



# **Preliminary Report**

**for**

## **Future Business Park**

### **City of Ramsey**



## **TABLE OF CONTENTS**

<b>INTRODUCTION.....</b>	<b>1</b>
<b>STUDY CONTENT.....</b>	<b>1</b>
<b>INITIAL INFORMATION .....</b>	<b>2</b>
<b>GENERAL DISCUSSION.....</b>	<b>2</b>
<b>UNDERSTANDING PREVIOUS IMPROVEMENTS .....</b>	<b>4</b>
<b>ADDITIONAL ANALYSIS.....</b>	<b>6</b>
<b>COST CONSIDERATIONS.....</b>	<b>10</b>
<b>PROJECT FINANCING.....</b>	<b>11</b>

## **APPENDICES**

- APPENDIX A – FIGURES**
- APPENDIX B – TRAFFIC STUDY**
- APPENDIX C – STORM WATER ANALYSIS**

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## INTRODUCTION

The Ramsey City Council and Ramsey Economic Development Authority (EDA) have identified the need to prepare for the development of a new business park within the City. The City is targeting a large area of privately owned green-field space located on the north side of Trunk Highway 10, west of Armstrong Boulevard, for a future Ramsey Business Park. Currently, the City is in the process of rezoning this area to meet future land use goals. Figure 1 in Appendix A depicts the general area of the business park and study area.

The future business park is one component (about 92 acres) of a larger green-field area ready for development (about 350 acres). This larger green-field area includes areas for single-family residential development (about 118 acres), medium-density residential (about 31 acres) and room for a future private school campus (about 90 acres). In addition to green-field development, the City expects a portion of existing adjoining light-industrial space to be redeveloped into a traditional retail/commercial area (about 42 acres). See Figure 2 in Appendix A for future land use goals.

The City's future business park, and larger developable green-field area, will be served by the future Trunk Highway 10/Armstrong Boulevard (CSAH 83) interchange. Construction of this interchange began in the spring of 2015 and is expected for completion in the spring of 2017. The City expects the construction of this major interchange to increase the demand for development of this green-field area; and the future Ramsey Business Park.

The primary roadway system serving this developable area is Bunker Lake Boulevard and Puma Street. These roadways are both Municipal State-Aid (MSA) streets. This analysis includes studying traffic impacts resulting from the future business park (along with other users), examining the feasibility of constructing supporting infrastructure, and developing preliminary design layout plans and specifications.

## STUDY CONTENT

The primary purpose of this analysis is to determine minimum required infrastructure needs and costs associated with developing the green-field area. Roadways and intersections included in the study are as follows:

- Bunker Lake Boulevard from Armstrong Boulevard to Puma Street,
- Puma Street from Bunker Lake Boulevard to Alpine Drive,
- The Bunker Lake Boulevard/ Armstrong Boulevard intersection,
- The Bunker Lake Boulevard/ Puma Street intersection,
- The Puma Street/ Alpine Drive intersection, and

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- The Armstrong Boulevard/ Alpine Drive intersection.

Figure 3 in Appendix A depicts the roadways and intersections included in this analysis.

Our analysis consists of four separate components that, when tied together, provide an overview of the corridor needs:

- **Traffic Impact Study** – Defines the needs of the roadways and intersections in the study area,
- **Regional Storm Water Analysis** – Defines conceptual storm water ponding needs,
- **Preliminary Design Layout** – Provides a graphical depiction of the roadways and intersections, and
- **Final Report** – Describes required infrastructure improvements, layouts and costs.

## INITIAL INFORMATION

Prior to the study, the City of Ramsey provided the following information and guidance for the study area.

- The City is not master-planning this entire developable area. It is unknown where internal driveways, roadways and curb-cuts will be needed. Therefore, the design of Bunker Lake Boulevard and Puma Street should not include any new curb-cut locations.
- Stubbing of sewer and water utilities along Bunker Lake Boulevard and Puma Street should be completed at regular intervals based on future land use needs.
- Cost estimations and design should include: roadway, trails/sidewalks, storm water management, street lighting, trunk water service and trunk sewer service.
- The intersection of Bunker Lake Boulevard and Armstrong Boulevard was constructed in 2011. Verification that this intersection was constructed to accommodate traffic demands must be completed.
- The City has adopted Comprehensive Sanitary Sewer and Water Plans. These plans should be reviewed and consulted as forecasting and design work is completed.
- Regional storm water considerations and solutions should be included in the study.

## GENERAL DISCUSSION

While the primary focus of the analysis is related to providing infrastructure to serve development, additional considerations can influence decision-making. The following items were considered throughout the course of the analysis.

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## Right-of-Way Requirements

While it is anticipated that most of the improvements will be development driven, and Right of Way will be secured through the platting process, understanding and documenting the potential needs will allow the City to plan in advance for acquisitions. The City can then provide that documentation to developers as they begin to consider options within the study area.

## Phased Improvements

While there is a general understanding of the improvements required to ultimately serve the area, sequencing of the improvements will allow for planning and fiscal responsibility. Our understanding of the most logical phasing sequence includes:

- **Phase 1** – Complete construction of Bunker Lake Boulevard from Armstrong Boulevard to the westerly school property driveway. Sanitary sewer and water have already been extended to this point.
- **Phase 2** – Construction of Bunker Lake Boulevard from the Phase 1 limits to Puma Street. Construction of Puma Street from Bunker Lake Boulevard to the north. The northerly limits along Puma Street will be the approximate location of a lift station required to serve areas further to the north and west.
- **Phase 3** – Completion of improvements along Puma Street.
- **Future Phases** – We verified the improvements considered can service areas beyond Phase 3. For instance, the gravity sanitary sewer can serve areas west of Puma Street. No further work was completed beyond Phase 3 other these verifications.

Costs for each phase were developed to allow for the City to plan for the sequenced implementation of the improvements. The anticipated phasing is depicted on Figure 4 in Appendix A.

## Jurisdictional Authority/Approvals/Permits

As the project moves from the planning stages to design and construction, permits will be required from various agencies. Understanding and planning for requirements associated with obtaining permits and approvals at this time will be critical to the ultimate success of the process. The following agencies will be permitting entities for considered improvements:

- Minnesota Department of Transportation State Aid: Bunker Lake Boulevard and Puma Street are State Aid routes,
- Minnesota Pollution Control Agency: NPDES Storm Water Permit,
- Minnesota Pollution Control Agency: Sanitary Sewer Extension Permit,
- Minnesota Department of Health (MDH): Watermain Extension and Dewatering,

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- Anoka County: Work in Right of Way, and
  - Lower Rum River Watershed Management Organization: Storm Water.

### **Recent Improvements**

Improvements to the area were completed in 2011. The street and utility improvements completed at that time included:

- Extension of sanitary sewer along the west side of Armstrong Boulevard from just north of Sunwood Drive to Bunker Lake Boulevard,
- Extension of watermain from the east side of Armstrong Boulevard to the west side of Bunker Lake Boulevard,
- Extension of sanitary sewer and watermain in newly platted Bunker Lake Boulevard right-of-way,
- Development of a storm sewer system to service the street and right-of-way requirements,
- Extension of Bunker Lake Boulevard roadway,
- Paving of Puma Street, and
- Extension of a bituminous trail along Puma Street from Bunker Lake Boulevard to Alpine Drive.

All of the improvements completed at that time were consistent with the City's Comprehensive Plans.

## **UNDERSTANDING PREVIOUS IMPROVEMENTS**

Significant consideration and planning was completed prior to completion of the improvements constructed in 2011. Understanding the thoughts behind previous improvements can help avoid omissions when considering future improvements.

### **Street and Trail Improvements**

#### Bunker Lake Boulevard

The previous improvements provided a two-lane roadway from Armstrong Boulevard to Puma Street. The roadway was designed to allow for future widening and expansion as development and other potential transportation improvements surrounding the area increased traffic on this roadway. It was anticipated that ultimate expansion of Bunker Lake Boulevard to two lanes in each direction with center turn lane would be required for future development along Bunker Lake Boulevard.

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The Comprehensive Plan indicates that projected traffic on this roadway could be 11,000 ADT if the street is part of a future Mississippi River crossing. Without being part of a River crossing, the Comprehensive Plan provides 20-year projections of 5,000 ADT.

The roadway was located within the right-of-way to provide future flexibility in roadway expansion with minimal modifications to what will be constructed.

#### Puma Street

Improvements to Puma Street were evaluated because of the need to extend Bunker Lake Boulevard to Puma Street, a distance of about one-half mile.

Puma Street received only minimal improvements, being widened from 18 feet width to 24 feet and paved with 2 inches of bituminous over 6 inches of aggregate base. More significant upgrades to the roadway were anticipated, but not completed at that time.

The anticipated future requirements included a 32 foot wide street with curb and gutter with full base and pavement improvement.

#### Bituminous Trails

A 10-foot wide bituminous trail was constructed along the north side of the Bunker Lake Boulevard from Armstrong Boulevard to Puma Street and on the west side of Puma Street from Bunker to Alpine Drive.

#### Intersections

Bunker Lake Boulevard and Armstrong Boulevard was reconstructed to include turn lanes and signalization.

### **Sanitary Sewer Improvements**

Sanitary sewer was extended north along the west side of Armstrong Boulevard from 146th Avenue/Sunwood Drive NW to Bunker Lake Boulevard. To meet the Comprehensive Sanitary Sewer Plan and serve additional areas beyond the study area, a 21-inch sewer main was constructed. It was intended to extend the 21-inch trunk sewer further to the north to service Fire Station No. 1 and the proposed future location of the water treatment plant.

In accordance with the Comprehensive Plan, an 18-inch sanitary sewer was extended westward along Bunker Lake Boulevard. This line will provide service to the study area, as well as future development that may occur on the south side of Bunker Lake Boulevard, and could be further extended in accordance with the Comprehensive Plan.

### **Water Distribution and Supply Improvements**

Watermain was extended across Armstrong Boulevard from the main on the east side of Armstrong Boulevard. From there, the watermain was further extended westward in Bunker Lake Boulevard.

It was planned to extend this trunk watermain west to Puma Street and north to Alpine Drive via

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Puma Street to provide future looping and provide water to unserved areas and future developments. Loops within future development would be utilized to promote reliability and functional flexibility as well as promoting fresh water moving throughout the system.

It was previously determined that the elevated storage for the City of Ramsey is adequate to provide fire flow to the study area. The distribution system was also found to be adequate to move the water from the City's three towers to the study area.

***Additional Consideration:***

*The right-of-way of Bunker Lake Boulevard could be utilized for a future route of a 30-inch raw watermain from a future intake on the Mississippi River to the proposed site of the water treatment plant, just south of Fire Station No. 1. Because the exact location of the intake and raw watermain alignment had not yet been determined, no provisions were made during the previous improvements.*

**Storm Water Management**

Drainage for the study area is essentially sheet flow to the center of the site to existing wetlands, and then easterly through the wetlands and through a culvert under Armstrong Boulevard. Runoff continues to flow into the actively developing COR area.

A storm sewer system was installed in Bunker Lake Boulevard to manage the storm water runoff within the right-of-way. We anticipate that this included considerations for the future widening and extension of Bunker Lake Boulevard as well.

Extensive hydraulic modeling was refined and detail added to represent preliminary storm water management conditions for future development scenarios.

## **ADDITIONAL ANALYSIS**

As a portion of this analysis, we completed traffic and storm water studies and reviewed City Comprehensive Plans for sanitary sewer and water main needs for the study area. The traffic study is included as Appendix B and the storm water study is included as Appendix C to this report. The following is a summary of results for the various analyses and reviews.

### **Traffic Analysis**

The traffic analysis was completed to determine required lane geometry for Bunker Lake Boulevard and Puma Street, along with turn lane requirements at four intersections in the study area.

The Future Business Park development is proposed north of Trunk Highway (T.H. 10) and west of Armstrong Boulevard. Armstrong Boulevard is a critical north-south corridor for the City of Ramsey, Anoka County, and the region carrying traffic from T.H. 10 to surrounding areas. The Business Park development includes residential, business park, commercial, and institutional land uses. These land uses result in an increase of 18,500 to 23,300 trips per day into and out of the area at full build.

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The traffic increase from both the background growth and the development results in a need for capacity improvements at individual roadways and intersections in the study area. The following concise summary of improvements should be completed based on the mitigation necessary to achieve acceptable operations. For the 2040 Full-Build scenario, operations can be improved, but will still be considered unacceptable at many of the intersections. This is due to the large amount of traffic entering and exiting on Bunker Lake Boulevard and Armstrong Boulevard. Short term improvements are intended to mitigate current safety or operations problems, mid-term improvements are needed to accommodate both development and background traffic growth, and long-term improvements are needed to handle the overall development to year 2040.

Exact timing for improvements will be based upon the actual development timing and background traffic growth. Short Term improvements can be considered as the minimum requirements based on projected traffic growth. Mid Term and Long Term improvements are considerations and may ultimately be required to serve the area.

#### Short Term Improvements

- Bunker Lake Boulevard (west of Armstrong Boulevard): Expand to a four lane section for development.
  - The eastbound approach should include two 300 foot left turn lanes, two through lanes, and one right turn lane.
  - A full median should be provided to the west end of the commercial area.
  - A full access should be at least 845 feet from Armstrong Boulevard and a right in/right out access should be at least 470 feet from Armstrong Boulevard.
- Bunker Lake Boulevard (west of commercial section): Expand to a three lane section for development (two through lanes and one center left turn lane).
  - Right turn lanes (locations and lengths) will be determined based on development type.
- Puma Street: Expand to a three lane section for development (two through lanes and one center left turn lane).
  - Right turn lanes (locations and lengths) will be determined based on development type.
- Bunker Lake Boulevard & Puma Street: An all-way stop, two-way stop, or roundabout will operate adequately at this intersection for the 2040 Full-Build conditions. The roundabout option may offer better operations than the other two options at 2040 Full-Build.

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### Mid-Term Improvements

- Armstrong Boulevard & Alpine Drive: Add northbound and southbound left turn lanes. Modify eastbound and westbound lanes to include a thru/left and a right turn lane.
- Alpine Drive & Puma Street: Add a westbound left turn lane and eastbound right turn lane.
- Armstrong Boulevard & Bunker Lake Boulevard: Re-stripe southbound lanes to include a dual southbound left turn lane. A southbound double left turn lane will help reduce queues entering the COR development. Improvements were done in 2011 to this intersection and a future southbound left turn lane was designed, but not striped.

### Long-Term Improvements

- Armstrong Boulevard & Bunker Lake Boulevard: Modify the southerly eastbound through lane to a through-right lane. Another option would be to keep the two through lanes and modify the right turn lane into a free right with an add lane that runs south to T.H. 10.

### Alternative Improvements

At several locations along the corridor, opportunities exist for implementation of alternative alignments. These are depicted as options to consider based on development concepts.

Alternative concepts are depicted at the intersection of Bunker Lake Boulevard and Puma Street (Figure 10) and the intersection of Puma Street and Alpine Drive (Figure 12). The alternatives are provided for future discussion and will not significantly impact project costs.

Figures 5 through 12 in Appendix A depict future roadway and intersection improvements in the study area.

### **Sanitary Sewer and Water Main**

An 18-inch sanitary sewer main was extended west along Bunker Lake Boulevard as a portion of the 2011 improvements. Based on information contained in the Comprehensive Plan, The 18-inch line will be extended along Bunker Lake Boulevard and north along Puma Street. North of the Puma Street/Bunker Lake Boulevard intersection, grade becomes an issue and a sanitary sewer lift station is required to serve areas further north and west. North of the lift station, the Comprehensive plan indicates a 12-inch gravity main will be adequate to convey sanitary sewer flows from the area.

A 16-inch water main was extended west along Bunker Lake Boulevard as a portion of the 2011 improvements. The Comprehensive plan indicated that either a 12-inch or a 16-inch water main would be required along Bunker Lake Boulevard and Puma Street, depending on the final selected location of a future water treatment plant to be constructed in this area. For our analysis, we assumed a 16-inch water main would be constructed.

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Figures 13 through 15 in Appendix A depict sanitary sewer and water main improvements.

### **Storm Water Management**

Storm water management concepts were developed to maintain existing drainage patterns and preserve the conveyance and flood storage capacity of the primary wetland corridor that bisects the area. This will restrict development along the wetland corridor and retain the pre-development flood capacity, thereby maintaining existing flow rates into the COR.

The study area can be segmented into three drainage districts, generally delineated by future land use. Figure 16 in Appendix A displays the drainage area breakdown and a general regional pond layout. The drainage area consists of a multi-use site (Area 1), residential area (Area 2), and commercial and industrial sites (Area 3). The watersheds were modeled under future land use conditions to generally size retention ponds to meet existing flow rates. The ponds were also located with respect to potential storm sewer depths, reductions in wetland impacts, maximization of developable area and potential aesthetic function.

The ponds depicted on Figure 16 in Appendix A depict areas that are best suited for regional rate control basins only. Additional design parameters and regional storm water management planning should be further refined as the areas begin to develop.

Cost estimates were not developed for the regional pond construction or internal site storm sewer conveyance. It is anticipated that costs associated with pond construction will be completed by the developer as a portion of the site grading. Also, it is assumed that internal site drainage will be accommodated by dry swales and ditch systems to reduce storm sewer costs.

### **Street Lighting**

Street lighting was included in the project costs to the level provided along Riverdale Drive, east of Armstrong Boulevard. This includes both street level lighting and pedestrian lighting along the corridors.

### **Trails/Sidewalks**

Existing trails were previously constructed along the north side of Bunker Lake Boulevard and the west side of Puma Street. Project costs were prepared which include trails along the south side of Bunker Lake Boulevard and the east side of Puma Street.

### **Phase Transitions**

There is the potential for portions of the roadways to be constructed to wider sections than currently exist. If this occurs, the new roadways will need to taper to meet the existing roadway widths. The tapered sections will then be removed as the next phase of improvements is completed. Costs were included in each phase for these tapering sections.

### **Right Turn Lane Additions**

The roadways depicted in the exhibits depict through lanes and left turn lanes. Right turn lanes will be required at each access off of Bunker Lake Boulevard and Puma Street. Individual access locations were not considered in this study, and so the locations and lengths of right turn lanes were not considered at

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this time. The actual access locations will be dependent upon the type of land use and internal site characteristics. We included allowances for the right turn lanes in each phase for budgeting purposes.

### **Landscaping**

The base project includes a very utilitarian approach to the area. Bituminous trails and lighting were included, but other features, such as trees, shrubs, decorative features and monuments are not included in the estimated project costs.

### **Right of Way and Easements**

Locations of right of way needs are depicted on the exhibits based on roadway and trail needs. The exact areas will need to be determined during the platting process. We assumed that the rights of way would be dedicated as a portion of the development process and no costs are included in the project costs for acquisitions.

## **COST CONSIDERATIONS**

Costs were developed based upon phased implementation. The phasing is as depicted on Figure 4 in Appendix A.

<b><u>Improvement Type</u></b>	<b><u>Phase 1</u></b>	<b><u>Phase 2</u></b>	<b><u>Phase 3</u></b>
Roadway	\$ 1,153,000	\$ 920,000	\$ 1,160,000
Trails/Sidewalks	\$ 172,000	\$ 126,000	\$ 151,000
Storm Water Management	\$ 0	\$ 0	\$ 64,000
Street Lighting	\$ 154,000	\$ 112,000	\$ 136,000
Trunk Water	\$ 7,000	\$ 272,000	\$ 283,000
Trunk Sanitary Sewer	\$ 0	\$ 185,000	\$ 620,000
Phase Transition	\$ 120,000	\$ 120,000	\$ 80,000
Right Turn Lane Additions	<u>\$ 200,000</u>	<u>\$ 200,000</u>	<u>\$ 200,000</u>
Improvements Costs/Phase	\$ 1,806,000	\$ 1,935,000	\$ 2,694,000

The above costs are considered project costs and include 30% contingencies and project development costs.

The Phase Transition amounts are costs associated with tapering pavements sections to match in-place sections where required.

Right turn lanes are not depicted on the graphics, but will be required. The actual right turn lane locations and lengths will be determined by the entrance locations, land use and associated traffic impacts. Costs included for right turn lanes in the estimate are considered average amounts based on anticipated accesses for the area.

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Street lighting costs are based upon recent installations within the City of Ramsey.

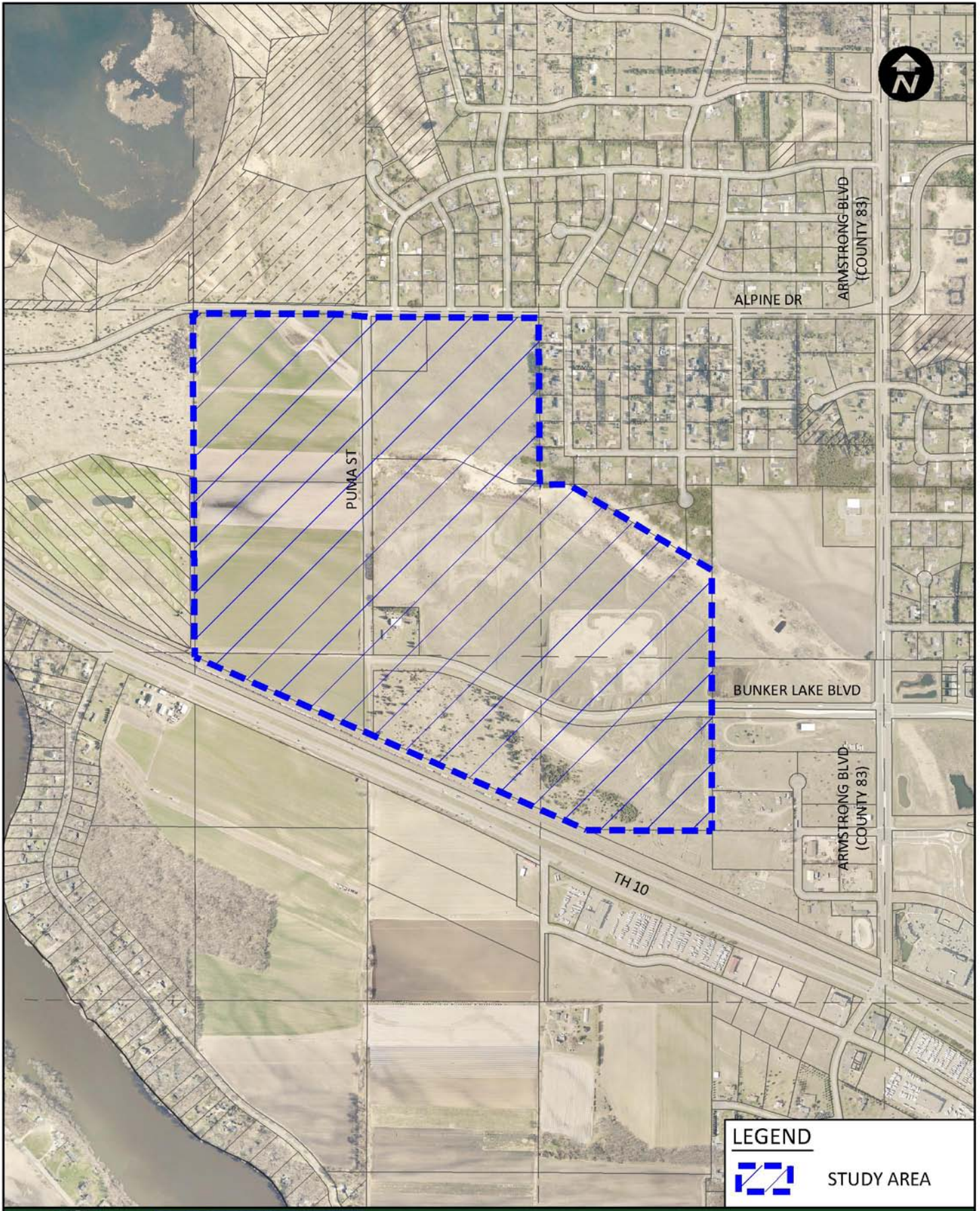
For storm water management, costs were included for manholes, catch basins, and pipe within the street sections. No costs for ponding were included for Phases 1, 2 and 4. For Phase 3, ponding costs were included for excavation related activities. We assumed a ponding area would be acquired through the platting process, and ponding within a development site would be expanded to include volume for roadway drainage.

The Phase 2 limits are based upon the area that can be served by a gravity sanitary sewer system. The Phase 3 sanitary sewer costs include a lift station and forcemain.

