residential uses in COR4 and COR5 must also comply with the following:

*A. Location of main entrance*

1. A building must include a front porch or covered balcony/patio at all main entrances that face a street. The porch or stoop shall adjoin the main entrance and the main entrance shall be accessible from the porch.
2. The main entrance of each principal building must face the street. On corner lots, the main entrance may face either of the streets or be oriented to the corner. With buildings that have more than one (1) main entrance, only one (1) entrance must meet this requirement.



B. *Porches*: Porches used to satisfy the design criteria shall comply with the following:

1. Porches shall be covered by a solid roof. The roof shall not

be located more than 12 feet above the floor of the porch. If the roof of a required porch is developed as a deck or balcony, it may be flat.

2. The porch shall have minimum dimensions of 6 feet by 6 feet. (6' x 6'). For single-family detached dwelling units, the covered area provided by the porch must be at least forty-eight (48) square feet and a minimum of eight (8) feet wide. If the main entrance is for more than one (1) dwelling unit, the covered area provided by the porch must be at least sixty-three (63) square feet and a minimum of nine (9) feet wide.



C. *Covered balconies/patio:* The covered area must be at least forty-eight (48) square feet, a minimum of eight (8) feet wide, and no more than fifteen (15) feet above grade. The covered area must be accessible from the interior living space of the house.

D. *Openings between porch floor and ground:* Openings of more than one (1) foot between the porch floor and the ground must be covered with a solid material or lattice.



*E. Roofs*

1. *Slope:* Principal structures must have a roof that is sloped, with a pitch that is no flatter than six (6) units of horizontal run to twelve (12) units of horizontal rise.
2. *Architectural features:* The roof of a principal structure shall include the following architectural details:
   a. At least one (1) dormer facing the street. If only one (1) dormer is included, it shall be at least five (5) feet wide and shall be centered horizontally between each end of the front elevation. If more than one (1) dormer is provided, a dormer at least four (4) feet wide must be provided on each side of the front elevation; or
   b. A gabled end, or a gabled end of a roof projection, facing the street.
3. *Roof eaves:* Roof eaves must project from the building wall at least twelve (12) inches, measured horizontally, on at least the front and side elevations.

THE COR
AT RAMSEY
DISTRICT BOUNDARIES
BOUNDARY LABELS
NORTH
LANDFORM
From Site to Finish
Sub-District Map
Version 6.2
11/07/2012
RAMSEY BLVD.
ARMSTRONG BLVD.
US HIGHWAY 10
LAKE RAMSEY COMMONS
BUSINESS PARK
CITY HALL
FUTURE PEDESTRIAN OVERPASS
FUTURE RIVER CROSSING
WEST MISSISSIPPI REGIONAL PARK

## Sub-District Framework - COR1 Mixed Use Core

### Public Realm / Streetscape

Public realm and streetscape improvements define the character of The COR and create a memorable signature for the Mixed Use Core sub-district. This is the most urban of all sub-districts in The COR and will be developed with a very urban pattern. Great parks and great streets, encourage intensified levels of activity, support the proposed mix of uses, invite community gathering and accommodate special events throughout the year.

### Site Development

Framework standards that address building location, organization of space and parking options tend to focus on what can be measured – dimensions, setbacks, number of spaces and so on. But in addition to these issues, the Design Framework also describes the aesthetic qualities and design character of a preferred 'urban form' for the Mixed Use Core. The compact and higher density blocks that define this sub-district encourage a mix of uses, with a continuous built edge along street frontage. Innovative parking strategies support this mix, providing easy access to destination shopping, restaurant and entertainment venues. Together these elements will promote the core area as the center of activity – the place to see and be seen within The COR.

### Architecture

Buildings in the Mixed Use Core will play a major role in defining the overall character of The COR. The proposed mix of uses for this signature destination suggests the potential for a variety of building types, demanding creativity and innovation to highlight unique architecture, while knitting the entire sub-district together as a coherent whole. Overall building design is an important consideration, but emphasis on first floor façade treatments is essential to encourage street-level activity and enhance the pedestrian experience. Architecture to be '4-sided' at all locations visible to public areas. Emphasis will be on great design along public street frontage.

Table 3

| COR1 Development Standards | Arterial Street | Destination Street | Parkway | Connector Street | Downtown Street | Local Street |
|---|---|---|---|---|---|---|
| Minimum lot size | None | None | None | None | None | None |
| Minimum lot width | 20 feet | 20 feet | 20 feet | 20 feet | 20 feet | 20 feet |
| Minimum lot depth | 80 feet | 80 feet | 80 feet | 80 feet | 80 feet | 80 feet |
| Allowable residential density in dwelling units per acre [1] | >15 DU/AC | >15 DU/AC | >15 DU/AC | >15 DU/AC | >15 DU/AC | >15 DU/AC |
| Minimum floor area ratio (FAR) for nonresidential uses/vertically mixed buildings/sites | .75 | .75 | .75 | .75 | .75 | .75 |
| Build to Line | | | | | | |
| Front yard[4] | 30 feet as measured from building front to right-of-way[2][3] (60% of front facade w/in max.) | 5 feet as measured from building front to right-of-way[2] (60% of front facade w/in max.) | 5 feet as measured from building front to right-of-way[2] (60% of front facade w/in max.) | 5 feet as measured from building front to right-of-way[2] (60% of front facade w/in max.) | 5 feet as measured from building front to right-of-way[2] (60% of front facade w/in max.) | 5 feet as measured from building front to right-of-way[2] (60% of front facade w/in max.) |
| Side yard | no req. | no req. | no req. | no req. | no req. | no req. |
| Rear yard | no req. | no req. | no req. | no req. | no req. | no req. |
| Driveway length (minimum) | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units |
| Building height (min. - max.) | 2 - 5 stories. | 2 - 5 stories. | 2 - 5 stories. | 2 - 5 stories. | 2 - 5 stories. | 2 - 5 stories. |
| Planter Style | N/A | Planter Bed | Boulevard Sod | Boulevard Sod | N/A | Boulevard Sod |
| Tree Spacing (on center) | N/A | 35 feet | 35 feet | 35 feet | 35 feet | 35 feet |
| Boulevard Width | N/A | 6 feet | 6 feet | 6 feet | N/A | 6 feet |
| Sidewalk Width | 10 feet | 10 feet | 6 feet | 10 feet | 10 feet | 10 feet |

1. Residential density is based on the net area of the parcel in question for parcels. In the event that public open space that is not dedicated to the City is developed independently of any particular residential project, the land area of the open space shall be divided equally among those abutting projects for purposes of density calculations.
2. Build to line shall be measured from building front to edge of right-of-way, or edge of sidewalk easement as defined by the City and said sidewalk must be encumbered by a sidewalk easement recorded with the office of the Anoka County Recorder.
3. The City may approve up to a 60-foot setback if it finds that topography or other factors require that a building be set back further to achieve acceptable grades or buffer between the street, the site entrance and the building.
4. In order to address vision clearance standards on higher speed roadways, parcels that are located at an intersection with an arterial roadway are allowed a build-to line of 35 feet from both streets.

A. At least sixty (60%) percent of street frontage of any lot shall be occupied by building facades meeting this build-to-line. On lots with more than one (1) street frontage, the build to line shall apply on each side fronting a street. An enclosed open area plaza space or outdoor seating with a decorative wall with a minimum height of three feet (3') and a maximum of four and one-half feet (4 ½') can be used to meet the sixty (60%) percent street frontage requirement.

B. Screening Of Parking Areas: Wherever a surface parking area faces a street frontage, such frontage shall be screened with a decorative wall, railing, hedge, or a combination of these elements, to a minimum height of three feet (3') and a maximum height of four and one-half feet ($4^1/_2$') above the level of the parking lot, at the build-to line. This screening may be broken into sections along the street edge provided it meets the sixty (60%) percent required.

## Sub-District Framework - COR2 Commercial

### Public Realm / Streetscape

While the Commercial Sub-district encourages a mix of large and small floor plates accommodating auto-oriented uses, this suggests even greater attention be paid to public realm and streetscape improvements that not only accommodate vehicles, but also invite bicycle and pedestrian traffic. Surface parking lots provide convenient access to storefronts, but present an additional challenge to the overall visual character and aesthetic appeal of this area. While no large public parks are identified for this sub-district, small pocket parks, squares or other gathering spaces are encouraged. A consistent, attractive streetscape is also essential.

### Site Development

Site Design Framework for this sub-district focus on a unique opportunity to recast typical commercial development patterns into a contemporary and innovative strategy that responds to overall objectives for The COR. Specifically, this suggests that the majority of buildings front on the primary through streets, with parking and service areas on the side or in the back, away from view. However, the market realities suggest that the types of auto-oriented users in this district will have the potential for larger parking fields and drive-throughs that will make a true urban model challenging. The City will hold all users to this design vision while modifying the COR2 standards slightly to accommodate these types of more typical suburban land uses. A mix of uses within individual blocks, including retail, restaurant and residential, further enhances this model, addresses design character/aesthetics and promotes activity throughout much of the day and evening hours.

### Architecture

Buildings in the Commercial Sub-district make a significant contribution to first impressions of The COR. Buildings form gateways at the major entries into the site, architectural elements and choice of materials convey a certain character and the scale or massing of structures begins to define the feel or experience of this place. These are not just 'commodity' buildings, but instead should raise the bar in terms of overall design and specific details that make The COR unique, inviting and memorable. Architecture to be '4-sided' at all locations visible to public areas. Emphasis will be on great design along public street frontage.

Table 4

| COR2 Development Standards | Arterial Street | Destination Street | Parkway | Connector Street | Downtown Street | Local Street |
|---|---|---|---|---|---|---|
| Minimum lot size | None | None | None | None | None | None |
| Minimum lot width | 80 feet | 80 feet | 80 feet | 80 feet | 80 feet | 80 feet |
| Minimum lot depth | 100 feet | 100 feet | 100 feet | 100 feet | 100 feet | 100 feet |
| Allowable residential density in dwelling units per acre [1] | >15 DU/AC | >15 DU/AC | >15 DU/AC | >15 DU/AC | >15 DU/AC | >15 DU/AC |
| Build to Line | | | | | | |
| Front yard[4] | 30 feet as measured from building front to right-of-way[2][3] (40% of front facade w/in max.) | 15 feet as measured from building front to right-of-way[2] (40% of front facade w/in max.) | 30 feet as measured from building front to right-of-way[2][3] (40% of front facade w/in max.) | 15 feet as measured from building front to right-of-way[2] (40% of front facade w/in max.) | 15 feet as measured from building front to right-of-way[2] (40% of front facade w/in max.) | 15 feet as measured from building front to right-of-way[2] (40% of front facade w/in max.) |
| Side yard | no req. | no req. | no req. | no req. | no req. | no req. |
| Rear yard | no req. | no req. | no req. | no req. | no req. | no req. |
| Driveway length (minimum) | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units |
| Building height (min. - max.) | 1-4 stories. | 1-4 stories. | 1-4 stories. | 1-4 stories. | 1-4 stories. | 1-4 stories. |
| Planter Style | N/A | Boulevard Sod | Boulevard Sod | Boulevard Sod | N/A | Boulevard Sod |
| Tree Spacing (on center) | N/A | 35 feet | 35 feet | 35 feet | 35 feet | 35 feet |
| Boulevard Width | N/A | 6 feet | 6 feet | 6 feet | N/A | 6 feet |
| Sidewalk Width | 10 feet | 6 feet | 6 feet | 10 feet | 10 feet | 10 feet |

1. Residential density is based on the net area of the parcel in question for parcels. In the event that public open space that is not dedicated to the City is developed independently of any particular residential project, the land area of the open space shall be divided equally among those abutting projects for purposes of density calculations.
2. Build to line shall be measured from building front to edge of right-of-way, or edge of sidewalk easement as defined by the City and said sidewalk must be encumbered by a sidewalk easement recorded with the office of the Anoka County Recorder.
3. The City may approve up to a 60-foot setback if it finds that topography or other factors require that a building be set back further to achieve acceptable grades or buffer between the street, the site entrance and the building.
4. In order to address vision clearance standards on higher speed roadways, parcels that are located at an intersection with an arterial roadway are allowed a build-to line of 35 feet from both streets.

A. At least forty (40%) percent of street frontage of any lot shall be occupied by building facades meeting this build-to-line. On lots with more than one (1) street frontage, the build to line shall apply only to one (1) street frontage.
   1. An enclosed open area plaza space or outdoor seating with a decorative wall with a minimum height of three feet (3') and a maximum of four and one-half feet (4 ½') can be used to meet the forty (40%) percent street frontage requirement.
   2. The City may approve a variation from the required build to line if the applicant provides a street edge consisting of fencing, decorative wall and/or landscaping with a minimum height of three feet (3') and a maximum of four and one-half feet (4 ½') can be used to meet the forty (40%) percent street frontage requirement.

B. Screening Of Parking Areas: Wherever a surface parking area faces a street frontage, such frontage shall be screened with a decorative wall, railing, hedge, or a combination of these elements, to a minimum height of three feet (3') and a maximum height of four and one-half feet ($4^1/_2$') above the

level of the parking lot, at the build-to line. This screening may be broken into sections along the street edge provided it meets the forty (40%) percent required on all street frontages.

## Sub-District Framework - COR3 Workplace

### Public Realm/Streetscape

The Workplace Sub-district also encourages a mix of large and small floor plate buildings, but instead of commercial or entertainment, this area of The COR is dominated by office and institutional uses. With opportunities for corporate or medical campus development comes the attendant auto-related infrastructure – easy access, bigger streets and large surface parking lots. Once again, this suggests that equal attention be paid to public realm and streetscape improvements that not only accommodate vehicles, but also invite bicycle and pedestrian traffic. The Draw, an active, neighborhood scale, recreational play space has been included in this sub-district, but small pocket parks, squares or other gathering places are also encouraged. In addition, streetscape improvements provide an important public amenity and inviting pedestrian connection to adjacent sub-districts.

### Site Development

The mix of medical, office, institutional and other uses in this sub-district suggest the potential for a campus-like arrangement of buildings on some blocks. These blocks would tend to be more internally oriented than in other districts, with driveways, parking lots, courtyards and walkway connections in the center, ringed by buildings around the outside. Buildings would still face adjacent streets, with both primary and secondary entries provided to animate these important façades, particularly along Ramsey Boulevard, Sunwood Drive and Rhinestone Street. While the Workplace sub-district also encourages mixed use, this desired development objective will likely occur mostly within blocks, not within individual buildings as seen in other districts.

### Architecture

Buildings in the Workplace Sub-district also make a significant contribution to first impressions as people enter The COR via Highway 10, Ramsey Boulevard and Sunwood Drive. Buildings form gateways at the major entries into the site, architectural elements and choice of materials convey quality and permanence, and the scale or massing of structures begins to define the feel and character of this place. The proposed mix of uses within this sub-district suggest a variety of potential building types – blending medical campus with small office, storefront and some housing -- demands design creativity and innovation to highlight unique architecture, and knit the entire sub-district together as a coherent whole. Architecture to be '4-sided' at all locations visible to public areas. Emphasis will be on great design along public street frontage.

Table 5

| COR3 Development Standards | Arterial Street | Destination Street | Parkway | Connector Street | Downtown Street | Local Street |
|---|---|---|---|---|---|---|
| Minimum lot size | None | None | None | None | None | None |
| Minimum lot width | 40 feet | 40 feet | 40 feet | 40 feet | 40 feet | 40 feet |
| Minimum lot depth | 80 feet | 80 feet | 80 feet | 80 feet | 80 feet | 80 feet |
| Allowable residential density in dwelling units per acre [(1)] | none | none | none | none | none | none |
| Minimum floor area ratio (FAR) for nonresidential uses/vertically mixed buildings/sites | .25 | .25 | .25 | .25 | .25 | .25 |
| Build to Line | | | | | | |
| Front yard[(4)] | 30 feet as measured from building front to right-of-way[(2)(3)] (60% of front facade w/in max.) | 15 feet as measured from building front to right-of-way[(2)] (60% of front facade w/in max.) | 15 feet as measured from building front to right-of-way[(2)] (60% of front facade w/in max.) | 15 feet as measured from building front to right-of-way[(2)] (60% of front facade w/in max.) | 15 feet as measured from building front to right-of-way[(2)] (60% of front facade w/in max.) | 15 feet as measured from building front to right-of-way[(2)] (60% of front facade w/in max.) |
| Side yard | no req. | no req. | no req. | no req. | no req. | no req. |
| Rear yard | no req. | no req. | no req. | no req. | no req. | no req. |
| Driveway length (minimum) | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units |
| Building height (min. - max.) | 2 - 4 stories. | 2 - 4 stories. | 2 - 4 stories. | 2 - 4 stories. | 2 - 4 stories. | 2 - 4 stories. |
| Planter Style | N/A | Planter Bed | Boulevard Sod | Boulevard Sod | N/A | Boulevard Sod |
| Tree Spacing (on center) | N/A | 35 feet | 35 feet | 35 feet | 35 feet | 35 feet |
| Boulevard Width | N/A | 6 feet | 6 feet | 6 feet | N/A | 6 feet |
| Sidewalk Width | 10 feet | 10 feet | 6 feet | 10 feet | 10 feet | 10 feet |

1. Residential density is based on the net area of the parcel in question for parcels. In the event that public open space that is not dedicated to the City is developed independently of any particular residential project, the land area of the open space shall be divided equally among those abutting projects for purposes of density calculations.
2. Build to line shall be measured from building front to edge of right-of-way, or edge of sidewalk easement as defined by the City and said sidewalk must be encumbered by a sidewalk easement recorded with the office of the Anoka County Recorder.
3. The City may approve up to a 60-foot setback if it finds that topography or other factors require that a building be set back further to achieve acceptable grades or buffer between the street, the site entrance and the building.
4. In order to address vision clearance standards on higher speed roadways, parcels that are located at an intersection with an arterial roadway are allowed a build-to line of 35 feet from both streets.

A. At least sixty (60%) percent of street frontage of any lot shall be occupied by building facades meeting this build-to-line. On lots with more than one (1) street frontage, the build to line shall apply on each side fronting a street. An enclosed open area plaza space or outdoor seating with a decorative wall with a minimum height of three feet (3') and a maximum of four and one-half feet (4 ½') can be used to meet the sixty (60%) percent street frontage requirement.

B. Screening Of Parking Areas: Wherever a surface parking area faces a street frontage, such frontage shall be screened with a decorative wall, railing, hedge, or a combination of these elements, to a minimum height of three feet (3') and a maximum height of four and one-half feet ($4^1/_2$') above the level of the parking lot, at the build-to line. This screening may be broken into sections along the street edge provided it meets the sixty (60%) percent required.

## Sub-District Framework - COR4 Neighborhood

### Public Realm/Streetscape

Two prominent public parks supply much of the informal green space for The COR, and more specifically, provide the valuable park frontage and mix of amenities needed to support housing development within the Neighborhood Sub-district. North Commons surrounds an existing wetland and provides open space for year-round activities including a proposed sledding hill. The sub-district is adjacent to The Draw, which is characterized by wetlands, ponds and a meandering stream channel surrounded by gently sloping hills. Other park features include active and passive recreation areas, natural and manicured landscapes, education and interpretation opportunities, pedestrian and bicycle trails and many other amenities. Tree-lined streets connect these parks to surrounding residential neighborhoods and to nearby parks and amenities throughout The COR.

### Site Development

The Neighborhood Sub-district emphasizes residential development. To support the proposed mix of housing, a framework of streets and blocks, based on the traditional grid system, encourages compact development patterns with increasing densities closer to the heart of The COR. Typical blocks either front onto signature parks or include some private green space within the site; many blocks have both. The arterial streets that frame this property, including Ramsey, Armstrong and Bunker Lake Boulevards, provide an important 'face' for this sub-district. Residential front doors will connect with public walks along each of these streets promoting the urban character of The COR.

### Architecture

The largest in terms of overall acreage, the Neighborhood Sub-district will define the character and quality of the entire northern half of The COR property. With prominent street frontage along most of the major thoroughfares that serve this site, the variety of choices for building type, architectural style and design detailing are crucial decisions that together will promote a safe and attractive residential neighborhood. Integrating contemporary and traditional styles is also an important consideration, central to the notion that a unique and creative model for housing development will be a signature for The COR. Architecture to be '4-sided' at all locations visible to public areas. Emphasis will be on great design along public street frontage.

Table 6

| COR4 Development Standards | Arterial Street | Destination Street | Parkway | Connector Street | Downtown Street | Local Street |
|---|---|---|---|---|---|---|
| Minimum lot size | None | None | None | None | None | None |
| Minimum lot width | 20 feet | 20 feet | 20 feet | 20 feet | 20 feet | 20 feet |
| Minimum lot depth | 80 feet | 80 feet | 80 feet | 80 feet | 80 feet | 80 feet |
| Allowable residential density in dwelling units per acre [1] | 4-15 DU/AC | 4-15 DU/AC | 4-15 DU/AC | 4-15 DU/AC | 4-15 DU/AC | 4-15 DU/AC |
| Minimum floor area ratio (FAR) for nonresidential uses/vertically mixed buildings/sites | .25 | .25 | .25 | .25 | .25 | .25 |
| Build to Line | | | | | | |
| Front yard[4] | 30 feet as measured from building front to right-of-way[2][3] (60% of front facade w/in max.) | 20 feet as measured from building front to right-of-way[2] (60% of front facade w/in max.) | 20 feet as measured from building front to right-of-way[2] (60% of front facade w/in max.) | 20 feet as measured from building front to right-of-way[2] (60% of front facade w/in max.) | 20 feet as measured from building front to right-of-way[2] (60% of front facade w/in max.) | 20 feet as measured from building front to right-of-way[2] (60% of front facade w/in max.) |
| Side yard | no req. | no req. | no req. | no req. | no req. | no req. |
| Rear yard | no req. | no req. | no req. | no req. | no req. | no req. |
| Driveway length (minimum) | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units | 25 feet for residential units |
| Building height (min. - max.) | 1-4 stories. | 1-4 stories. | 1-4 stories. | 1-4 stories. | 1-4 stories. | 1-4 stories. |
| Planter Style | N/A | Planter Bed | Boulevard Sod | Boulevard Sod | N/A | Boulevard Sod |
| Tree Spacing (on center) | N/A | 35 feet | 35 feet | 35 feet | 35 feet | 35 feet |
| Boulevard Width | N/A | 6 feet | 6 feet | 6 feet | N/A | 6 feet |
| Sidewalk Width | 10 feet | 10 feet | 6 feet | 10 feet | 10 feet | 10 feet |

1. Residential density is based on the net area of the parcel in question for parcels. In the event that public open space that is not dedicated to the City is developed independently of any particular residential project, the land area of the open space shall be divided equally among those abutting projects for purposes of density calculations.
2. Build to line shall be measured from building front to edge of right-of-way, or edge of sidewalk easement as defined by the City and said sidewalk must be encumbered by a sidewalk easement recorded with the office of the Anoka County Recorder.
3. The City may approve up to a 60-foot setback if it finds that topography or other factors require that a building be set back further to achieve acceptable grades or buffer between the street, the site entrance and the building.
4. In order to address vision clearance standards on higher speed roadways, parcels that are located at an intersection with an arterial roadway are allowed a build-to line of 35 feet from both streets.

A. Screening Of Parking Areas: Wherever a surface parking area faces a street frontage, such frontage shall be screened with a decorative wall, railing, hedge, or a combination of these elements, to a minimum height of three feet (3') and a maximum height of four and one-half feet ($4^1/_2$') above the level of the parking lot, at the build-to line. This screening may be broken into sections along the street edge provided it meets the sixty (60%) percent required.

## Sub-District Framework - COR5 Parks & Open Space

### Public Realm/Streetscape

The overall structure of The COR is based on a system of linked parks, trails and open space. This includes existing and proposed parks and trails defined in city and regional parks plans, joined with new parks and trails within The COR. Of equal importance is the contribution from each block and each development project to this green structure, adding a variety of private, semi-private and perhaps some additional public space throughout each sub-district. Great strolling streets provide connections between commercial, workplace, entertainment and residential neighborhoods and encourage shared use for cars, pedestrians and bicycles.

### Site Development

The COR Master Plan illustrates a strong framework of green space, including a mix of public parks, destination amenities, courtyards, commons and other features. As a key component of the overall plan, this integrated system of parks, trails and open space provides the framework around which all other land uses are organized. Placemaking and connectivity are important site development considerations, linking each block and each sub-district with major public spaces nearby and with many other amenities and attractions in The COR.

### Architecture

There are numerous opportunities to include buildings and other structures as significant design features within the proposed parks, trails and open space system for The COR. These could range from simple picnic shelters and landscaped arbors to more complex park buildings that might contain meeting rooms, rest rooms, storage areas and other facilities. Design of these important buildings should respond to the specific setting and landscape features in each park, and complement the overall character and quality of buildings located within surrounding blocks.  Additionally, limited retail is planned along the perimeter of the park.