## **PROJECT FINANCING**



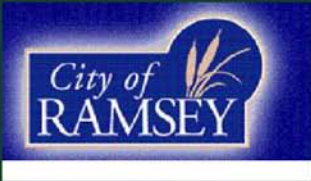
# APPENDIX A - FIGURES



**LEGEND**

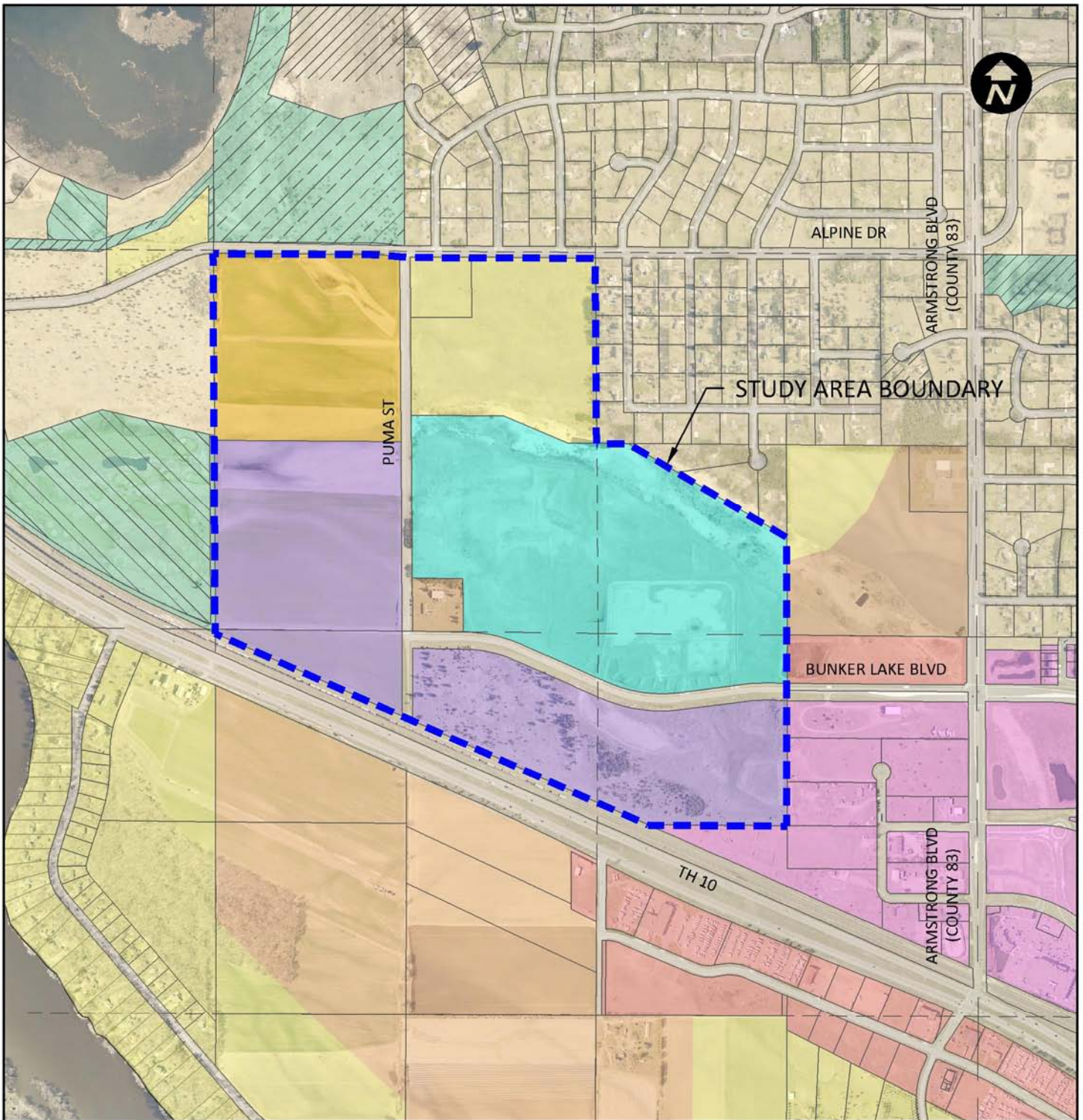


**STUDY AREA**



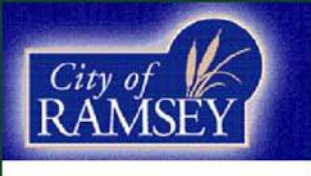
**FUTURE BUSINESS PARK  
CITY OF RAMSEY, MINNESOTA**

**FIGURE 1 - STUDY AREA**  
Date, 2015



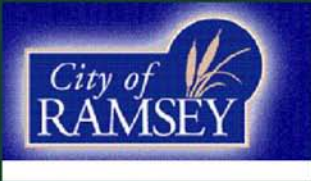
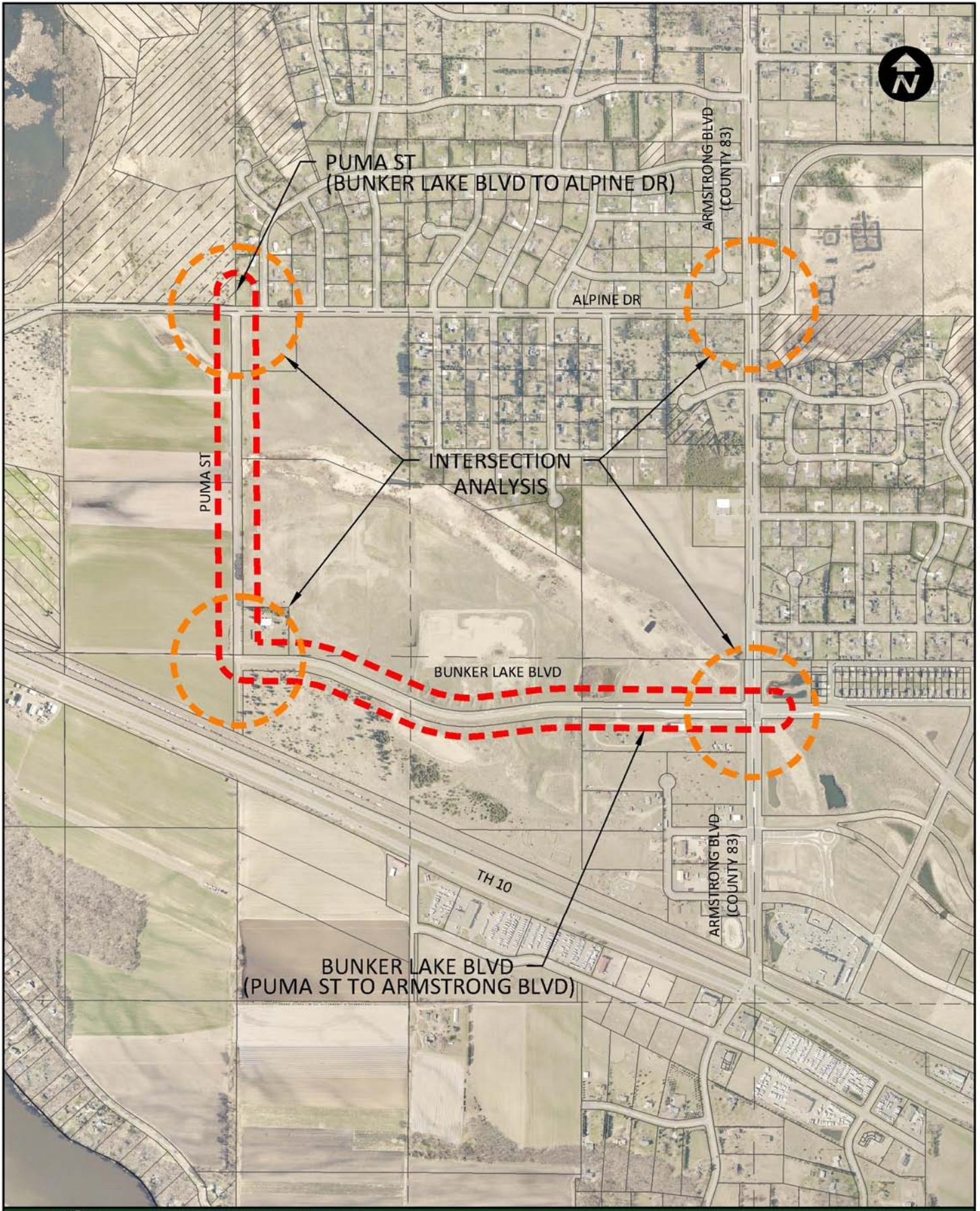
**LEGEND**

 LOW DENSITY RESIDENTIAL	 OFFICE PARK	 BUSINESS PARK	 RURAL PRESERVE
 MEDIUM DENSITY RESIDENTIAL	 COMMERCIAL	 PUBLIC	 PARK
 HIGH DENSITY RESIDENTIAL	 MU	 RURAL DEVELOPING	



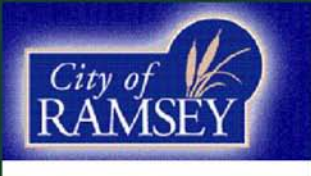
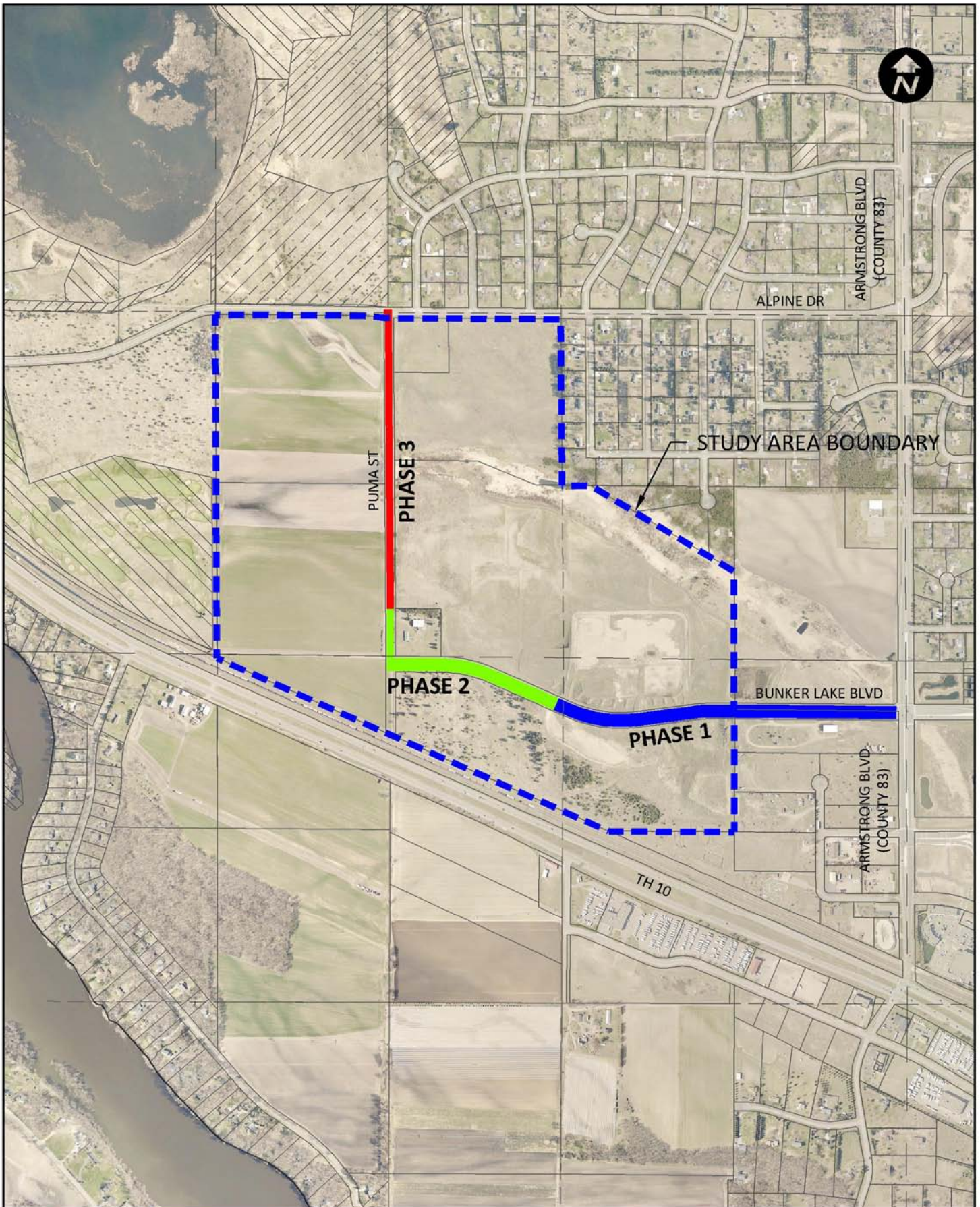
**FUTURE BUSINESS PARK  
CITY OF RAMSEY, MINNESOTA**

FIGURE 2 - LAND USE  
Date, 2015



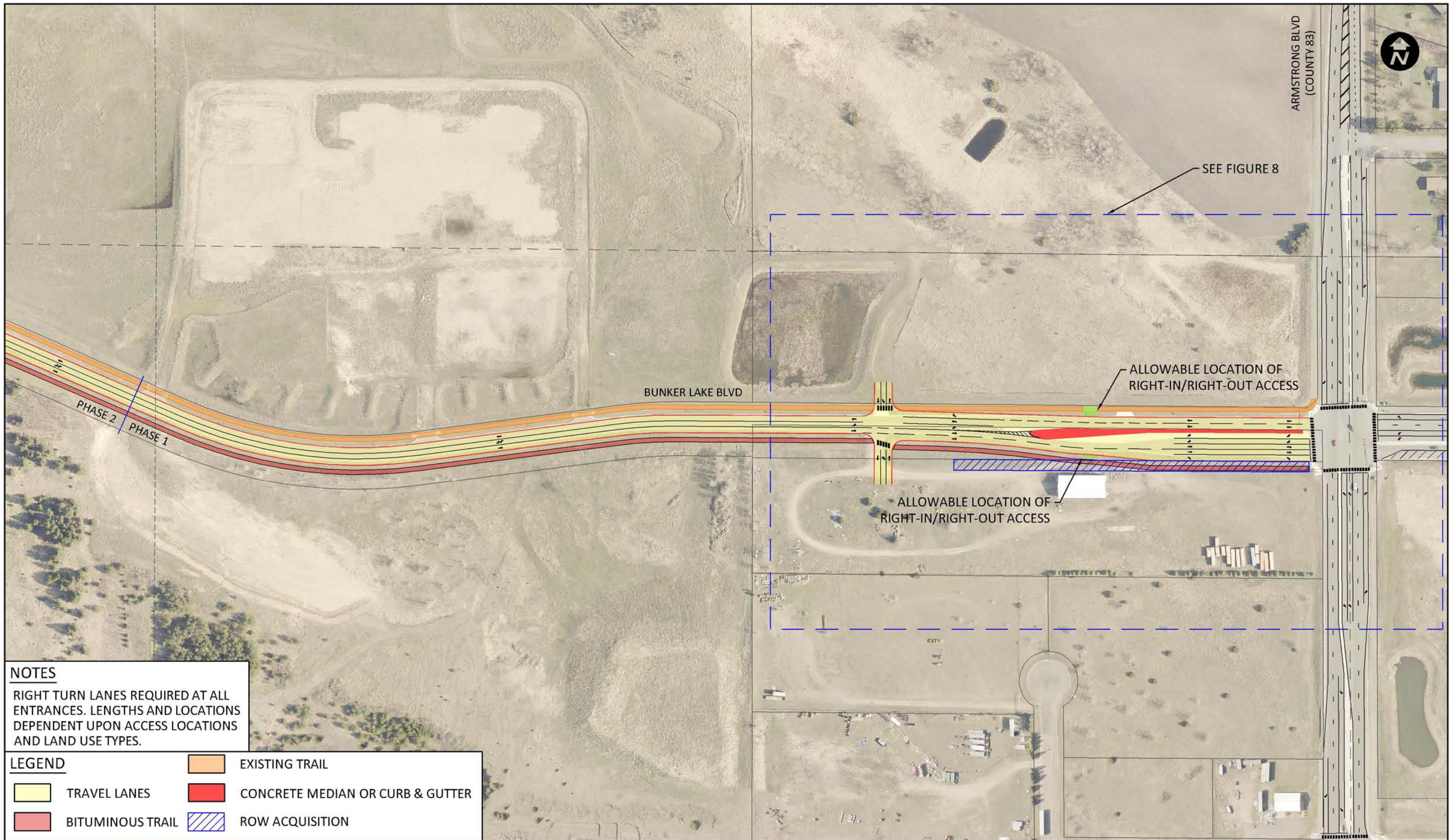
# FUTURE BUSINESS PARK CITY OF RAMSEY, MINNESOTA

FIGURE 3 - INFRASTRUCTURE ANALYSIS  
Date, 2015








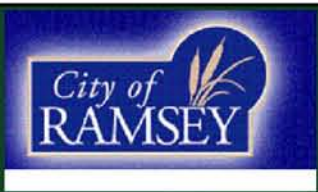
# FUTURE BUSINESS PARK CITY OF RAMSEY, MINNESOTA

FIGURE 4 - PHASING  
Date, 2015



**NOTES**  
 RIGHT TURN LANES REQUIRED AT ALL ENTRANCES. LENGTHS AND LOCATIONS DEPENDENT UPON ACCESS LOCATIONS AND LAND USE TYPES.

LEGEND	
	EXISTING TRAIL
	TRAVEL LANES
	CONCRETE MEDIAN OR CURB & GUTTER
	BITUMINOUS TRAIL
	ROW ACQUISITION



**FUTURE BUSINESS PARK  
 CITY OF RAMSEY, MINNESOTA**

FIGURE 5 - GEOMETRICS  
 Date, 2015



PUMA ST

PHASE 3  
PHASE 2

SEE FIGURES 9 & 10






BUNKER LAKE BLVD

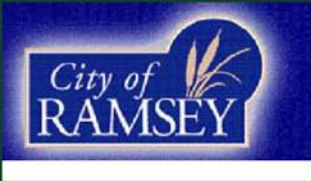
PHASE 2  
PHASE 1

**NOTES**

RIGHT TURN LANES REQUIRED AT ALL ENTRANCES. LENGTHS AND LOCATIONS DEPENDENT UPON ACCESS LOCATIONS AND LAND USE TYPES.

**LEGEND**

- |   |                  |   |                                  |
|---|------------------|---|----------------------------------|
|  | EXISTING TRAIL   |  | CONCRETE MEDIAN OR CURB & GUTTER |
|  | TRAVEL LANES     |  | ROW ACQUISITION                  |
|  | BITUMINOUS TRAIL |   |                                  |



**FUTURE BUSINESS PARK  
CITY OF RAMSEY, MINNESOTA**

FIGURE 6 - GEOMETRICS  
Date, 2015



ALPINE DR

SEE FIGURES 11 & 12






PUMA ST

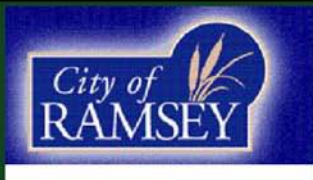
PHASE 3

**NOTES**

RIGHT TURN LANES REQUIRED AT ALL ENTRANCES. LENGTHS AND LOCATIONS DEPENDENT UPON ACCESS LOCATIONS AND LAND USE TYPES.

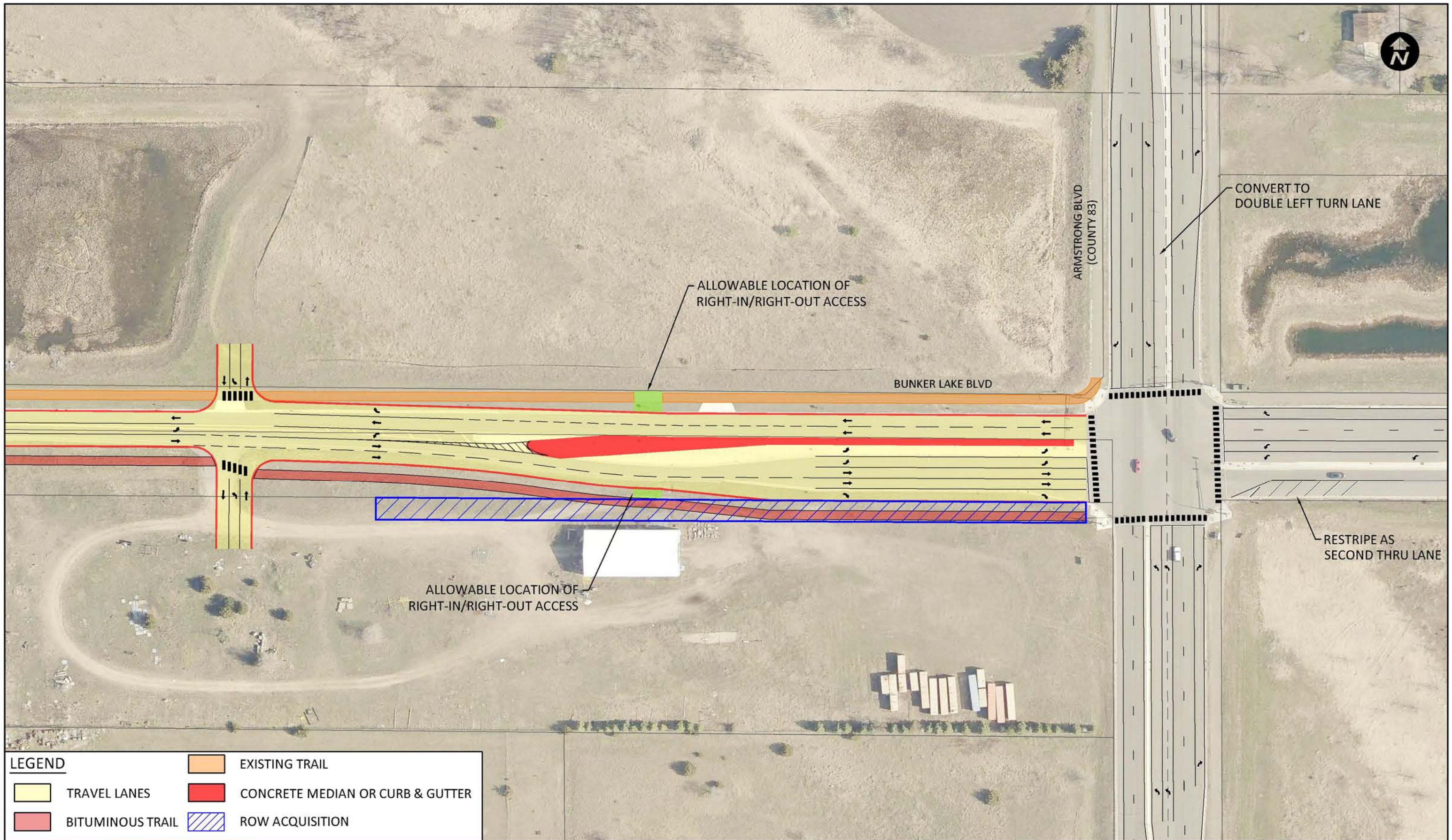
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	EXISTING TRAIL		CONCRETE MEDIAN OR CURB & GUTTER
	TRAVEL LANES		ROW ACQUISITION
	BITUMINOUS TRAIL		



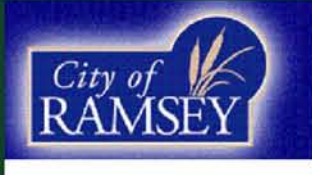
**FUTURE BUSINESS PARK  
CITY OF RAMSEY, MINNESOTA**

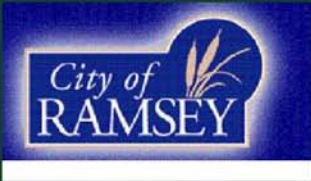
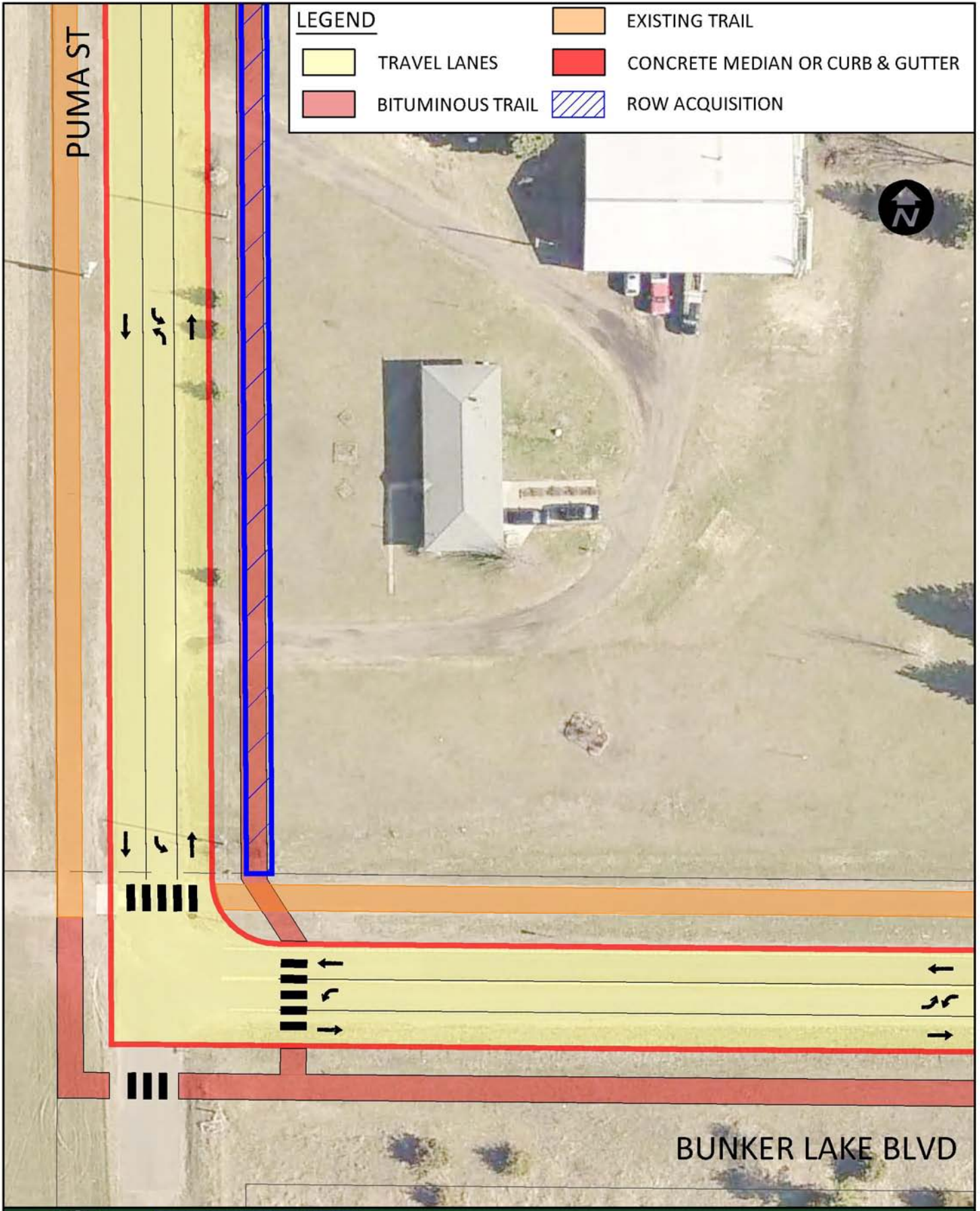
FIGURE 7 - GEOMETRICS  
Date, 2015



FUTURE BUSINESS PARK  
CITY OF RAMSEY, MINNESOTA

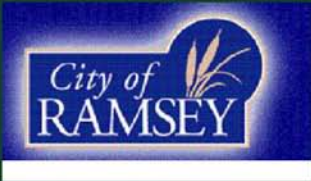
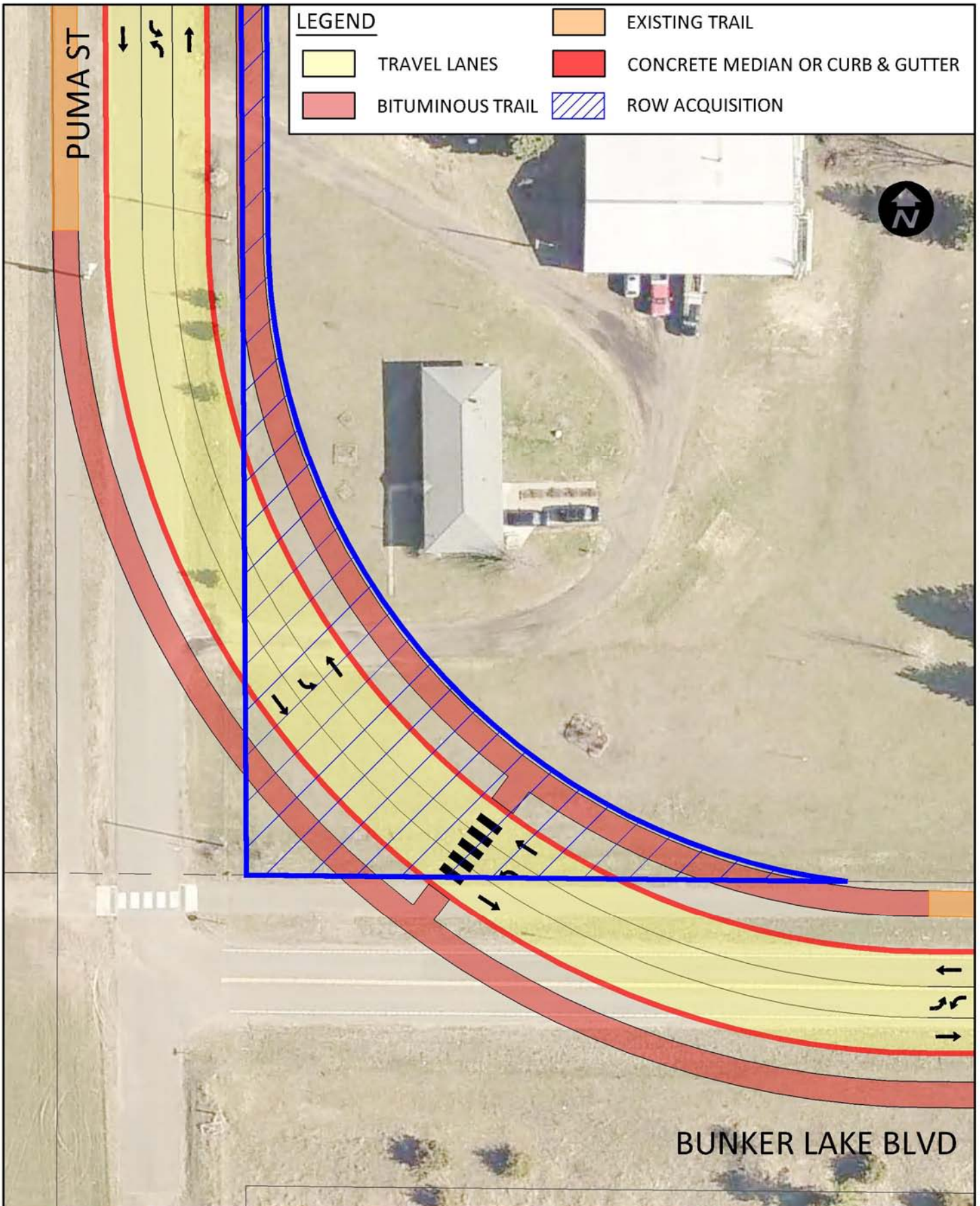
FIGURE 8 - BUNKER LAKE BOULEVARD AT ARMSTRONG BOULEVARD  
Date, 2015





**FUTURE BUSINESS PARK  
CITY OF RAMSEY, MINNESOTA**

**FIGURE 9 - BUNKER LAKE BOULEVARD & PUMA STREET**  
Date, 2015



**FUTURE BUSINESS PARK**  
**CITY OF RAMSEY, MINNESOTA**  
**FIGURE 10 - BUNKER LAKE BOULEVARD & PUMA STREET**  
**ALTERNATIVE CONCEPT**

Date, 2015

**LEGEND**



TRAVEL LANES



BITUMINOUS TRAIL



EXISTING TRAIL



CONCRETE MEDIAN OR CURB & GUTTER

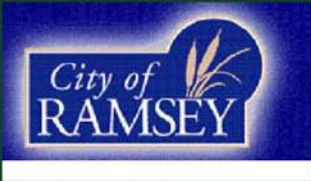
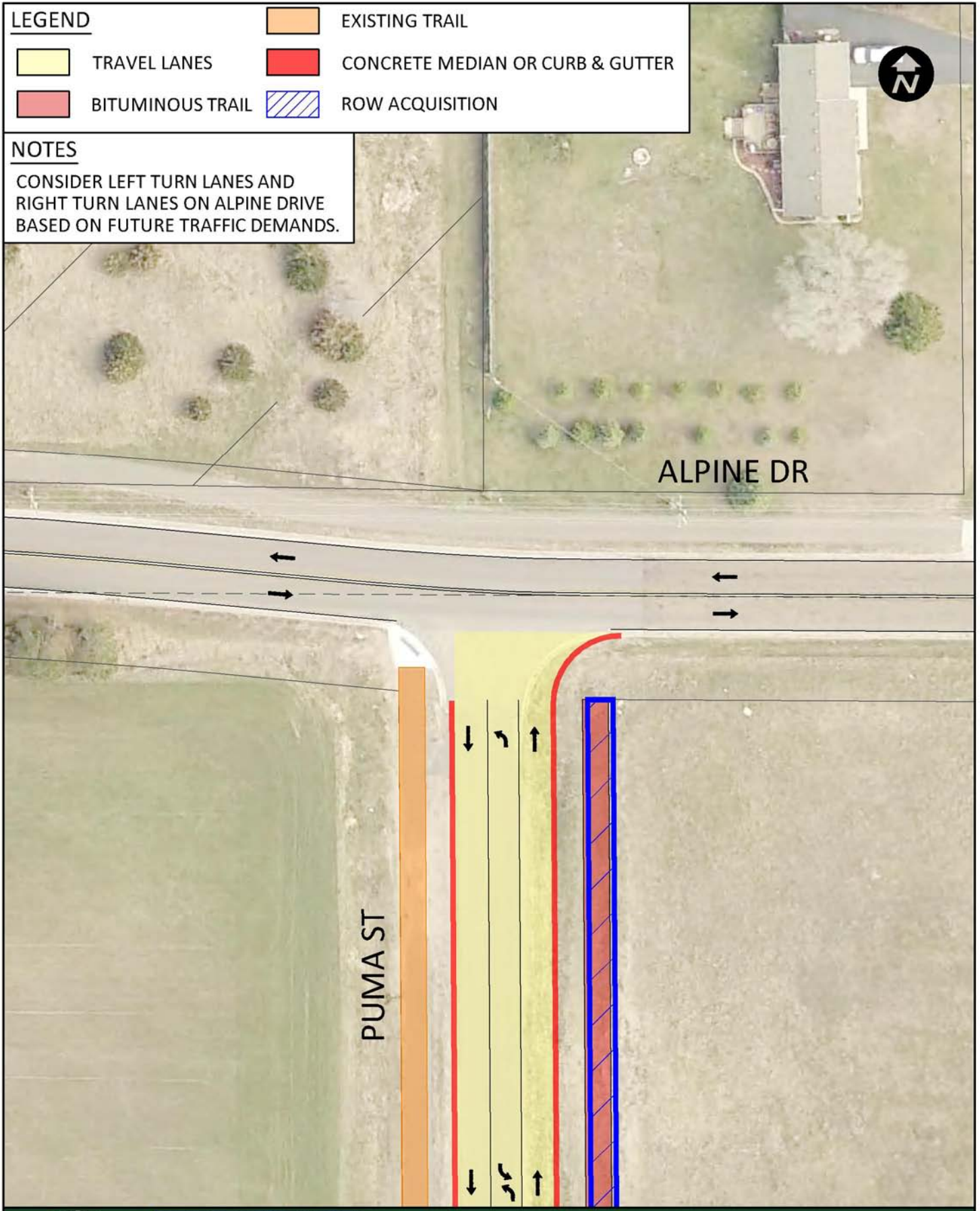


ROW ACQUISITION



**NOTES**

CONSIDER LEFT TURN LANES AND RIGHT TURN LANES ON ALPINE DRIVE BASED ON FUTURE TRAFFIC DEMANDS.



**FUTURE BUSINESS PARK  
CITY OF RAMSEY, MINNESOTA**

**FIGURE 11 - PUMA STREET & ALPINE DRIVE**

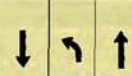
Date, 2015

ALPINE DR



PUMA ST

POTENTIAL  
ROW VACATION



**NOTES**

CONSIDER LEFT TURN LANES AND  
RIGHT TURN LANES ON ALPINE DRIVE  
BASED ON FUTURE TRAFFIC DEMANDS.

**LEGEND**



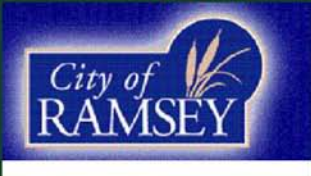
TRAVEL LANES



CONCRETE MEDIAN  
OR CURB & GUTTER

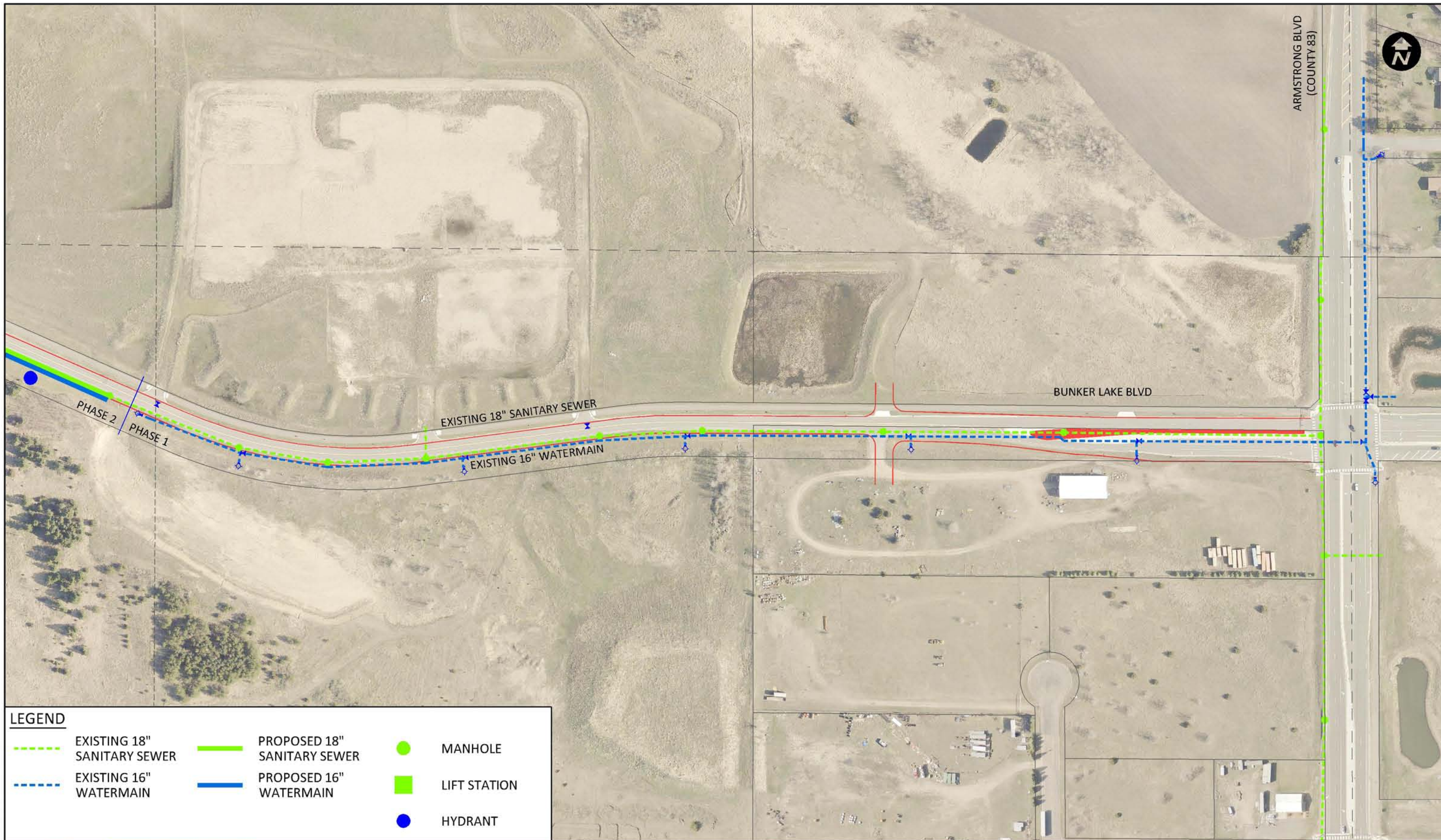


BITUMINOUS TRAIL

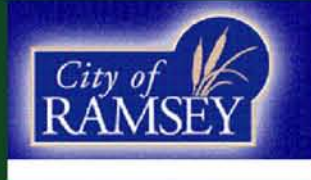


**FUTURE BUSINESS PARK**  
**CITY OF RAMSEY, MINNESOTA**  
FIGURE 12 - PUMA STREET & ALPINE DRIVE  
ALTERNATIVE CONCEPT

Date, 2015



LEGEND					
	EXISTING 18" SANITARY SEWER		PROPOSED 18" SANITARY SEWER		MANHOLE
	EXISTING 16" WATERMAIN		PROPOSED 16" WATERMAIN		LIFT STATION
					HYDRANT



FUTURE BUSINESS PARK  
 CITY OF RAMSEY, MINNESOTA  
 FIGURE 13 - SANITARY SEWER AND WATER  
 Date, 2015



PUMA ST

PROPOSED SANITARY SEWER LIFT STATION

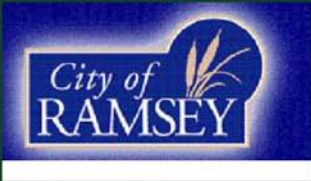
PHASE 3  
PHASE 2

BUNKER LAKE BLVD

PHASE 2  
PHASE 1

**LEGEND**

- |   |                             |   |                             |  |              |
|---|-----------------------------|---|-----------------------------|--|--------------|
|  | EXISTING 18" SANITARY SEWER |  | PROPOSED 18" SANITARY SEWER |  | MANHOLE      |
|  | EXISTING 16" WATERMAIN      |  | PROPOSED 16" WATERMAIN      |  | LIFT STATION |
|   |                             |   |                             |  | HYDRANT      |



**FUTURE BUSINESS PARK  
CITY OF RAMSEY, MINNESOTA**

FIGURE 14 - SANITARY SEWER AND WATER  
Date, 2015



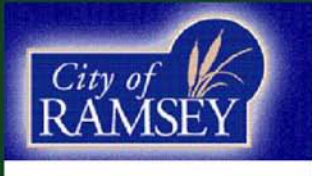
ALPINE DR

PUMA ST

PHASE 3

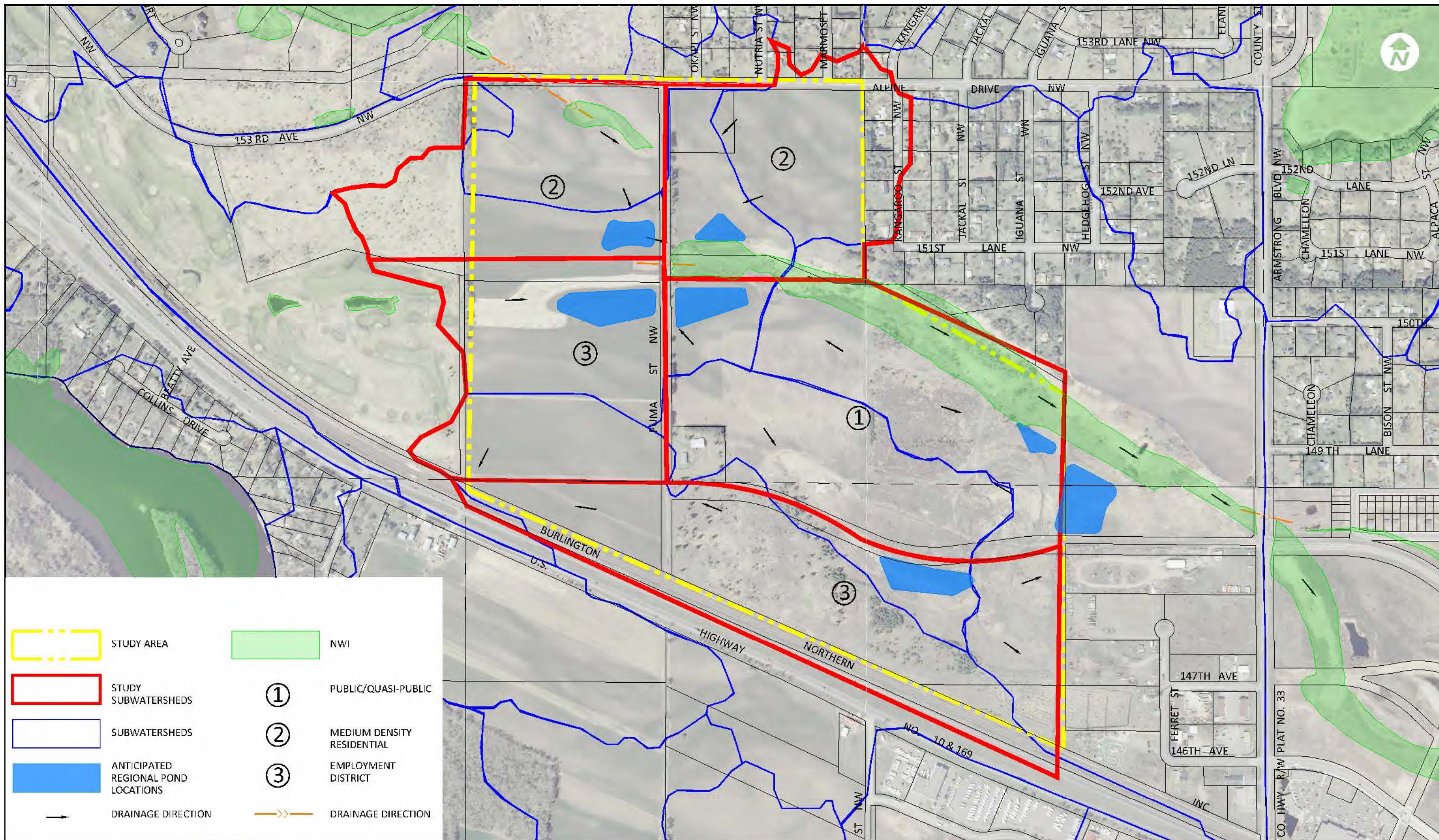
**LEGEND**

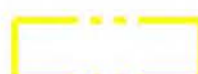
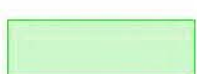





- |   |                             |   |                             |  |              |
|---|-----------------------------|---|-----------------------------|--|--------------|
|  | EXISTING 18" SANITARY SEWER |  | PROPOSED 18" SANITARY SEWER |  | MANHOLE      |
|  | EXISTING 16" WATERMAIN      |  | PROPOSED 16" WATERMAIN      |  | LIFT STATION |
|   |                             |   |                             |  | HYDRANT      |

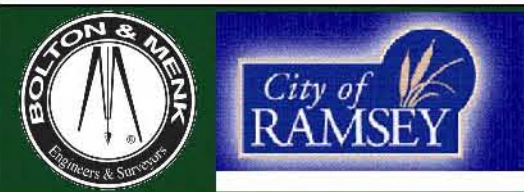


**FUTURE BUSINESS PARK  
CITY OF RAMSEY, MINNESOTA**

FIGURE 15 - SANITARY SEWER AND WATER  
Date, 2015



- |   |                                     |   |                            |
|---|-------------------------------------|---|----------------------------|
|  | STUDY AREA                          |  | NWI                        |
|  | STUDY SUBWATERSHEDS                 | ①   | PUBLIC/QUASI-PUBLIC        |
|  | SUBWATERSHEDS                       | ②   | MEDIUM DENSITY RESIDENTIAL |
|  | ANTICIPATED REGIONAL POND LOCATIONS | ③   | EMPLOYMENT DISTRICT        |
|  | DRAINAGE DIRECTION                  |  | DRAINAGE DIRECTION         |



**FUTURE BUSINESS PARK  
CITY OF RAMSEY, MINNESOTA**  
FIGURE 16 - Regional Stormwater Considerations  
June, 2015



## APPENDIX B - TRAFFIC STUDY

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Traffic Impact Study for

# Future Business Park

City of Ramsey, MN

June 24, 2015

Project Number R16.109828

---

**DRAFT**

**Submitted by:**

Bolton & Menk, Inc.  
12224 Nicollet Avenue  
Burnsville, MN 55337  
P: 952-890-0509  
F: 952-890-8065



**CERTIFICATION**

**DRAFT**

Traffic Impact Study

for

Future Business Park

Ramsey, MN

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.

By: \_\_\_\_\_

Bryan T. Nemeth, P.E., PTOE

License No. 43354

Date: 6/25/2015



## TABLE OF CONTENTS

<b>Executive Summary .....</b>	<b>1</b>
A. Short Term.....	1
B. Mid-Term .....	1
C. Long-Term.....	2
<b>I. Introduction.....</b>	<b>3</b>
<b>II. Background .....</b>	<b>3</b>
A. Proposed Development.....	3
<b>III. Measures of Effectiveness .....</b>	<b>4</b>
A. Level of Service and Delay .....	4
<b>IV. Existing Conditions.....</b>	<b>5</b>
A. Data Collection.....	5
B. Operations.....	8
C. Safety.....	9
<b>V. No-Build Conditions .....</b>	<b>11</b>
A. 2040 No-Build Operations.....	11
B. No-Build Mitigation .....	14
<b>VI. Build Conditions .....</b>	<b>15</b>
A. Traffic Forecasts .....	15
B. 2040 Build Operations.....	22
C. Proposed Mitigation .....	26
D. Additional Operations Analysis (50% Development Completion) .....	27
<b>Appendix A- TH 10 &amp; Armstrong Boulevard Overpass Layout .....</b>	<b>28</b>
<b>Appendix B- Traffic Volumes.....</b>	<b>29</b>
<b>Appendix C- Crash Reports .....</b>	<b>30</b>
<b>Appendix D- Trip Generation For Future Business Park Development .....</b>	<b>31</b>
<b>Appendix E- Trip Generation For COR Development .....</b>	<b>32</b>
<b>Appendix F- Operations Analysis (Available Upon Request).....</b>	<b>33</b>



## FIGURES

<b>Figure 1: Proposed Future Business Park Development Location .....</b>	<b>3</b>
<b>Figure 2.1: Existing Traffic Volumes.....</b>	<b>6</b>
<b>Figure 2.2: Existing Traffic Volumes (with Overpass).....</b>	<b>7</b>
<b>Figure 3: 2040 No-Build Traffic Volumes.....</b>	<b>13</b>
<b>Figure 4: Trip Generation Zones.....</b>	<b>16</b>
<b>Figure 5: Trip Distribution Map .....</b>	<b>17</b>
<b>Figure 6.1: 2040 Build Traffic Volumes (Alternative 1A: High School) .....</b>	<b>18</b>
<b>Figure 6.2: 2040 Build Traffic Volumes (Alternative 1B: K-12 Schools).....</b>	<b>19</b>
<b>Figure 6.3: 2040 Build Traffic Volumes (Alternative 2: Business Park).....</b>	<b>20</b>
<b>Figure 6.4: 2040 Build Traffic Volumes (Alternative 3: Low Density Residential).21</b>	

## TABLES

<b>Table 1: Level of Service Criteria.....</b>	<b>4</b>
<b>Table 2: 2015 Existing Traffic Operations Analysis.....</b>	<b>8</b>
<b>Table 3: 2015 Existing Traffic Operations Analysis (with Overpass).....</b>	<b>8</b>
<b>Table 4: 2040 No-Build Future Traffic Operations Analysis .....</b>	<b>11</b>
<b>Table 8: 2040 Build Operations Analysis (Alternative 1A: High School) .....</b>	<b>22</b>
<b>Table 9: 2040 Build Operations Analysis (Alternative 1B: K-12 Schools).....</b>	<b>22</b>
<b>Table 10: 2040 Traffic Operations Analysis (Alternative 2: Business Park) .....</b>	<b>23</b>
<b>Table 11: 2040 Build Operations Analysis (Alternative 3: LD Residential) .....</b>	<b>23</b>
<b>Table 12: Development Intersection Operations Analysis .....</b>	<b>24</b>
<b>Table 13: Operations Analysis with River Crossing .....</b>	<b>25</b>
<b>Table 14: 2030 (50% Development) Operations Analysis .....</b>	<b>27</b>

## APPENDIX

<b>Appendix A- TH 10 &amp; Armstrong Boulevard Overpass Layout .....</b>	<b>28</b>
<b>Appendix B- Traffic Volumes.....</b>	<b>29</b>
<b>Appendix C- Crash Reports .....</b>	<b>30</b>
<b>Appendix D- Trip Generation For Future Business Park Development .....</b>	<b>31</b>
<b>Appendix E- Trip Generation For COR Development .....</b>	<b>32</b>
<b>Appendix F- Operations Analysis (Available Upon Request).....</b>	<b>33</b>

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## EXECUTIVE SUMMARY

The Future Business Park development is proposed north of T.H. 10 and west of Armstrong Boulevard. Armstrong Boulevard is a critical north-south corridor for the City of Ramsey, Anoka County, and the region carrying traffic from Trunk Highway (T.H.) 10 to surrounding areas. The Business Park development includes residential, business park, commercial, and institutional land uses. These land uses result in an increase of approximately 18,500 to 23,300 trips per day into and out of the area at full build.

The traffic increase from both the background growth and the development results in a need for capacity improvements at individual intersections in the study area. The following concise summary of improvements should be completed based on the mitigation necessary to achieve acceptable operations. For the 2040 Full-Build scenario, operations can be improved, but are still considered unacceptable at many of the intersections. This is due to the large amount of traffic entering and exiting on Bunker Lake Boulevard and Armstrong Boulevard. Short term improvements are intended to mitigate current safety or operations problems, mid-term improvements are needed to accommodate both development and background traffic growth, and long-term improvements are needed to handle the overall development out to 2040. Exact timing for improvements should be based upon the actual development timing and background traffic growth.

### A. Short Term

- Bunker Lake Boulevard (west of Armstrong Blvd): Expand to a four lane section for development.
  - The eastbound approach should include two 300 ft left turn lanes, two through lanes, and one right turn lane.
  - A full median should be provided to the west end of the commercial area.
  - A full access should be at least 845 ft from Armstrong Boulevard and a right in/right out access should be at least 470 ft from Armstrong Boulevard.
- Bunker Lake Boulevard (west of commercial section): Expand to a three lane section for development (two through lanes and one center left turn lane).
  - Right turn lanes (locations and lengths) are to be dictated by development type.
- Puma Street: Expand to a three lane section for development (two through lanes and one center left turn lane).
  - Right turn lanes (locations and lengths) are to be dictated by development type.
- Bunker Lake Boulevard & Puma Street: An all-way stop, two-way stop, or roundabout will operate adequately at this intersection for the 2040 Full-Build conditions. The roundabout option may offer better operations than the other two options at 2040 Full-Build.

### B. Mid-Term

- Armstrong Boulevard & Alpine Drive: Add northbound and southbound left turn lanes. Modify eastbound and westbound lanes to include a thru/left and a right turn lane.
- Alpine Drive & Puma Street: Add a westbound left turn lane and eastbound right turn lane.
- Armstrong Boulevard & Bunker Lake Boulevard: Re-stripe southbound lanes to include

---

a dual southbound left turn lane. A southbound double left turn lane will help reduce queues entering the COR development. Improvements were done in 2011 to this intersection and a future southbound left turn lane was designed, but not striped.

### C. Long-Term

- Armstrong Boulevard & Bunker Lake Boulevard: Modify the southerly eastbound through lane to a through-right lane. Another option would be to keep the two through lanes and modify the right turn lane into a free right with an add lane that runs south to T.H. 10.