Table 7

| COR5 Development Standards | Arterial Street | Destination Street | Parkway | Connector Street | Downtown Street | Local Street |
|---|---|---|---|---|---|---|
| Minimum lot size | 0.5 | N/A | 0.5 | 0.5 | 0.5 | 0.5 |
| Minimum lot width | N/A | N/A | N/A | N/A | N/A | N/A |
| Minimum lot depth | N/A | N/A | N/A | N/A | N/A | N/A |
| Allowable residential density in dwelling units per acre [(1)] | N/A | N/A | N/A | N/A | N/A | N/A |
| Minimum floor area ratio (FAR) for nonresidential uses/vertically mixed buildings/sites | N/A | N/A | N/A | N/A | N/A | N/A |
| Build to Line | | | | | | |
| Front yard[(4)] | 30 feet as measured from building front to right-of-way[(2)(3)] (60% of front facade w/in max.) | N/A | 10 feet as measured from building front to right-of-way[(2)] (60% of front facade w/in max.) | 10 feet as measured from building front to right-of-way[(2)] (60% of front facade w/in max.) | 10 feet as measured from building front to right-of-way[(2)] (60% of front facade w/in max.) | 10 feet as measured from building front to right-of-way[(2)] (60% of front facade w/in max.) |
| Side yard | no req. | N/A | no req. | no req. | no req. | no req. |
| Rear yard | no req. | N/A | no req. | no req. | no req. | no req. |
| Driveway length (minimum) | 25 feet | N/A | 25 feet | 25 feet | 25 feet | 25 feet |
| Building height (min. - max.) | 1-2 stories. | N/A | 1-2 stories. | 1-2 stories. | 1-2 stories. | 1-2 stories. |
| Planter Style | N/A | N/A | Boulevard Sod | Boulevard Sod | N/A | Boulevard Sod |
| Tree Spacing (on center) | N/A | N/A | 35 feet | 35 feet | 35 feet | 35 feet |
| Boulevard Width | N/A | N/A | 6 feet | 6 feet | N/A | 6 feet |
| Sidewalk Width | 10 feet | N/A | 6 feet | 10 feet | 10 feet | 10 feet |

1. Residential density is based on the net area of the parcel in question for parcels. In the event that public open space that is not dedicated to the City is developed independently of any particular residential project, the land area of the open space shall be divided equally among those abutting projects for purposes of density calculations.
2. Build to line shall be measured from building front to edge of right-of-way, or edge of sidewalk easement as defined by the City and said sidewalk must be encumbered by a sidewalk easement recorded with the office of the Anoka County Recorder.
3. The City may approve up to a 60-foot setback if it finds that topography or other factors require that a building be set back further to achieve acceptable grades or buffer between the street, the site entrance and the building.
4. In order to address vision clearance standards on higher speed roadways, parcels that are located at an intersection with an arterial roadway are allowed a build-to line of 35 feet from both streets.

A. Where commercial buildings are planned, at least sixty (60%) percent of street frontage of any lot shall be occupied by building facades meeting this build-to-line. On lots with more than one (1) street frontage, the build to line shall apply on each side fronting a street. An enclosed open area plaza space or outdoor seating with a decorative wall with a minimum height of three feet (3') and a maximum of four and one-half feet (4 ½') can be used to meet the sixty (60%) percent street frontage requirement.

B. Screening Of Parking Areas: Wherever a surface parking area faces a street frontage, such frontage shall be screened with a decorative wall, railing, hedge, or a combination of these elements, to a minimum height of three feet (3') and a maximum height of four and one-half feet ($4^1/_2$') above the level of the parking lot, at the build-to line. This screening may be broken into sections along the street edge provided it meets the sixty (60%) percent required.

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# Implementation

## Introduction

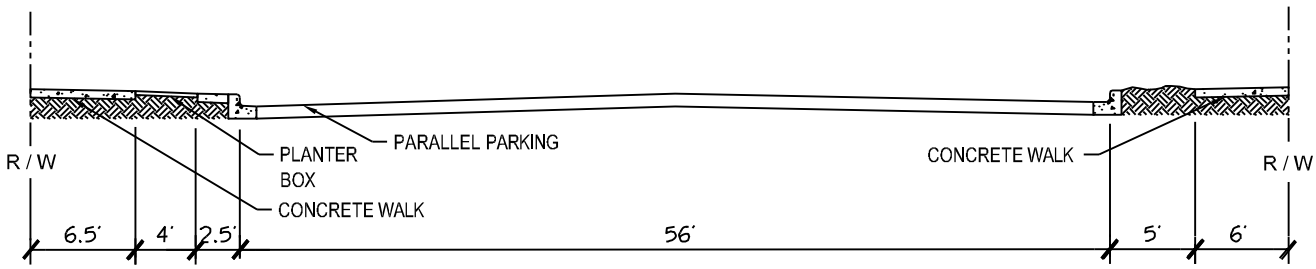
This framework provides distinct strategies for guiding The COR's form and appearance. This framework's vision for the COR will take several years to implement. Successful implementation will require consistent application of the Design Framework by City staff. Zoning enforcement and design framework standards will not succeed without the cooperation and commitment of landowners, development interests, and the rest of the community.

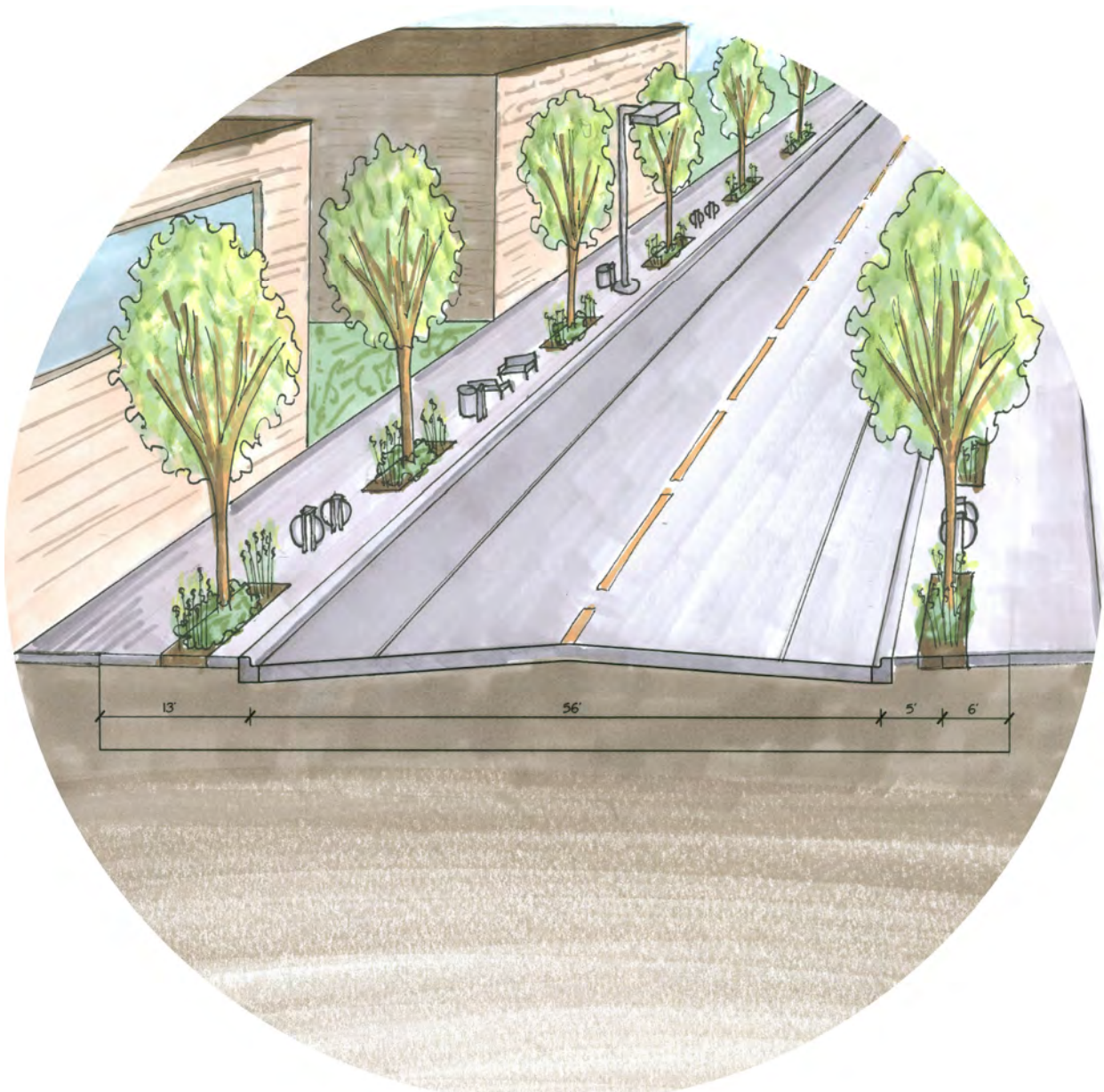
## Design Review

The Design Framework will be administered by staff as part of the development review process. Staff will incorporate design review to ensure compliance with the Design Framework as a standard step in the development review process.

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# APPENDIX A:
# SPECIFICATIONS AND DETAILS



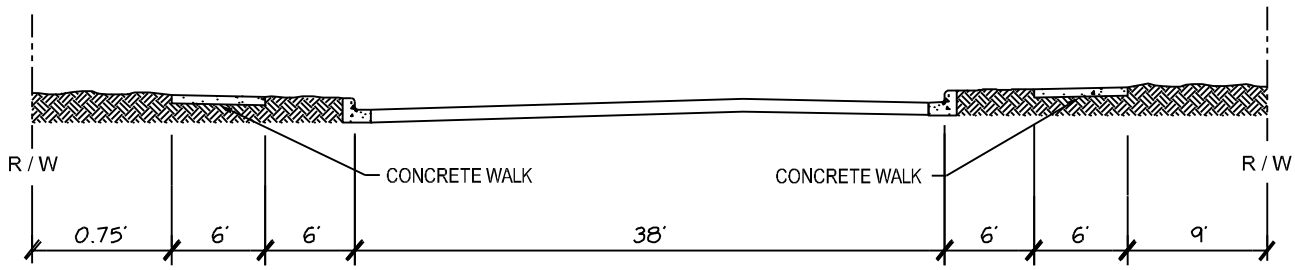



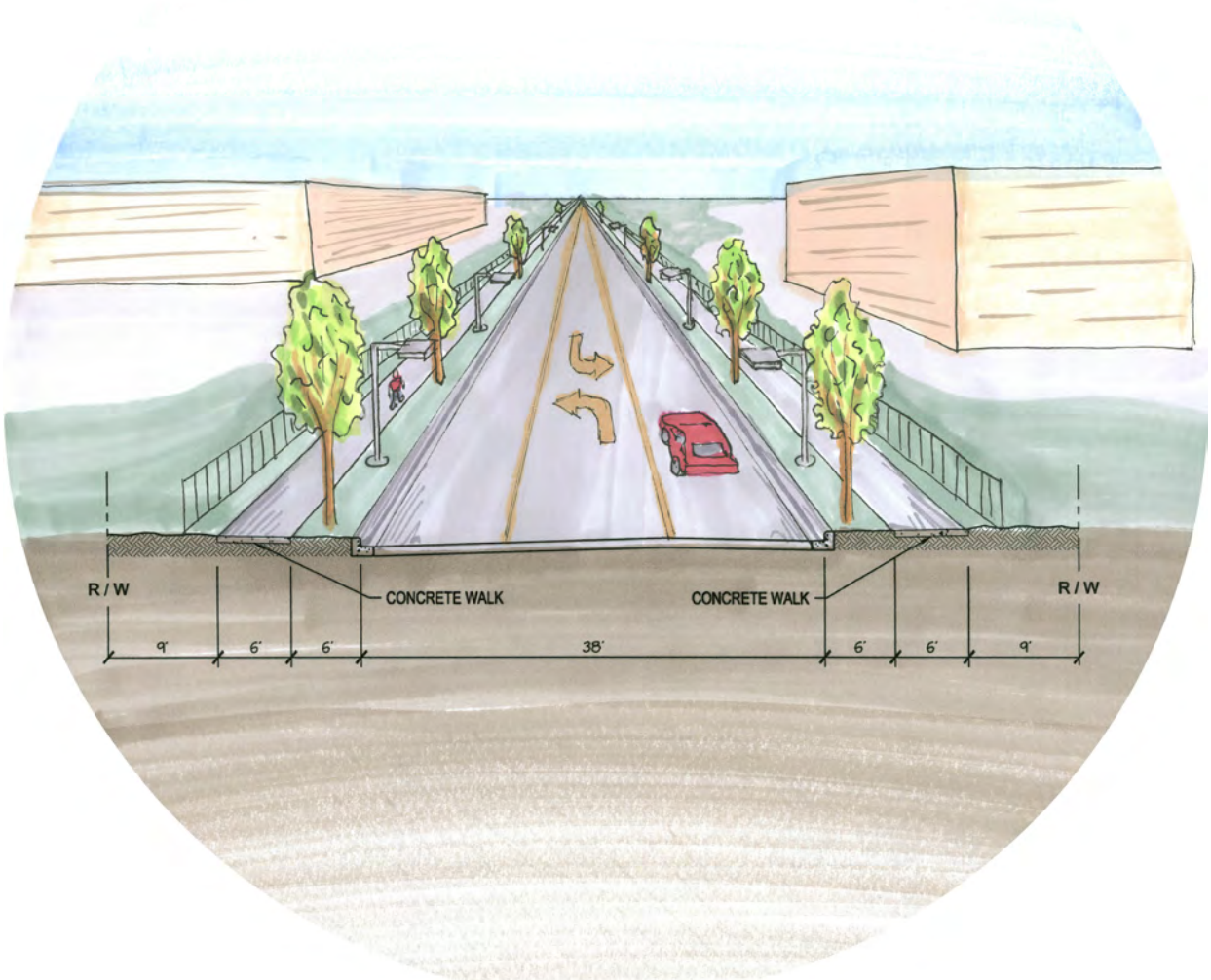

LANDFORM
From Site to Finish

# DESIGN FRAMEWORK
## The COR at Ramsey

PERSPECTIVE SECTION #1
Sunwood Dr. East of Zeolite St.

THE COR
RAMSEY, MINNESOTA



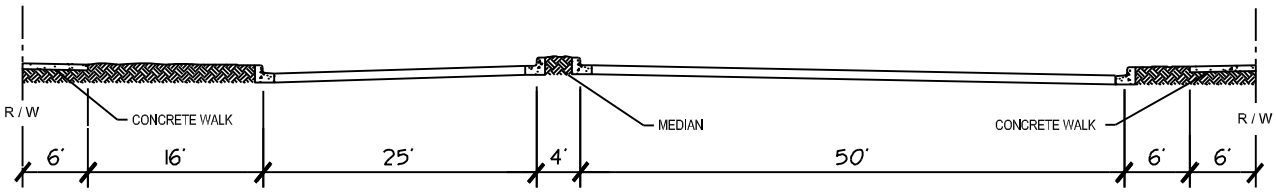



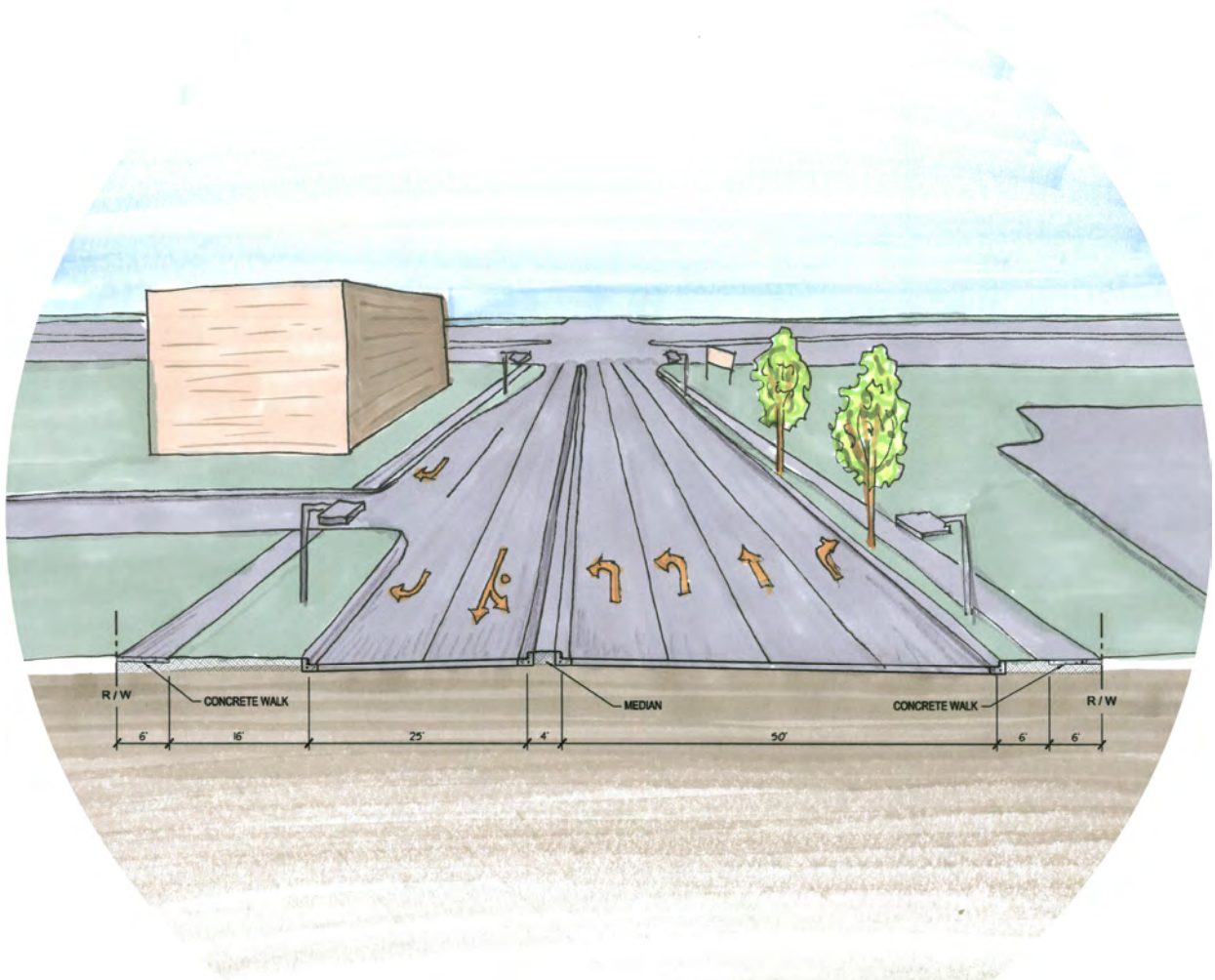

LANDFORM
From Site to Finish

# DESIGN FRAMEWORK
## The COR at Ramsey

PERSPECTIVE SECTION #2
Sunwood Dr. West of Zeolite St.

THE COR
RAMSEY, MINNESOTA



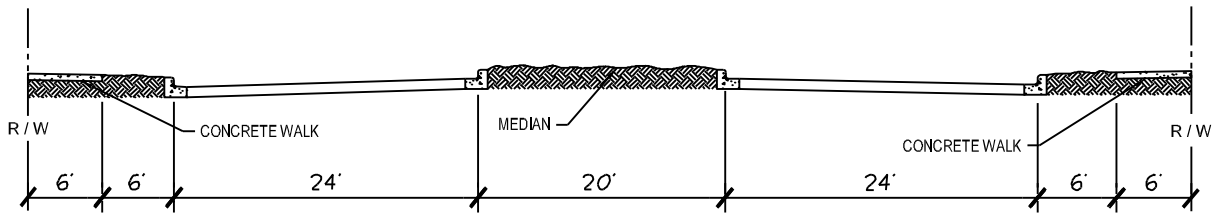



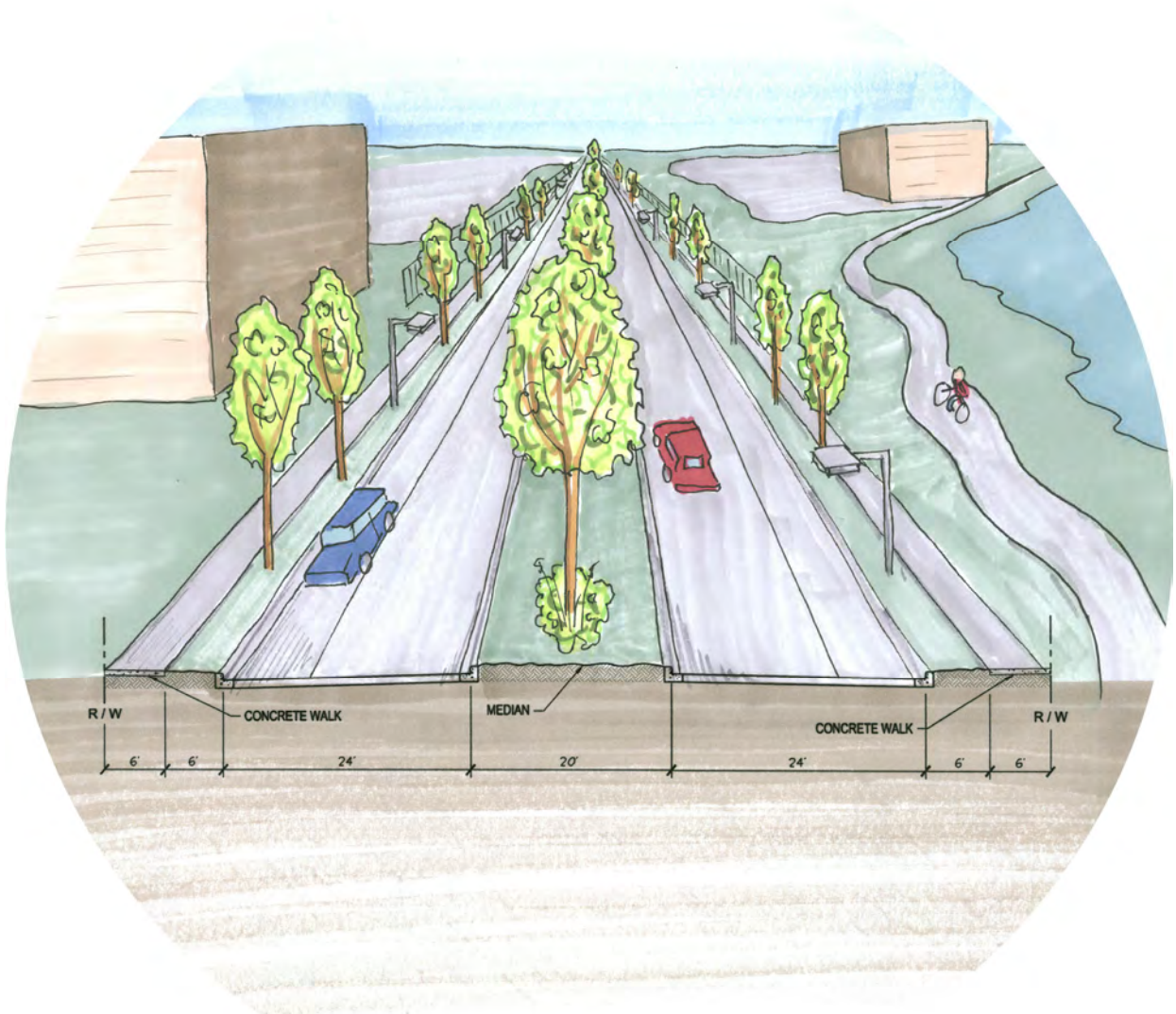

LANDFORM
From Site to Finish

# DESIGN FRAMEWORK
## The COR at Ramsey

PERSPECTIVE SECTION #3
Ramsey Pkwy. West of Roundabout

THE COR
RAMSEY, MINNESOTA



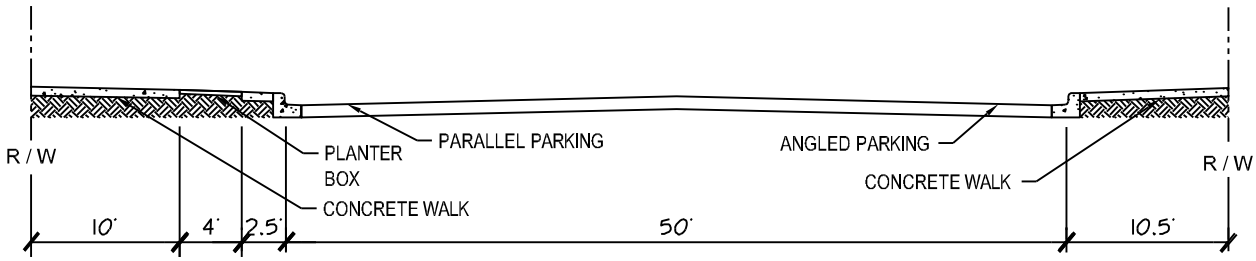



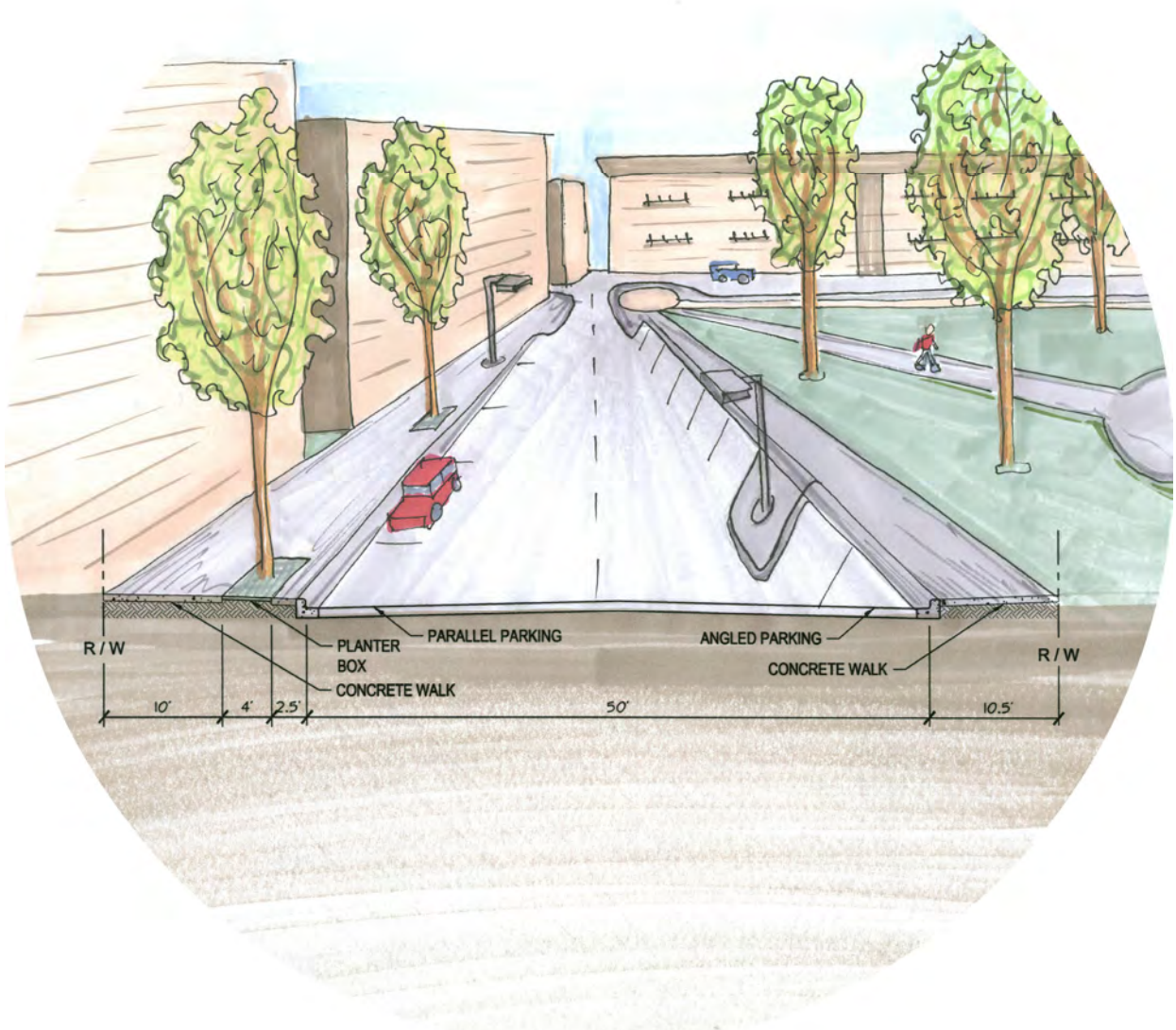

LANDFORM
From Site to Finish

# DESIGN FRAMEWORK
## The COR at Ramsey

PERSPECTIVE SECTION #4
Ramsey Pkwy. East of Zeolite St.