## I. INTRODUCTION

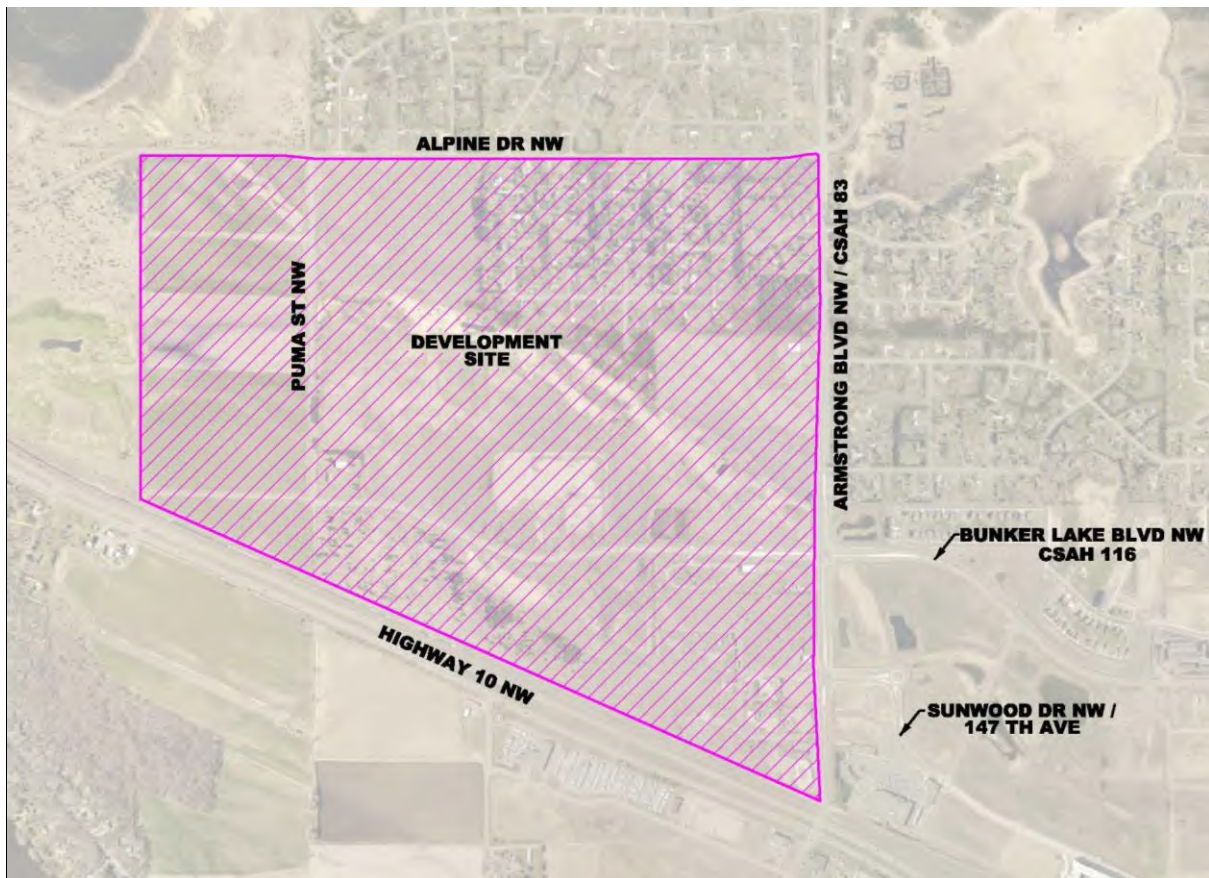
The proposed Future Business Park development is located on the southwest side of the City of Ramsey, north of T.H. 10 and just west of Armstrong Boulevard (CSAH 83). The future development is anticipated to impact the traffic on the public roadway system and surrounding area. Consequently, the traffic control and roadway geometry in the area may need to be modified to accommodate the increased traffic to maintain safety and adequate operations. This study analyzes the anticipated impacts of the Future Business Park development on the surrounding area.

## II. BACKGROUND

### A. Proposed Development

The proposed Future Business Park development is located just west of Armstrong Boulevard, between T.H. 10 and Alpine Drive. The development will have two main access points: the north entrance at Alpine Drive and Puma Street, and the east entrance at Bunker Lake Boulevard and Armstrong Boulevard. **Figure 1** below outlines the proposed development site. The development is anticipated to include residential, commercial, business park, and institutional land uses.

**Figure 1: Proposed Future Business Park Development Location**



---

### III. MEASURES OF EFFECTIVENESS

The traffic operations analysis for the intersections consider the following measures to determine the adequacy of the intersection design to meet acceptable operations: intersection delay/Level of Service (LOS) and volume-to-capacity ratios. An explanation of each of these measures is provided below:

#### A. Level of Service and Delay

The operational analysis results are described as a Level of Service (LOS) ranging from A to F. These letters serve to describe a range of operating conditions for different types of facilities. Levels of Service are calculated based on the 2010 Highway Capacity Manual, which defines the level of service, based on control delay. Control delay is the delay experienced by vehicles slowing down as they are approaching the intersection, the wait time at the intersection, and the time for the vehicle to speed up through the intersection and enter into the traffic stream. The average intersection control delay is a volume weighted average of delay experienced by all motorists entering the intersection on all intersection approaches. The control delay is modeled within the analysis software, Trafficware Synchro/SimTraffic. Level of Service D is commonly taken as an acceptable design year LOS. The level of service and its associated intersection delay for a signalized and unsignalized intersection is presented below. The delay threshold for unsignalized intersections is lower for each LOS compared to signalized intersections, which accounts for the fact that people expect a higher level of service when at a stop-controlled intersection.

**Table 1: Level of Service Criteria**

	<b>Signalized Intersection</b>	<b>Unsignalized Intersection</b>
<b>LOS</b>	<b>Control Delay per Vehicle (sec.)</b>	<b>Control Delay per Vehicle (sec.)</b>
A	≤ 10	≤ 10
B	>10 and ≤ 20	>10 and ≤ 15
C	>20 and ≤ 35	>15 and ≤ 25
D	>35 and ≤ 55	>25 and ≤ 35
E	>55 and ≤ 80	>35 and ≤ 50
F	>80	>50

---

## IV. EXISTING CONDITIONS

There are a total of four signalized intersections and three unsignalized intersections that will be evaluated in this study. The interchange on T.H. 10 & Armstrong Boulevard is currently being built, so the analysis will include a scenario with and without the new overpass. Based on MnDOT's Traffic Data Mapping Application, Armstrong Boulevard carries a range of 4,500 vehicles per day near the north end of the study area and 6,200 vehicles per day near the south end of the study area. Armstrong Boulevard will be a 4 lane divided roadway at the south end of the study area converting to a 2 lane undivided roadway at the north end of the study area. The posted speed limit is 55 mph through the study area along Armstrong Boulevard.

### A. Data Collection

#### 1. Traffic Counts

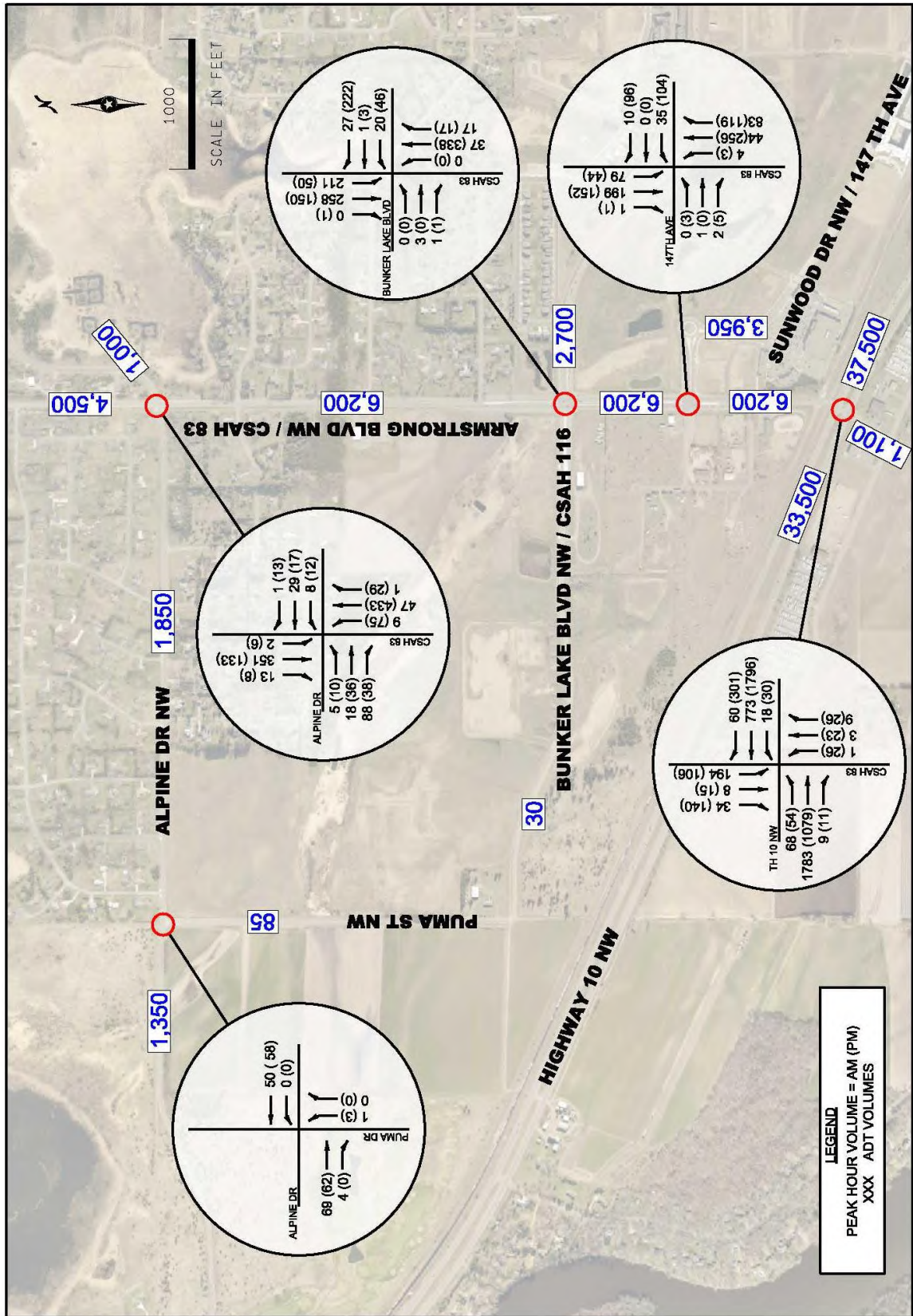
Traffic data was collected in April 2015. This includes 13 hour traffic volumes at the following intersections.

- Armstrong Boulevard & 147<sup>th</sup> Ave - Signalized
- Armstrong Boulevard & Bunker Lake Boulevard – Signalized
- Armstrong Boulevard & Alpine Drive - Unsignalized
- Alpine Drive & Puma Street – Unsignalized

Traffic data at T.H. 10 & Armstrong Boulevard was pulled from a previous study conducted in 2013.

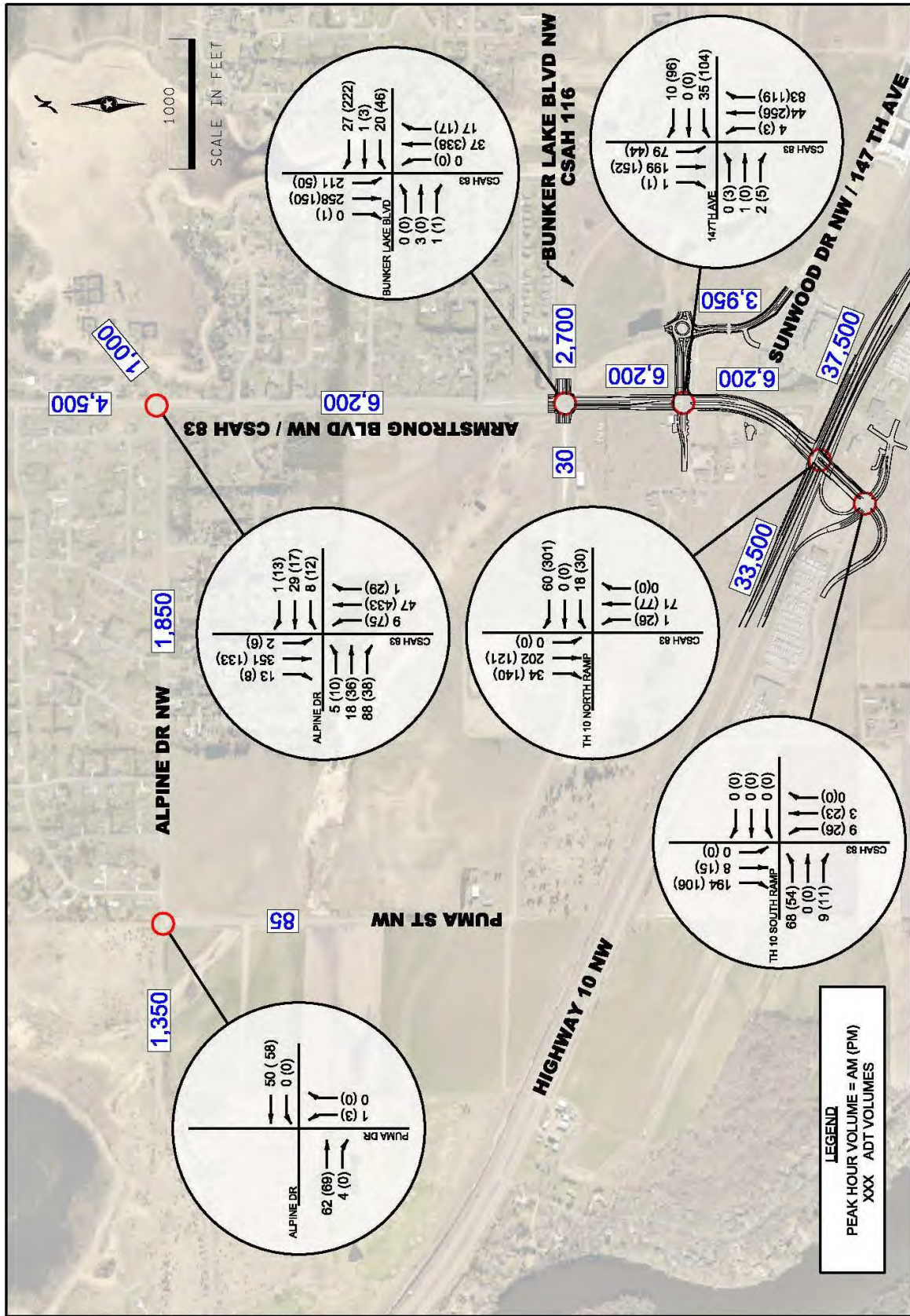
Figures 2.1 and 2.2 show the existing intersection traffic counts.

Figure 2.1: Existing Traffic Volumes



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Figure 2.2: Existing Traffic Volumes (with Overpass)



## B. Operations

The existing operations analysis was completed for the five intersections within the study area and is shown in **Table 2**. The new interchange between T.H. 10 and Armstrong Boulevard was analyzed at the two exit ramps and is shown in **Table 3**.

**Table 2: 2015 Existing Traffic Operations Analysis**

Traffic Control Scenario	Peak Hour	Intersection Delay*- LOS		Maximum Delay-LOS**	Limiting Movement ***	Max Approach Queue			
						Direction	Average Queue (ft)	Max Queue (ft) ****	
<b>Existing 2015</b>									
TH 10/169 & CSAH 83 (Armstrong Blvd) <i>Signal</i>	AM	46	D	107	F	EBL	EBT	644	1048
	PM	40	D	88	F	WBL	WBT	496	524
CSAH 83 (Armstrong Blvd & 147th Avenue) <i>Signal</i>	AM	9	A	35	C	NBL	SBL	53	101
	PM	9	A	33	C	EBL	NBT	39	73
CSAH 83 (Armstrong Blvd & CSAH 116 (Bunker Lake Blvd)) <i>Signal</i>	AM	10	A	33	C	EBT	SBL	83	143
	PM	9	A	21	C	WBL	NBT	52	87
CSAH 83 (Armstrong Blvd) & Alpine Drive NW <i>TWSC</i>	AM	2	A	9	A	EBT	EBR	32	52
	PM	4	A	13	B	WBL	EBL/T	27	54
Alpine Drive NW & Puma Street NW <i>TWSC</i>	AM	1	A	4	A	NBL	NBL/R	2	14
	PM	1	A	5	A	NBL	NBL/R	3	18

\*Delay in seconds per vehicle

\*\*Maximum delay and LOS on any approach and/or movement

\*\*\*Limiting Movement is the highest delay movement.

\*\*\*\*Max Queue refers to the 95% Queue (Passenger car stored length = 25 ft, Heavy vehicle stored length = 45 ft)

**Table 3: 2015 Existing Traffic Operations Analysis (with Overpass)**

Traffic Control Scenario	Peak Hour	Intersection Delay*- LOS		Maximum Delay-LOS**	Limiting Movement ***	Max Approach Queue			
						Direction	Average Queue (ft)	Max Queue (ft) ****	
<b>Existing 2015 (With Overpass)</b>									
TH 10/169 South Ramp & CSAH 83 (Armstrong Blvd) <i>Signal</i>	AM	5	A	14	B	NBL	EBL	33	59
	PM	5	A	12	B	EBL	EBL	23	53
TH 10/169 North Ramp & CSAH 83 (Armstrong Blvd) <i>Signal</i>	AM	9	A	20	B	WBL	SBT	50	96
	PM	8	A	20	B	WBL	SBT	41	79
CSAH 83 (Armstrong Blvd & 147th Avenue) <i>Signal</i>	AM	7	A	27	C	NBL	SBL	43	90
	PM	9	A	31	C	EBL	SBT	30	65
CSAH 83 (Armstrong Blvd & CSAH 116 (Bunker Lake Blvd)) <i>Signal</i>	AM	11	B	31	C	WBL	SBL	86	153
	PM	9	A	20	B	SBL	NBT	59	105
CSAH 83 (Armstrong Blvd) & Alpine Drive NW <i>TWSC</i>	AM	2	A	9	A	WBL	EBR	34	57
	PM	4	A	12	B	EBL	EBL/T	30	59
Alpine Drive NW & Puma Street NW <i>TWSC</i>	AM	1	A	6	A	NBL	NBL/R	1	8
	PM	1	A	4	A	NBL	NBL/R	3	17

\*Delay in seconds per vehicle

\*\*Maximum delay and LOS on any approach and/or movement

\*\*\*Limiting Movement is the highest delay movement.

\*\*\*\*Max Queue refers to the 95% Queue (Passenger car stored length = 25 ft, Heavy vehicle stored length = 45 ft)

Overall, all intersections within the study area operate within acceptable service levels with a LOS of C or better. The T.H 10 & Armstrong Boulevard interchange will alleviate the delays that were caused at the previous signalized intersection. Currently, there is no need for operational mitigation.

---

## C. Safety

### 1. Safety/Crash Analysis

Beyond the operational analysis, the crash history of the studied intersections was completed using the crash data pulled from Minnesota Crash Mapping Analysis Tool (MnCMAT). The Armstrong Boulevard corridor from 147<sup>th</sup> Ave to Alpine has had a total of 25 crashes over the 5 year period (2010-2014) with the majority being property damage only crashes. The individual intersection crash reports are shown in **Appendix C**.

Most of the intersections had very few crashes over the last 5 years. The T.H. 10 & Armstrong Boulevard intersection was not analyzed for crashes because it is currently being modified into an interchange. The following is a summary of crashes per intersection:

#### *Armstrong Boulevard at 147<sup>th</sup> Ave*

- 3 crashes (2 rear end, 1 right angle)

#### *Armstrong Boulevard at Bunker Lake Boulevard*

- 1 crash (rear end)

#### *Armstrong Boulevard at Alpine Drive*

- 14 crashes (8 right angle, 2 rear end, 2 left turn, 1 sideswipe, 1 other)
- The majority of the right angle crashes are caused by westbound vehicles failing to yield to right of way. The existing skew of the east leg may contribute to these right angle crashes by preventing adequate sight distances.
- There has also been an incapacitating injury at this intersection in 2013 (southbound rear end) and a non-incapacitating injury at this intersection in 2014 (northbound left turn into traffic)

#### *Alpine Drive at Puma Street*

- 0 crashes

---

## 2. Mitigation Recommendations

Mitigation due to safety concerns includes the following:

*Bunker Lake Boulevard (west of commercial section)*

- Three lane section is recommended (two through lanes & a center two-way-left-turn-lane) once the development is constructed. (short-term)
- Right turn lanes (locations and lengths) are to be dictated by development type. (short-term)

*Armstrong Boulevard & Alpine Drive*

- Add northbound and southbound left turn lanes. (mid-term)

*Alpine Drive & Puma Street*

- Add westbound left turn lane. (mid-term)
- Add eastbound right turn lane. (mid-term)

*Puma Street*

- Three lane section is recommended (two through lanes & a center two-way-left-turn-lane) once the development is constructed. (short-term)
- Right turn lanes (locations and lengths) are to be dictated by development type. (short-term)

## V. NO-BUILD CONDITIONS

Historic daily traffic volumes from 2000 to 2013 were used to formulate a 20 year background growth rate of 1.8% for Armstrong Boulevard. Therefore, background traffic was projected to grow by 43% along Armstrong Boulevard. No-Build conditions includes the background growth along with the traffic generated from the COR development. It is assumed that the COR development, east of Armstrong Boulevard, is fully built out for this scenario. The Future Business Park development, the focus of this study, is assumed to generate no traffic for this no-build scenario.

Parts of the COR development have already been built out, so only the portions that haven't been built out were analyzed for potential trips. The total new COR development is projected to generate 37,500 daily trips (6,150 peak hour trips). It was assumed that 1/3 of the traffic generated by the COR development will enter/exit on Bunker Lake Boulevard & Armstrong Boulevard. The COR development trips are included in **Appendix B**.

Assumptions made for all future scenarios include that the signals are uncoordinated, which is what they operate as currently. Signal timings are optimized for each scenario. Left turn movements at signals are all protected except for the westbound left turn at the T.H.10 North Ramp.

### A. 2040 No-Build Operations

Future traffic volumes for 2040 were forecasted for the study area without any additional development. Historic growth rates were used to calculate the 20 year growth rate of 1%. This growth rate was applied to Armstrong Boulevard to account for background traffic along the roadway. No-Build 2040 traffic volumes are shown in **Figures 3**.

**Table 4: 2040 No-Build Future Traffic Operations Analysis**

Traffic Control Scenario	Peak Hour	Intersection Delay* - LOS		Maximum Delay-LOS**	Limiting Movement***	Max Approach Queue			
						Direction	Average Queue (ft)	Max Queue (ft)****	
<b>Design Year 2040 No-Build</b>									
TH 10/169 South Ramp & CSAH 83 (Armstrong Blvd) <i>Signal</i>	AM	8	A	19	B	NBL	EBL/T	68	106
	PM	8	A	17	B	NBL	EBL/T	68	107
TH 10/169 North Ramp & CSAH 83 (Armstrong Blvd) <i>Signal</i>	AM	10	A	22	C	WBL	WBT	117	198
	PM	12	B	25	C	NBL	SBT	125	217
CSAH 83 (Armstrong Blvd & 147th Avenue) <i>Signal</i>	AM	8	A	27	C	NBL	WBT	72	164
	PM	12	B	33	C	NBL	SBT	136	248
CSAH 83 (Armstrong Blvd & CSAH 116 (Bunker Lake Blvd)) <i>Signal</i>	AM	15	B	36	D	EBT	NBR	92	165
	PM	18	B	31	C	WBL	WBL	178	251
CSAH 83 (Armstrong Blvd) & Alpine Drive NW <i>TWSC</i>	AM	4	A	15	B	WBL	EBL/T	30	75
	PM	7	A	38	E	EBL	NBL/T	56	130
Alpine Drive NW & Puma Street NW <i>TWSC</i>	AM	1	A	4	A	NBL	NBL/R	1	10
	PM	1	A	5	A	NBL	NBL/R	3	17

*No Build Scenario assumes the east (COR) development is built out, but the west development has not been built out*

\*Delay in seconds per vehicle

\*\*Maximum delay and LOS on any approach and/or movement

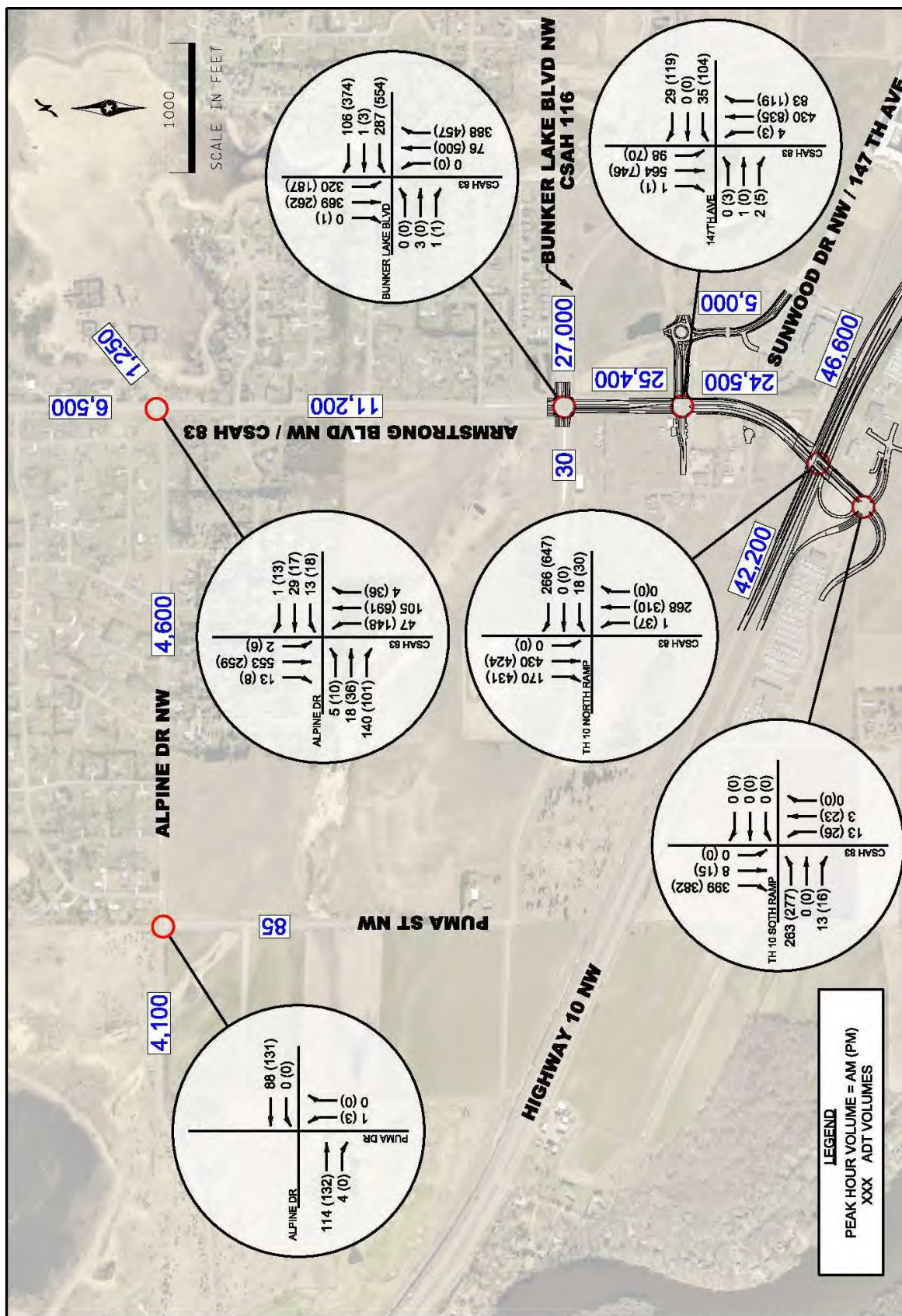
\*\*\*Limiting Movement is the highest delay movement.

\*\*\*\*Max Queue refers to the 95% Queue (Passenger car stored length = 25 ft, Heavy vehicle stored length = 45 ft)

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Based on the expected growth in the area, the corridor is anticipated to experience acceptable operations at most of the intersections. All intersections operate at an overall level of service of B or higher. Level of Service D is commonly taken as an acceptable design year LOS. The only intersection experiencing significant delay at an individual movement is the eastbound left turn at Armstrong Boulevard & Alpine Drive. This movement experiences 38 seconds of delay (LOS E) during the PM peak hour.

Figure 3: 2040 No-Build Traffic Volumes



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## B. No-Build Mitigation

There are few mitigation recommendations due to the adequate level of service at most intersections. The following suggestions are anticipated to provide adequate service for the 2040 No-Build conditions.