THE COR
RAMSEY, MINNESOTA



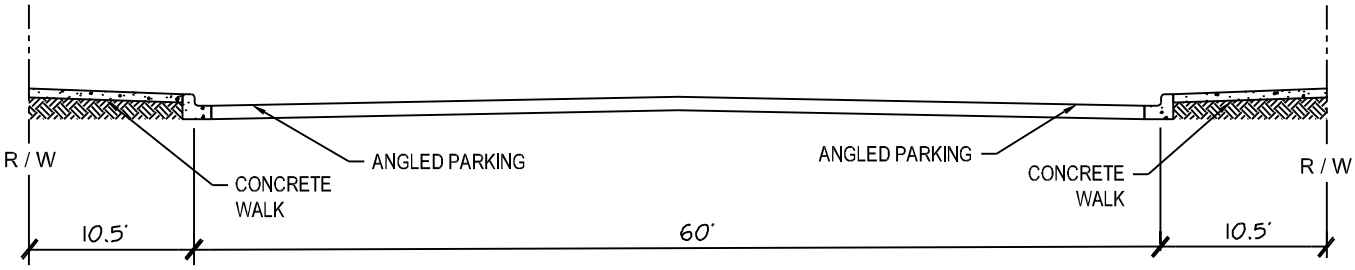



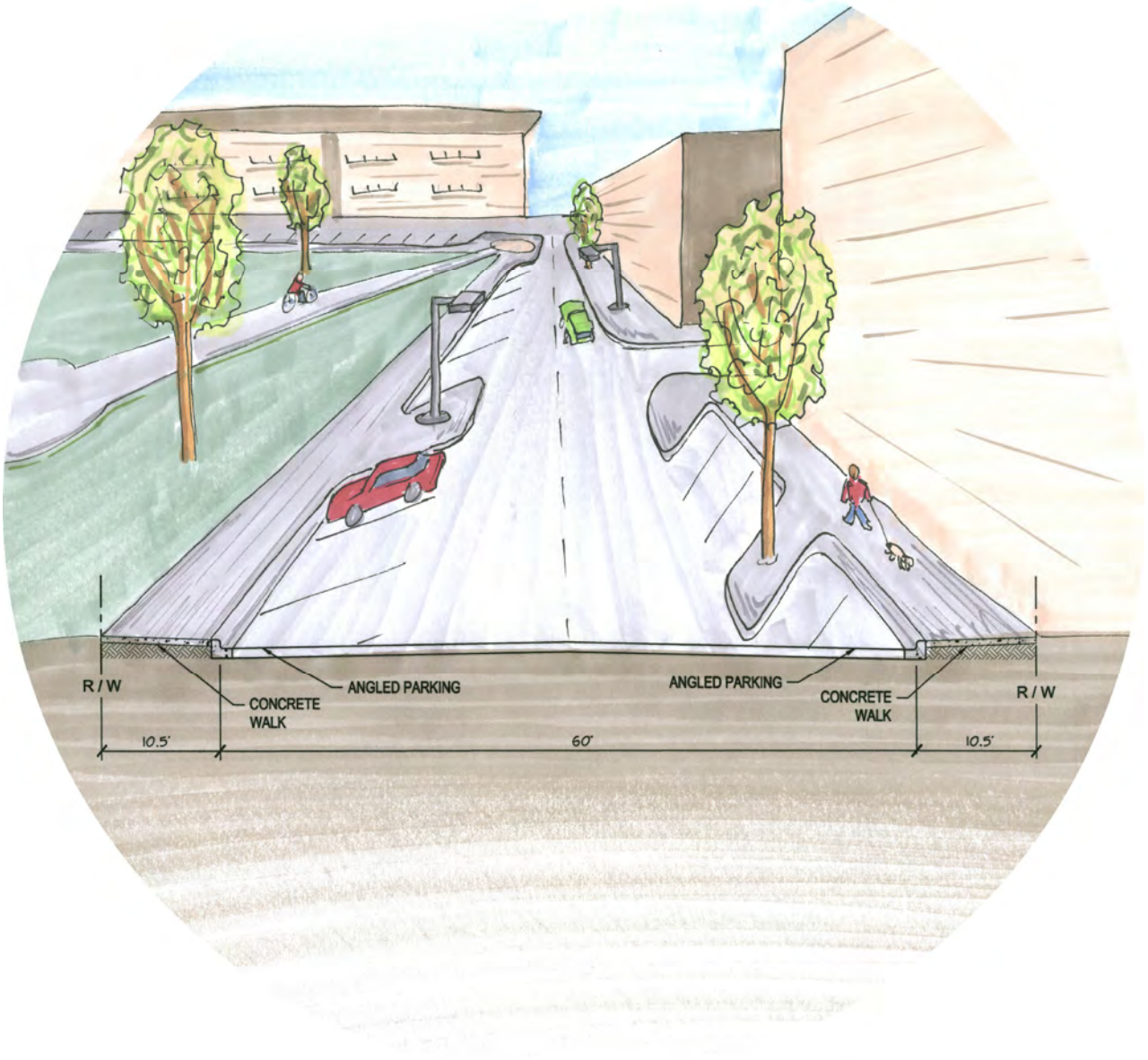

LANDFORM
From Site to Finish

# DESIGN FRAMEWORK
## The COR at Ramsey

PERSPECTIVE SECTION #5
West of Municipal Plaza

THE COR
RAMSEY, MINNESOTA



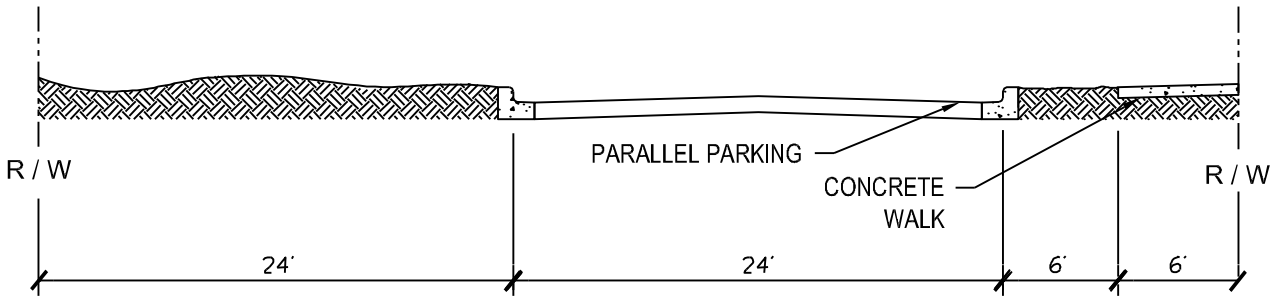



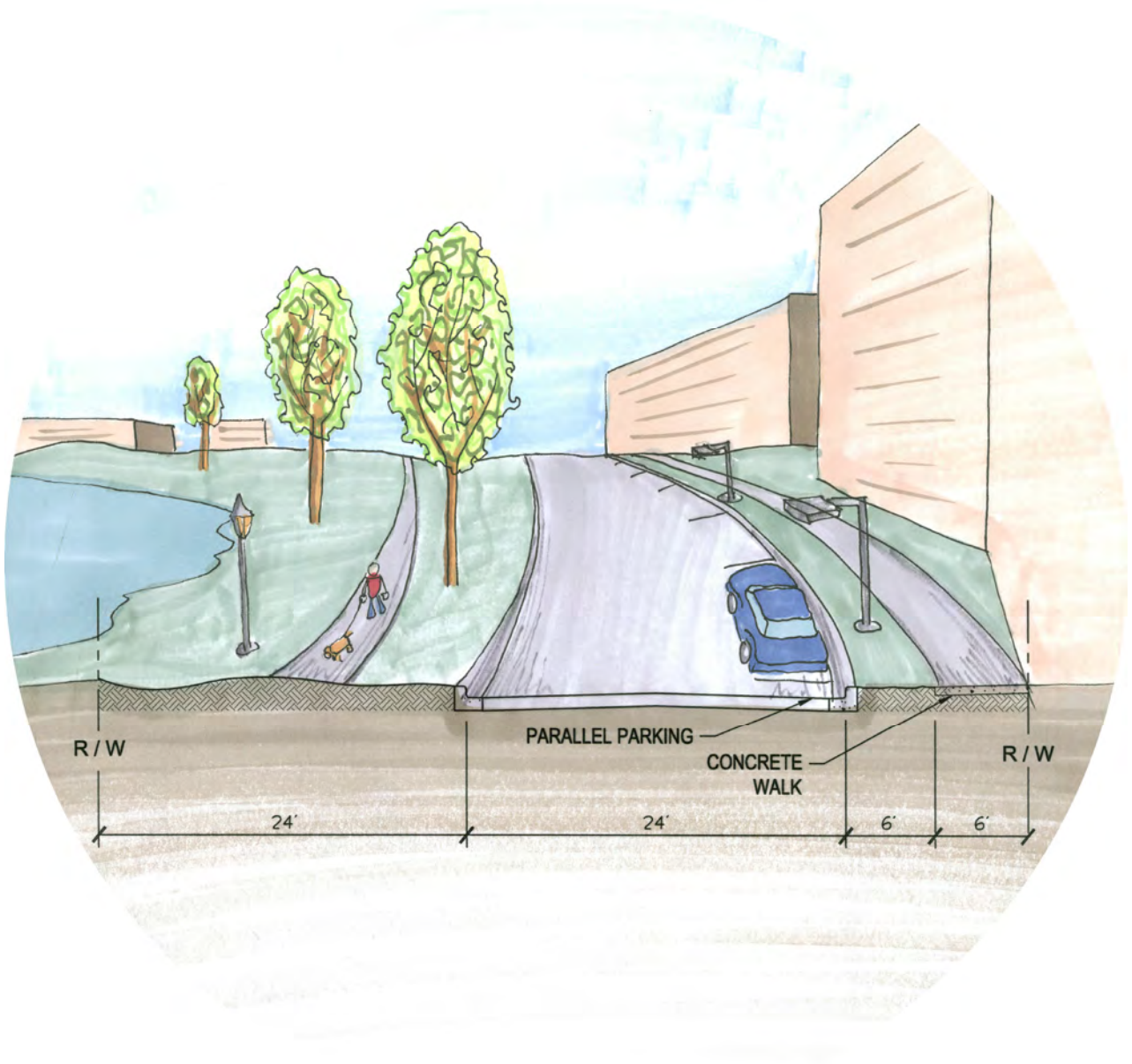

LANDFORM
From Site to Finish

# DESIGN FRAMEWORK
## The COR at Ramsey

PERSPECTIVE SECTION #6
Center St. East of Municipal Plaza

THE COR
RAMSEY, MINNESOTA




LANDFORM
From Site to Finish

# DESIGN FRAMEWORK
## The COR at Ramsey

PERSPECTIVE SECTION #7
Ramsey Pkwy. South of The Draw

THE COR
RAMSEY, MINNESOTA




DRAFT

EXHIBIT B.1

LANDFORM
From Site to Finish

DESIGN FRAMEWORK
The COR at Ramsey

PYLON/COMMUNITY SIGN 'A'
Armstrong Blvd. & Highway 10

THE COR
RAMSEY, MINNESOTA




Eastbound




Westbound

DRAFT

EXHIBIT B.2

LANDFORM
From Site to Finish

DESIGN FRAMEWORK
The COR at Ramsey

PYLON/COMMUNITY SIGN 'B'
Commuter Rail & Highway 10

THE COR
RAMSEY, MINNESOTA




DRAFT

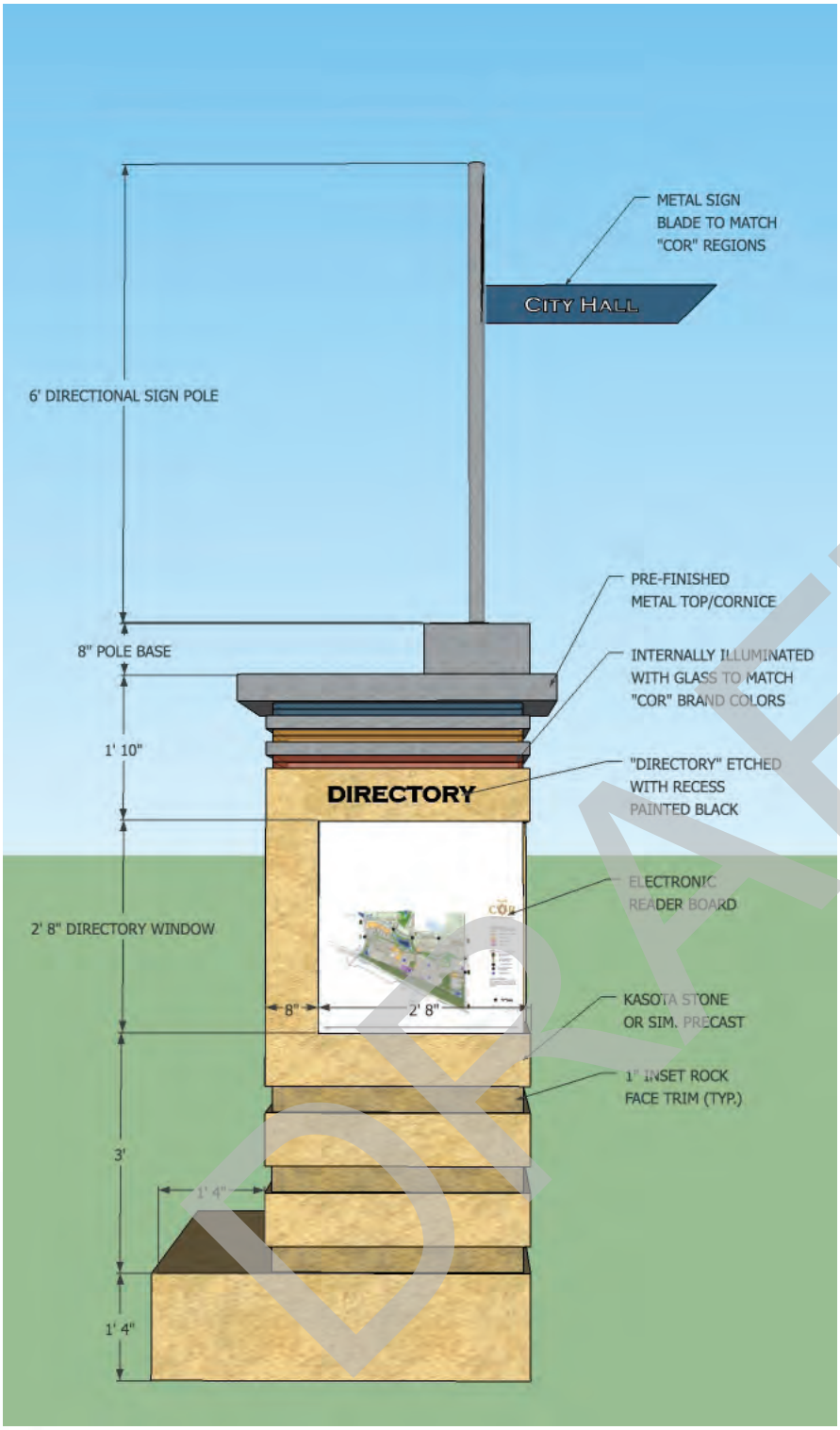
EXHIBIT B.3

LANDFORM
From Site to Finish

DESIGN FRAMEWORK
The COR at Ramsey

PYLON/COMMUNITY SIGN 'C'
Ramsey Blvd. & Highway 10

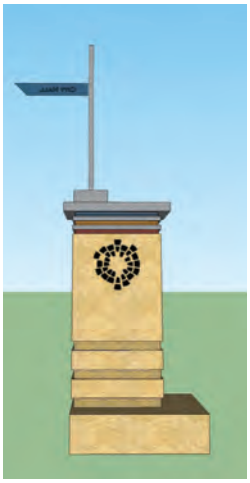
THE COR
RAMSEY, MINNESOTA



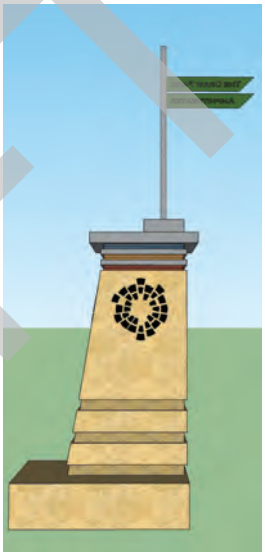

DIRECTORY PANEL VIEW




EVENTS PANEL VIEW



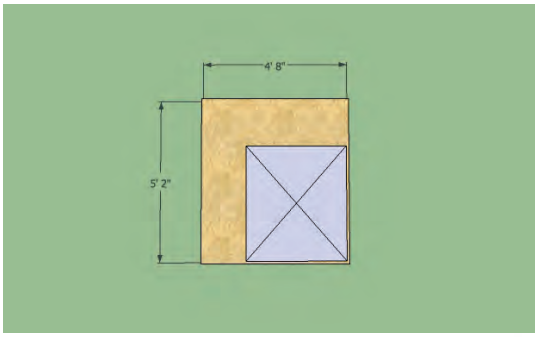
REAR VIEW



SIDE VIEW




PERSPECTIVE




PLAN VIEW

DRAFT

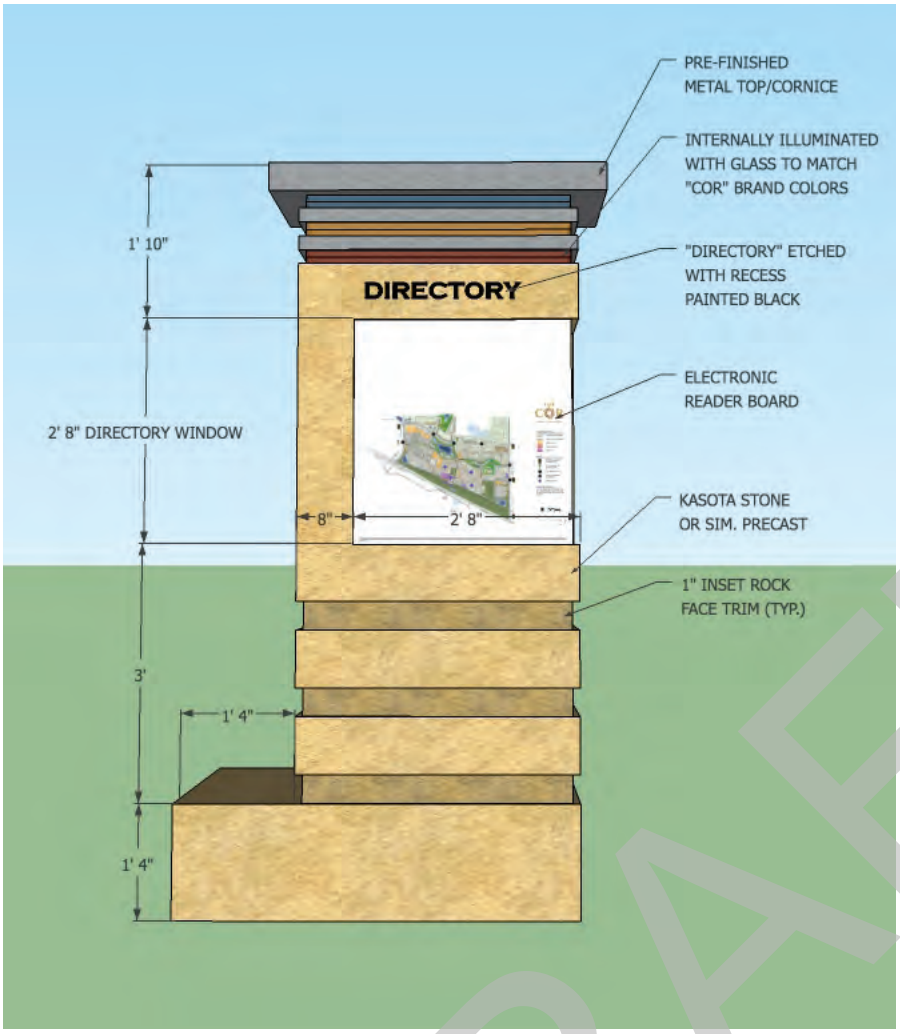
EXHIBIT B.4

LANDFORM
From Site to Finish

# DESIGN FRAMEWORK
## The COR at Ramsey

COMMUNITY KIOSK 'A'
Commuter Rail & Veterans Dr.

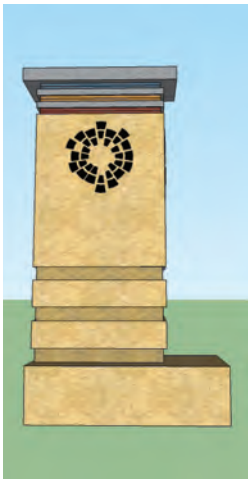
THE COR
RAMSEY, MINNESOTA




DIRECTORY PANEL VIEW




EVENTS PANEL VIEW



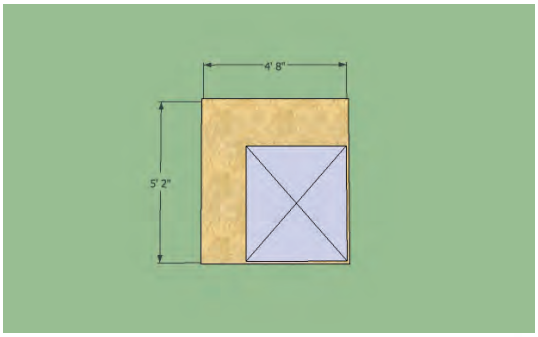
REAR VIEW



SIDE VIEW




PERSPECTIVE




PLAN VIEW

DRAFT

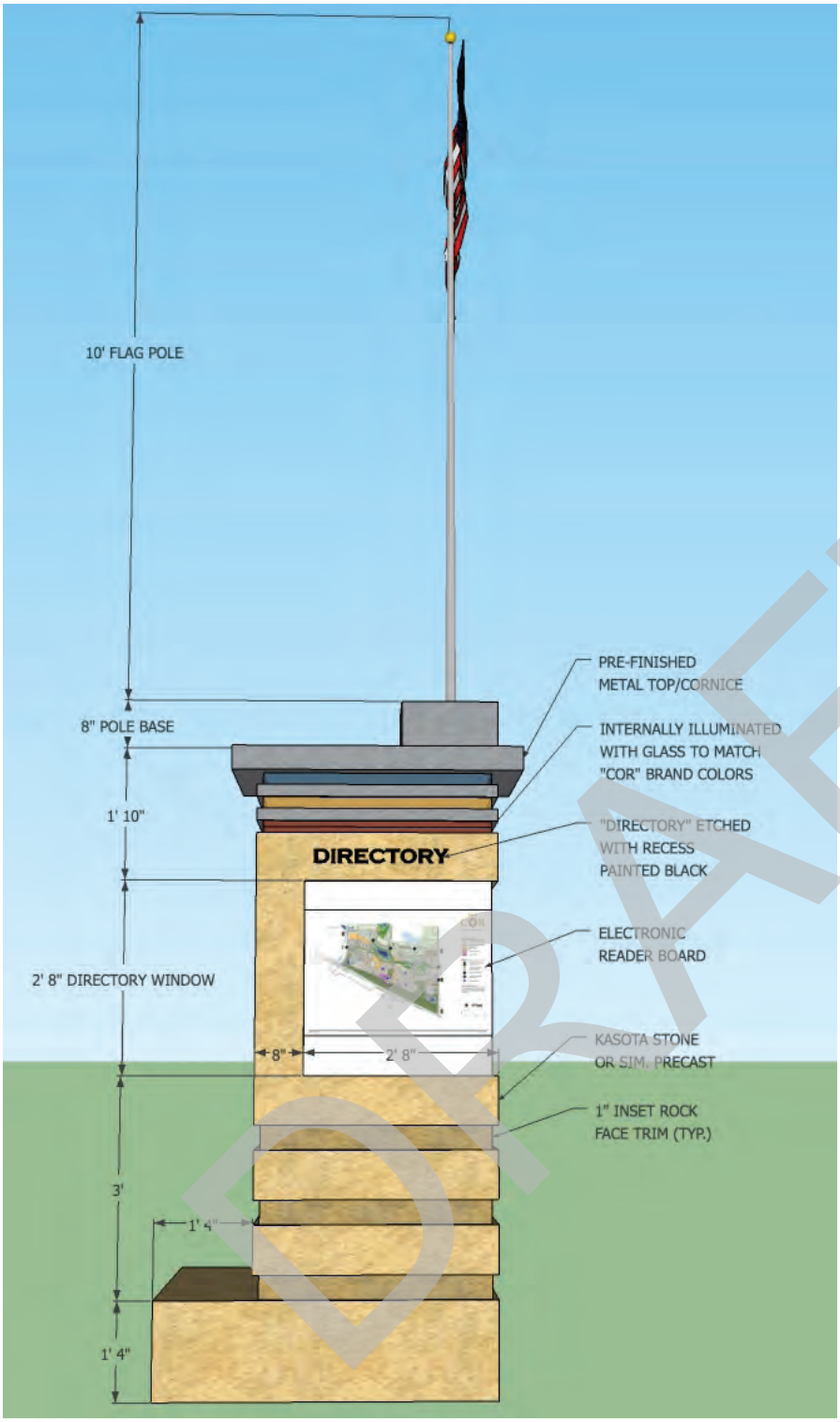
EXHIBIT B.5

LANDFORM
From Site to Finish

# DESIGN FRAMEWORK
## The COR at Ramsey

COMMUNITY KIOSK 'B'
Sunwood Dr. & Center St.