### 1. Geometric Improvements

It is recommended that the following changes be made with regard to the intersection geometry in the study area to provide acceptable operations in 2040:

#### *Armstrong Boulevard & Alpine Drive*

- Add eastbound and westbound thru/left and right turn lanes (mid-term)

#### *Armstrong Boulevard & Bunker Lake Boulevard*

- Re-stripe southbound lanes to include a dual southbound left turn lane. A southbound double left turn lane will help reduce queues entering the COR development. Improvements were done in 2011 to this intersection and a future southbound left turn lane was designed, but not striped. (mid-term)

The proposed 2040 no-build mitigation should provide a LOS of D or better for all intersection movements. A more thorough investigation should be conducted for a possible re-alignment of the east leg of Armstrong Boulevard & Alpine Drive.

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## VI. BUILD CONDITIONS

### A. Traffic Forecasts

The full build traffic forecast was calculated by combining the anticipated growth (2040 No-build volumes) with the expected amount of trips the proposed development will generate. Trip forecasts were generated using the information within the Institute of Transportation Engineers (ITE) Trip Generation Manual. ITE provides codes that correlate a land use with the anticipated traffic based on previous studies.

**Figure 4** shows different trip generation zones within the development along with the land use in each zone. These zones are based on where traffic will enter/exit the development. Zone 1 will be evaluated with four alternatives in the north quadrant; a high school, K-12 schools, Business Park, and low density residential. The business park option is expected to generate the most traffic in Zone 1 (2,000 peak hour trips, 7,050 daily trips), while the low density residential option is expected generate the least amount of traffic in Zone 1 (1,150 peak hour trips, 4,900 daily trips). The total development (Zones 1-5) is projected to generate anywhere from 18,500 to 23,300 new daily trips. More detailed information regarding trip generations for each scenario is included in **Appendix B**.

The following access assumptions were made for each zone:

Access off of Bunker Lake Boulevard:

- Zone 1 & 3

Access off of Armstrong Boulevard:

- Zone 2

Access off of Puma Street

- Zone 4

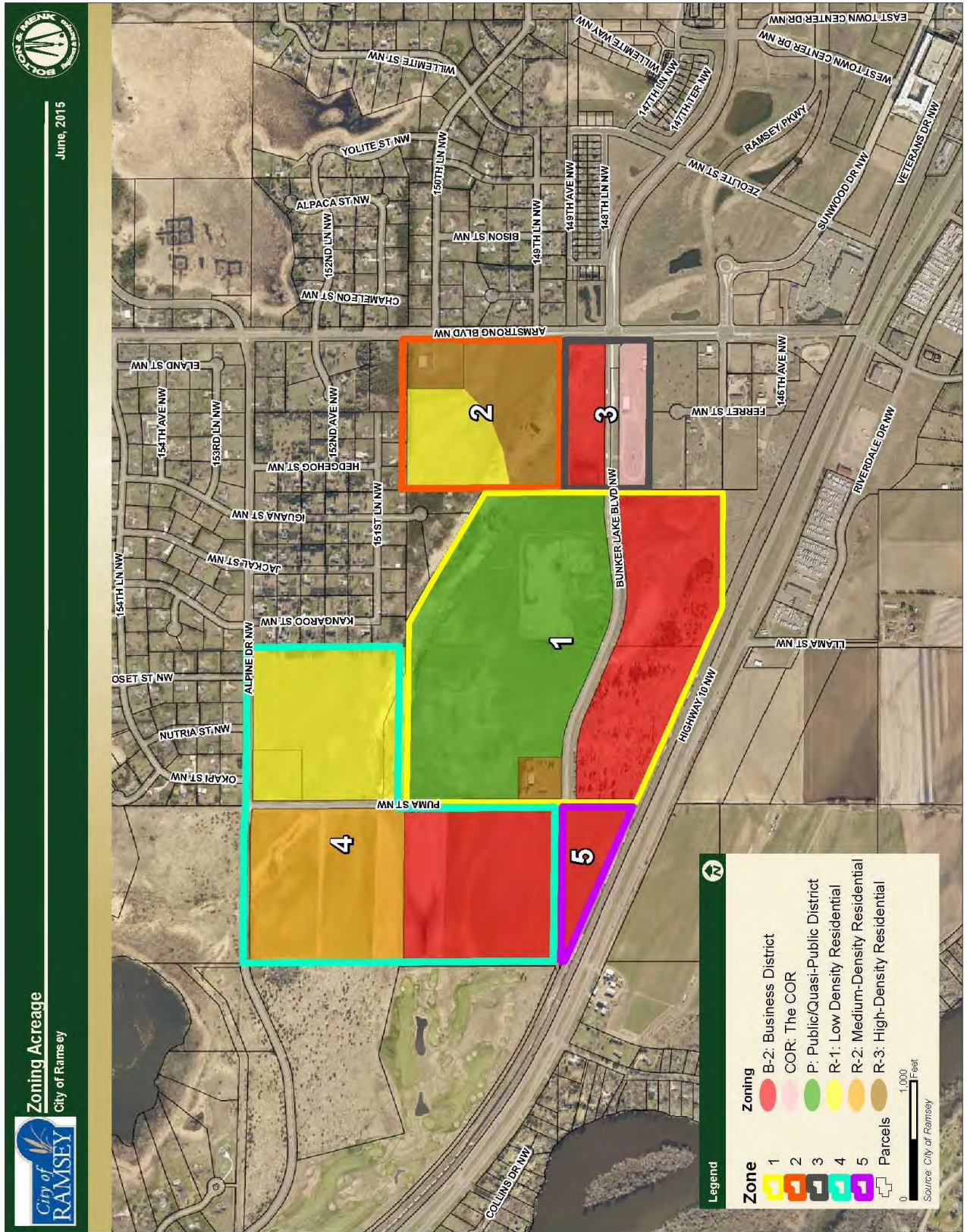
Accesses off of Bunker Lake Boulevard and Puma Street

- Zone 5

Trips to and from the development area are generally directed to the south to T.H. 10. The trips were distributed to the roadway using existing trip distribution as a basis. The generated trips from the proposed development were added to the 2040 No-Build forecasted volumes to develop the 2040 Build conditions. The trip distribution to and from the development is shown in **Figure 5**. The 2040 Build traffic volumes can be seen in **Figure 6.1** through **6.4**.

The different alternatives correspond to the land use on the north side of Zone 1. Alternative 1A assumes a high school is built, Alternative 1B assumes K-12 schools are built, Alternative 2 assumes a business park is built, and Alternative 3 assumes low density residential homes are built.

Figure 4: Trip Generation Zones



June, 2015

Zoning Acreage  
City of Ramsey



Map Document: \\ARCSERVER\GIS\RAMSR\16109828\SR\Map\Zoning\_AOI.mxd  
Date Saved: 6/22/2015 8:45:36 AM

Figure 5: Trip Distribution Map

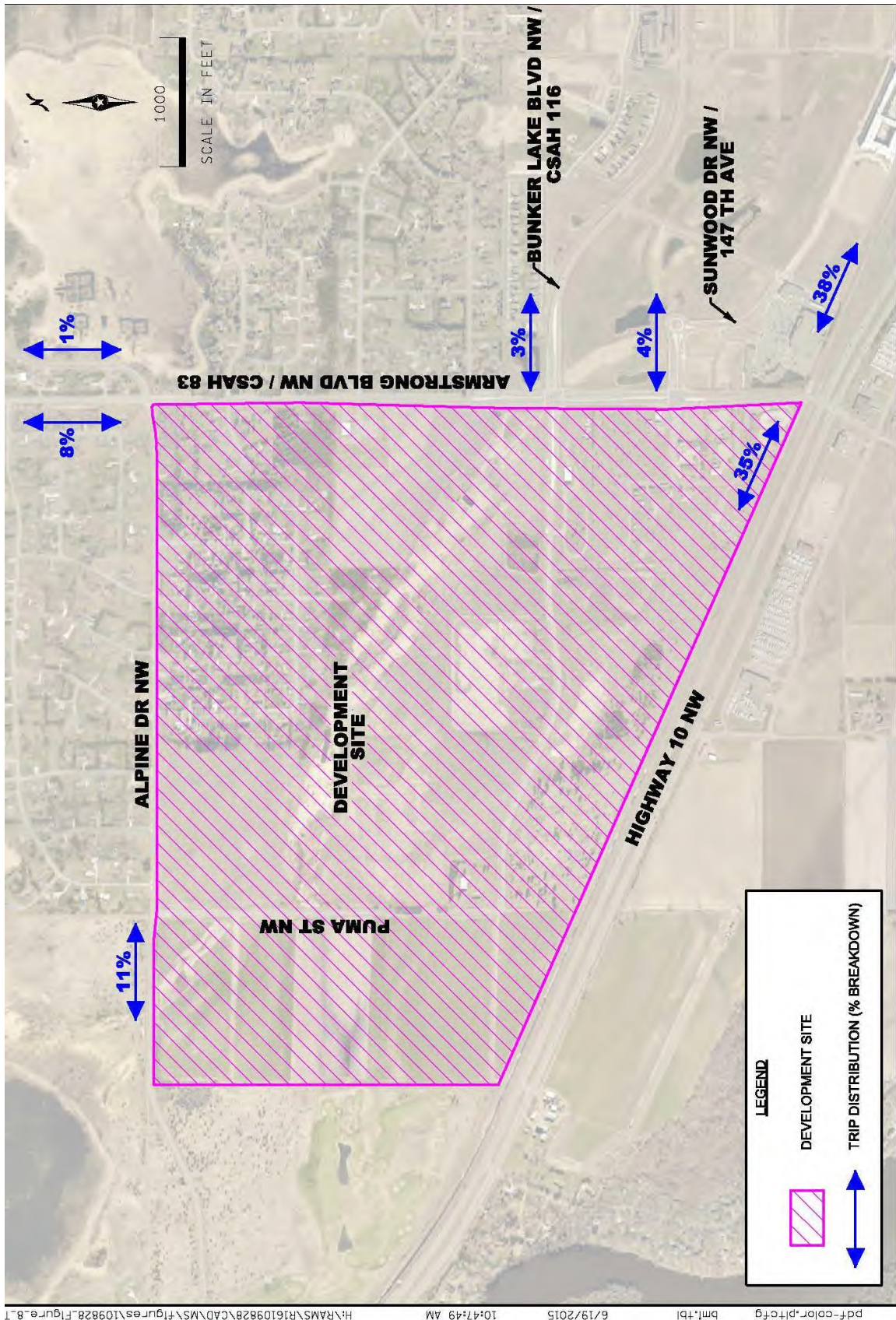


Figure 6.1: 2040 Build Traffic Volumes (Alternative 1A: High School)

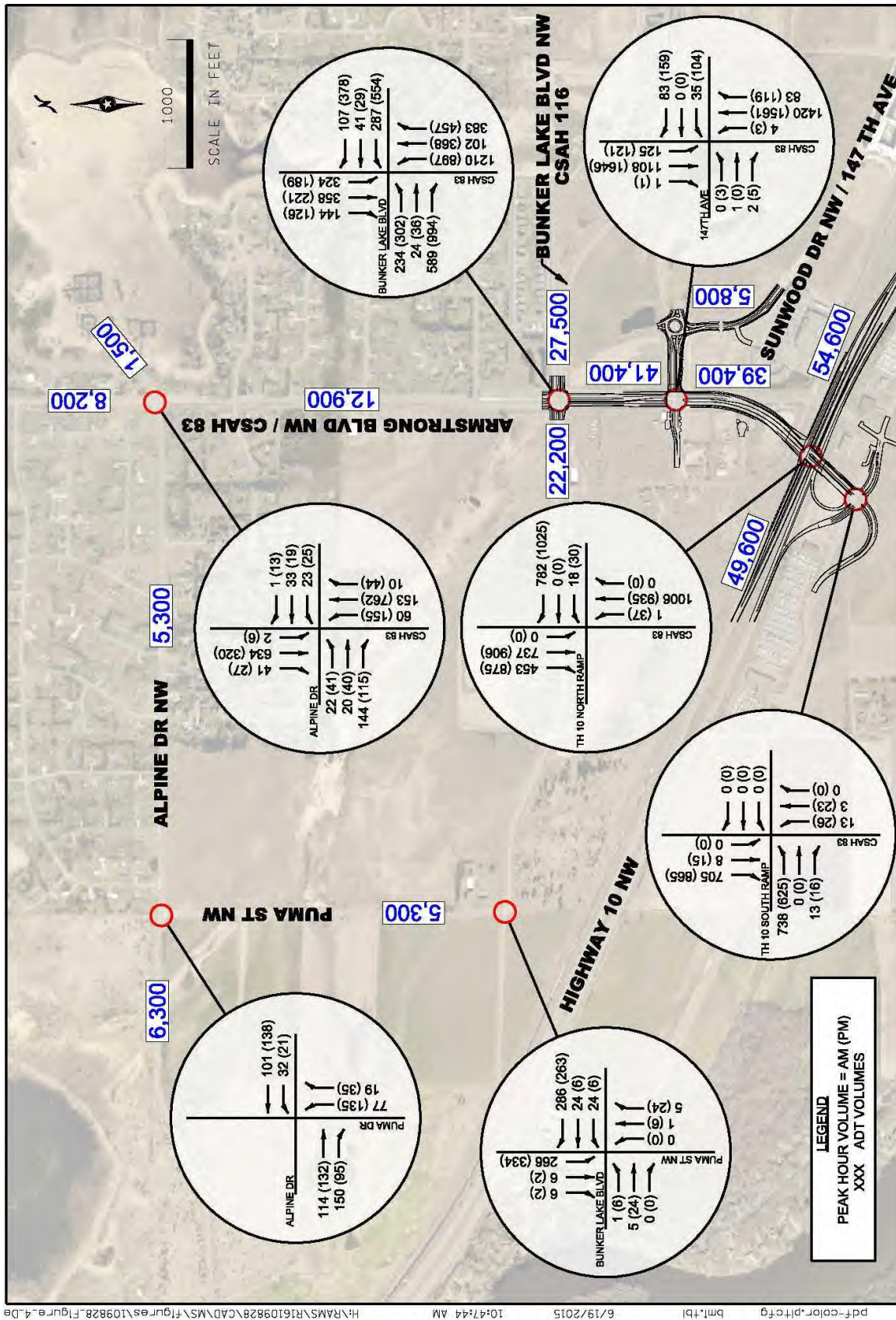


Figure 6.2: 2040 Build Traffic Volumes (Alternative 1B: K-12 Schools)

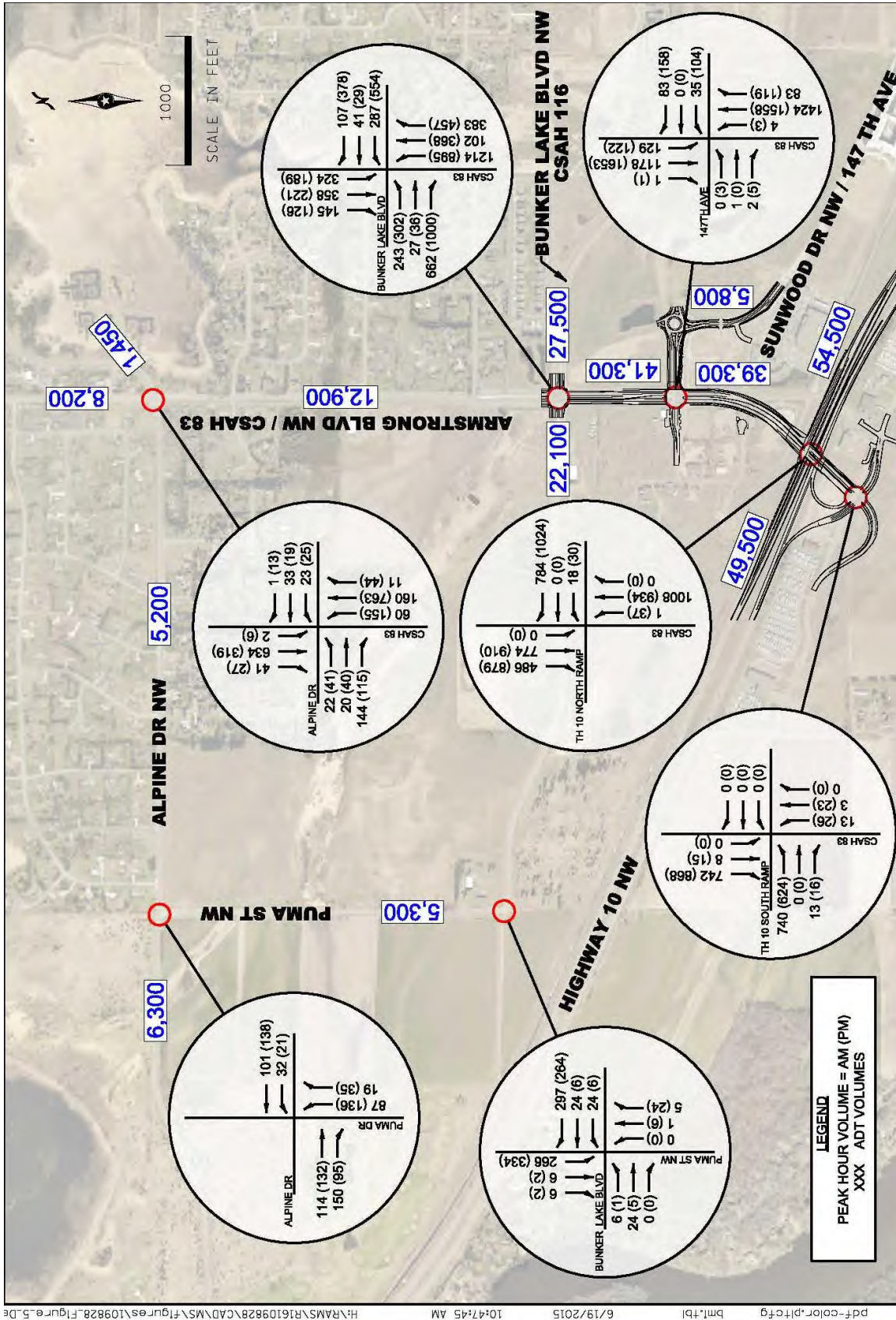
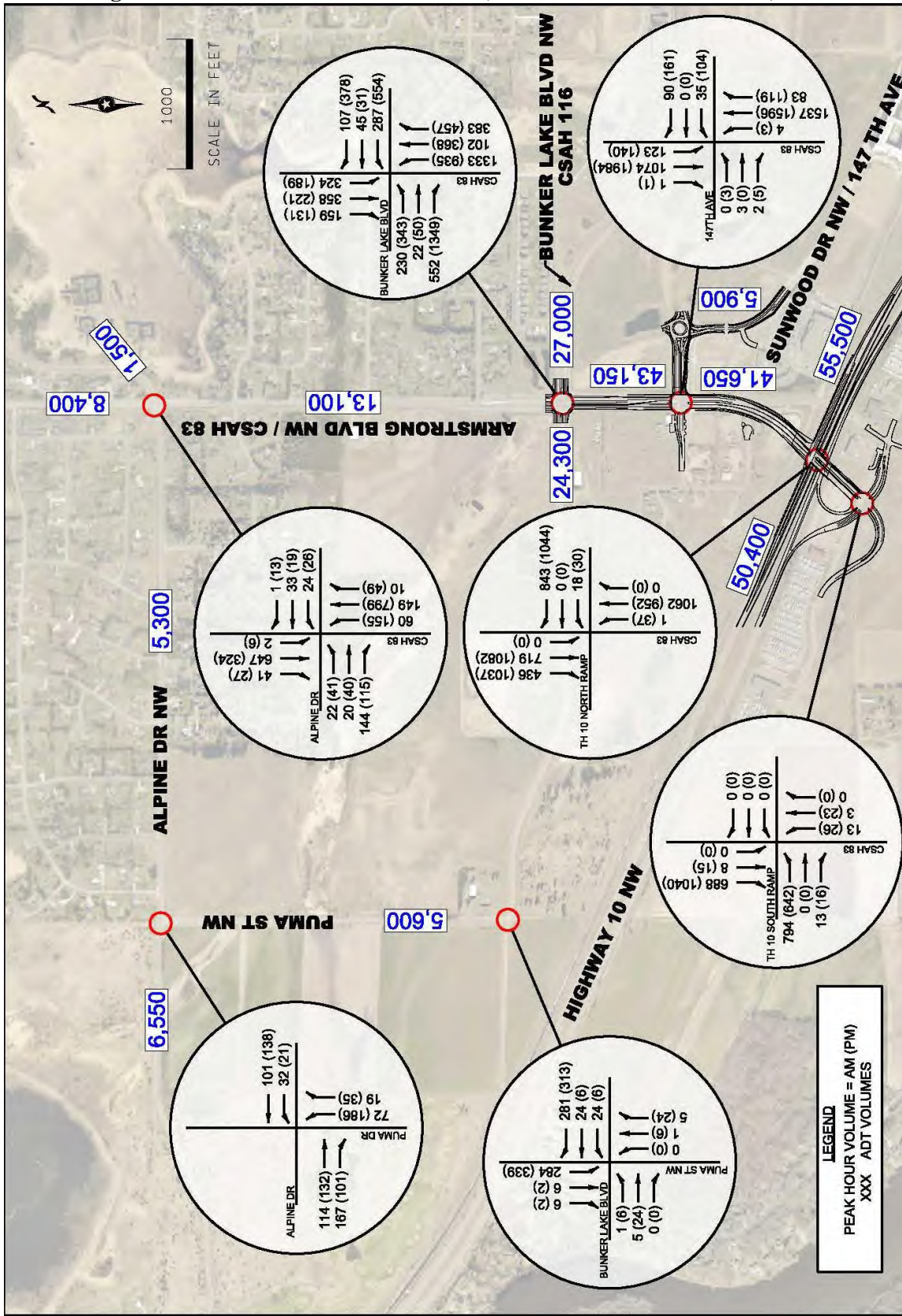
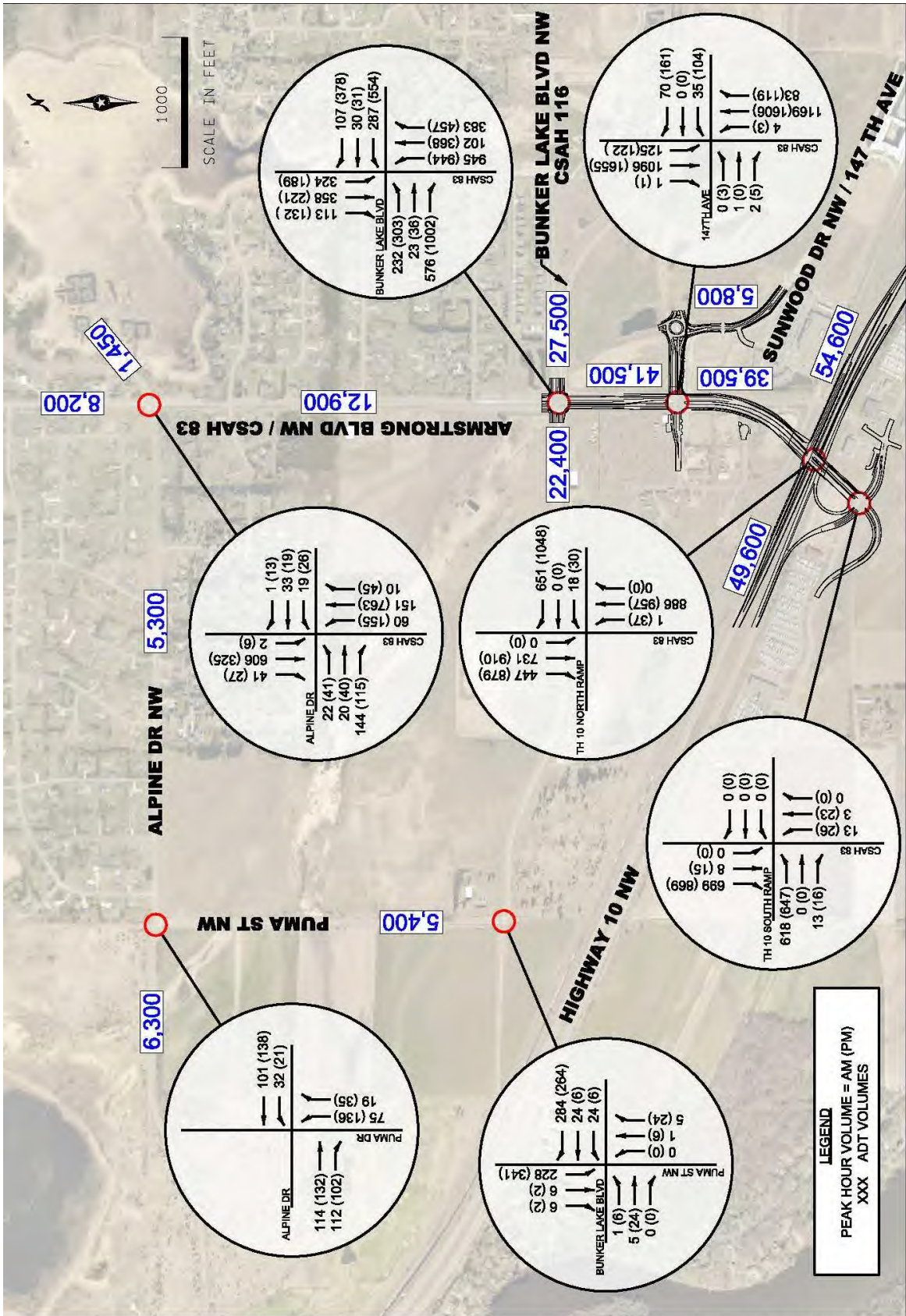


Figure 6.3: 2040 Build Traffic Volumes (Alternative 2: Business Park)



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Figure 6.4: 2040 Build Traffic Volumes (Alternative 3: Low Density Residential)



## B. 2040 Build Operations

### 1. Operations Analysis

The traffic operations results for the 2040 Build is included in Tables 8-11.

**Table 8: 2040 Build Operations Analysis (Alternative 1A: High School)**

Traffic Control Scenario	Peak Hour	Intersection Delay*- LOS		Maximum Delay-LOS**	Limiting Movement***	Max Approach Queue			
						Direction	Average Queue (ft)	Max Queue (ft)****	
<b>Design Year 2040 Alternative 1A</b>									
TH 10/169 South Ramp & CSAH 83 (Armstrong Blvd) <i>Signal</i>	AM	47	D	86	F	EBL	EBT	149	734
	PM	18	B	29	C	NBL	EBL	130	241
TH 10/169 North Ramp & CSAH 83 (Armstrong Blvd) <i>Signal</i>	AM	131	F	326	F	WBR	WBT/R	1106	2034
	PM	112	F	280	F	WBR	WBT/R	1104	2061
CSAH 83 (Armstrong Blvd & 147th Avenue) <i>Signal</i>	AM	67	E	175	F	NBL	NBT	894	1276
	PM	60	E	114	F	NBT	NBT	873	1262
CSAH 83 (Armstrong Blvd & CSAH 116 (Bunker Lake Blvd) <i>Signal (Added EB through-right, left, and SB left turn lanes)</i>	AM	66	E	162	F	WBL	NBT	793	990
	PM	74	E	182	F	NBL	NBT	821	1014
CSAH 83 (Armstrong Blvd) & Alpine Drive NW <i>TWSC</i>	AM	4	A	25	C	WBR	EBL/T	36	88
	PM	9	A	54	F	EBL	EBL/T	76	171
Alpine Drive NW & Puma Street NW <i>TWSC</i>	AM	2	A	7	A	NBL	NBL/T	36	58
	PM	3	A	8	A	NBL	NBL/R	47	74
Puma Street NW & Bunker Lake Blvd <i>Option 1: AWSC</i>	AM	4	A	9	A	SBT	SBL/T/R	56	84
	PM	4	A	9	A	WBL	SBLR/E	59	86
Puma Street NW & Bunker Lake Blvd <i>Option 2: 3 Legged intersection (with curve)</i>	AM	1	A	11	B	EBL	NBT/L	14	49
	PM	1	A	8	A	EBL	EBL/T	23	43
Puma Street NW & Bunker Lake Blvd <i>Option 3: Roundabout</i>	AM	3	A	4	A	SBT	SBL/T/R	18	57
	PM	3	A	4	A	SBT	WBL/T/R	25	64

\*Delay in seconds per vehicle

\*\*Maximum delay and LOS on any approach and/or movement

\*\*\*Limiting Movement is the highest delay movement.

\*\*\*\*Max Queue refers to the 95% Queue (Passenger car stored length = 25 ft, Heavy vehicle stored length = 45 ft)

**Table 9: 2040 Build Operations Analysis (Alternative 1B: K-12 Schools)**

Traffic Control Scenario	Peak Hour	Intersection Delay*- LOS		Maximum Delay-LOS**	Limiting Movement***	Max Approach Queue			
						Direction	Average Queue (ft)	Max Queue (ft)****	
<b>Design Year 2040 Alternative 1B</b>									
TH 10/169 South Ramp & CSAH 83 (Armstrong Blvd) <i>Signal</i>	AM	32	C	56	E	EBL	EBL	225	446
	PM	20	B	34	C	EBL	EBL	140	277
TH 10/169 North Ramp & CSAH 83 (Armstrong Blvd) <i>Signal</i>	AM	137	F	322	F	WBR	WBT/R	1064	1975
	PM	104	F	243	F	WBR	WBT/R	1037	2033
CSAH 83 (Armstrong Blvd & 147th Avenue) <i>Signal</i>	AM	90	F	166	F	NBL	NBT	920	1217
	PM	86	F	237	F	NBL	NBT	822	1330
CSAH 83 (Armstrong Blvd & CSAH 116 (Bunker Lake Blvd) <i>Signal (Added EB through-right, left, and SB left turn lanes)</i>	AM	85	F	322	F	WBL	NBT	802	994
	PM	100	F	296	F	WBL	NBT	797	1074
CSAH 83 (Armstrong Blvd) & Alpine Drive NW <i>TWSC</i>	AM	4	A	19	C	EBT	EBL/T	36	80
	PM	7	A	29	D	WBL	EBL/T	52	106
Alpine Drive NW & Puma Street NW <i>TWSC</i>	AM	2	A	8	A	NBL	NBL/T	38	60
	PM	3	A	9	A	NBL	NBL/T	49	79
Puma Street NW & Bunker Lake Blvd <i>Option 1: AWSC</i>	AM	4	A	9	A	SBT	SBL/T/R	54	77
	PM	4	A	10	A	SBT	SBL/T/R	59	87
Puma Street NW & Bunker Lake Blvd <i>Option 2: 3 Legged intersection (with curve)</i>	AM	1	A	8	A	EBL	NBL/R	13	43
	PM	1	A	8	A	EBL	EBL/R	24	46
Puma Street NW & Bunker Lake Blvd <i>Option 3: Roundabout</i>	AM	3	A	3	A	SBL	SBL/T/R	18	53
	PM	3	A	5	A	NBT	SBL/T/R	19	58

\*Delay in seconds per vehicle

\*\*Maximum delay and LOS on any approach and/or movement

\*\*\*Limiting Movement is the highest delay movement.

\*\*\*\*Max Queue refers to the 95% Queue (Passenger car stored length = 25 ft, Heavy vehicle stored length = 45 ft)

**Table 10: 2040 Traffic Operations Analysis (Alternative 2: Business Park)**

Traffic Control Scenario	Peak Hour	Intersection Delay*- LOS		Maximum Delay-LOS**	Limiting Movement ***	Max Approach Queue			
						Direction	Average Queue (ft)	Max Queue (ft) ****	
<b>Design Year 2040 Alternative 2</b>									
TH 10/169 South Ramp & CSAH 83 (Armstrong Blvd) <i>Signal</i>	AM	81	F	147	F	EBL	EBT	434	1574
	PM	48	D	95	F	EBL	EBT	174	815
TH 10/169 North Ramp & CSAH 83 (Armstrong Blvd) <i>Signal</i>	AM	118	F	312	F	WBR	WBT/R	1134	2008
	PM	115	F	347	F	WBR	WBT/R	1212	2070
CSAH 83 (Armstrong Blvd & 147th Avenue) <i>Signal</i>	AM	62	E	189	F	NBL	NBT	948	1183
	PM	86	F	140	F	EBL	NBT	893	1263
CSAH 83 (Armstrong Blvd & CSAH 116 (Bunker Lake Blvd) <i>Signal (Added EB through-right, left, and SB left turn lanes)</i>	AM	73	E	228	F	WBL	NBT	798	996
	PM	100	F	293	F	WBL	NBT	841	959
CSAH 83 (Armstrong Blvd) & Alpine Drive NW <i>TWSC</i>	AM	4	A	19	C	WBL	EBL/T	35	82
	PM	6	A	27	D	EBT	NBL/T	47	123
Alpine Drive NW & Puma Street NW <i>TWSC</i>	AM	2	A	7	A	NBL	NBL/R	33	52
	PM	3	A	9	A	NBL	NBL/T	51	79
Puma Street NW & Bunker Lake Blvd <i>Option 1: AWSC</i>	AM	4	A	10	A	SBT	SBL/T/R	60	91
	PM	5	A	10	A	WBL	SBL/T/R	59	90
Puma Street NW & Bunker Lake Blvd <i>Option 2: 3 Legged intersection (with curve)</i>	AM	1	A	11	B	EBL	NBL/T	14	45
	PM	1	A	8	A	EBL	EBL/R	23	47
Puma Street NW & Bunker Lake Blvd <i>Option 3: Roundabout</i>	AM	3	A	4	A	SBT	SBL/T/R	20	57
	PM	3	A	4	A	EBT	SBL/T/R	20	64

\*Delay in seconds per vehicle

\*\*Maximum delay and LOS on any approach and/or movement

\*\*\*Limiting Movement is the highest delay movement.

\*\*\*\*Max Queue refers to the 95% Queue (Passenger car stored length = 25 ft, Heavy vehicle stored length = 45 ft)

**Table 11: 2040 Build Operations Analysis (Alternative 3: LD Residential)**

Traffic Control Scenario	Peak Hour	Intersection Delay*- LOS		Maximum Delay-LOS**	Limiting Movement ***	Max Approach Queue			
						Direction	Average Queue (ft)	Max Queue (ft) ****	
<b>Design Year 2040 Alternative 3</b>									
TH 10/169 South Ramp & CSAH 83 (Armstrong Blvd) <i>Signal</i>	AM	13	B	24	C	NBL	EBL/R	101	176
	PM	28	C	52	D	EBL	EBL/R	190	417
TH 10/169 North Ramp & CSAH 83 (Armstrong Blvd) <i>Signal</i>	AM	85	F	225	F	WBR	WBT/R	694	1628
	PM	109	F	285	F	WBR	WBT/R	1143	2056
CSAH 83 (Armstrong Blvd & 147th Avenue) <i>Signal</i>	AM	62	E	272	F	NBL	NBT	824	1289
	PM	87	F	163	F	NBL	NBT	887	1282
CSAH 83 (Armstrong Blvd & CSAH 116 (Bunker Lake Blvd) <i>Signal (Added EB through-right, left, and SB left turn lanes)</i>	AM	72	E	189	F	NBL	NBT	812	1025
	PM	98	F	307	F	WBL	NBT	817	1026
CSAH 83 (Armstrong Blvd) & Alpine Drive NW <i>TWSC</i>	AM	4	A	18	C	EBL	NBL/T	32	86
	PM	7	A	33	D	EBL	EBL/T	59	131
Alpine Drive NW & Puma Street NW <i>TWSC</i>	AM	2	A	7	A	NBL	NBL/R	32	55
	PM	3	A	8	A	NBL	NBL/T	45	72
Puma Street NW & Bunker Lake Blvd <i>Option 1: AWSC</i>	AM	4	A	7	A	WBL	SBL/T/R	52	80
	PM	4	A	9	A	SBT	SBL/T/R	62	95
Puma Street NW & Bunker Lake Blvd <i>Option 2: 3 Legged intersection (with curve)</i>	AM	1	A	8	A	EBL	NBL/T	12	45
	PM	1	A	8	A	EBL	EBL/R	23	41
Puma Street NW & Bunker Lake Blvd <i>Option 3: Roundabout</i>	AM	3	A	4	A	EBT	SBL/T/R	16	51
	PM	3	A	4	A	NBT	SBL/T/R	26	71

\*Delay in seconds per vehicle

\*\*Maximum delay and LOS on any approach and/or movement

\*\*\*Limiting Movement is the highest delay movement.

\*\*\*\*Max Queue refers to the 95% Queue (Passenger car stored length = 25 ft, Heavy vehicle stored length = 45 ft)

Based on the expected growth in the area, and the generated trips from the proposed development, the study area is anticipated to have unacceptable operations at multiple intersections. Three of the signalized intersections have an overall LOS of E or worse in all of the alternative scenarios. The other signalized intersection, T.H. 10 South Ramp, is projected to have an acceptable overall LOS in Alternative 1A, 1B, and 3. The alternative 2 scenario shows the T.H. 10 South Ramp intersection having a LOS F during the AM peak hour. All signalized intersections have at least one movement with a LOS of D or worse in all of the scenarios. The unsignalized intersections are projected to operate adequately with the exception of Armstrong Boulevard & Alpine Drive. The eastbound and westbound approaches are experiencing excessive delays at this intersection for all alternatives. Alternative 2 will be used to determine what mitigation is necessary in the study area because it generated the most traffic out of the four alternatives. Overall, the operations can be improved, but are still considered unacceptable at many of the intersections. This is due to the large amount of traffic entering and exiting on Bunker Lake Boulevard and Armstrong Boulevard.

## 2. Additional Analysis

Additional operations analysis was completed to determine what intersection control would be adequate for the first development entrance west of Armstrong Boulevard on Bunker Lake Boulevard. Because of the heavy traffic along Bunker Lake Boulevard, it was assumed that stop control would not be suitable for this intersection. A roundabout and signal were modeled for the 2040 PM Build Alternative 2 scenario and the results are shown below.

**Table 12: Development Intersection Operations Analysis**

Traffic Control Scenario	Peak Hour	Intersection Delay*- LOS	Maximum Delay-LOS**	Limiting Movement ***	Max Approach Queue				
					Direction	Average Queue (ft)	Max Queue (ft) ****		
<b>First Development Entrance on Bunker Lake Road (West of Armstrong Boulevard)</b>									
Signal <i>Lanes: (EB/WB: L, T, T, R. NB/SB: L/T,R)</i>	PM	30 C	58 E	WBL	SBT	152	310		
Roundabout <i>Lanes: (EB/WB: L/T, T/R. NB/SB: L/T,R)</i>	PM	27 D	46 E	EB	EBT/R	150	300		

\*Delay in seconds per vehicle

\*\*Maximum delay and LOS on any approach and/or movement

\*\*\*Limiting Movement is the highest delay movement.

\*\*\*\*Max Queue refers to the 95% Queue (Passenger car stored length = 25 ft, Heavy vehicle stored length = 45 ft)

The signal or roundabout options both operate with an adequate overall level of service if the lanes shown are constructed. There will be at least one movement that has a LOS E or worse in both of the options.

Analysis was also completed to model the intersections if a river crossing was constructed along Armstrong Boulevard. It was assumed that the largest change in traffic due to the addition of the river crossing would be on T.H. 10. Therefore, the T.H. 10 ramp intersections were evaluated for operations. Intersections north of T.H. 10 were assumed to operate similarly to the scenarios without the river crossing.

**Table 13: Operations Analysis with River Crossing**

Traffic Control Scenario	Peak Hour	Intersection Delay*- LOS		Maximum Delay-LOS**		Limiting Movement ***	Max Approach Queue		
							Direction	Average Queue (ft)	Max Queue (ft) ****
<b>2040 Build Alt 2 (With River Crossing)</b>									
T.H. 10 South Ramp <i>Signal</i>	PM	151	F	475	F	EBL	EBT	1621	2762
T.H. 10 North Ramp <i>Signal</i>	PM	98	F	205	F	SBT	WBT/R	667	1550

\*Delay in seconds per vehicle

\*\*Maximum delay and LOS on any approach and/or movement

\*\*\*Limiting Movement is the highest delay movement.

\*\*\*\*Max Queue refers to the 95% Queue (Passenger car stored length = 25 ft, Heavy vehicle stored length = 45 ft)

The delays at these intersections get worse with the river crossing because additional vehicles are using these ramps to access the river crossing from T.H. 10. A more thorough investigation should be conducted in the future to determine countermeasures if a river crossing is to be constructed.

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## C. Proposed Mitigation

### 1. Mitigation

The proposed No-Build mitigations identified under the No-Build Conditions should be considered as well as the following to improve operations for the 2040 Build condition. Although these changes will improve operations, many of the intersections will still be considered unacceptable. This is due to the large amount of traffic entering and exiting on Bunker Lake Boulevard and Armstrong Boulevard.

#### a) Traffic Control

It is recommended that the following changes be made with regard to the traffic control in the study area:

##### *Bunker Lake Boulevard & Puma Street*

- All-way stop control, a 3 legged intersection with two-way stop control, and a roundabout were evaluated at this intersection. Each option operated with adequate levels of service. (short-term)

#### b) Geometric Improvements

It is recommended that the following changes be made with regard to the intersection geometry of the study area:

##### *Armstrong Boulevard & Bunker Lake Boulevard*

- Add a second eastbound left turn lane (short-term)
- Convert the southerly eastbound through lane into a through-right lane (long-term)
- Another option would be an eastbound free-right with an add lane that can be extended to the T.H. 10 North Ramp (long-term)

It is recommended that free-rights only be constructed when actually needed due the impact they have on pedestrian movements. Another option may be to signalize the right turn movement and provide an overlap phase to provide more green time to the right turn.

## D. Additional Operations Analysis (50% Development Completion)

A 2030 analysis was also completed to determine when the study area would start experiencing significant delays. This analysis assumes 50% of the Future Business Park development is complete and 50% of the COR development is complete.

**Table 14: 2030 (50% Development) Operations Analysis**

Traffic Control Scenario	Peak Hour	Intersection Delay*- LOS		Maximum Delay-LOS**		Limiting Movement ***	Max Approach Queue		
							Direction	Average Queue (ft)	Max Queue (ft) ****
<b>Design Year 2030 Build Alternative Alternative 2 (50% Development)</b>									
TH 10/169 South Ramp & CSAH 83 (Armstrong Blvd) <i>Signal</i>	PM	9	A	17	B	NBL	EBL	64	100
TH 10/169 North Ramp & CSAH 83 (Armstrong Blvd) <i>Signal</i>	PM	12	B	22	C	NBL	SBT	178	330
CSAH 83 (Armstrong Blvd & 147th Avenue) <i>Signal (Added EB through, right, left, and SB left turn lanes)</i>	PM	11	B	37	D	EBL	NBT	130	203
CSAH 83 (Armstrong Blvd & CSAH 116 (Bunker Lake Blvd) <i>Signal</i>	PM	37	D	72	E	WBL	EBT	146	561
CSAH 83 (Armstrong Blvd) & Alpine Drive NW <i>TWSC</i>	PM	5	A	22	C	EBL	NBL/T	40	126
Alpine Drive NW & Puma Street NW <i>TWSC</i>	PM	3	A	6	A	NBR	NBL/T	41	66

Assumes the east (COR) development and west development are 50% built out

\*Delay in seconds per vehicle

\*\*Maximum delay and LOS on any approach and/or movement

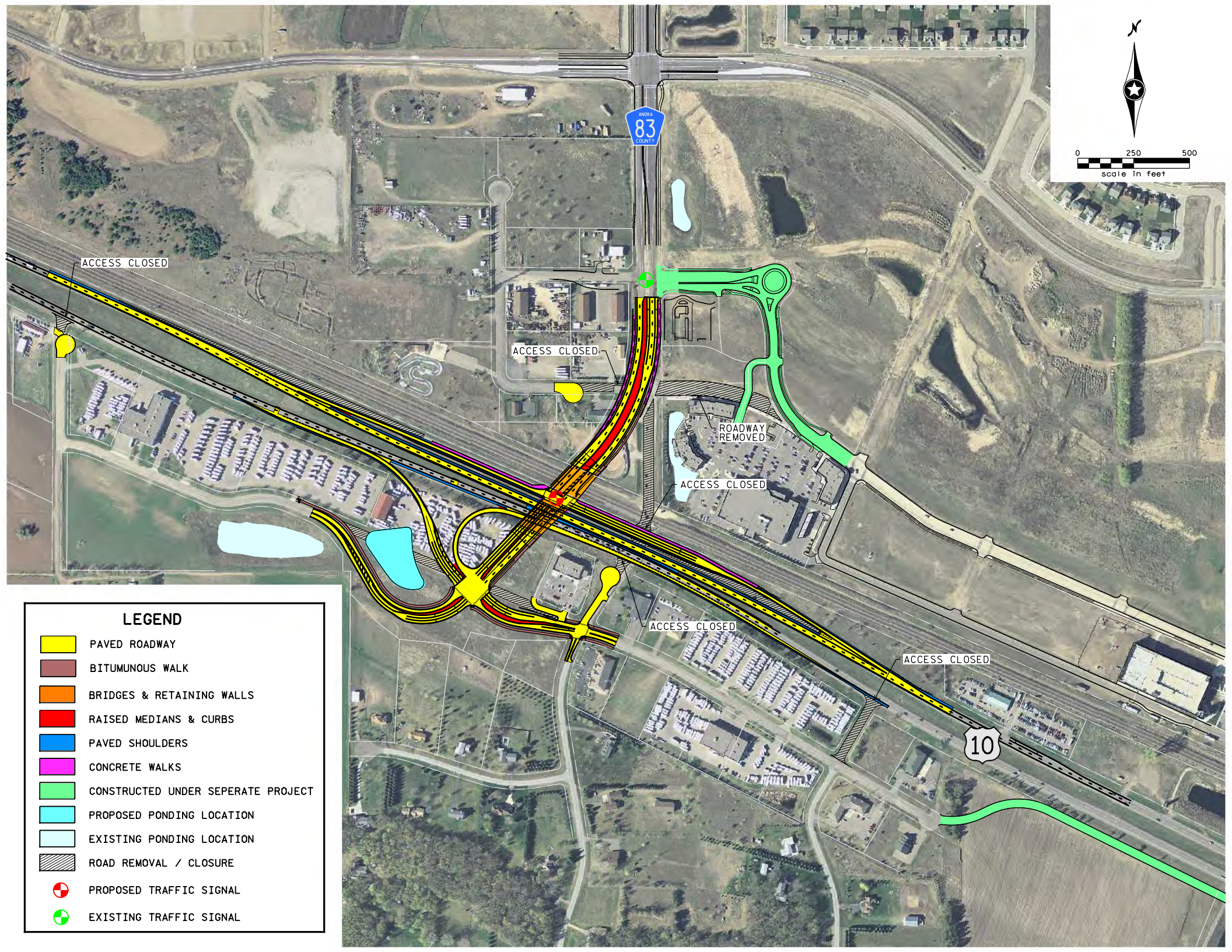
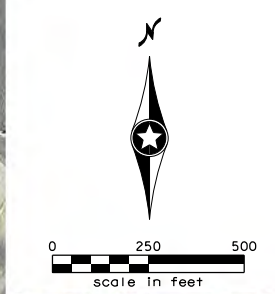
\*\*\*Limiting Movement is the highest delay movement.

\*\*\*\*Max Queue refers to the 95% Queue (Passenger car stored length = 25 ft, Heavy vehicle stored length = 45 ft)

At 50% development, the intersections are anticipated to operate with adequate delays. Therefore, it is projected that the intersections will start to experience excessive delays anywhere from 50% to 100% completion of the development.



**APPENDIX A-**  
**TH 10 & ARMSTRONG BOULEVARD**  
**OVERPASS LAYOUT**



**LEGEND**

- PAVED ROADWAY
- BITUMINOUS WALK
- BRIDGES & RETAINING WALLS
- RAISED MEDIANS & CURBS
- PAVED SHOULDERS
- CONCRETE WALKS
- CONSTRUCTED UNDER SEPERATE PROJECT
- PROPOSED PONDING LOCATION
- EXISTING PONDING LOCATION
- ROAD REMOVAL / CLOSURE
- + PROPOSED TRAFFIC SIGNAL
- EXISTING TRAFFIC SIGNAL



## APPENDIX B- TRAFFIC VOLUMES



# Traffic Data Inc

PO Box 16296  
St. Louis Park, MN 55416

File Name : 1 - Alpine Dr & Puma St NW, 4-8-15, 6am-7pm

Site Code : 1

Start Date : 4/8/2015

Page No : 1

Alpine Dr and Puma St NW  
Ramsey, MN

## Groups Printed- Cars + - Trucks

Start Time	Southbound						Alpine Dr Westbound						Puma St NW Northbound						Alpine Dr Eastbound						Int. Total							
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total								
06:00 AM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	10
06:15 AM	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	18
06:30 AM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	0	13	1	0	14	0	0	0	0	0	0	21
06:45 AM	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	21
Total	0	0	0	0	0	0	0	0	38	0	0	38	0	0	0	0	0	0	0	0	0	31	1	0	32	0	0	0	0	0	0	70
07:00 AM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	19
07:15 AM	0	0	0	0	0	0	0	0	15	0	0	15	0	0	0	0	0	0	0	0	0	14	1	0	15	0	0	0	0	0	0	30
07:30 AM	0	0	0	0	0	0	0	0	19	0	0	19	0	1	0	0	0	0	1	0	0	19	2	0	21	0	0	0	0	0	0	41
07:45 AM	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	0	0	0	17	1	0	18	0	0	0	0	0	0	27
Total	0	0	0	0	0	0	0	0	50	0	0	50	0	1	0	0	0	1	0	0	62	4	0	66	0	0	0	0	0	0	117	
08:00 AM	0	0	0	0	0	0	0	0	14	0	0	14	0	1	0	0	0	1	0	0	11	2	0	13	0	0	0	0	0	0	28	
08:15 AM	0	0	0	0	0	0	0	0	11	0	0	11	0	1	0	0	0	1	0	0	15	0	0	15	0	0	0	0	0	0	27	
08:30 AM	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	0	0	7	1	0	8	0	0	0	0	0	0	19	
08:45 AM	0	0	0	0	0	0	0	1	8	0	0	9	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	20	
Total	0	0	0	0	0	0	0	1	44	0	0	45	0	2	0	0	0	2	0	0	44	3	0	47	0	0	0	0	0	0	94	
09:00 AM	0	0	0	0	0	0	0	1	10	0	0	11	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	16	
09:15 AM	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	16	
09:30 AM	0	0	0	0	0	0	0	0	7	0	0	7	0	1	0	0	0	1	0	0	5	0	0	5	0	0	0	0	0	0	13	
09:45 AM	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	10	
Total	0	0	0	0	0	0	0	1	31	0	0	32	0	1	0	0	0	1	0	0	22	0	0	22	0	0	0	0	0	0	55	
10:00 AM	0	0	0	0	0	0	0	0	8	0	0	8	0	1	0	0	0	1	0	0	7	0	0	7	0	0	0	0	0	0	16	
10:15 AM	0	0	0	0	0	0	0	0	4	0	0	4	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	5	
10:30 AM	0	0	0	0	0	0	0	0	6	0	0	6	0	1	0	3	0	4	0	0	5	1	0	6	0	0	0	0	0	0	16	
10:45 AM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	14	0	0	14	0	0	0	0	0	0	17	
Total	0	0	0	0	0	0	0	0	21	0	0	21	0	3	0	3	0	6	0	0	26	1	0	27	0	0	0	0	0	0	54	
11:00 AM	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	11	
11:15 AM	0	0	0	0	0	0	0	0	10	0	0	10	0	1	0	0	0	1	0	0	7	1	0	8	0	0	0	0	0	0	19	
11:30 AM	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	17	
11:45 AM	0	0	0	0	0	0	0	0	8	0	0	8	0	1	0	0	0	1	0	0	6	0	0	6	0	0	0	0	0	0	15	
Total	0	0	0	0	0	0	0	0	35	0	0	35	0	2	0	0	0	2	0	0	24	1	0	25	0	0	0	0	0	0	62	
12:00 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	1	0	0	0	1	0	0	21	1	0	22	0	0	0	0	0	0	31	
12:15 PM	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	11	
12:30 PM	0	0	0	0	0	0	0	0	6	0	0	6	0	2	0	0	0	2	0	0	8	0	1	9	0	0	0	0	0	0	17	
12:45 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	12	0	0	12	0	0	0	0	0	0	15	
Total	0	0	0	0	0	0	0	0	21	0	0	21	0	3	0	0	0	3	0	0	48	1	1	50	0	0	0	0	0	0	74	
01:00 PM	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	22	
01:15 PM	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	0	0	7	1	0	8	0	0	0	0	0	0	19	
01:30 PM	0	0	0	0	0	0	0	1	9	0	0	10	0	0	0	1	0	1	0	0	4	1	0	5	0	0	0	0	0	0	16	
01:45 PM	0	0	0	0	0	0	0	0	11	0	0	11	0	2	0	0	0	2	0	0	7	0	0	7	0	0	0	0	0	0	20	
Total	0	0	0	0	0	0	0	1	42	0	0	43	0	2	0	1	0	3	0	0	29	2	0	31	0	0	0	0	0	0	77	