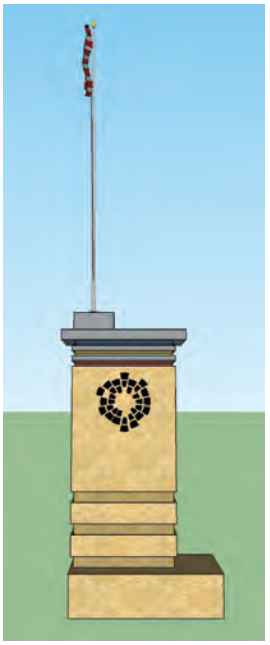
THE COR
RAMSEY, MINNESOTA




DIRECTORY PANEL VIEW




EVENTS PANEL VIEW



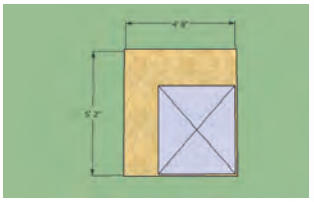
REAR VIEW



SIDE VIEW




PERSPECTIVE



PLAN VIEW

DRAFT

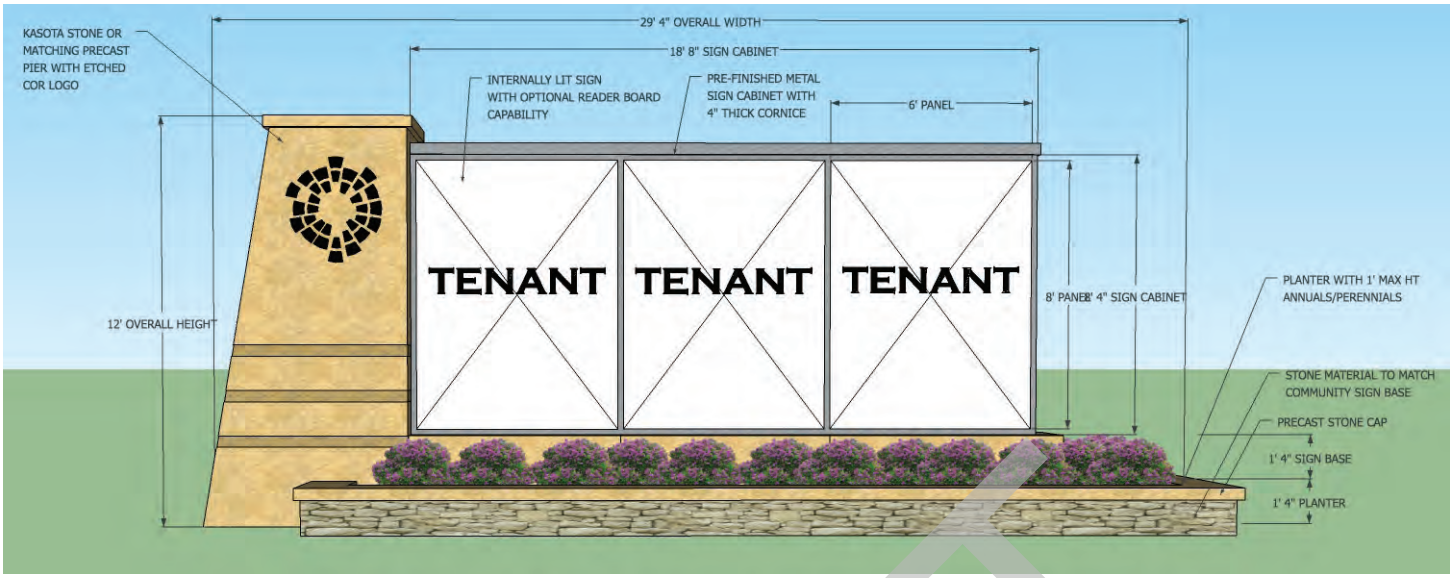
EXHIBIT B.6

LANDFORM
From Site to Finish

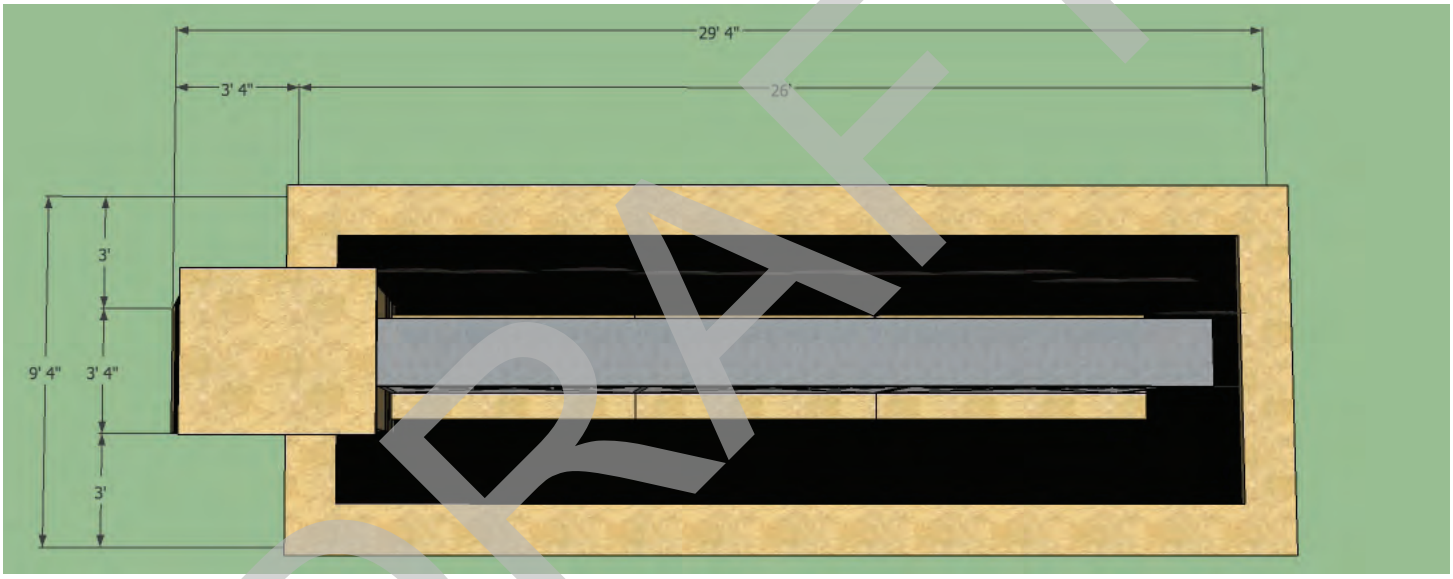
# DESIGN FRAMEWORK
## The COR at Ramsey

COMMUNITY KIOSK 'C'
Sunwood Dr. at Municipal Plaza

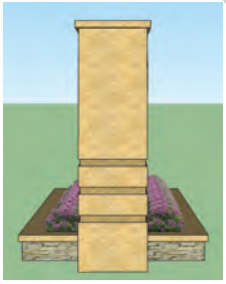
THE COR
RAMSEY, MINNESOTA



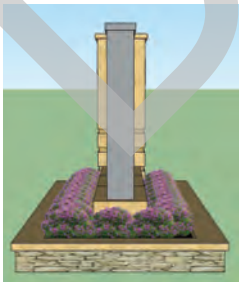

ELEVATION AT SUNWOOD



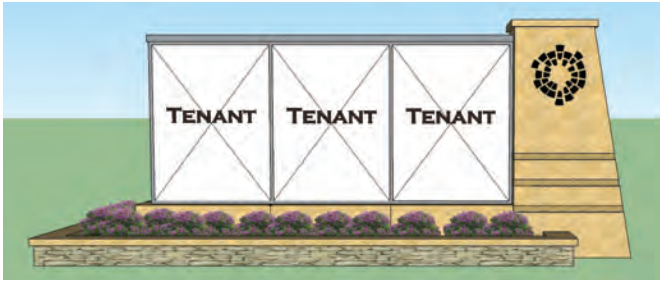

PLAN VIEW



PROFILE VIEW



PROFILE VIEW




ELEVATION

EXHIBIT B.7

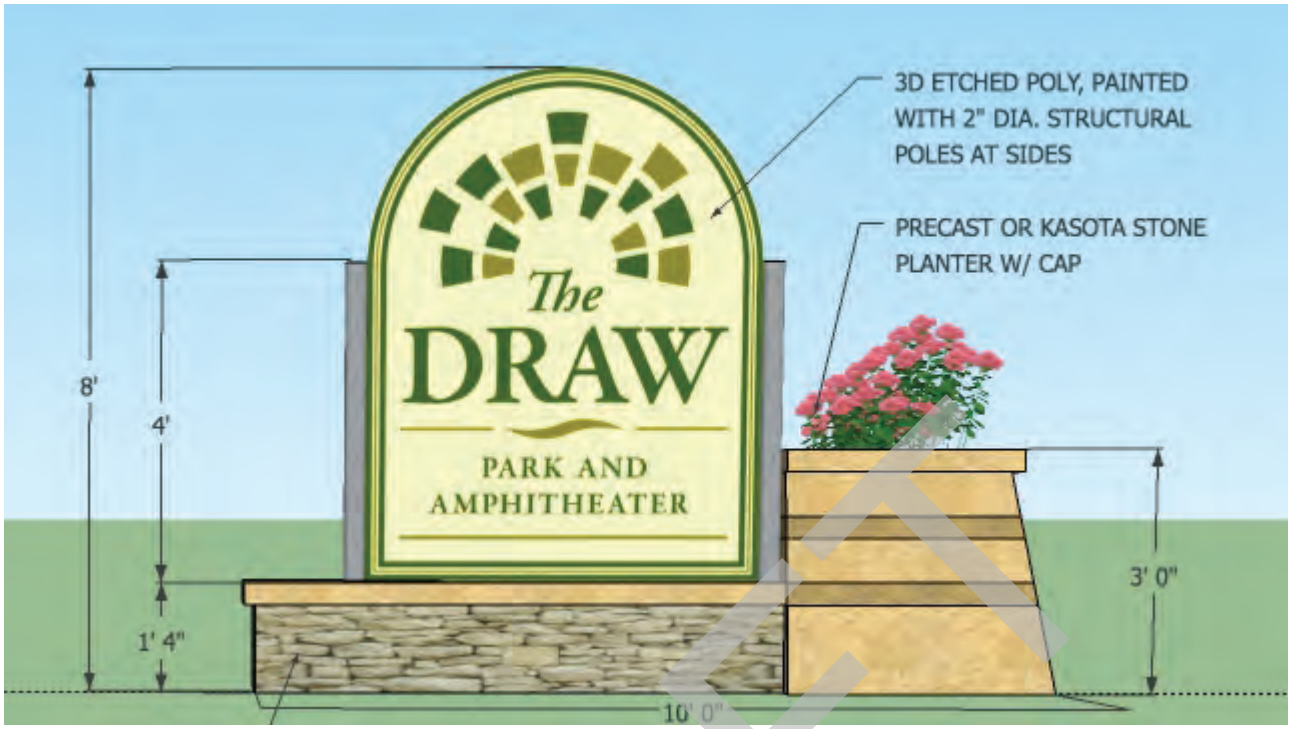
DRAFT

LANDFORM
From Site to Finish

# DESIGN FRAMEWORK
## The COR at Ramsey

PROJECT GATEWAY SIGN 'A'
Sunwood Dr. & Armstrong Blvd.

THE COR
RAMSEY, MINNESOTA







DRAFT

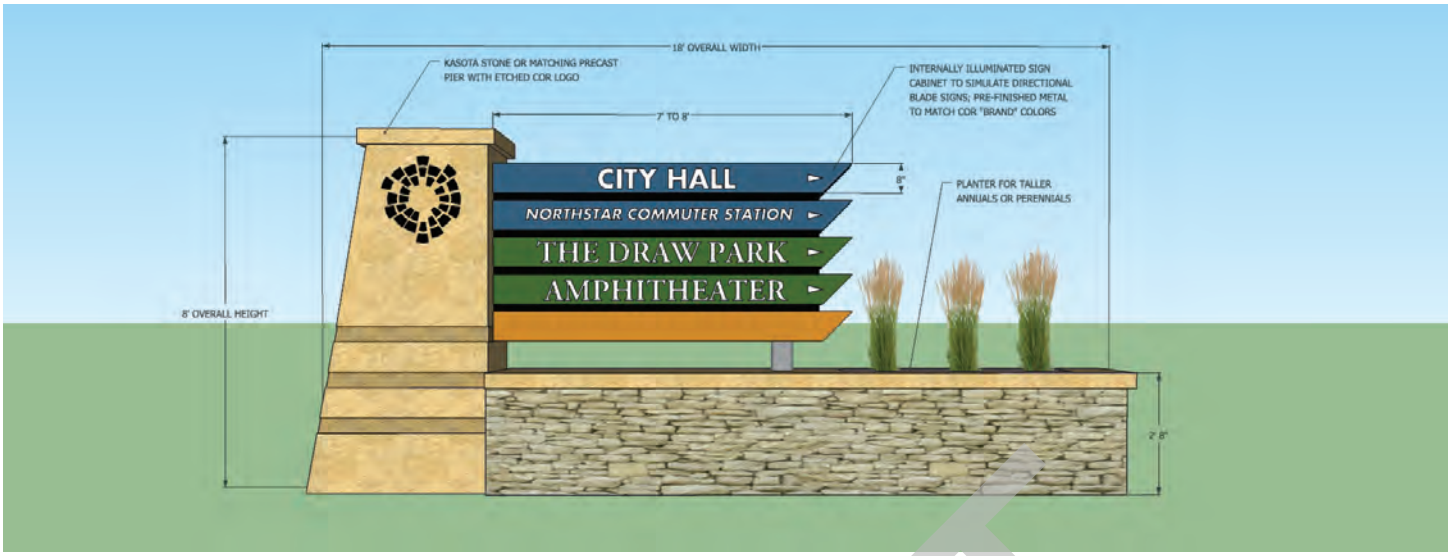
EXHIBIT B.8

LANDFORM
From Site to Finish

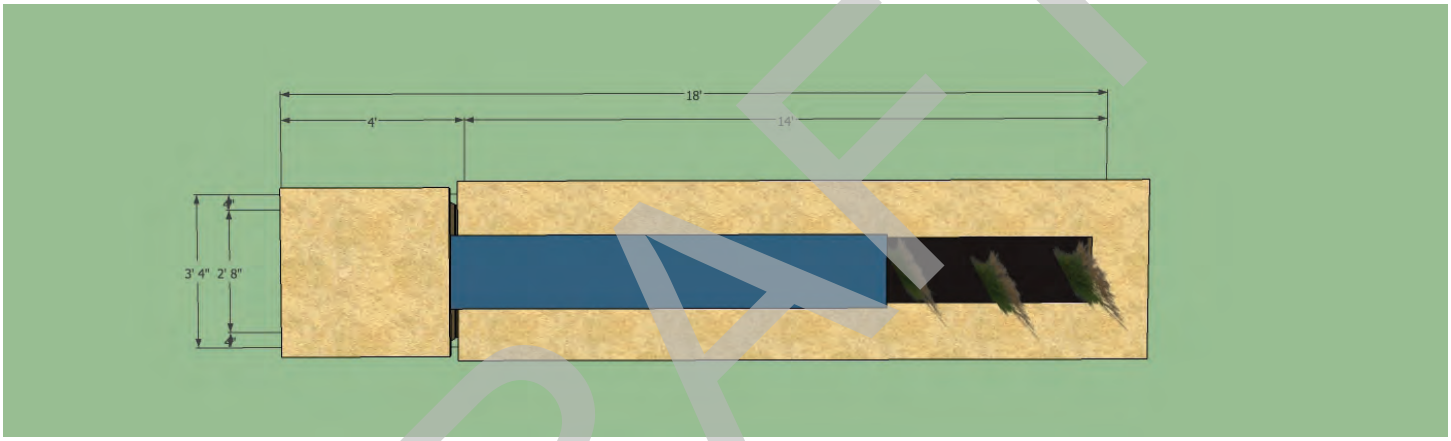
DESIGN FRAMEWORK
The COR at Ramsey

PUBLIC PARK SIGNS

THE COR
RAMSEY, MINNESOTA



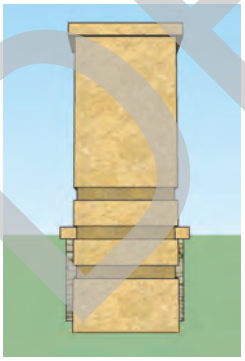

ELEVATION AT EASTBOUND BUNKER LAKE




PLAN VIEW



PROFILE VIEW



PROFILE VIEW




ELEVATION AT WESTBOUND BUNKER LAKE

DRAFT

EXHIBIT B.9

LANDFORM
From Site to Finish

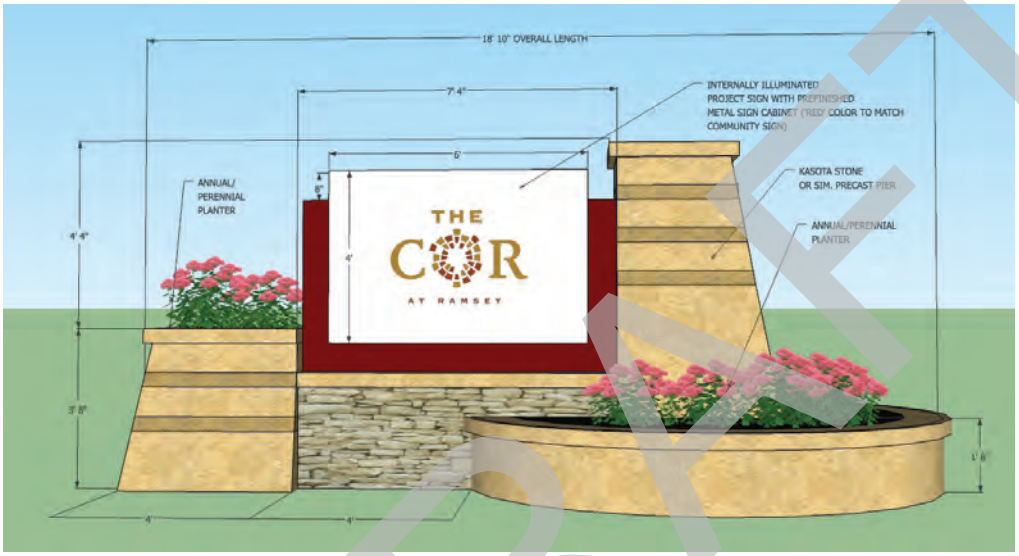
DESIGN FRAMEWORK
The COR at Ramsey

PROJECT GATEWAY SIGN 'C'
Bunker Lake Blvd. & Center St.

THE COR
RAMSEY, MINNESOTA




ELEVATION AT SOUTH BOUND RAMSEY




ELEVATION AT WESTBOUND BUNKER LAKE




PERSPECTIVE

DRAFT

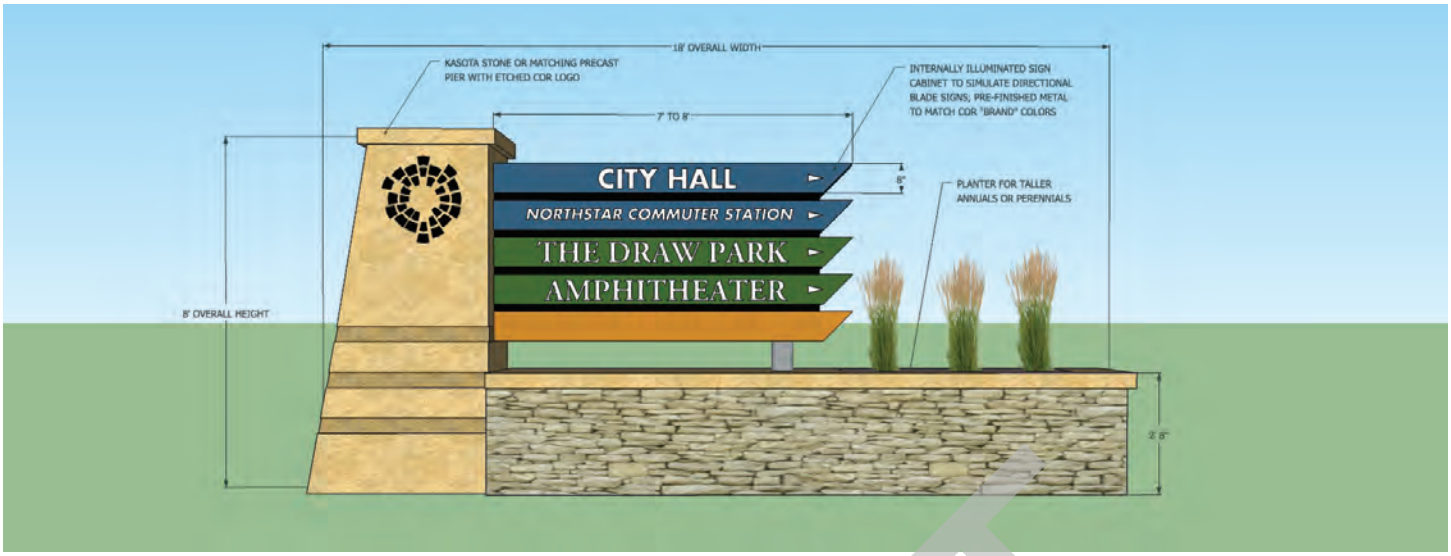
EXHIBIT B.10

LANDFORM
From Site to Finish

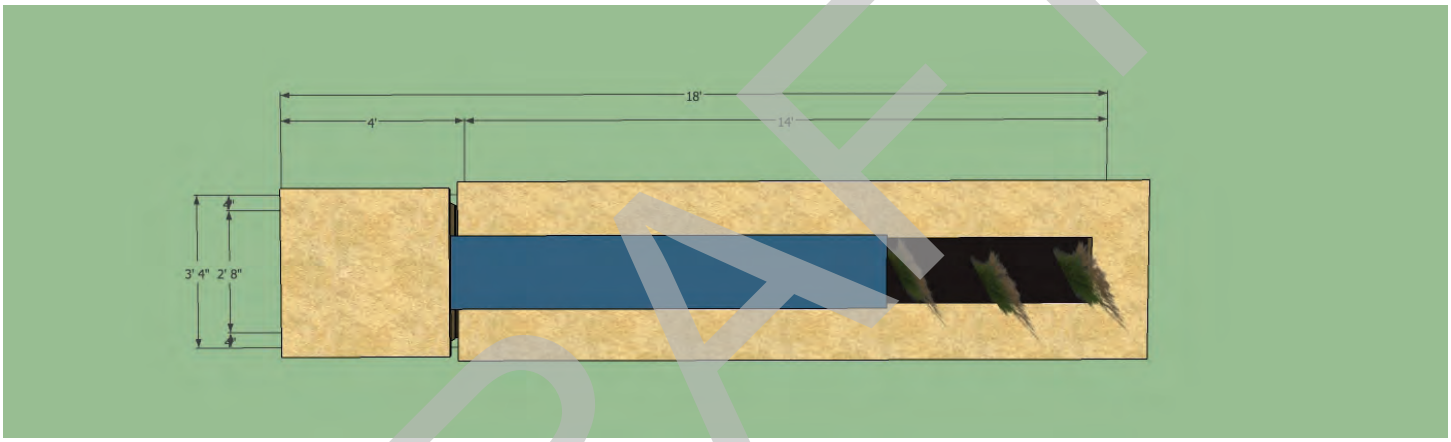
DESIGN FRAMEWORK
The COR at Ramsey

PROJECT GATEWAY SIGN 'D'
Bunker Lake Blvd. & Ramsey Blvd.

THE COR
RAMSEY, MINNESOTA



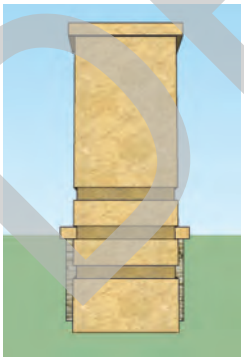

ELEVATION AT SOUTHBOUND RAMSEY




PLAN VIEW



PROFILE VIEW



PROFILE VIEW




ELEVATION AT NORTHBOUND RAMSEY

DRAFT

EXHIBIT B.11

LANDFORM
From Site to Finish

DESIGN FRAMEWORK
The COR at Ramsey

PROJECT GATEWAY SIGN 'E'
Sunwood Dr. & Ramsey Blvd.

THE COR
RAMSEY, MINNESOTA




DRAFT

EXHIBIT B.12

LANDFORM
From Site to Finish

DESIGN FRAMEWORK
The COR at Ramsey

PUBLIC PARKING SIGNAGE
Standard Signage

THE COR
RAMSEY, MINNESOTA




DRAFT

EXHIBIT B.13

LANDFORM
From Site to Finish

# DESIGN FRAMEWORK
## The COR at Ramsey

LIGHT POLE BANNER SIGNS
Standard Signage

THE COR
RAMSEY, MINNESOTA

# Capital Improvement Program

2020 *thru* 2029

## City of Ramsey, Minnesota

**Project #** 04-WTR-005

**Project Name** Complete Pump House 3

**Department** Water Utility
**Contact** Unassigned
**Type** Improvement
**Useful Life** 50 Years
**Category** Water Utility Improvement
**Priority** 1-Existing Obligation (High)
**Status** Active

**Total Cost** $240,000

### Description

This project would add stone and other treatments to the exterior of the unfinished pumphouse to reflect the civic architecture in The COR, to include public buildings, landscaping, as well as, streetscaping.