# Traffic Data Inc

PO Box 16296  
St. Louis Park, MN 55416

File Name : 1 - Alpine Dr & Puma St NW, 4-8-15, 6am-7pm

Site Code : 1

Start Date : 4/8/2015

Page No : 2

Alpine Dr and Puma St NW  
Ramsey, MN

## Groups Printed- Cars + - Trucks

Start Time	Southbound						Alpine Dr Westbound						Puma St NW Northbound						Alpine Dr Eastbound						Int. Total	
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total		
02:00 PM	0	0	0	0	0	0	0	0	14	0	1	15	0	0	0	0	0	0	0	0	0	7	0	0	7	22
02:15 PM	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	11	0	0	11	16	
02:30 PM	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	0	0	10	0	1	11	20	
02:45 PM	0	0	0	0	0	0	0	0	16	0	0	16	0	3	0	0	0	3	0	0	7	0	0	7	26	
Total	0	0	0	0	0	0	0	0	44	0	1	45	0	3	0	0	0	3	0	0	35	0	1	36	84	
03:00 PM	0	0	0	0	0	0	0	1	12	0	0	13	0	0	0	0	0	0	0	0	13	0	0	13	26	
03:15 PM	0	0	0	0	0	0	0	1	16	0	0	17	0	2	0	1	0	3	0	0	9	0	0	9	29	
03:30 PM	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	0	0	12	0	0	12	23	
03:45 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	1	0	1	0	0	21	0	2	23	32	
Total	0	0	0	0	0	0	0	2	47	0	0	49	0	2	0	2	0	4	0	0	55	0	2	57	110	
04:00 PM	0	0	0	0	0	0	0	0	16	0	2	18	0	0	0	0	0	0	0	0	18	1	0	19	37	
04:15 PM	0	0	0	0	0	0	0	0	14	0	0	14	0	0	0	0	0	0	1	0	17	0	0	18	32	
04:30 PM	0	0	0	0	0	0	0	0	22	0	0	22	0	0	0	0	0	0	0	0	19	0	0	19	41	
04:45 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	2	0	0	0	2	0	0	20	0	1	21	31	
Total	0	0	0	0	0	0	0	0	60	0	2	62	0	2	0	0	0	2	1	0	74	1	1	77	141	
05:00 PM	0	0	0	0	0	0	0	0	14	0	1	15	0	1	0	0	0	1	0	0	13	0	0	13	29	
05:15 PM	0	0	0	0	0	0	0	0	14	0	1	15	0	2	0	0	0	2	0	0	28	0	0	28	45	
05:30 PM	0	0	0	0	0	0	0	0	14	0	0	14	0	0	0	0	0	0	0	0	24	0	0	24	38	
05:45 PM	0	0	0	0	0	0	0	0	15	0	0	15	0	1	0	0	0	1	0	0	13	0	0	13	29	
Total	0	0	0	0	0	0	0	0	57	0	2	59	0	4	0	0	0	4	0	0	78	0	0	78	141	
06:00 PM	0	0	0	0	0	0	0	0	10	0	0	10	0	2	0	0	0	2	0	0	10	0	0	10	22	
06:15 PM	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	1	4	5	0	0	12	0	2	14	30	
06:30 PM	0	0	0	0	0	0	0	0	11	0	1	12	0	0	0	0	1	1	0	0	7	1	0	8	21	
06:45 PM	0	0	0	0	0	0	0	0	10	0	1	11	0	0	0	0	4	4	0	0	6	0	3	9	24	
Total	0	0	0	0	0	0	0	0	42	0	2	44	0	2	0	1	9	12	0	0	35	1	5	41	97	
Grand Total	0	0	0	0	0	0	0	5	532	0	7	544	0	27	0	7	9	43	1	0	563	15	10	589	1176	
Apprch %	0	0	0	0	0	0	0	0.9	97.8	0	1.3		0	62.8	0	16.3	20.9		0.2	0	95.6	2.5	1.7			
Total %	0	0	0	0	0	0	0	0.4	45.2	0	0.6	46.3	0	2.3	0	0.6	0.8	3.7	0.1	0	47.9	1.3	0.9	50.1		
Cars +	0	0	0	0	0	0	0	4	506	0	6	516	0	26	0	7	8	41	1	0	532	15	10	558	1115	
% Cars +	0	0	0	0	0	0	0	80	95.1	0	85.7	94.9	0	96.3	0	100	88.9	95.3	100	0	94.5	100	100	94.7	94.8	
Trucks	0	0	0	0	0	0	0	1	26	0	1	28	0	1	0	0	1	2	0	0	31	0	0	31	61	
% Trucks	0	0	0	0	0	0	0	20	4.9	0	14.3	5.1	0	3.7	0	0	11.1	4.7	0	0	5.5	0	0	5.3	5.2	



# Traffic Data Inc

PO Box 16296  
St. Louis Park, MN 55416

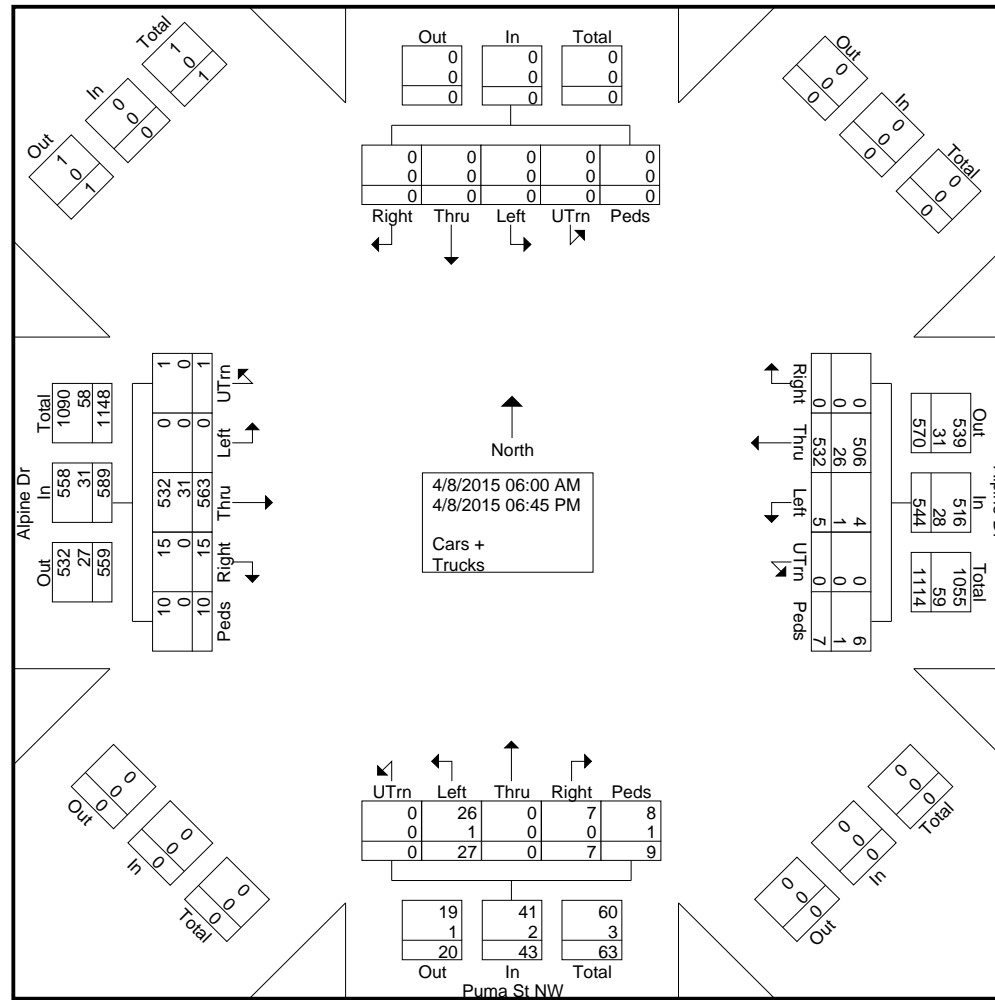
File Name : 1 - Alpine Dr & Puma St NW, 4-8-15, 6am-7pm

Site Code : 1

Start Date : 4/8/2015

Page No : 3

Alpine Dr and Puma St NW  
Ramsey, MN





# Traffic Data Inc

PO Box 16296  
St. Louis Park, MN 55416

File Name : 1 - Alpine Dr & Puma St NW, 4-8-15, 6am-7pm

Site Code : 1

Start Date : 4/8/2015

Page No : 4

## Alpine Dr and Puma St NW Ramsey, MN

Start Time	Southbound						Alpine Dr Westbound					Puma St NW Northbound					Alpine Dr Eastbound					Int. Total			
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru		Right	Peds	App. Total
Peak Hour Analysis From 06:00 AM to 09:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:15 AM																									
07:15 AM	0	0	0	0	0	0	0	0	15	0	0	15	0	0	0	0	0	0	0	0	14	1	0	15	30
07:30 AM	0	0	0	0	0	0	0	0	19	0	0	19	0	1	0	0	0	1	0	0	19	2	0	21	41
07:45 AM	0	0	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	0	0	17	1	0	18	27
08:00 AM	0	0	0	0	0	0	0	0	14	0	0	14	0	1	0	0	0	1	0	0	11	2	0	13	28
Total Volume	0	0	0	0	0	0	0	0	57	0	0	57	0	2	0	0	0	2	0	0	61	6	0	67	126
% App. Total	0	0	0	0	0	0	0	0	100	0	0	100	0	100	0	0	0	0	0	0	91	9	0	100	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.750	.000	.000	.750	.000	.500	.000	.000	.000	.500	.000	.000	.803	.750	.000	.798	.768
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 11:15 AM																									
11:15 AM	0	0	0	0	0	0	0	0	10	0	0	10	0	1	0	0	0	1	0	0	7	1	0	8	19
11:30 AM	0	0	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	0	0	0	6	0	0	6	17
11:45 AM	0	0	0	0	0	0	0	0	8	0	0	8	0	1	0	0	0	1	0	0	6	0	0	6	15
12:00 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	1	0	0	0	1	0	0	21	1	0	22	31
Total Volume	0	0	0	0	0	0	0	0	37	0	0	37	0	3	0	0	0	3	0	0	40	2	0	42	82
% App. Total	0	0	0	0	0	0	0	0	100	0	0	100	0	100	0	0	0	0	0	0	95.2	4.8	0	100	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.841	.000	.000	.841	.000	.750	.000	.000	.000	.750	.000	.000	.476	.500	.000	.477	.661
Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:30 PM																									
04:30 PM	0	0	0	0	0	0	0	0	22	0	0	22	0	0	0	0	0	0	0	0	19	0	0	19	41
04:45 PM	0	0	0	0	0	0	0	0	8	0	0	8	0	2	0	0	0	2	0	0	20	0	1	21	31
05:00 PM	0	0	0	0	0	0	0	0	14	0	1	15	0	1	0	0	0	1	0	0	13	0	0	13	29
05:15 PM	0	0	0	0	0	0	0	0	14	0	1	15	0	2	0	0	0	2	0	0	28	0	0	28	45
Total Volume	0	0	0	0	0	0	0	0	58	0	2	60	0	5	0	0	0	5	0	0	80	0	1	81	146
% App. Total	0	0	0	0	0	0	0	0	96.7	0	3.3	100	0	100	0	0	0	0	0	0	98.8	0	1.2	100	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.659	.000	.500	.682	.000	.625	.000	.000	.000	.625	.000	.000	.714	.000	.250	.723	.811



# Traffic Data Inc

PO Box 16296  
St. Louis Park, MN 55416

File Name : 2 - Armstrong Blvd NW & Alpine Dr, 4-8-15, 6am-7pm

Site Code : 2

Start Date : 4/8/2015

Page No : 1

Armstrong Blvd NW and Alpine Dr  
Ramsey, MN

## Groups Printed- Cars + - Trucks

Start Time	Armstrong Blvd NW Southbound						Alpine Dr Westbound						Armstrong Blvd NW Northbound						Alpine Dr Eastbound						Int. Total
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	
06:00 AM	0	0	58	0	0	58	0	2	3	0	0	5	0	0	6	0	0	6	0	0	1	10	0	11	80
06:15 AM	0	3	73	2	0	78	0	3	4	0	0	7	0	4	12	0	0	16	0	0	1	7	0	8	109
06:30 AM	0	2	82	0	0	84	0	1	4	0	0	5	0	1	8	0	0	9	0	4	2	15	0	21	119
06:45 AM	0	3	87	0	0	90	0	0	8	0	0	8	0	1	6	0	0	7	0	1	3	21	0	25	130
Total	0	8	300	2	0	310	0	6	19	0	0	25	0	6	32	0	0	38	0	5	7	53	0	65	438
07:00 AM	0	2	89	3	0	94	0	0	4	0	0	4	0	4	9	0	0	13	0	1	4	21	0	26	137
07:15 AM	0	0	90	2	0	92	0	2	9	0	0	11	0	1	10	0	0	11	0	0	4	23	0	27	141
07:30 AM	0	0	107	6	0	113	0	1	13	1	0	15	0	2	11	1	0	14	0	3	4	27	0	34	176
07:45 AM	0	0	65	2	0	67	0	5	3	0	0	8	0	2	17	0	0	19	0	1	6	17	0	24	118
Total	0	2	351	13	0	366	0	8	29	1	0	38	0	9	47	1	0	57	0	5	18	88	0	111	572
08:00 AM	0	0	63	1	0	64	0	7	8	1	0	16	0	9	14	0	0	23	0	4	1	12	0	17	120
08:15 AM	0	1	43	1	0	45	0	2	5	0	0	7	0	6	9	2	0	17	0	2	5	19	0	26	95
08:30 AM	0	1	56	2	0	59	0	4	5	2	1	12	0	3	15	1	0	19	0	1	2	11	0	14	104
08:45 AM	0	1	36	4	0	41	0	0	2	0	0	2	0	6	14	1	0	21	0	2	4	9	0	15	79
Total	0	3	198	8	0	209	0	13	20	3	1	37	0	24	52	4	0	80	0	9	12	51	0	72	398
09:00 AM	0	2	53	2	0	57	0	0	3	1	0	4	0	5	12	3	0	20	0	0	2	7	0	9	90
09:15 AM	0	0	43	1	0	44	0	1	4	1	0	6	0	5	24	1	0	30	0	0	3	7	0	10	90
09:30 AM	0	1	28	0	0	29	0	0	3	1	0	4	0	4	17	0	0	21	0	0	3	11	0	14	68
09:45 AM	0	0	23	0	0	23	0	1	3	1	0	5	0	7	25	2	0	34	0	0	0	7	0	7	69
Total	0	3	147	3	0	153	0	2	13	4	0	19	0	21	78	6	0	105	0	0	8	32	0	40	317
10:00 AM	0	1	28	1	0	30	0	1	3	0	0	4	0	3	26	4	0	33	0	1	1	7	0	9	76
10:15 AM	0	0	25	1	0	26	0	1	1	2	0	4	0	6	19	3	0	28	0	0	2	3	1	6	64
10:30 AM	0	3	25	1	0	29	0	3	2	1	0	6	0	3	25	1	0	29	0	0	2	3	0	5	69
10:45 AM	0	2	25	1	0	28	0	4	1	2	0	7	0	2	23	0	0	25	0	2	5	9	0	16	76
Total	0	6	103	4	0	113	0	9	7	5	0	21	0	14	93	8	0	115	0	3	10	22	1	36	285
11:00 AM	0	0	33	1	0	34	0	2	3	0	0	5	0	7	26	1	0	34	0	1	0	7	0	8	81
11:15 AM	0	0	33	1	0	34	0	0	3	2	0	5	0	13	55	3	0	71	0	1	2	5	0	8	118
11:30 AM	0	2	28	0	0	30	0	2	1	0	0	3	0	9	29	1	1	40	0	0	4	7	1	12	85
11:45 AM	0	2	26	0	0	28	0	2	1	0	0	3	0	10	28	2	0	40	0	2	1	6	0	9	80
Total	0	4	120	2	0	126	0	6	8	2	0	16	0	39	138	7	1	185	0	4	7	25	1	37	364
12:00 PM	0	2	33	0	0	35	0	3	6	2	0	11	0	2	25	2	0	29	0	2	3	13	0	18	93
12:15 PM	0	1	20	0	0	21	1	0	5	0	0	6	0	4	29	1	0	34	0	1	2	9	0	12	73
12:30 PM	0	1	27	0	0	28	0	1	1	1	0	3	0	3	21	4	0	28	0	1	3	7	0	11	70
12:45 PM	0	1	30	0	0	31	0	1	2	2	1	6	0	12	33	0	1	46	0	2	4	10	0	16	99
Total	0	5	110	0	0	115	1	5	14	5	1	26	0	21	108	7	1	137	0	6	12	39	0	57	335
01:00 PM	0	0	30	2	0	32	0	1	4	0	0	5	0	8	26	2	0	36	0	0	2	10	0	12	85
01:15 PM	0	0	21	0	0	21	0	2	5	0	0	7	0	10	25	3	0	38	0	1	0	9	1	11	77
01:30 PM	0	1	31	0	0	32	0	3	1	0	0	4	0	8	31	1	0	40	0	0	0	5	0	5	81
01:45 PM	0	0	26	3	0	29	0	1	1	2	0	4	0	8	35	1	0	44	0	1	5	7	0	13	90
Total	0	1	108	5	0	114	0	7	11	2	0	20	0	34	117	7	0	158	0	2	7	31	1	41	333



# Traffic Data Inc

PO Box 16296  
St. Louis Park, MN 55416

File Name : 2 - Armstrong Blvd NW & Alpine Dr, 4-8-15, 6am-7pm

Site Code : 2

Start Date : 4/8/2015

Page No : 2

Armstrong Blvd NW and Alpine Dr  
Ramsey, MN

## Groups Printed- Cars + - Trucks

Start Time	Armstrong Blvd NW Southbound						Alpine Dr Westbound						Armstrong Blvd NW Northbound						Alpine Dr Eastbound						Int. Total
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	
02:00 PM	0	0	28	0	0	28	0	4	5	1	0	10	0	8	41	5	1	55	0	1	0	12	1	14	107
02:15 PM	0	1	31	1	0	33	0	2	3	1	0	6	0	8	52	2	0	62	0	0	2	11	0	13	114
02:30 PM	0	3	31	0	0	34	0	1	0	1	0	2	0	16	52	1	0	69	0	0	4	8	0	12	117
02:45 PM	0	2	25	2	0	29	0	1	4	3	0	8	0	14	68	1	0	83	0	2	3	7	0	12	132
Total	0	6	115	3	0	124	0	8	12	6	0	26	0	46	213	9	1	269	0	3	9	38	1	51	470
03:00 PM	0	3	23	1	0	27	0	1	4	2	0	7	0	20	71	2	0	93	0	0	6	8	0	14	141
03:15 PM	0	2	29	2	0	33	0	1	3	0	0	4	0	12	66	4	0	82	0	5	2	8	3	18	137
03:30 PM	0	3	34	2	0	39	0	1	6	3	0	10	0	13	79	2	0	94	0	1	6	8	0	15	158
03:45 PM	0	0	37	0	0	37	0	3	2	1	0	6	0	9	78	7	1	95	0	3	11	8	1	23	161
Total	0	8	123	5	0	136	0	6	15	6	0	27	0	54	294	15	1	364	0	9	25	32	4	70	597
04:00 PM	0	0	37	2	0	39	0	1	6	1	0	8	0	22	85	2	0	109	0	1	8	13	2	24	180
04:15 PM	0	1	35	0	0	36	0	2	5	6	0	13	0	16	96	11	1	124	0	3	10	6	1	20	193
04:30 PM	0	2	37	2	0	41	0	3	5	4	0	12	0	28	126	11	0	165	0	1	7	15	1	24	242
04:45 PM	0	3	32	6	0	41	0	3	3	3	0	9	0	9	102	4	0	115	0	4	11	12	1	28	193
Total	0	6	141	10	0	157	0	9	19	14	0	42	0	75	409	28	1	513	0	9	36	46	5	96	808
05:00 PM	0	0	29	0	0	29	0	4	4	0	1	9	0	22	109	3	1	135	0	2	8	5	0	15	188
05:15 PM	0	0	27	2	0	29	0	1	7	1	0	9	0	19	81	5	0	105	0	4	12	11	0	27	170
05:30 PM	0	1	38	4	0	43	0	2	5	1	0	8	0	24	84	2	1	111	0	3	10	15	1	29	191
05:45 PM	0	0	39	0	0	39	0	0	1	2	0	3	0	17	76	6	0	99	0	1	7	4	0	12	153
Total	0	1	133	6	0	140	0	7	17	4	1	29	0	82	350	16	2	450	0	10	37	35	1	83	702
06:00 PM	0	2	23	1	0	26	0	1	2	1	0	4	0	19	76	3	0	98	0	2	5	7	1	15	143
06:15 PM	0	1	35	2	0	38	0	1	5	2	0	8	0	16	54	6	0	76	0	1	5	8	1	15	137
06:30 PM	0	3	37	3	0	43	0	9	5	1	0	15	0	10	36	4	0	50	0	1	2	9	0	12	120
06:45 PM	0	2	39	2	0	43	0	6	8	0	0	14	0	11	56	1	0	68	0	0	4	6	0	10	135
Total	0	8	134	8	0	150	0	17	20	4	0	41	0	56	222	14	0	292	0	4	16	30	2	52	535
Grand Total	0	61	2083	69	0	2213	1	103	204	56	3	367	0	481	2153	122	7	2763	0	69	204	522	16	811	6154
Apprch %	0	2.8	94.1	3.1	0		0.3	28.1	55.6	15.3	0.8		0	17.4	77.9	4.4	0.3		0	8.5	25.2	64.4	2		
Total %	0	1	33.8	1.1	0	36	0	1.7	3.3	0.9	0	6	0	7.8	35	2	0.1	44.9	0	1.1	3.3	8.5	0.3	13.2	
Cars +	0	56	2039	67	0	2162	1	101	196	52	2	352	0	459	2089	118	3	2669	0	64	196	506	9	775	5958
% Cars +	0	91.8	97.9	97.1	0	97.7	100	98.1	96.1	92.9	66.7	95.9	0	95.4	97	96.7	42.9	96.6	0	92.8	96.1	96.9	56.2	95.6	96.8
Trucks	0	5	44	2	0	51	0	2	8	4	1	15	0	22	64	4	4	94	0	5	8	16	7	36	196
% Trucks	0	8.2	2.1	2.9	0	2.3	0	1.9	3.9	7.1	33.3	4.1	0	4.6	3	3.3	57.1	3.4	0	7.2	3.9	3.1	43.8	4.4	3.2



# Traffic Data Inc

PO Box 16296  
St. Louis Park, MN 55416

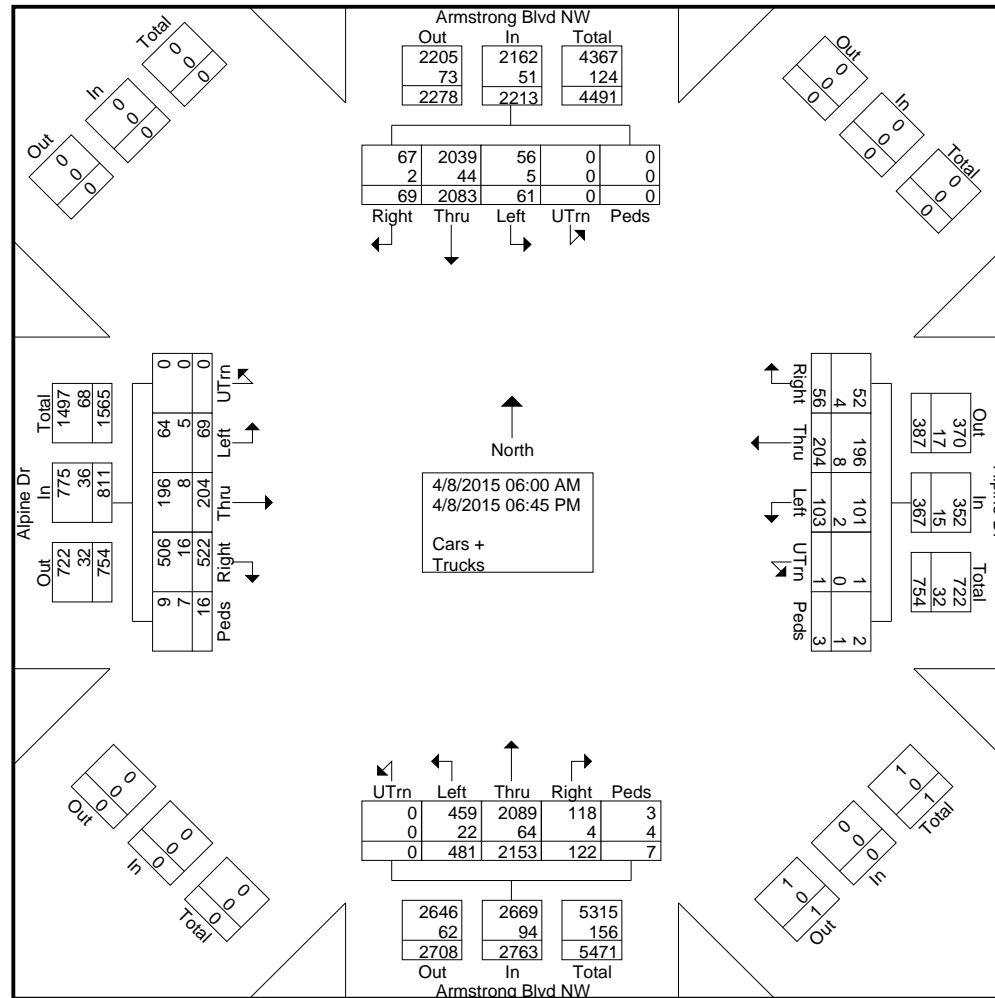
File Name : 2 - Armstrong Blvd NW & Alpine Dr, 4-8-15, 6am-7pm

Site Code : 2

Start Date : 4/8/2015

Page No : 3

Armstrong Blvd NW and Alpine Dr  
Ramsey, MN





# Traffic Data Inc

PO Box 16296  
St. Louis Park, MN 55416

File Name : 2 - Armstrong Blvd NW & Alpine Dr, 4-8-15, 6am-7pm

Site Code : 2

Start Date : 4/8/2015

Page No : 4

## Armstrong Blvd NW and Alpine Dr Ramsey, MN

Start Time	Armstrong Blvd NW Southbound						Alpine Dr Westbound					Armstrong Blvd NW Northbound						Alpine Dr Eastbound					Int. Total		
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right		Peds	App. Total
Peak Hour Analysis From 06:00 AM to 09:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 06:45 AM																									
06:45 AM	0	3	87	0	0	90	0	0	8	0	0	8	0	1	6	0	0	7	0	1	3	21	0	25	130
07:00 AM	0	2	89	3	0	94	0	0	4	0	0	4	0	4	9	0	0	13	0	1	4	21	0	26	137
07:15 AM	0	0	90	2	0	92	0	2	9	0	0	11	0	1	10	0	0	11	0	0	4	23	0	27	141
07:30 AM	0	0	107	6	0	113	0	1	13	1	0	15	0	2	11	1	0	14	0	3	4	27	0	34	176
Total Volume	0	5	373	11	0	389	0	3	34	1	0	38	0	8	36	1	0	45	0	5	15	92	0	112	584
% App. Total	0	1.3	95.9	2.8	0		0	7.9	89.5	2.6	0		0	17.8	80	2.2	0		0	4.5	13.4	82.1	0		
PHF	.000	.417	.871	.458	.000	.861	.000	.375	.654	.250	.000	.633	.000	.500	.818	.250	.000	.804	.000	.417	.938	.852	.000	.824	.830
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 11:15 AM																									
11:15 AM	0	0	33	1	0	34	0	0	3	2	0	5	0	13	55	3	0	71	0	1	2	5	0	8	118
11:30 AM	0	2	28	0	0	30	0	2	1	0	0	3	0	9	29	1	1	40	0	0	4	7	1	12	85
11:45 AM	0	2	26	0	0	28	0	2	1	0	0	3	0	10	28	2	0	40	0	2	1	6	0	9	80
12:00 PM	0	2	33	0	0	35	0	3	6	2	0	11	0	2	25	2	0	29	0	2	3	13	0	18	93
Total Volume	0	6	120	1	0	127	0	7	11	4	0	22	0	34	137	8	1	180	0	5	10	31	1	47	376
% App. Total	0	4.7	94.5	0.8	0		0	31.8	50	18.2	0		0	18.9	76.1	4.4	0.6		0	10.6	21.3	66	2.1		
PHF	.000	.750	.909	.250	.000	.907	.000	.583	.458	.500	.000	.500	.000	.654	.623	.667	.250	.634	.000	.625	.625	.596	.250	.653	.797
Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:15 PM																									
04:15 PM	0	1	35	0	0	36	0	2	5	6	0	13	0	16	96	11	1	124	0	3	10	6	1	20	193
04:30 PM	0	2	37	2	0	41	0	3	5	4	0	12	0	28	126	11	0	165	0	1	7	15	1	24	242
04:45 PM	0	3	32	6	0	41	0	3	3	3	0	9	0	9	102	4	0	115	0	4	11	12	1	28	193
05:00 PM	0	0	29	0	0	29	0	4	4	0	1	9	0	22	109	3	1	135	0	2	8	5	0	15	188
Total Volume	0	6	133	8	0	147	0	12	17	13	1	43	0	75	433	29	2	539	0	10	36	38	3	87	816
% App. Total	0	4.1	90.5	5.4	0		0	27.9	39.5	30.2	2.3		0	13.9	80.3	5.4	0.4		0	11.5	41.4	43.7	3.4		
PHF	.000	.500	.899	.333	.000	.896	.000	.750	.850	.542	.250	.827	.000	.670	.859	.659	.500	.817	.000	.625	.818	.633	.750	.777	.843