Additionally, detailed planning in 2019 identified the value in adding to this highly visible public site - a restroom and a plaza/seating area along Center Street. The project will also consider photovoltaic panels to screen some of the industrial looking roofline and shade for the seating area. This power can be available for some the of the public irrigation systems - ex: the pumphouse.

### Justification

The purpose and outcome would be to complete the building that has been in an unfinished state for more than a decade. The improvements coincide with the tens of millions of dollwars in adjoining private investments in Ramsey's Downtown District.

| Expenditures | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Improvements Other than Building Cost | 240,000 | | | | | | | | | | 240,000 |
| **Total** | **240,000** | | | | | | | | | | **240,000** |

| Funding Sources | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Grants/Outside Sources | 30,000 | | | | | | | | | | 30,000 |
| Water Utility Fund | 210,000 | | | | | | | | | | 210,000 |
| **Total** | **240,000** | | | | | | | | | | **240,000** |





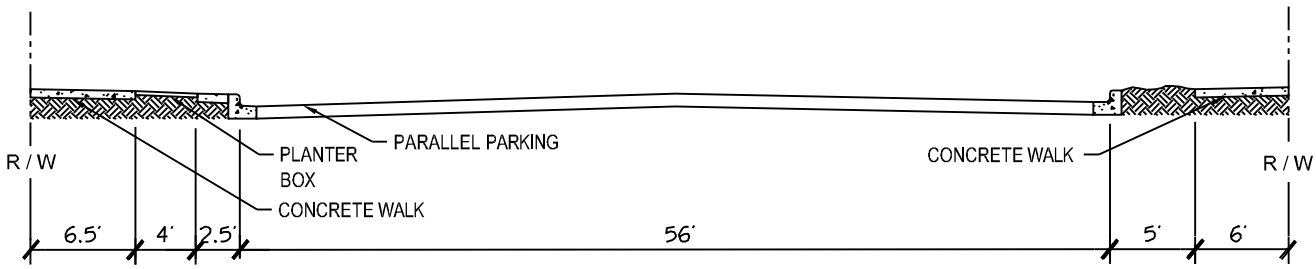


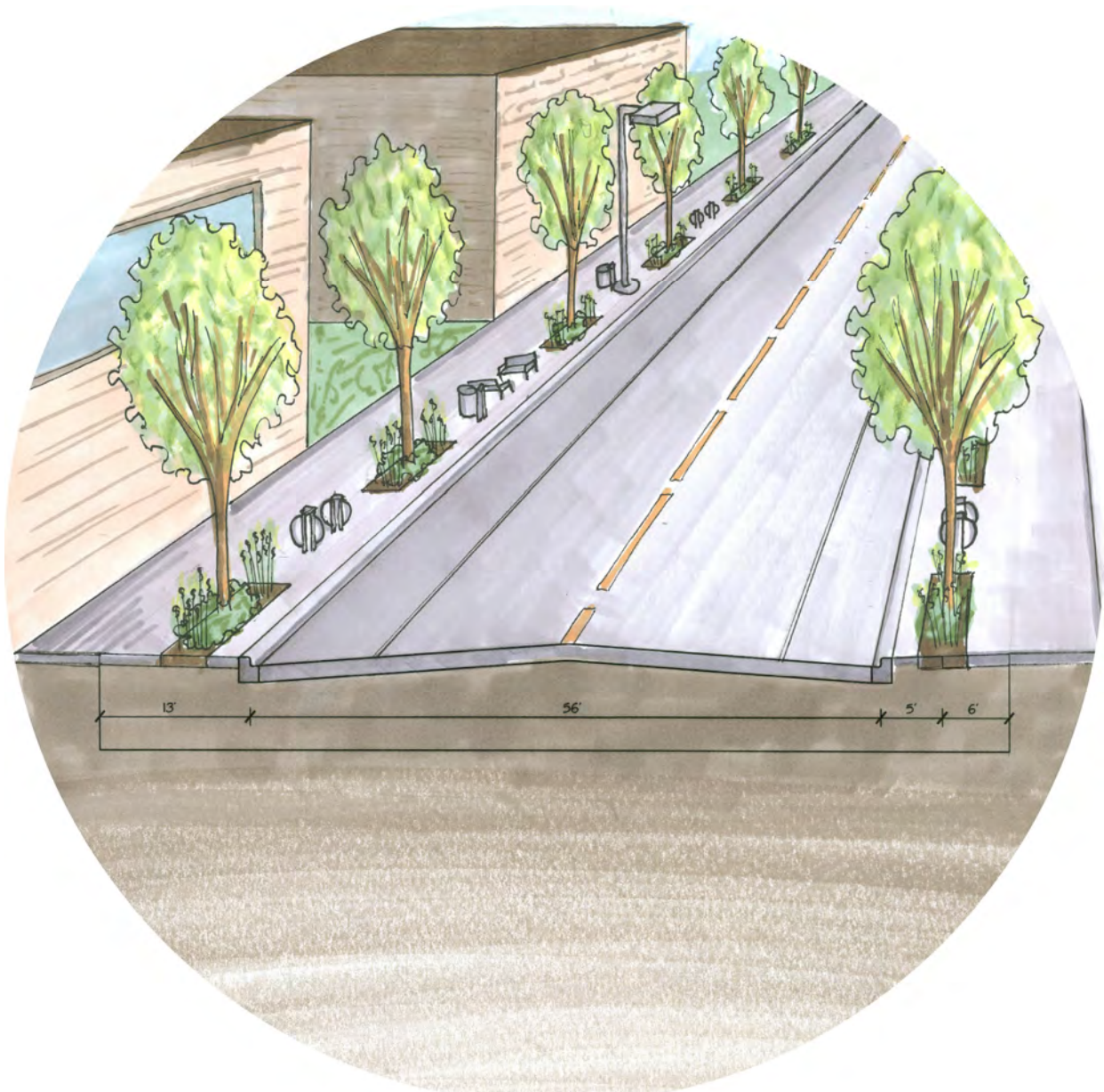



DANGER
CHEMICAL ROOM
AUTHORIZED
PERSONNEL
ONLY
DANGER
CHLORINE
GAS




DANGER !
EAR PROTECTION
REQUIRED IN
THIS AREA



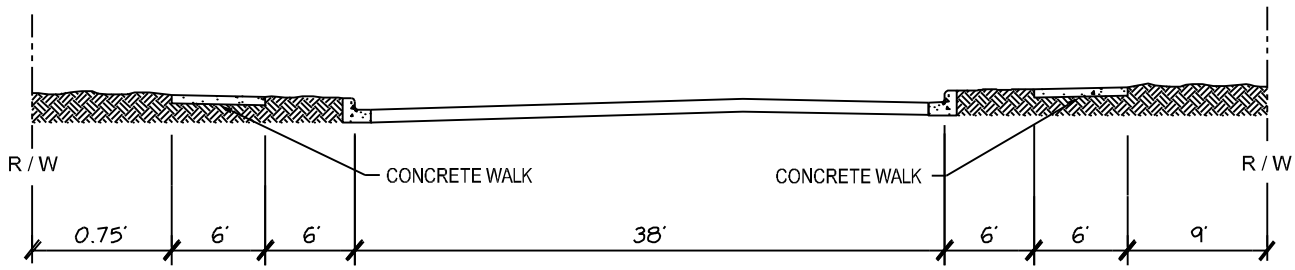



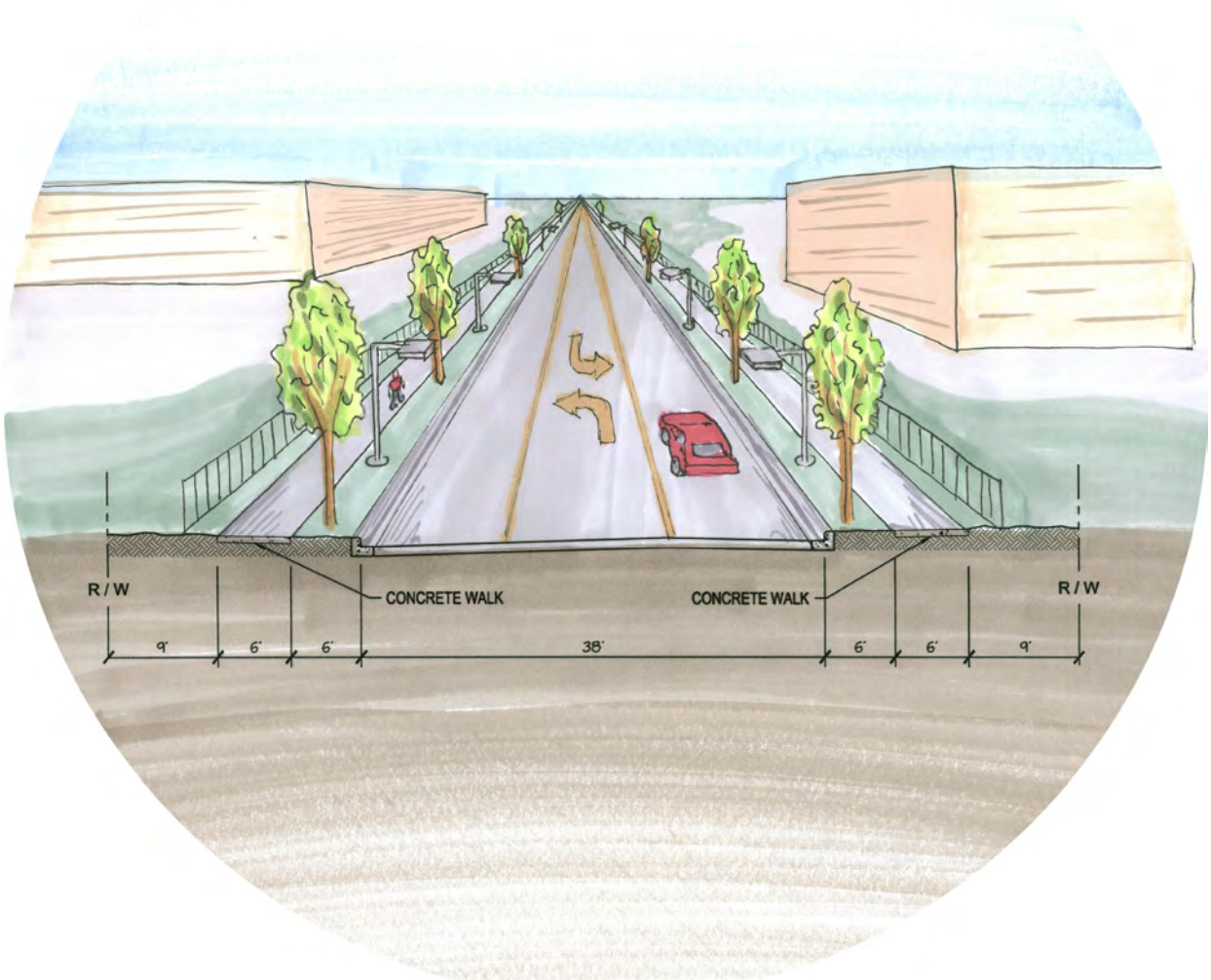

LANDFORM
From Site to Finish

# DESIGN FRAMEWORK
## The COR at Ramsey

PERSPECTIVE SECTION #1
Sunwood Dr. East of Zeolite St.

THE COR
RAMSEY, MINNESOTA



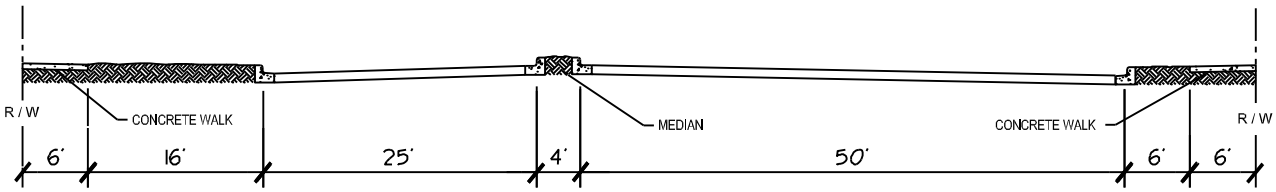



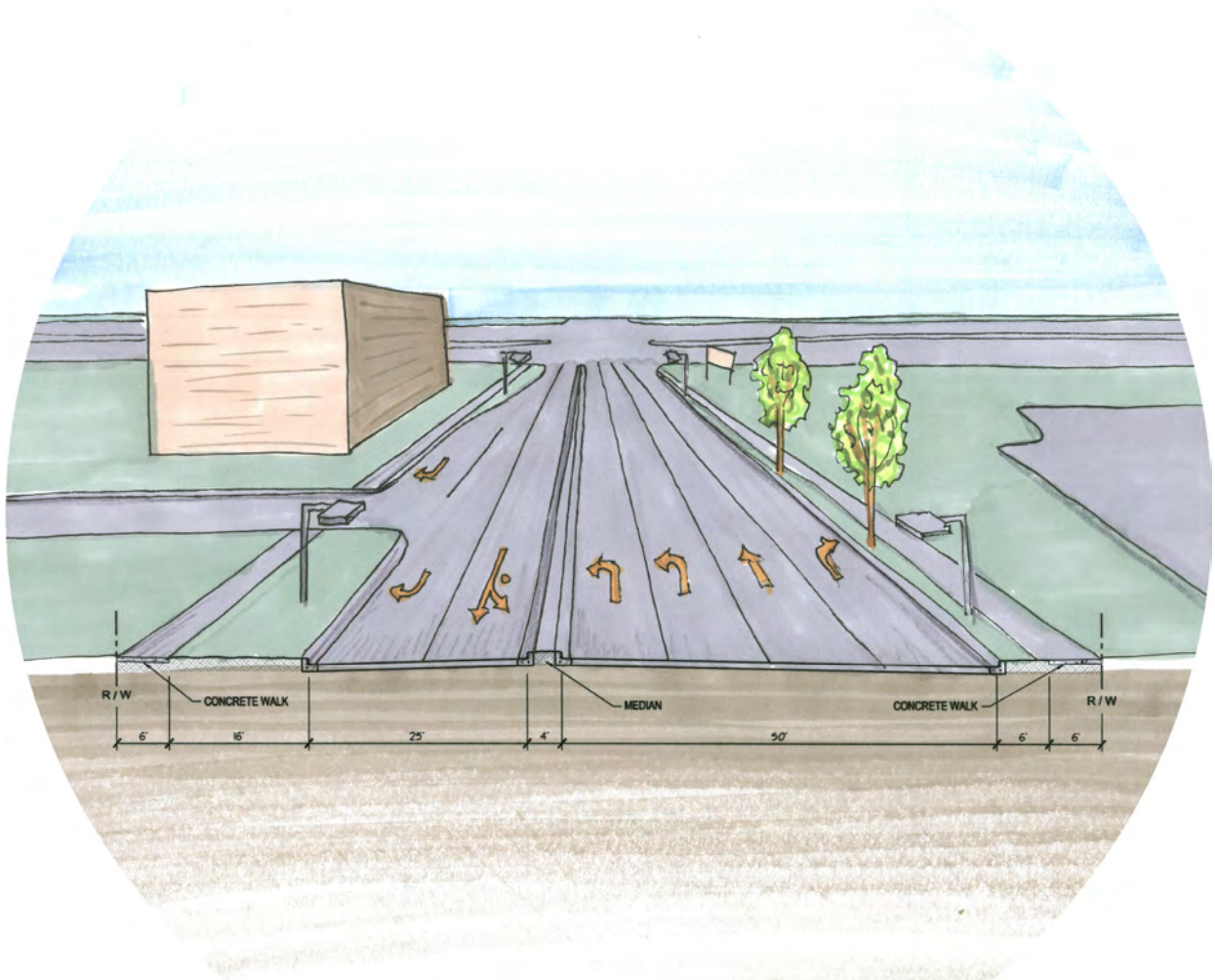

LANDFORM
From Site to Finish

# DESIGN FRAMEWORK
## The COR at Ramsey

PERSPECTIVE SECTION #2
Sunwood Dr. West of Zeolite St.

THE COR
RAMSEY, MINNESOTA



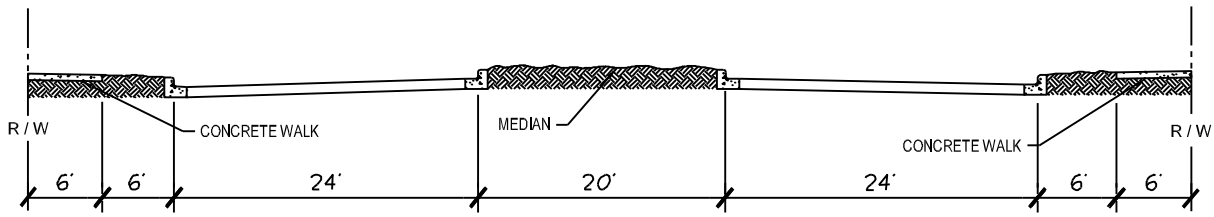



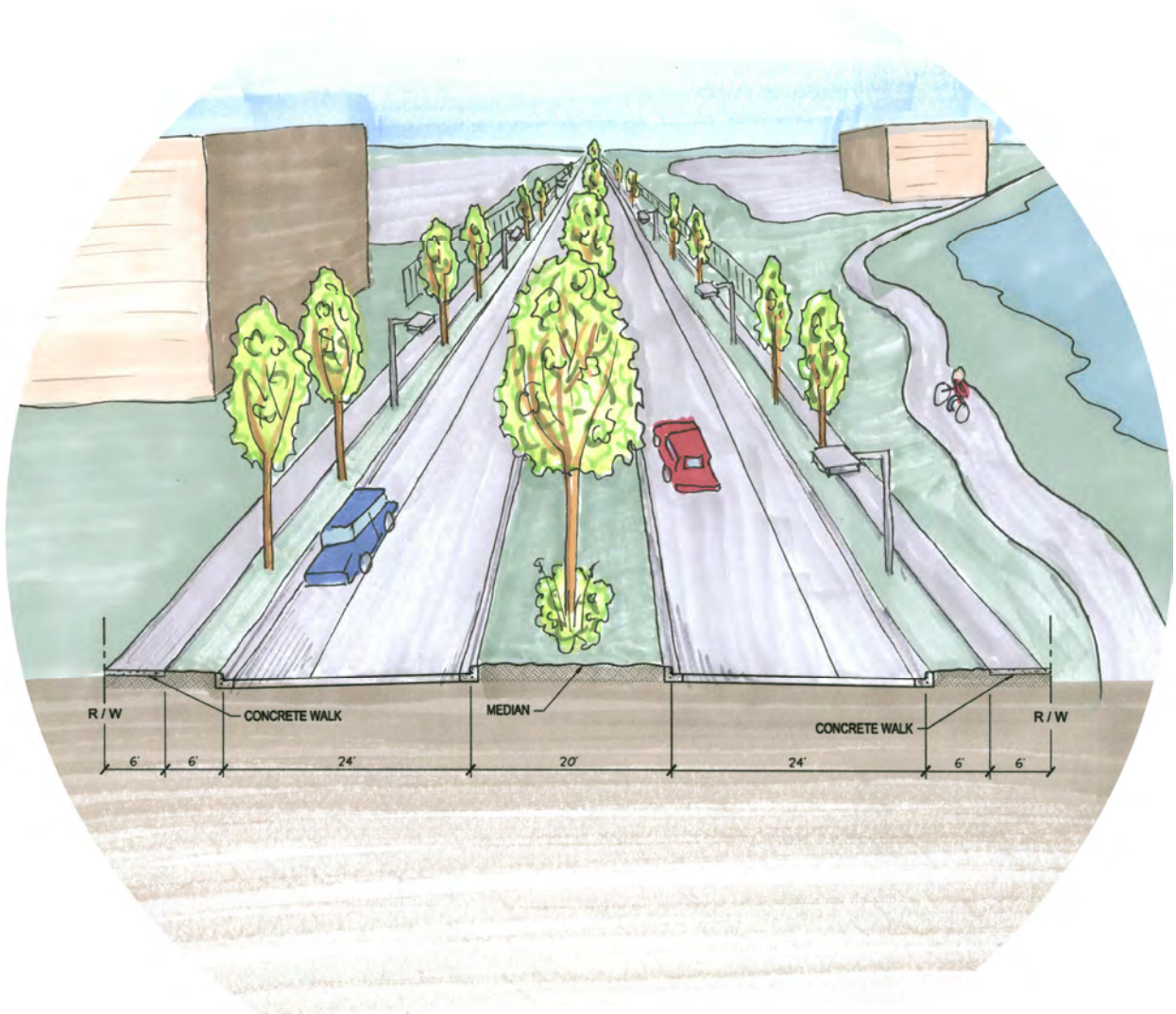

LANDFORM
From Site to Finish

# DESIGN FRAMEWORK
## The COR at Ramsey

PERSPECTIVE SECTION #3
Ramsey Pkwy. West of Roundabout

THE COR
RAMSEY, MINNESOTA



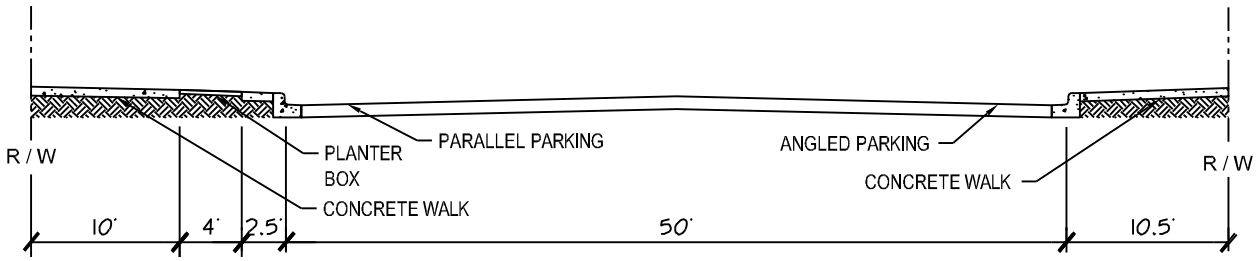



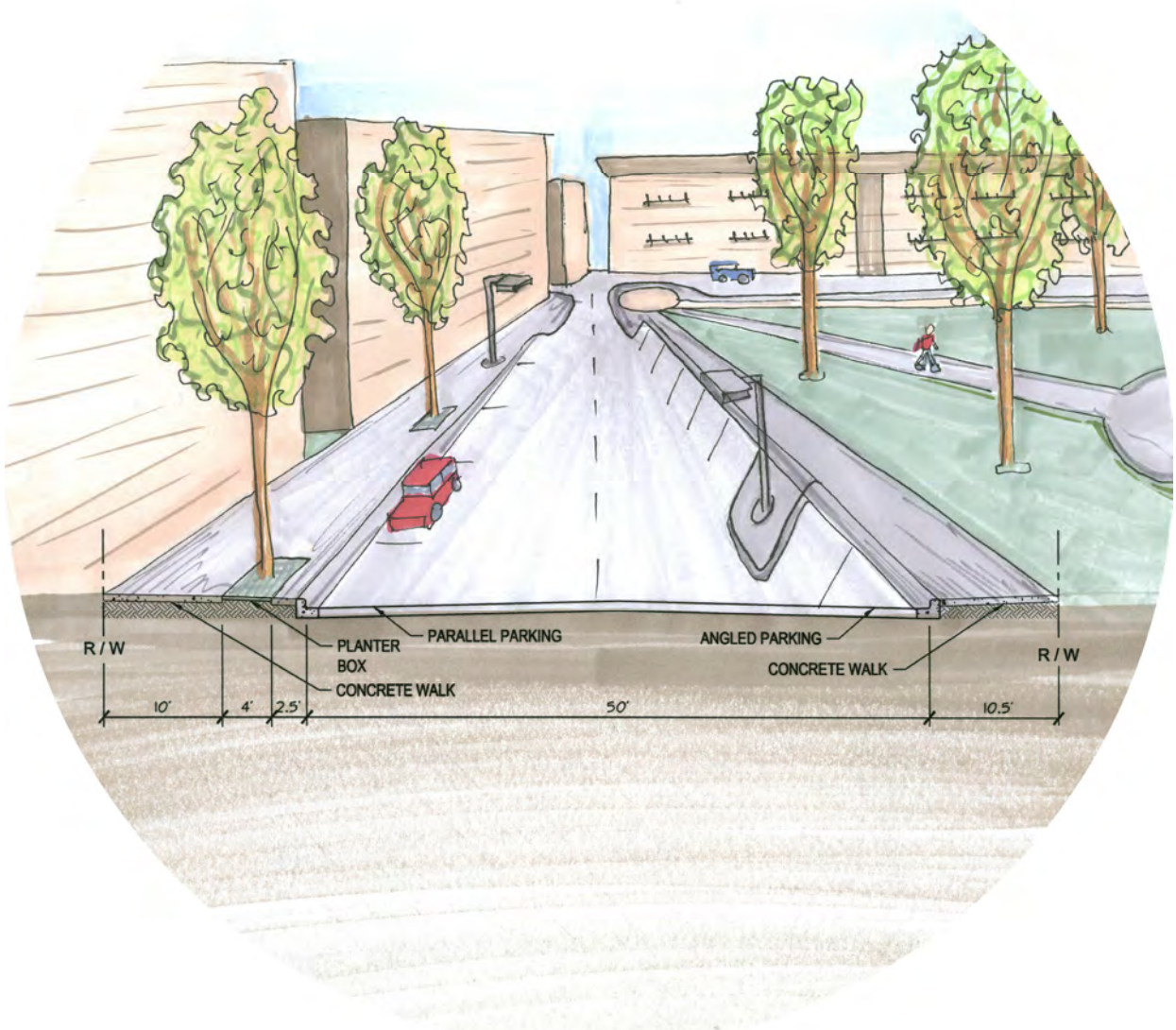

LANDFORM
From Site to Finish

# DESIGN FRAMEWORK
## The COR at Ramsey

PERSPECTIVE SECTION #4
Ramsey Pkwy. East of Zeolite St.

THE COR
RAMSEY, MINNESOTA



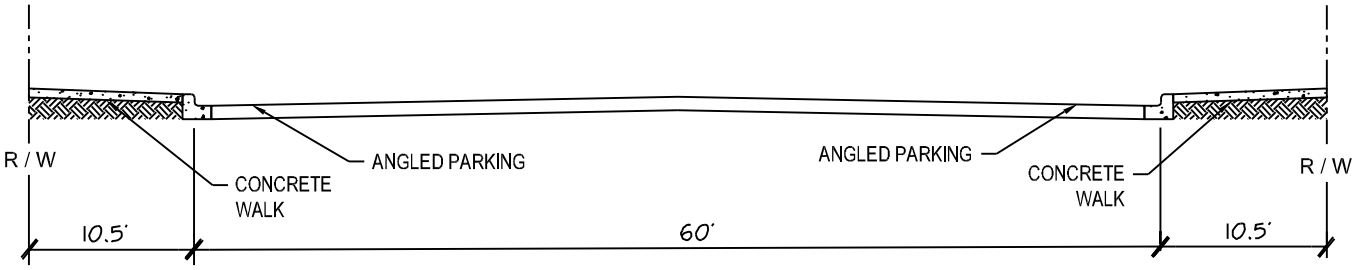



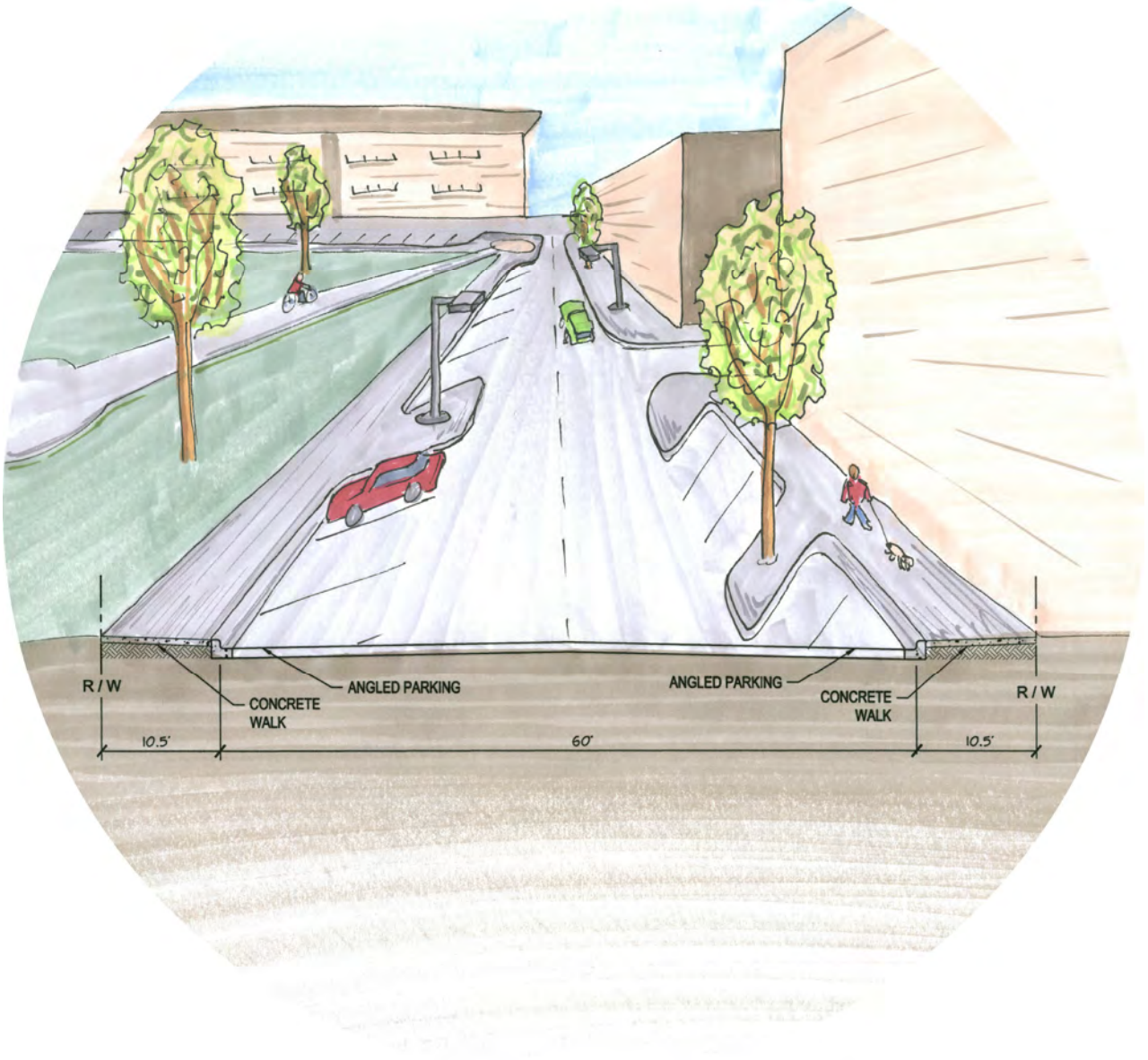

LANDFORM
From Site to Finish

# DESIGN FRAMEWORK
## The COR at Ramsey

PERSPECTIVE SECTION #5
West of Municipal Plaza

THE COR
RAMSEY, MINNESOTA



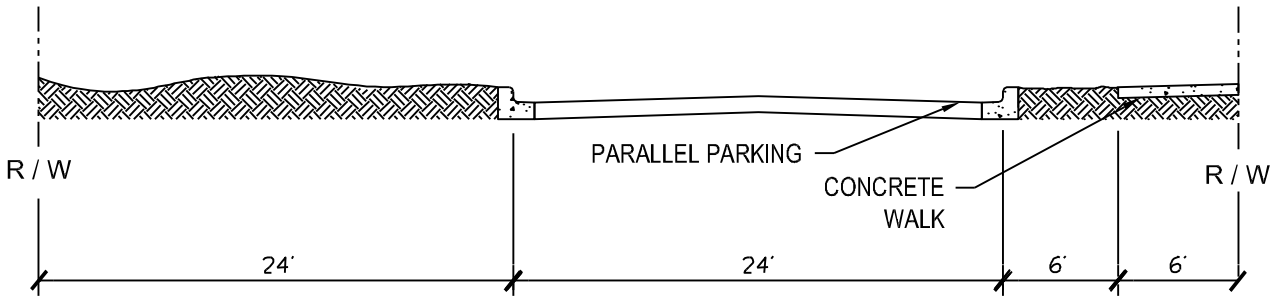



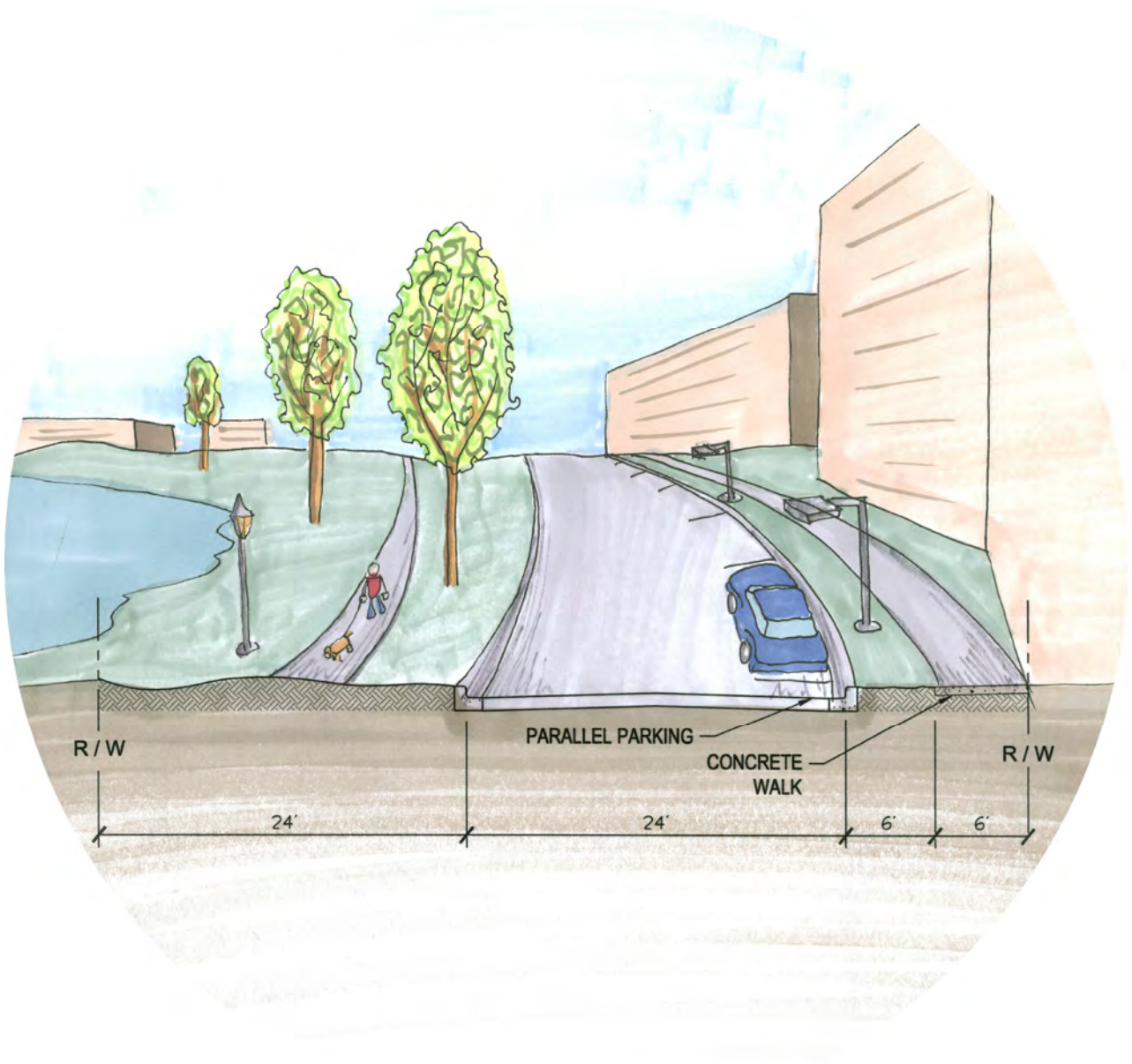

LANDFORM
From Site to Finish

# DESIGN FRAMEWORK
## The COR at Ramsey

PERSPECTIVE SECTION #6
Center St. East of Municipal Plaza

THE COR
RAMSEY, MINNESOTA




LANDFORM
From Site to Finish

# DESIGN FRAMEWORK
## The COR at Ramsey

PERSPECTIVE SECTION #7
Ramsey Pkwy. South of The Draw

THE COR
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# The COR Interim Development Plan

Anticipated Adoption: 2017

| | |
|---|---|
| City Council | Mayor Sarah Strommen<br>Councilmember At-Large John LeTourneau<br>Councilmember At-Large Kristine Williams<br>Ward 1 Councilmember Jill Johns<br>Ward 2 Councilmember Mark Kuzma<br>Ward 3 Councilmember Melody Shryock<br>Ward 4 Councilmember Chris Riley |
| Planning Commission | Chairperson Randy Bauer<br>Vice-Chairperson Gary Van Scoy<br>Bruce Anderson<br>Ralph Brauer<br>Cheri Gengler<br>Cindy Nosan<br>Patrick Surma<br>Former Chairperson Gary Levine (in memory) |
| Economic Development Authority | Chairperson Jim Steffen<br>Vice-Chairperson Wayne Skaff<br>Philip Brundt<br>Brian Burandt<br>Glen Hardin<br>Chris Riley (Council Representative)<br>Kristine Williams (Council Representative) |
| Parks and Recreation Commission: | Shane Bennett, Chairperson<br>Russell Bayer<br>Andrew Fyten<br>Jennifer Lestico<br>Brandon Sis<br>Charles Tchuinkwa<br>Jon Trappen |

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| | |
|---|---|
| Environmental Policy Board | Thomas Stadola, Chairperson<br>Michael Valentine, Vice-Chairperson<br>Colleen Anderson<br>Reid Bernard<br>Jane Covart<br>Michael Hiatt<br>Lucas Trossen |
| Staff Team: | Tim Gladhill, Community Development Director<br>Kurt Ulrich, City Administrator<br>Patrick Brama, Asst. City Administrator/Economic Dev. Manager<br>Chris Anderson, City Planner<br>Bruce Westby, City Engineer<br>Mark Riverblood, Parks and Asst. Public Works Superintendent |

Version: I:\The Cor\2015 Vision Clarification\Vision Document 2017\Interim Development Plan\The COR Interim Development Plan.Docx 4/3/2017 2:07 PM

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## Purpose of Interim Plan

The purpose of this document is to set into motion potential land use policy changes for The COR. In 2015, the City's Planning Commission described a need to evaluate and clarify the vision for The COR in response to several project approvals.

The Land Use Plan and Zoning Code are not the vision. They are the tool to achieve the vision. Focus on the elements that are important to us, regardless of the land use (examples include, but are not limited to greenway connections, sense of place, walkability). There are ways to achieve the vision, regardless of the use.

## Common Terms

**The COR Development Plan.** This is the existing land use plan for The COR circa 2011. This is the official control and legal basis for land use decisions within The COR. Also referred to as the 'Development Plan'. This is the 'second generation plan' for the development, preceded by the Ramsey Town Center Master Plan.

**The COR Interim Development Plan.** This is the document you are reading now. While the City continues to refine land use recommendations and feasibility analysis for The COR, this document is intended to be a guiding policy document to review quality projects that do not meet the strict adherence to The COR Development Plan. Also referred to as the 'Interim Development Plan'.

**The COR Development Plan Amendment.** This is a future document. This will be the document that updates the Zoning Code, otherwise known as the official controls, for The COR. This will replace existing Comprehensive Plan, Zoning Code, and Design Framework. Also referred to as the 'Plan Amendment'. This will be considered the 'third generation plan' for The COR.

## Using this Document

This land use plan is an interim plan that will guide land use decisions prior to a formal amendment for The COR. Uses currently allowed in The COR Development Plan shall be allowed consistent with applicable law. Projects consistent with options contained within this Interim Development Plan, but conflict with the existing plan, may proceed forward, but shall require a formal Plan Amendment. The policy directives of this document are advisory in nature, and are not binding. If a proposed project meets the minimum requirements of the existing Development Plan, it shall be considered consistent with the Development Plan and Zoning Code and shall be approved.

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## Vision

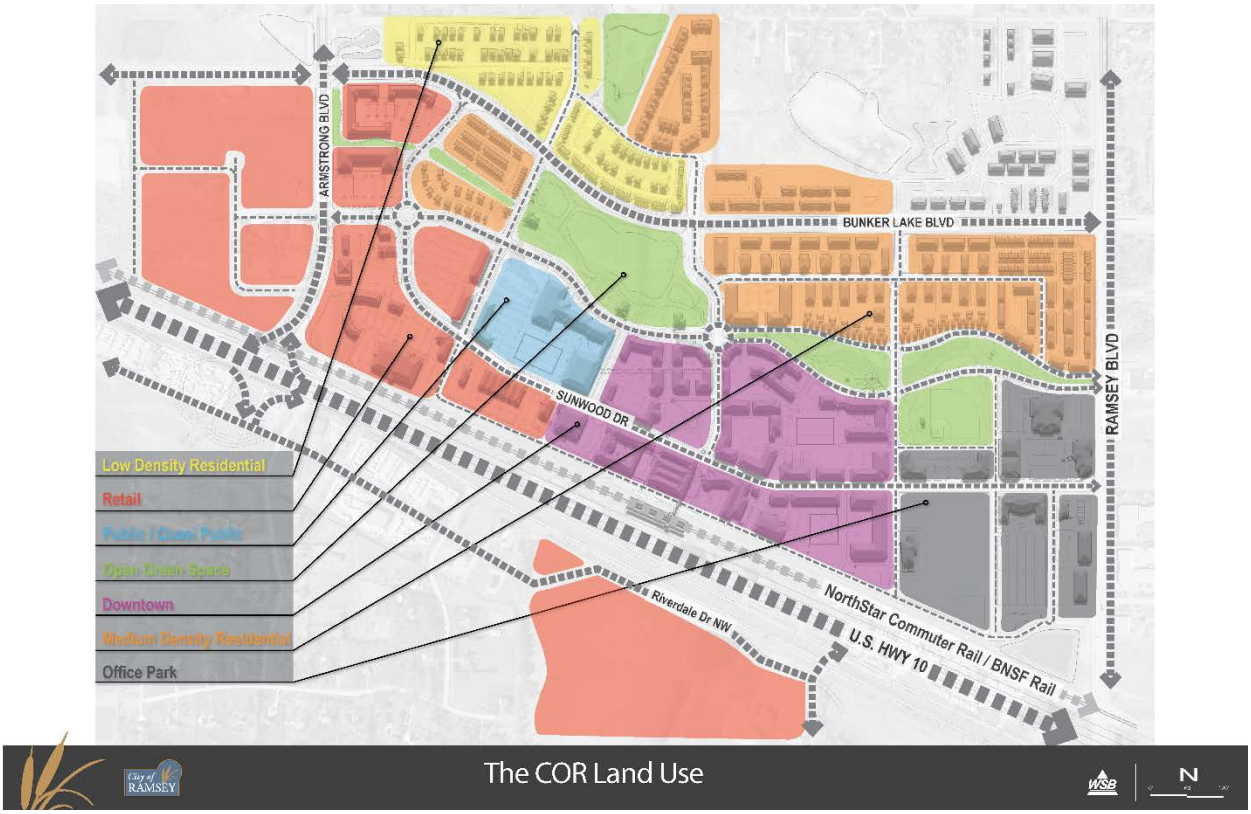
The Vision Statement was created for the purpose of crafting update land use scenarios and is not intended to approve or disapprove individual projects. Projects must be reviewed using the City's Zoning Code as the official land use control. The Vision Statement is not a regulatory tool, yet a visionary tool.

> *The COR will serve as a City Center primarily to bring people of Ramsey together that embraces natural market opportunities. The COR will also attract energy from the surrounding region. It will be a unique destination, technology-accessible, and serve as a gathering place. It will feature unique architecture stressing historical feel and function.*

## Development-Wide Assumptions

1. The development is part of a broader **GROWTH MANAGEMENT STRATEGY** that protects the City's primary land use goal to respect the **BALANCE OF RURAL AND URBAN CHARACTER**.
2. The development shall take a **MIX OF USES** within the development, which is also known as **HORIZONTALLY MIXED USE** approach versus a strict adherence to traditional mixed-use definitions to require vertically mixed-use buildings. The mix of land use districts and land use types within the development as a whole shall guide success of mixed use, not strictly mix of uses within a building, block, or individual district. These types of mixes although not required, are encouraged. The 'mix of uses' approach shall not preclude flexible first floor and vertically mixed use buildings.
3. Our vision includes significant areas guided for a variety of **RETAIL OFFERINGS**. **HOUSING DENSITY** is important to that vision.
   The emphasis of the master plan concepts is to **GUIDE LAND USE**, and is **NOT SPECIFIC SITE PLAN REVIEW**. Future developers shall have the creative freedom to propose other concepts that are generally in line with **OVERALL VISION**.

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## Land Use District (Sub-District) Descriptions and Requirements

The COR is divided into five (5) distinct land use districts that ensure a mix of uses and guides quality private and public development. These districts are considered sub-districts and can be amended easier than traditional zoning districts. The overall land use mix shall be provided. Amending sub-districts shall be approved by resolution of the City Council after recommendation by the Planning Commission, but shall not require a Public Hearing. Amending sub-district boundaries shall not require a Comprehensive Plan Amendment so long as the over land use balance is preserved.

1. Downtown District (COR-1)
2. Retail District (COR-2)
3. Office District (COR-3)
4. Residential District (COR-4)
5. Parks and Open Space District (COR-5)

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## The Downtown District (COR-1)

**Downtown District Description.** The Downtown District shall be a high-density district with a mix of uses. Vertically mixed use buildings are not required, but are encouraged. The Downtown District shall be predominantly high-density residential to support existing transit and City growth-management goals, but is not required. Shared parking districts are an integral part of the success of this district. Urban design shall also emphasize build-to lines and pedestrian interaction. The district shall have the most robust architectural design standards amongst all City land use districts.

This district is the focal point of the development. This quarter-mile radius is key to land use supportive of transit and other City land use goals. The City of Ramsey and its funding partners (Anoka County, CTIB-Counties Transit Improvement Board, and Metropolitan Council) invested nearly $14 Million Dollars on the Northstar Commuter Rail – Ramsey Station, relying on The COR Development Plan. This district is described as predominantly high-density residential, with a number of commercial uses along Sunwood Drive. There should be a **MIX OF USES** within this district.

**Planning Commission Recommendation:** The City should focus on original visions to better manage parking and maximize land use of individual parcels. This includes reverting back to a **FLOOR AREA RATIO (FAR) OF 0.75** and retaining a strict adherence to **MAXIMUM PARKING** standards and shared **PARKING DISTRICT** requirements. Minimum density shall be fifteen (15) units per acre with no maximum density required.

**4/25/17 City Council Work Session Comment.** Concern was raised over reverting back to the 0.75 FAR, thus requiring vertical shared parking in the downtown district. Consensus was generally to study cost/benefit further, with acknowledgment of the need for flexibility.

**5/25/17 EDA Comment.** Open to discussion and reviewing further parking districts and parking ramps. However, the City should not force or require shared parking. Shared parking and parking ramps should be encouraged and strived for, but not required of private development. The City should not revert back to the 0.75 FAR.

## The Retail District (COR-2)

**Retail District Description.** The Retail District shall be focused on providing retail offerings to support the community and beyond. This district shall focus on smaller, unique shops, while allowing larger format retailers along Highway 10 where visibility and access is best.

Places to eat, shop, and be entertained were a key component of the original development. While other land uses have succeeded in continued growth, retail goals have struggled to keep pace. The City has continued to evaluate our retail marketing strategy, and amendments to this plan represent a broader effort to advance these goals.

Citywide, the community has over 150 acres of undeveloped or redevelopment areas guided for future retail growth. In comparison, the Riverdale shopping center in Coon Rapids is approximately 200 acres. Coupled with proximity to Elk River and physical barriers such as the Mississippi River and Rum River, it is not likely that the City will be successful in developing this amount of retail within this 20 year planning period, if at all. Additionally, the market for larger retail users is quickly changing with adapting technologies. The City's market experts have encouraged the City to re-evaluate its retail strategies.

EMPHASIS: The City continues to plan for a significant amount of retail growth within The COR and throughout the community. The recommendations below are not intended to de-emphasize our retail goals, yet strengthen said retail goals and focus on more appropriate areas for future growth.

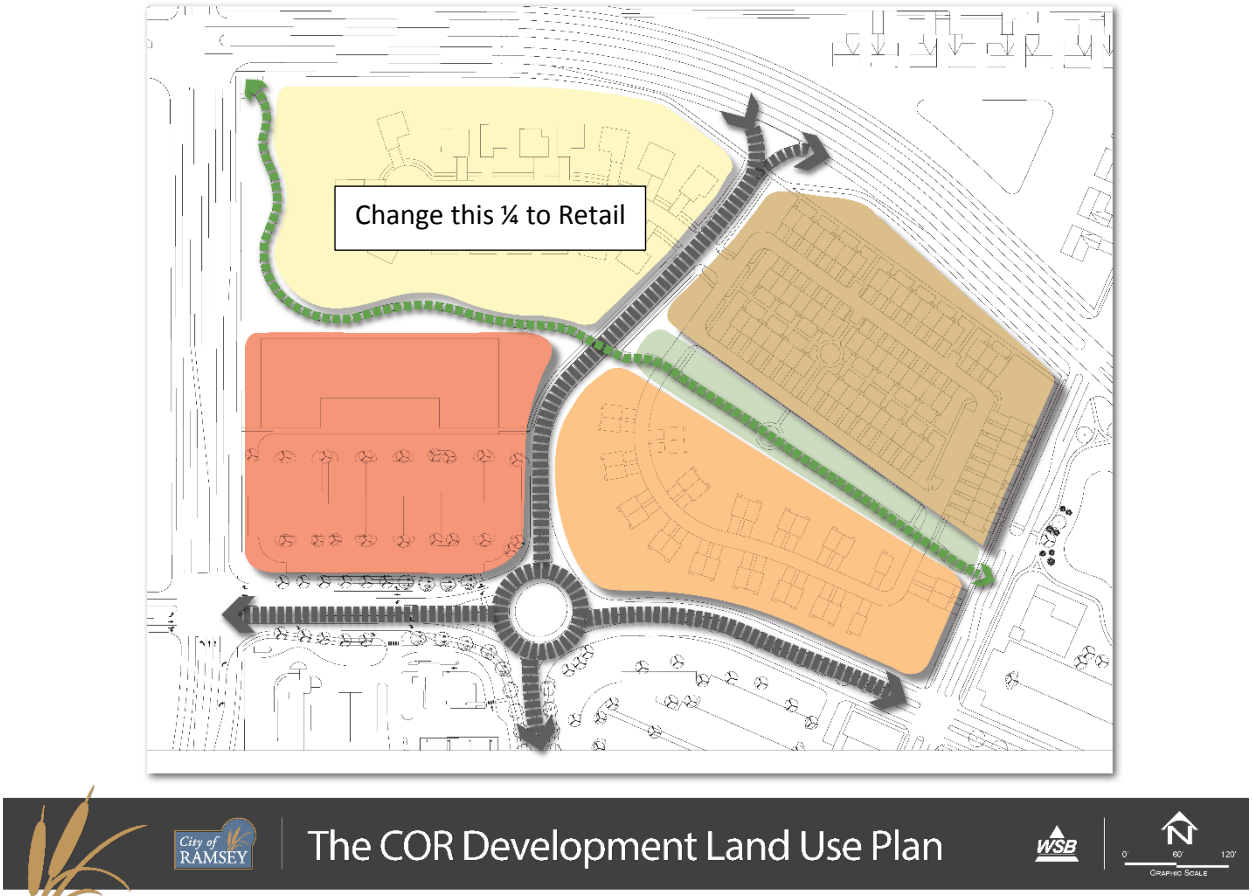
**Planning Commission Recommendation:**

The northwest quadrant of the development (bordered by Armstrong Boulevard, Bunker Lake Boulevard, Zeolite Street, and Sunwood Drive) should be amended to strengthen the **LAKE ITASCA GREENWAY**, create **SMALLER DESTINATION RETAIL USERS**. Half of this quadrant should be re-guided for **an APPROPRIATE RESIDENTIAL USE**, with **DENSITY** appropriate for the type of overall land use plan for The COR.

This is the area of **MOST SIGNIFICANT CHANGE** recommended by the Planning Commission. The Planning Commission collaborated on developing multiple land use scenarios. The overall approach was to divide the northwest quadrant into four (4) smaller sub-quadrants divided by future public roadways and greenways and allocating half the quadrants to smaller, destination retailers and the other half to residential uses. Based on feedback and reconciling multiple angles of consensus, the land use map below represents the primary recommended land use map.

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Primary NW Quadrant Land Use Map – Vertical Split (this will be the model of the actual land use map [focus on polygons per land use, less focus on detailed site planning])



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Continued on next page.

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## NW Quadrant Acceptable Alternatives

The alternatives listed below would require a future plan amendment, but are afforded certain policy feedback in advance. These can be viewed as 'pre-screened' alternatives.

### NW Quadrant Horizontal Split




Continued on next page.

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NW Quadrant All Retail




## The Office District (COR-3)

This district represented the area of highest consensus amongst the Planning Commission.

**Planning Commission Recommendation:** **NO AMENDMENTS** to this district are recommended. However, the City should look at strategies to encourage parking districts within this land use district as well.

Note. During the January 24, 2017 Joint Work Session between the City Council and Planning Commission, it was noted that an office user may be possible in the northeast quadrant currently guided for retail use. Staff's recommendation, while a potentially positive amendment, would be to consider

this possibility under a separate amendment, as the overall plan currently has a good balance of office planned, and a more comprehensive look would be needed for such an amendment.

## The Residential District (COR-4)

The Residential District is further divided into three (3) categories. The descriptions below include recommended adjustments to density ranges.

- 'Low' Density (COR-4a). This is predominantly detached single-family located north of Bunker Lake Boulevard. The minimum density shall be four (4) units per acre and densities up to fifteen (15) units per acre shall be allowed.
- Medium Density (COR-4b). These predominantly include townhomes, both attached and detached. Minimum density shall be eight (8) units per acre with a maximum density of fifteen (15) units per acre. Additional density may be allowed via Conditional Use Permit.
- High Density (COR-4c). These areas are focused immediately north of The Draw Park and Amphitheater and provide a unique opportunity for interaction and transition. The emphasis on mix of uses is muted compared to the Downtown District. The minimum density of this district shall by fifteen (15) units per acre with no cap of maximum density.

**Planning Commission Recommendation:** The remaining undeveloped area immediately north of The Draw currently owned by K Hovnanian Homes shall be re-guided to High Density Residential. The Planning Commission recognizes the success of high density residential abutting The Draw on the south side (Parkview East) and sees this as an opportunity for consistent design when coupled with the future Aeon Apartment Development (north side).

## Parks and Public Spaces (COR-5)

This district is governed by The COR Parks + Public Spaces Plan, and is included by reference as an integral part of The COR Interim Development Plan. Neither document shall be interpreted as a wholly separate document, and neither document shall be adopted or otherwise amended unless coinciding with each other. An amendment to one plan shall be considered an amendment to the other. This document has been adopted as a 'working draft' by consensus of the City Council. The intent is to adopt as a formal plan as part of the overall COR Development Plan Amendment.

Continued on next page.

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## Implementation Plan

The Interim Development Plan represents Phase I of a three (3) phase project.

1. Interim Development Plan (this step)
2. System Plans (roads, utilities, parking structures, infrastructure, etc.).
3. Development Pro-Forma (funding and financing options.

Continued on next page.

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## Major Planning COR Planning Efforts

### EFFORT #1
### COR Re-Visioning

**PURPOSE**
Update/ amend the vision for The COR.

1. Update COR Master Plan (map that shows vision, how the COR will look, how buildings will be oriented, where infrastructure should be located, etc.)

2. Update zoning district map (underlying land use regulations that will ensure the master plan will be implemented at the time individual projects come forward for review by the City)

3. Direction on outstanding major policy items:

   -Is vertically mixed use development a requirement?
   -appropriate size and location of retail uses?
   -Is there flexibility in location of zoning district borders?
   -Define basic vision and policy for community center.
   -Define basic vision and policy for parking ramps.

**RESPONSIBLE BOARD**
Planning Commission will draft a recommendation for Council consideration.

**TIMING**
Anticipated to have draft completed by April 2017. Once a draft is completed, it should be checked against COR System Plans and COR Pro-Forma. May need to be adjusted.

### EFFORT #2
### COR System Plans

**PURPOSE**
The City purchased The COR with two goals in mind (a) recover previous public investments, and (b) ensure the vision of The COR is implemented.

As a result, the City of Ramsey has taken the role of master developer for The COR. With the role, various assumed responsibilities are assigned to the City. Developers, businesses, and residents expect the city to have concept plans/ policies in place for the following items:

1. Storm water plan (regional)
2. Road plan (public roads)
3. Sign plan (development signs, way finding sigs, etc.)
4. Park & Trails plans
5. Community Center plan/ policy
6. Parking Ramp(s) plan/ policy
7. Cut/fill basic plan

There are many benefits to having this preliminary information ready—please see system plan dashboard for details. These plans are intended to be preliminary/ concept level only—for the sake of planning and budgeting.

**RESPONSIBLE BOARD**
Likely, all boards will be involved with this process. However, for the sake of efficiencies, the EDA will lead this effort. Findings will be presented to the Planning Commission and City Council.

**TIMING**
Upon completion of 1st draft of COR re-vision, staff would like to order this work for completion (i.e. begin May 2017). This work will take 6-9 months. Once draft is completed, it should be checked against COR Master Plan and COR Pro-Forma. May need to be adjusted.

### EFFORT #3
### COR Pro-Forma

**PURPOSE**

1. Update COR pro-forma based on updated vision and system plans. COR pro-forma will display the city's financial performance forecast/ project cash-flow over time (expenditures/ obligations versus revenues/ available funding).

2. Update COR TIF plan/ TIF analysis previously completed by Ehlers. This plan plays a major role in the "funding" side of the COR pro-forma. Because actual TIF revenues are based on actual completed projects, it would be helpful to update periodically. NOTE: TIF can only be used for projects completed before 2021.

3. Update COR land proceeds policy. Staff would like to (a) clearly identify what previous expenditures the City wishes to repay itself, (b) consider using land proceeds only for non TIF eligible costs, and (c) update the City's land sale proceeds forecasts.

**RESPONSIBLE BOARD**
EDA will draft a recommendation for Council consideration.

**TIMING**
Upon completion of COR re-vision and COR system plans, staff will complete this work (i.e. begin late 2017). This work will take 1-2 months. Once draft is completed, it should be checked against COR Master Plan and COR system plans. May need to be adjusted

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The group then formulated a broad work plan to accomplish the many steps to complete an overall plan amendment and update.

| The COR Development Plan Update Plan of Action | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2017 | | | | | | | | | | | | |
| | Quarter 1 | | | Quarter 2 | | | Quarter 3 | | | Quarter 4 | | | |
| | January | February | March | April | May | June | July | August | September | October | November | December | |
| **Task 1: Land Use Plan Update (Planning Commission)** | | | | | | | | | | | | | |
| Draft Vision Statement | | | | | | | | | | | | | |
| Draft Land Use/District Map | | | | | | | | | | | | | |
| Draft District Descriptions | | | | | | | | | | | | | |
| Draft Development and Design Standards | | | | | | | | | | | | | |
| Draft Development Plan Update (Zoning Code) | | | | | | | | | | | | | |
| Adopt Final Version of Development Plan | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| **Task 2: System Plan/Infrastructure Study (EDA)** | | | | | | | | | | | | | |
| Stormwater Plan | | | | | | | | | | | | | |
| Road Plan | | | | | | | | | | | | | |
| Sign Plan | | | | | | | | | | | | | |
| Parks and Recreation Plan | | | | | | | | | | | | | |
| Community Center Plan or Policy Statement | | | | | | | | | | | | | |
| Parking Ramp/District Plan or Policy Statement | | | | | | | | | | | | | |
| Cut/Fill Plan (Grading) | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| **Task 3: Project Pro Forma (EDA)** | | | | | | | | | | | | | |
| Pro-Forma | | | | | | | | | | | | | |
| Tax Increment Financing (TIF) Plan | | | | | | | | | | | | | |
| COR Land Sale Proceeds Policy | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

## Public Engagement

A key component of any policy decision is collaboration amongst its residents. These processes are part of natural and organic community conversations around key policy topics. The City will couple this policy discussion with ongoing workshops and community events as part of its overall Comprehensive Plan Update. For more information on this effort, please visit www.cityoframsey.com/ramsey2040.

**4/25/17 City Council Work Session Note:** All Boards and Commissions should review this document before the City Council considers formal adoption. The City Council should review the final document and approve before distributing to the public and stakeholders/landowners.

## Mobile Comprehensive Plan Tour

The City is planning a Mobile Comprehensive Plan Tour for policy makers that will include local examples of plans and policies being discussed in the Comprehensive Plan Update. The tour is planned to include examples discussed in this Interim Development Plan as well.

## Market Analysis

The Planning Commission recommends completion of a market analysis to confirm the policy directives of this document as it relates to the planned retail area. The Planning Commission continues to stress the importance of attracting retail uses to the Development, but want to ensure that there is not too much areas guided for retail growth beyond what the community can sustain.

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## Community Center

The Planning Commission desires to continue to plan for a Community Center in The COR. The Planning Commission feels that this type of use would benefit the community and be a draw for other users within the development. This analysis will be completed as a separate planning process.

## Architectural Standards

A key component of the policy discussion for The COR has been architectural design standards. The Planning Commission believes several recent projects fell short of community expectations. While originally intended to be part of Phase I of The COR Development Plan Update, the Planning Commission continues to refine these recommendations and will continue throughout Phase II and Phase III to bring a quality recommendation forward with a full Plan Amendment.

The standards below are not an exhaustive list of current design requirements, yet a focus on key topics that have been raised for future discussion. Upon final amendment, the City will prepare a side-by-side comparison of all existing and proposed design requirements. The final version of this Interim Development Plan will also include drawings/illustrations to illustrate the narrative being discussed.

The COR should continue to focus on four-sided architecture visible from the public realm. Quality signage on all four sides of the building should be allowed. The community should be able to park on public streets and reasonably access the building.

**Planning Commission Recommendation:**

In the interim, the Planning Commission shall serve as an ad-hoc architectural review committee. Projects shall complete an architectural review prior to official Site Plan Review. The Planning Commission reserves the right to establish an ad-hoc sub-committee to serve as this Architectural Review Committee. The Planning Commission recommends that the City supplement the Development Review Team with the services of a licensed architect to help develop updated design standards and review development proposals. This will add value to the process, hopefully streamline review, and is in line with other professional services the City employs in development review. The cost of these services are the responsibility of the Developer.

**Additional Discussion Points:**

* The intent of design requirements is to maintain a consistent development look and acknowledge the

pride and planning that went into the vision of this development. The tradeoff of a more densely developed areas was an acknowledgement of the need to 'step up' architectural design.

* All single-family homes in The COR shall include/not include a porch that protrudes from the front of the home, even with the garage, and not a recessed entry in the middle of the home.

* Over the next several months, the Planning Commission will better define front porches and if any additional design requirements or restrictions (i.e. split entry homes) are warranted. .

* Buildings in the Downtown District shall include a minimum of 50% brick. Vinyl siding shall not be allowed. Fiber cement panels shall be allowed as a complimentary material.

* Buildings in the Residential District shall have a minimum of 35% brick or stone on the front façade. Vinyl siding is allowed.

## Private Open Space and Stormwater Design

The Planning Commission has expressed a concern over a perceived lack of private open space in medium density development as well as depth and steep slopes of stormwater ponds within the development due to the higher density nature. This concern has not yet been resolved, but will continue to be discussed during Phases II and III of the Plan Amendment. The City shall take into account sidewalks, greenways, and other private and innovative improvements (such as wonerfs).

## Site Selection Process

The City is in a unique situation as Property Owner and Regulatory Authority. This presents opportunity, but also requires special attention to remain accountable to the public. In order to balance this approach without creating burdensome processes, the following steps shall be followed when considering a Purchase Agreement with the City in The COR.

Any perspective buyer of City-Owned Property in The COR shall first meet with City Staff to discuss appropriate sites. This is known as the Site Selection Process. The City and Buyer shall review multiple sites before selecting a preferred location. Depending on the complexity of the project, the City reserves the right to take this Site Selection Process to the Planning Commission, EDA, and City Council before reviewing a specific site.

The Buyer shall provide a site concept to be reviewed by the Planning Commission, EDA, and City Council before approving a Purchase Agreement. When a single-user proposes to purchase a portion of an undeveloped block or area, a series of 'site concepts' shall be developed before reviewing with any City board or commission. These site concepts shall demonstrate at least one reasonable concept for the remaining portion of the site that fits the vision and requirements of that area/district.

The Buyer must still complete the official Site Plan Review (and Subdivision) process after the Purchase Agreement Phase.

## History of Policy Discussion

This Interim Development Plan is the result of a Planning Commission initiative dating back to 2015. The City has invested a significant amount of time, energy, and resources in order to ensure a **MARKET RELEVANT PLAN** that balances **COMMUNITY VISION**.

### Joint Work Sessions

The City Council and Planning Commission have met on multiple occasions to frame the policy question, discuss strategies, and identify solutions.

- March 26, 2015 = Joint Work Session
- July 12, 2016 = Joint Work Session
- January 24, 2017 = Joint Work Session

### Surveys

In 2016, the City surveyed its Board and Commission Members on key topics related to The COR Development Plan.

The key directive coming out of review of these results on July 12, 2016 was to create a forum for policy makers to ask questions and receive direct feedback from developers and market experts, rather than completing another market study.

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## Market Panel Event

On October 27, 2016, the City hosted several market experts to respond to a wide range of policy topics raised by community policy makers. The output from this event served as an important foundation for land use recommendations developed by the Planning Commission.

## Planning Commission Work Sessions

The information gleaned from the steps above were utilized to begin important policy discussions about the future of The COR. Following review of the Market Panel Event, the City Council authorized the Planning Commission to begin formulating land use recommendations for The COR. The Planning Commission met Work Sessions dedicated to The COR on multiple occasions.

- January 5, 2017 (to prepare for the January 24, 2017 Joint Work Session with the City Council)
  - Develop a Vision Statement
- February 2, 2017
  - Refine the Vision Statement
  - Collaborate on a Future Land Use Map
- March 2, 2017
  - Refine the Vision Statement
  - Refine the Future Land Use Map and Alternative Future Land Use Maps
- April 18, 2017
  - Refine the Vision Statement
  - Refine the Future Land Use Map and Alternative Future Land Use Maps
- April 25, 2017
  - Draft document reviewed by City Council and Planning Commission in Joint Session.
  - Authorization to review with internal advisory boards and commissions.
- May 25, 2017
  - Draft document reviewed by EDA. Feedback/comments added to document.
- June 1, 2017
  - EDA comments reviewed by Planning Commission.

The Interim Development Plan is anticipated to be adopted in 2017.



The Waterfront

Armstrong Boulevard

Bunker Lake Boulevard

Ramsey Parkway

The Draw

Affinity Development

Municipal Plaza

Highway 10

Ramsey City Hall

Sunwood Drive

Pump House 3
context map

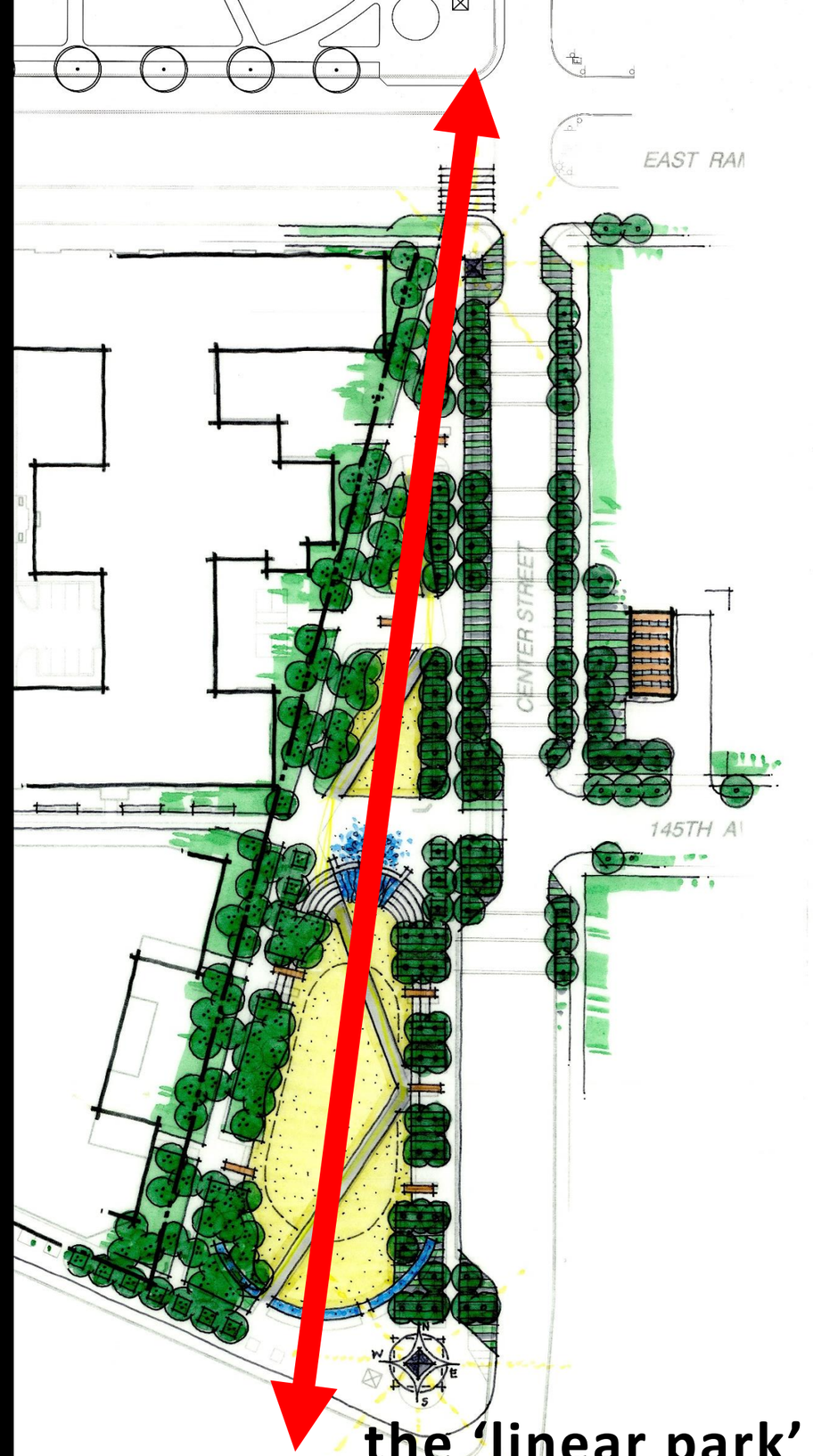
# RAMSEY COR – PARK SYSTEM COMPONENTS

## Municipal Plaza

( previous design study) Pump house 3

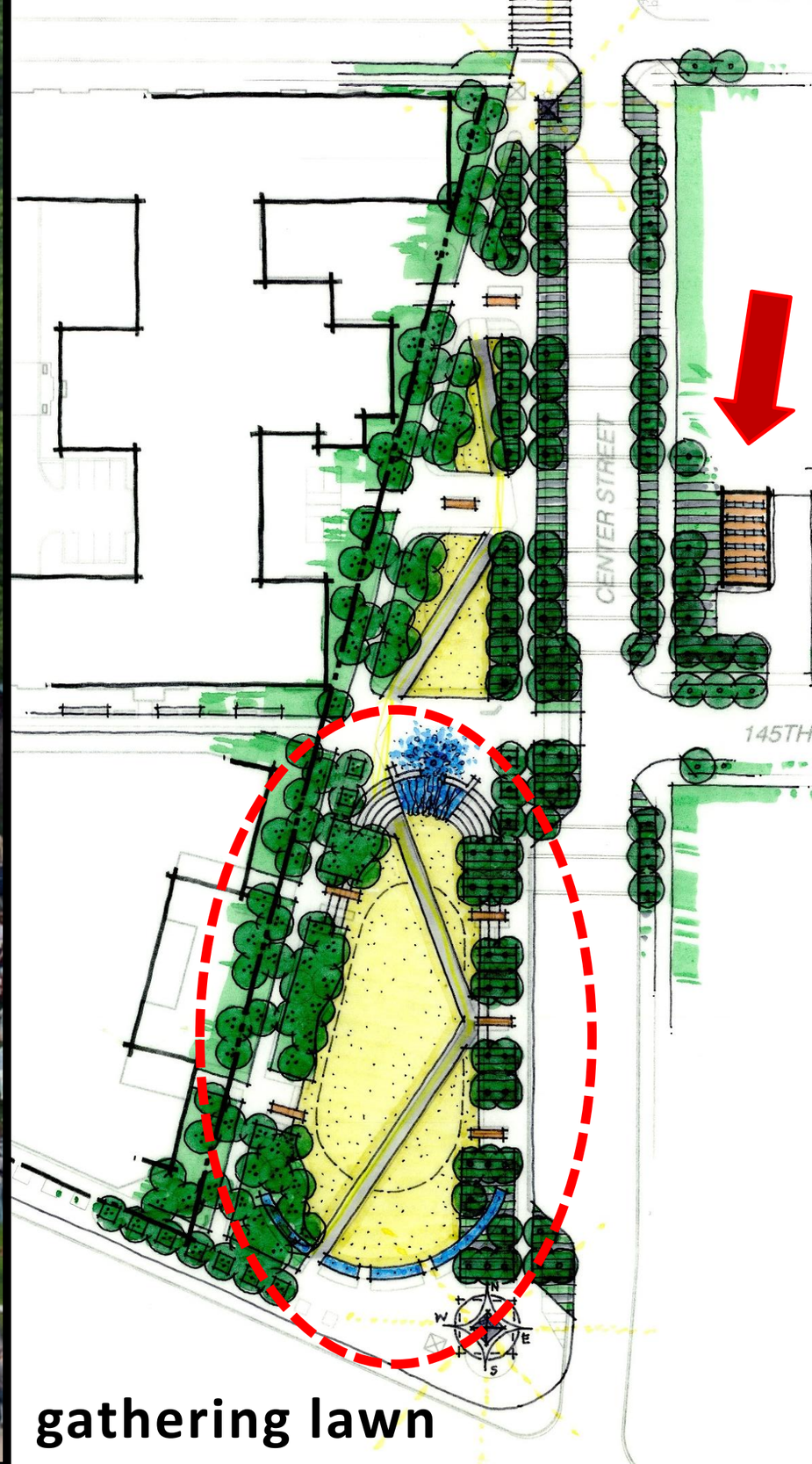







the ‘linear park’



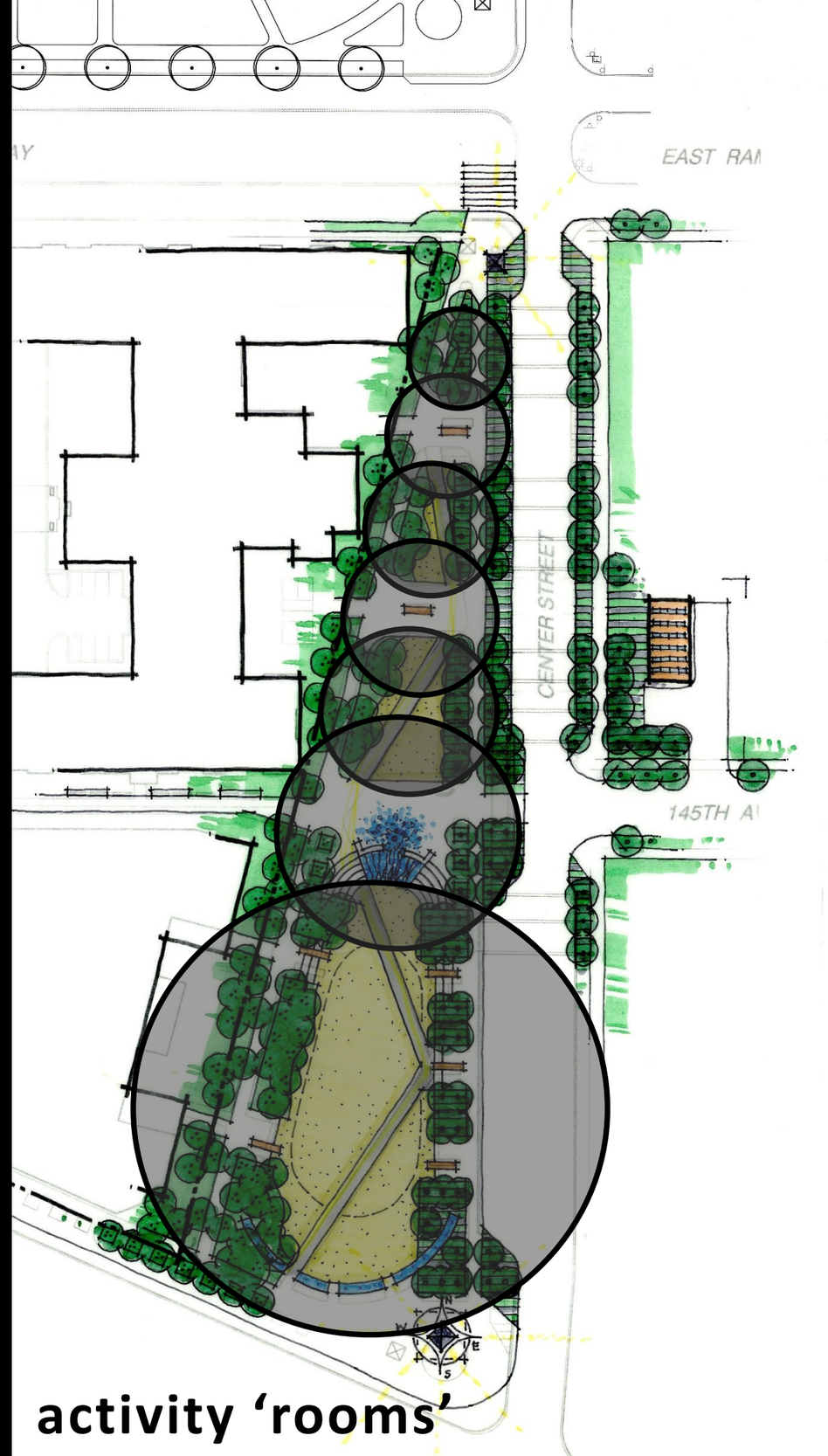



gathering lawn





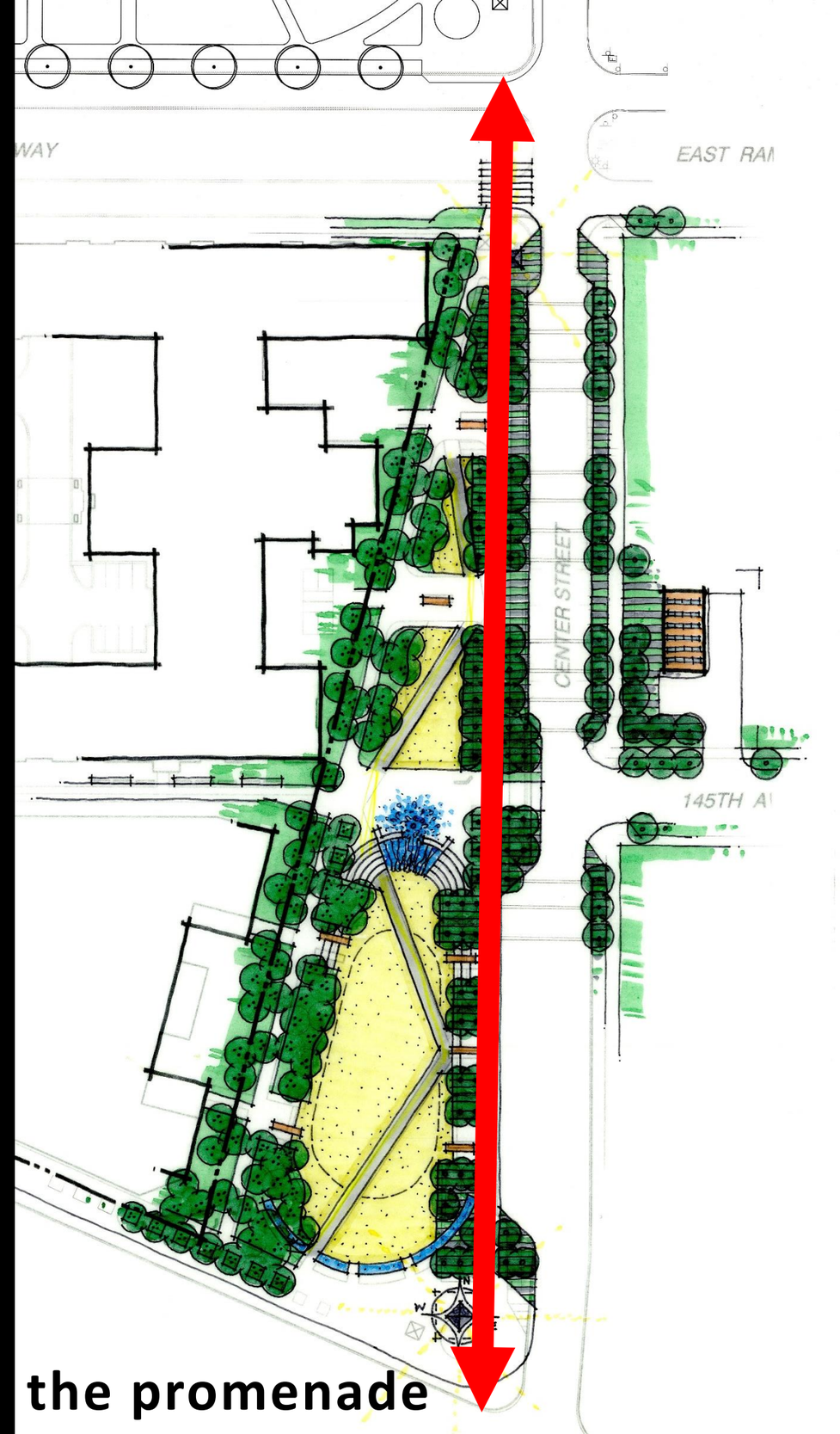




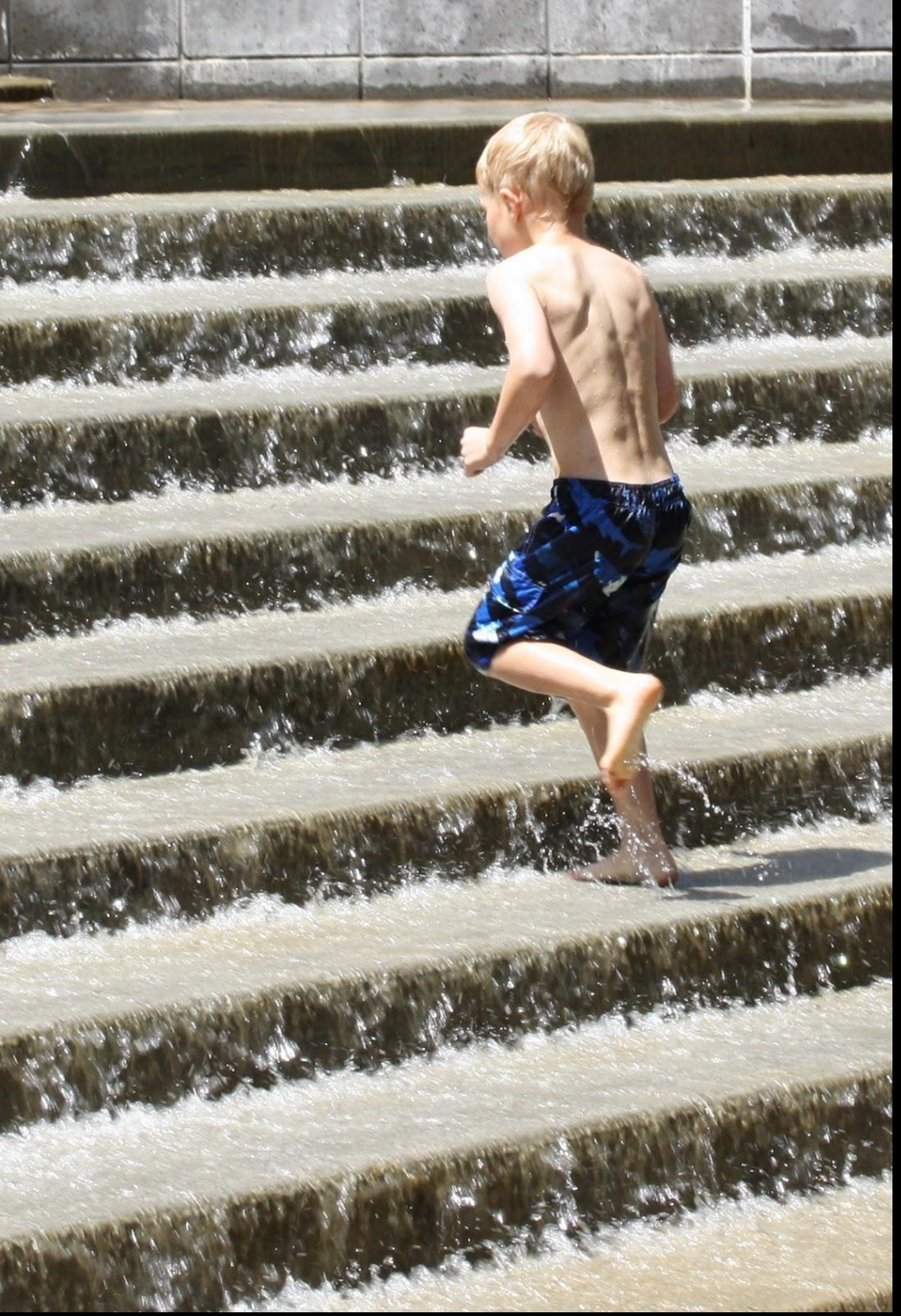

**activity ‘rooms’**



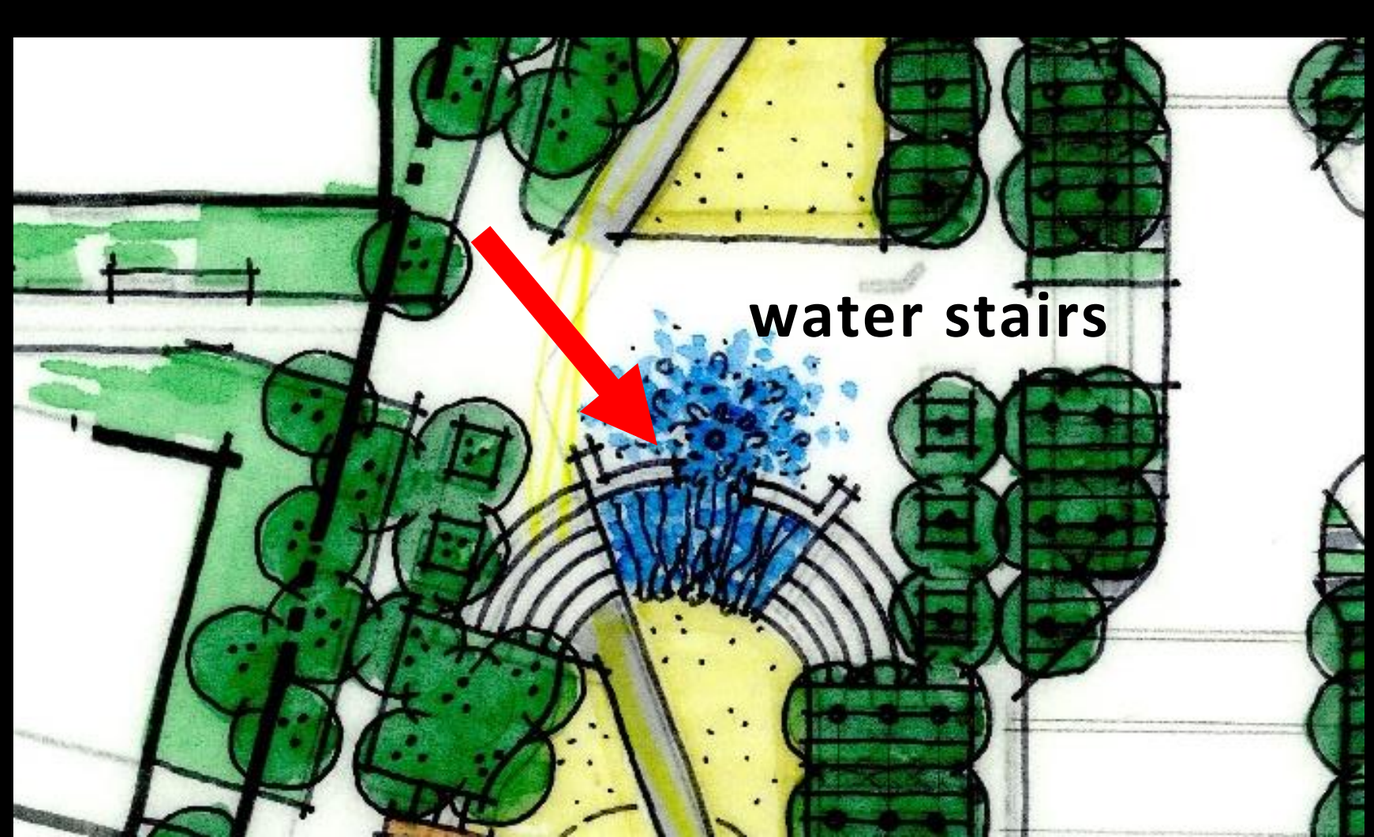





the promenade

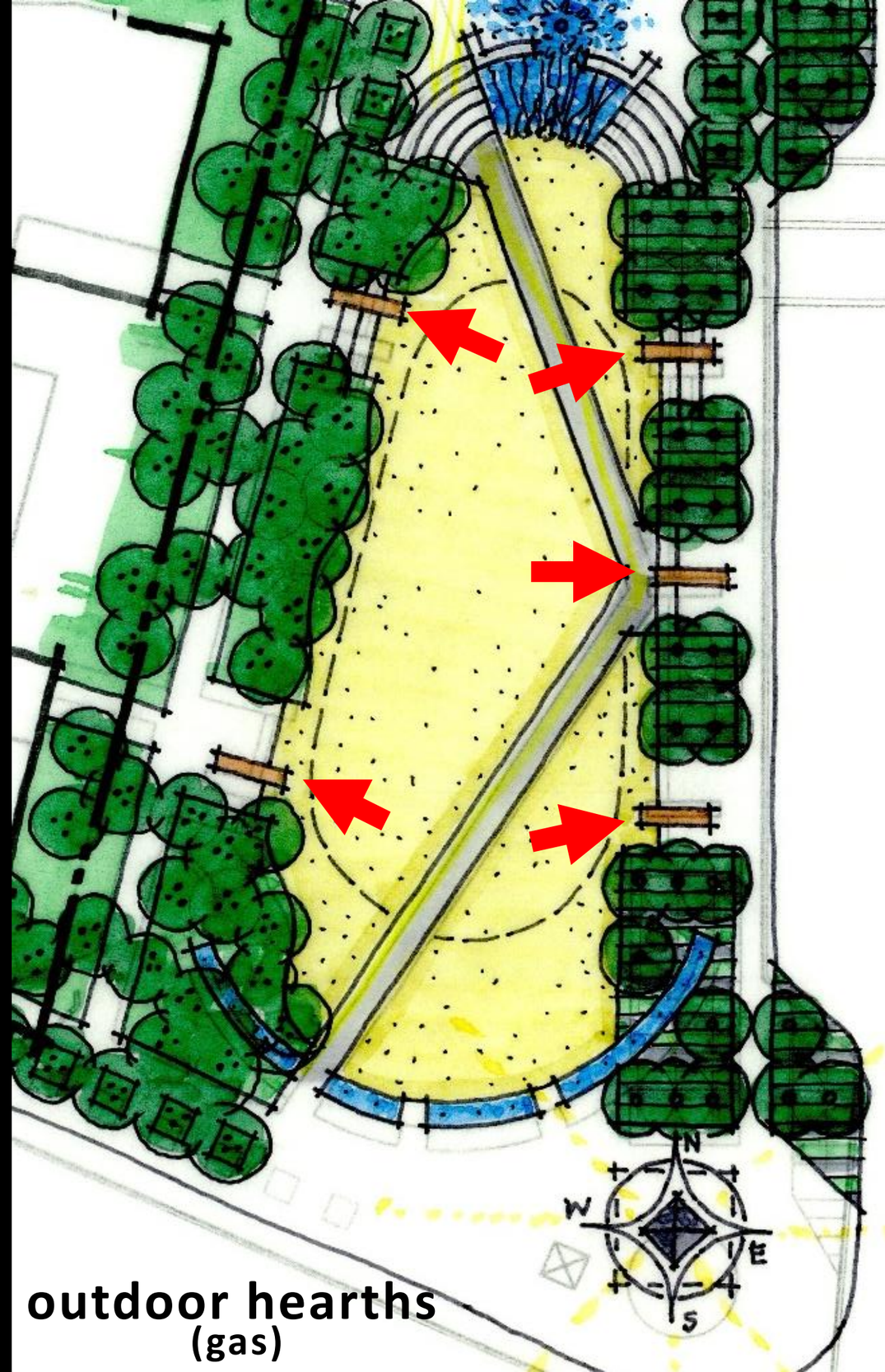





water stairs

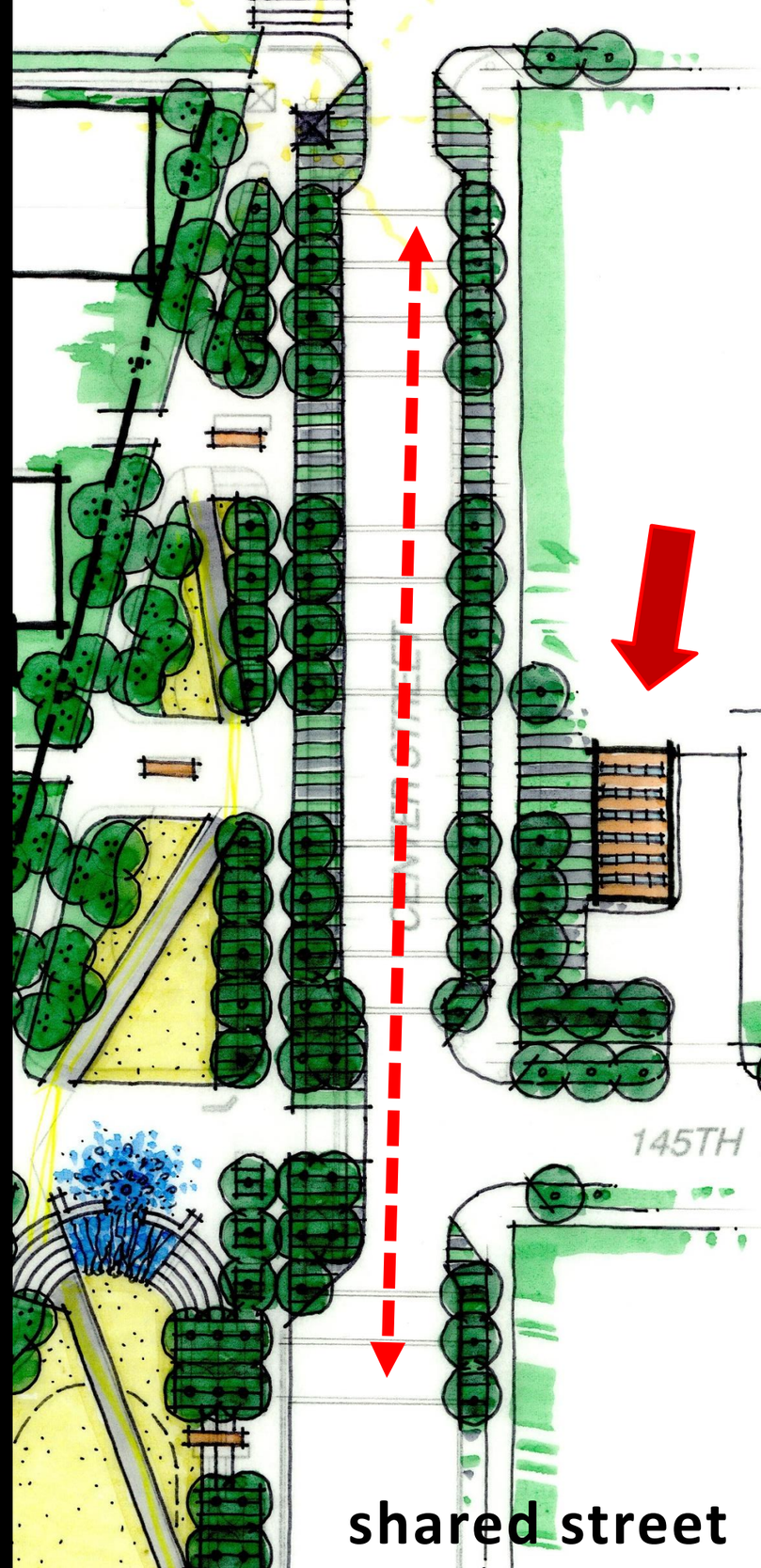


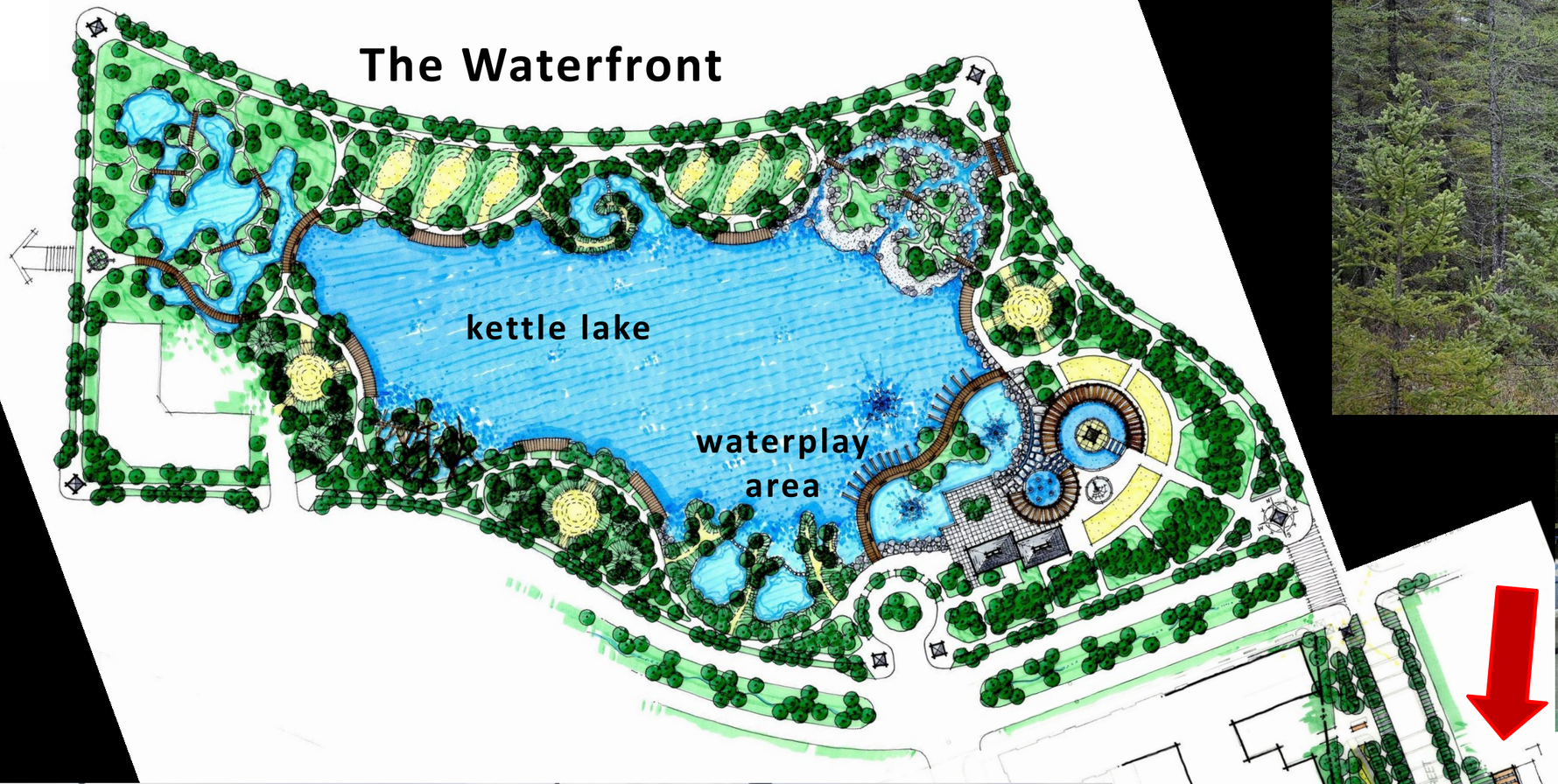


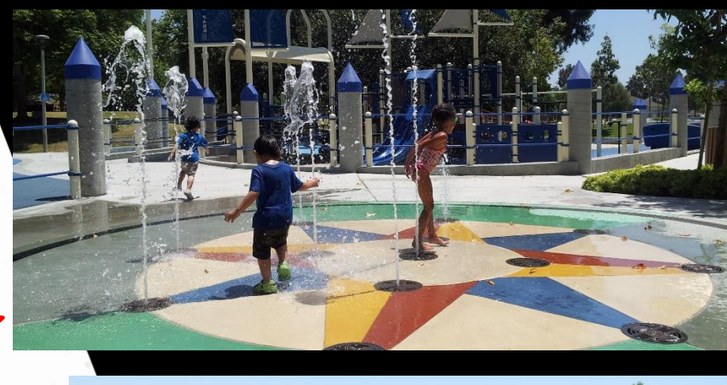

# outdoor hearths
## (gas)

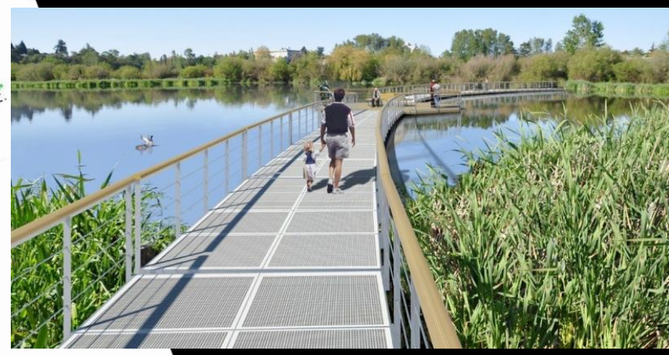



145TH
shared street












Municipal Plaza