# Traffic Data Inc

PO Box 16296  
St. Louis Park, MN 55416

File Name : 3 - Armstrong Blvd NW & Bunker Lake Blvd, 4-8-15, 6am-7pm

Site Code : 3

Start Date : 4/8/2015

Page No : 1

Armstrong Blvd NW and Bunker Lake Blvd  
Ramsey, MN

## Groups Printed- Cars + - Trucks

Start Time	Armstrong Blvd NW Southbound						Bunker Lake Blvd Westbound						Armstrong Blvd NW Northbound						Bunker Lake Blvd Eastbound						Int. Total
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	
06:00 AM	0	12	59	0	0	71	0	1	0	5	0	6	0	0	4	2	0	6	0	0	0	0	0	0	83
06:15 AM	0	24	61	0	0	85	0	0	0	3	0	3	0	0	12	1	0	13	0	0	0	0	0	0	101
06:30 AM	0	37	66	0	2	105	0	3	0	5	2	10	0	0	4	4	0	8	0	0	0	1	0	1	124
06:45 AM	0	50	63	0	0	113	0	1	0	4	0	5	0	0	4	4	0	8	0	0	0	0	0	0	126
Total	0	123	249	0	2	374	0	5	0	17	2	24	0	0	24	11	0	35	0	0	0	1	0	1	434
07:00 AM	0	42	66	0	0	108	0	3	0	7	0	10	0	0	7	1	0	8	0	0	0	0	0	0	126
07:15 AM	0	50	66	0	0	116	0	4	0	7	0	11	0	0	5	2	0	7	0	0	1	0	0	1	135
07:30 AM	0	71	74	0	0	145	0	7	1	6	0	14	0	0	10	7	0	17	0	0	1	1	0	2	178
07:45 AM	0	48	52	0	0	100	0	6	0	7	0	13	0	0	15	7	0	22	0	0	1	0	0	1	136
Total	0	211	258	0	0	469	0	20	1	27	0	48	0	0	37	17	0	54	0	0	3	1	0	4	575
08:00 AM	0	22	60	0	0	82	0	1	1	13	0	15	0	0	10	3	0	13	0	0	1	0	0	1	111
08:15 AM	0	21	49	0	0	70	0	3	1	11	0	15	0	0	16	6	0	22	0	0	1	0	0	1	108
08:30 AM	0	32	55	0	0	87	0	1	0	5	0	6	0	0	16	0	0	16	0	0	0	1	0	1	110
08:45 AM	0	7	44	0	0	51	0	6	0	14	0	20	1	0	11	1	0	13	0	0	1	0	0	1	85
Total	0	82	208	0	0	290	0	11	2	43	0	56	1	0	53	10	0	64	0	0	3	1	0	4	414
09:00 AM	0	17	44	0	0	61	0	4	0	5	0	9	0	0	17	1	0	18	0	0	1	0	0	1	89
09:15 AM	0	5	43	0	0	48	0	2	0	15	0	17	0	0	18	1	0	19	0	0	0	0	0	0	84
09:30 AM	0	11	38	0	0	49	0	5	1	7	0	13	0	0	19	2	0	21	0	0	0	0	0	0	83
09:45 AM	0	10	31	0	0	41	0	3	0	8	0	11	0	0	26	1	0	27	0	0	0	0	0	0	79
Total	0	43	156	0	0	199	0	14	1	35	0	50	0	0	80	5	0	85	0	0	1	0	0	1	335
10:00 AM	0	7	36	0	0	43	0	2	1	12	0	15	0	0	19	1	0	20	0	0	0	0	0	0	78
10:15 AM	0	8	24	0	0	32	1	3	1	5	1	11	0	0	23	2	0	25	0	0	0	0	0	0	68
10:30 AM	0	5	32	2	0	39	0	4	0	11	0	15	0	2	17	3	0	22	0	0	0	1	0	1	77
10:45 AM	0	10	30	0	0	40	0	6	0	11	0	17	0	0	14	0	0	14	0	0	0	0	0	0	71
Total	0	30	122	2	0	154	1	15	2	39	1	58	0	2	73	6	0	81	0	0	0	1	0	1	294
11:00 AM	0	11	38	0	1	50	1	4	0	11	1	17	0	0	27	2	1	30	0	0	0	0	1	1	98
11:15 AM	0	13	29	0	0	42	0	5	1	12	1	19	0	0	28	2	0	30	0	0	0	1	0	1	92
11:30 AM	0	6	34	0	0	40	0	7	0	15	0	22	0	1	32	2	0	35	0	0	0	0	0	0	97
11:45 AM	0	3	37	0	0	40	0	3	0	11	1	15	0	0	36	3	0	39	0	0	0	0	0	0	94
Total	0	33	138	0	1	172	1	19	1	49	3	73	0	1	123	9	1	134	0	0	0	1	1	2	381
12:00 PM	1	10	30	0	0	41	0	1	0	6	0	7	0	1	25	6	0	32	0	0	0	2	0	2	82
12:15 PM	0	8	28	0	0	36	0	4	0	16	0	20	1	0	22	2	0	25	0	0	0	0	0	0	81
12:30 PM	0	9	33	0	0	42	0	4	0	9	0	13	0	1	23	2	0	26	0	0	0	0	0	0	81
12:45 PM	0	12	29	0	1	42	0	5	0	18	1	24	0	0	30	7	1	38	0	0	0	0	0	0	104
Total	1	39	120	0	1	161	0	14	0	49	1	64	1	2	100	17	1	121	0	0	0	2	0	2	348
01:00 PM	0	10	27	0	0	37	0	4	0	11	0	15	0	0	27	5	0	32	0	0	0	0	0	0	84
01:15 PM	0	11	28	0	1	40	0	4	0	12	2	18	0	3	30	1	1	35	0	0	0	2	1	3	96
01:30 PM	0	10	26	0	0	36	0	3	1	9	0	13	0	0	31	2	0	33	0	0	2	0	0	2	84
01:45 PM	0	4	31	0	0	35	0	2	1	14	1	18	1	0	32	2	1	36	0	0	0	0	0	0	89
Total	0	35	112	0	1	148	0	13	2	46	3	64	1	3	120	10	2	136	0	0	2	2	1	5	353



# Traffic Data Inc

PO Box 16296  
St. Louis Park, MN 55416

File Name : 3 - Armstrong Blvd NW & Bunker Lake Blvd, 4-8-15, 6am-7pm

Site Code : 3

Start Date : 4/8/2015

Page No : 2

Armstrong Blvd NW and Bunker Lake Blvd  
Ramsey, MN

## Groups Printed- Cars + - Trucks

Start Time	Armstrong Blvd NW Southbound						Bunker Lake Blvd Westbound						Armstrong Blvd NW Northbound						Bunker Lake Blvd Eastbound						Int. Total
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	
02:00 PM	0	10	30	0	0	40	0	5	0	18	0	23	0	0	40	3	0	43	0	0	0	0	0	0	106
02:15 PM	0	11	31	0	0	42	0	6	0	13	0	19	0	0	45	10	0	55	0	0	0	1	0	1	117
02:30 PM	0	8	39	0	0	47	0	4	0	28	0	32	0	1	41	5	0	47	0	1	0	0	0	1	127
02:45 PM	0	13	19	0	0	32	0	4	3	26	0	33	0	0	58	5	0	63	0	0	0	0	0	0	128
Total	0	42	119	0	0	161	0	19	3	85	0	107	0	1	184	23	0	208	0	1	0	1	0	2	478
03:00 PM	0	13	23	0	0	36	0	7	0	49	0	56	0	0	50	7	0	57	0	0	0	0	0	0	149
03:15 PM	0	9	33	0	0	42	0	5	1	38	0	44	0	0	49	3	0	52	0	0	0	0	0	0	138
03:30 PM	0	13	34	0	3	50	0	16	1	46	0	63	0	0	53	5	0	58	0	0	0	0	2	2	173
03:45 PM	0	15	36	0	0	51	0	6	0	37	0	43	2	0	63	5	0	70	0	0	0	0	0	0	164
Total	0	50	126	0	3	179	0	34	2	170	0	206	2	0	215	20	0	237	0	0	0	0	2	2	624
04:00 PM	0	17	27	0	0	44	0	5	0	45	1	51	0	0	65	4	0	69	0	0	1	0	0	1	165
04:15 PM	0	12	37	0	0	49	0	14	0	50	0	64	0	0	80	2	1	83	0	0	0	0	1	1	197
04:30 PM	0	15	43	0	1	59	0	17	0	77	2	96	1	0	90	6	0	97	0	0	0	1	1	2	254
04:45 PM	0	14	38	0	1	53	0	8	2	39	1	50	0	0	82	5	2	89	0	0	0	0	2	2	194
Total	0	58	145	0	2	205	0	44	2	211	4	261	1	0	317	17	3	338	0	0	1	1	4	6	810
05:00 PM	0	9	31	1	0	41	0	7	1	56	0	64	0	0	86	4	0	90	0	0	0	0	0	0	195
05:15 PM	0	8	32	0	0	40	0	9	2	27	2	40	0	0	87	7	0	94	0	0	0	0	0	0	174
05:30 PM	0	14	43	0	1	58	0	4	0	42	0	46	0	0	81	3	1	85	0	0	0	0	1	1	190
05:45 PM	1	14	33	0	0	48	0	1	2	20	0	23	0	1	77	5	1	84	0	1	0	0	0	1	156
Total	1	45	139	1	1	187	0	21	5	145	2	173	0	1	331	19	2	353	0	1	0	0	1	2	715
06:00 PM	0	10	28	0	2	40	0	5	1	33	2	41	0	0	68	3	1	72	0	0	1	0	1	2	155
06:15 PM	0	13	33	1	1	48	0	5	0	24	2	31	0	0	56	3	6	65	0	0	0	0	5	5	149
06:30 PM	0	9	36	0	0	45	0	4	0	17	0	21	0	0	37	4	0	41	0	0	0	0	0	0	107
06:45 PM	0	9	38	0	0	47	0	1	0	17	0	18	0	0	58	2	0	60	0	0	1	0	0	1	126
Total	0	41	135	1	3	180	0	15	1	91	4	111	0	0	219	12	7	238	0	0	2	0	6	8	537
Grand Total	2	832	2027	4	14	2879	2	244	22	1007	20	1295	6	10	1876	176	16	2084	0	2	12	11	15	40	6298
Apprch %	0.1	28.9	70.4	0.1	0.5		0.2	18.8	1.7	77.8	1.5		0.3	0.5	90	8.4	0.8		0	5	30	27.5	37.5		
Total %	0	13.2	32.2	0.1	0.2	45.7	0	3.9	0.3	16	0.3	20.6	0.1	0.2	29.8	2.8	0.3	33.1	0	0	0.2	0.2	0.2	0.6	
Cars +	2	807	1984	4	13	2810	2	231	21	972	15	1241	6	10	1838	168	13	2035	0	2	12	11	9	34	6120
% Cars +	100	97	97.9	100	92.9	97.6	100	94.7	95.5	96.5	75	95.8	100	100	98	95.5	81.2	97.6	0	100	100	100	60	85	97.2
Trucks	0	25	43	0	1	69	0	13	1	35	5	54	0	0	38	8	3	49	0	0	0	0	6	6	178
% Trucks	0	3	2.1	0	7.1	2.4	0	5.3	4.5	3.5	25	4.2	0	0	2	4.5	18.8	2.4	0	0	0	0	40	15	2.8



# Traffic Data Inc

PO Box 16296  
St. Louis Park, MN 55416

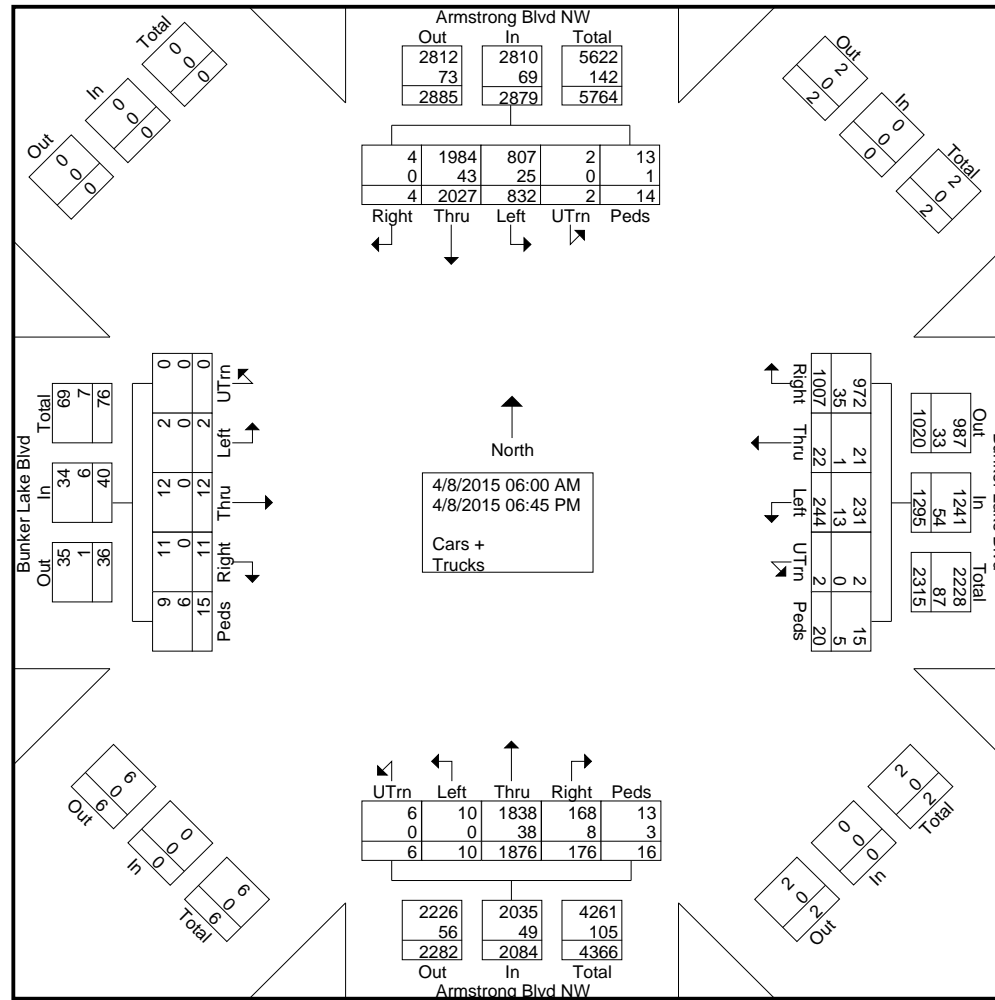
File Name : 3 - Armstrong Blvd NW & Bunker Lake Blvd, 4-8-15, 6am-7pm

Site Code : 3

Start Date : 4/8/2015

Page No : 3

Armstrong Blvd NW and Bunker Lake Blvd  
Ramsey, MN





# Traffic Data Inc

PO Box 16296  
St. Louis Park, MN 55416

File Name : 3 - Armstrong Blvd NW & Bunker Lake Blvd, 4-8-15, 6am-7pm

Site Code : 3

Start Date : 4/8/2015

Page No : 4

## Armstrong Blvd NW and Bunker Lake Blvd Ramsey, MN

Start Time	Armstrong Blvd NW Southbound						Bunker Lake Blvd Westbound					Armstrong Blvd NW Northbound						Bunker Lake Blvd Eastbound					Int. Total			
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right		Peds	App. Total	
Peak Hour Analysis From 06:00 AM to 09:45 AM - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 07:00 AM																										
07:00 AM	0	42	66	0	0	108	0	3	0	7	0	10	0	0	7	1	0	8	0	0	0	0	0	0	0	126
07:15 AM	0	50	66	0	0	116	0	4	0	7	0	11	0	0	5	2	0	7	0	0	1	0	0	0	1	135
07:30 AM	0	71	74	0	0	145	0	7	1	6	0	14	0	0	10	7	0	17	0	0	1	1	0	0	2	178
07:45 AM	0	48	52	0	0	100	0	6	0	7	0	13	0	0	15	7	0	22	0	0	1	0	0	0	1	136
Total Volume	0	211	258	0	0	469	0	20	1	27	0	48	0	0	37	17	0	54	0	0	3	1	0	0	4	575
% App. Total	0	45	55	0	0		0	41.7	2.1	56.2	0		0	0	68.5	31.5	0		0	0	75	25	0			
PHF	.000	.743	.872	.000	.000	.809	.000	.714	.250	.964	.000	.857	.000	.000	.617	.607	.000	.614	.000	.000	.750	.250	.000	.500	.808	
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 11:00 AM																										
11:00 AM	0	11	38	0	1	50	1	4	0	11	1	17	0	0	27	2	1	30	0	0	0	0	1	1	1	98
11:15 AM	0	13	29	0	0	42	0	5	1	12	1	19	0	0	28	2	0	30	0	0	0	1	0	0	1	92
11:30 AM	0	6	34	0	0	40	0	7	0	15	0	22	0	1	32	2	0	35	0	0	0	0	0	0	0	97
11:45 AM	0	3	37	0	0	40	0	3	0	11	1	15	0	0	36	3	0	39	0	0	0	0	0	0	0	94
Total Volume	0	33	138	0	1	172	1	19	1	49	3	73	0	1	123	9	1	134	0	0	0	1	1	1	2	381
% App. Total	0	19.2	80.2	0	0.6		1.4	26	1.4	67.1	4.1		0	0.7	91.8	6.7	0.7		0	0	0	50	50			
PHF	.000	.635	.908	.000	.250	.860	.250	.679	.250	.817	.750	.830	.000	.250	.854	.750	.250	.859	.000	.000	.000	.250	.250	.500	.972	
Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 04:15 PM																										
04:15 PM	0	12	37	0	0	49	0	14	0	50	0	64	0	0	80	2	1	83	0	0	0	0	1	1	1	197
04:30 PM	0	15	43	0	1	59	0	17	0	77	2	96	1	0	90	6	0	97	0	0	0	1	1	1	2	254
04:45 PM	0	14	38	0	1	53	0	8	2	39	1	50	0	0	82	5	2	89	0	0	0	0	2	2	2	194
05:00 PM	0	9	31	1	0	41	0	7	1	56	0	64	0	0	86	4	0	90	0	0	0	0	0	0	0	195
Total Volume	0	50	149	1	2	202	0	46	3	222	3	274	1	0	338	17	3	359	0	0	0	1	4	5	840	
% App. Total	0	24.8	73.8	0.5	1		0	16.8	1.1	81	1.1		0.3	0	94.2	4.7	0.8		0	0	0	20	80			
PHF	.000	.833	.866	.250	.500	.856	.000	.676	.375	.721	.375	.714	.250	.000	.939	.708	.375	.925	.000	.000	.000	.250	.500	.625	.827	



# Traffic Data Inc

PO Box 16296  
St. Louis Park, MN 55416

File Name : 4 - Armstrong Blvd NW & 147th Ave NW, 4-8-15, 6am-7pm

Site Code : 4

Start Date : 4/8/2015

Page No : 1

Armstrong Blvd NW and 147th Ave NW  
Ramsey, MN

Groups Printed- Cars + - Trucks

Start Time	Armstrong Blvd NW Southbound						147th Ave NW Westbound						Armstrong Blvd NW Northbound						147th Ave NW Eastbound						Int. Total
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	
06:00 AM	0	10	53	0	0	63	0	3	0	1	0	4	0	0	7	7	0	14	0	0	0	0	0	0	81
06:15 AM	0	10	51	0	0	61	0	6	0	1	1	8	0	0	12	9	0	21	0	0	0	0	0	0	90
06:30 AM	0	8	61	1	0	70	0	8	1	0	0	9	0	1	9	13	0	23	0	0	1	0	0	1	103
06:45 AM	0	13	50	0	0	63	0	8	1	1	0	10	0	3	7	14	0	24	0	0	0	0	0	0	97
Total	0	41	215	1	0	257	0	25	2	3	1	31	0	4	35	43	0	82	0	0	1	0	0	1	371
07:00 AM	0	13	57	0	0	70	0	4	0	2	0	6	0	2	6	8	0	16	0	0	0	0	0	0	92
07:15 AM	0	29	43	0	0	72	0	6	0	1	0	7	0	0	6	26	0	32	0	0	0	0	0	0	111
07:30 AM	0	20	60	0	0	80	0	18	0	4	0	22	0	1	12	27	0	40	0	0	1	2	0	3	145
07:45 AM	1	17	39	1	0	58	0	7	0	3	0	10	0	1	18	22	0	41	0	0	0	0	0	0	109
Total	1	79	199	1	0	280	0	35	0	10	0	45	0	4	42	83	0	129	0	0	1	2	0	3	457
08:00 AM	0	13	45	4	0	62	0	7	1	4	0	12	0	0	9	17	0	26	0	0	1	0	0	1	101
08:15 AM	0	9	37	1	0	47	0	7	1	5	0	13	0	1	20	16	0	37	0	0	0	2	0	2	99
08:30 AM	0	14	42	0	0	56	0	8	0	5	0	13	0	0	8	12	0	20	0	1	0	1	0	2	91
08:45 AM	0	13	38	0	0	51	0	7	1	6	0	14	0	2	8	20	0	30	0	0	1	0	0	1	96
Total	0	49	162	5	0	216	0	29	3	20	0	52	0	3	45	65	0	113	0	1	2	3	0	6	387
09:00 AM	0	14	34	1	0	49	0	5	0	4	0	9	0	2	12	6	0	20	0	1	0	2	0	3	81
09:15 AM	0	10	36	0	0	46	0	4	0	7	0	11	0	0	13	17	0	30	0	0	0	1	0	1	88
09:30 AM	0	6	35	1	0	42	0	15	0	9	0	24	0	0	11	19	0	30	0	0	0	4	0	4	100
09:45 AM	0	7	26	0	0	33	0	10	0	7	0	17	0	1	22	12	0	35	0	0	0	0	0	0	85
Total	0	37	131	2	0	170	0	34	0	27	0	61	0	3	58	54	0	115	0	1	0	7	0	8	354
10:00 AM	0	13	25	1	0	39	0	6	0	5	0	11	0	0	14	19	0	33	0	0	0	0	0	0	83
10:15 AM	0	3	24	0	0	27	0	12	2	7	0	21	0	0	19	17	0	36	0	0	2	1	0	3	87
10:30 AM	0	12	24	0	0	36	0	13	1	6	0	20	0	0	17	12	0	29	0	0	0	0	0	0	85
10:45 AM	0	9	26	0	0	35	0	15	1	0	0	16	0	0	14	17	0	31	0	0	0	1	0	1	83
Total	0	37	99	1	0	137	0	46	4	18	0	68	0	0	64	65	0	129	0	0	2	2	0	4	338
11:00 AM	0	16	27	0	0	43	0	10	2	9	1	22	0	0	20	22	0	42	0	0	0	0	0	0	107
11:15 AM	0	10	26	0	0	36	0	10	1	10	1	22	0	2	21	22	0	45	0	0	3	0	0	3	106
11:30 AM	1	14	24	1	0	40	0	10	1	12	0	23	0	2	19	20	0	41	0	0	1	2	0	3	107
11:45 AM	0	14	21	1	0	36	0	17	0	9	0	26	0	1	29	27	0	57	0	1	0	1	0	2	121
Total	1	54	98	2	0	155	0	47	4	40	2	93	0	5	89	91	0	185	0	1	4	3	0	8	441
12:00 PM	0	12	23	1	0	36	0	15	0	8	0	23	0	1	22	27	0	50	0	1	0	2	0	3	112
12:15 PM	0	6	26	0	0	32	0	16	0	8	0	24	0	1	20	24	0	45	0	0	1	1	0	2	103
12:30 PM	0	14	24	0	0	38	0	17	1	8	0	26	0	0	16	21	0	37	0	0	0	0	0	0	101
12:45 PM	0	10	23	0	0	33	0	14	1	10	0	25	0	0	28	23	0	51	0	0	0	2	0	2	111
Total	0	42	96	1	0	139	0	62	2	34	0	98	0	2	86	95	0	183	0	1	1	5	0	7	427
01:00 PM	0	7	24	1	0	32	1	12	0	7	0	20	0	0	25	16	0	41	0	0	0	0	0	0	93
01:15 PM	0	14	18	1	0	33	0	8	0	9	0	17	0	2	23	21	0	46	0	1	0	1	0	2	98
01:30 PM	0	7	23	0	0	30	0	14	0	12	0	26	0	0	21	25	0	46	0	0	0	1	0	1	103
01:45 PM	0	12	22	0	0	34	0	22	0	16	1	39	0	0	18	35	0	53	0	0	2	1	0	3	129
Total	0	40	87	2	0	129	1	56	0	44	1	102	0	2	87	97	0	186	0	1	2	3	0	6	423



# Traffic Data Inc

PO Box 16296  
St. Louis Park, MN 55416

File Name : 4 - Armstrong Blvd NW & 147th Ave NW, 4-8-15, 6am-7pm

Site Code : 4

Start Date : 4/8/2015

Page No : 2

Armstrong Blvd NW and 147th Ave NW  
Ramsey, MN

### Groups Printed- Cars + - Trucks

Start Time	Armstrong Blvd NW Southbound						147th Ave NW Westbound						Armstrong Blvd NW Northbound						147th Ave NW Eastbound						Int. Total
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	
02:00 PM	0	8	26	0	0	34	0	17	1	13	0	31	0	2	29	26	0	57	0	0	0	2	0	2	124
02:15 PM	0	13	25	1	0	39	0	9	1	15	0	25	0	0	44	26	0	70	0	0	0	0	0	0	134
02:30 PM	0	12	31	0	0	43	0	13	0	7	0	20	0	1	37	28	0	66	0	0	0	0	0	0	129
02:45 PM	0	8	13	1	0	22	0	10	0	18	0	28	0	0	45	27	0	72	0	1	0	0	0	1	123
Total	0	41	95	2	0	138	0	49	2	53	0	104	0	3	155	107	0	265	0	1	0	2	0	3	510
03:00 PM	0	4	26	0	0	30	0	20	0	16	0	36	0	0	42	37	0	79	0	1	0	0	0	1	146
03:15 PM	0	12	25	0	0	37	0	19	0	12	0	31	0	1	37	28	0	66	0	1	0	1	0	2	136
03:30 PM	0	20	31	1	2	54	0	13	1	12	0	26	0	1	50	29	0	80	0	0	1	0	0	1	161
03:45 PM	0	15	27	0	0	42	0	20	0	20	0	40	0	0	50	34	0	84	0	0	0	1	0	1	167
Total	0	51	109	1	2	163	0	72	1	60	0	133	0	2	179	128	0	309	0	2	1	2	0	5	610
04:00 PM	0	11	24	0	0	35	0	12	0	22	0	34	0	2	49	28	0	79	0	0	0	1	0	1	149
04:15 PM	0	13	36	0	0	49	0	29	0	28	0	57	0	0	55	31	0	86	0	0	0	1	1	2	194
04:30 PM	0	11	49	1	1	62	0	26	0	30	1	57	0	1	70	25	0	96	0	3	0	0	0	3	218
04:45 PM	0	9	40	0	0	49	0	24	0	19	2	45	0	0	61	36	0	97	0	0	0	0	0	0	191
Total	0	44	149	1	1	195	0	91	0	99	3	193	0	3	235	120	0	358	0	3	0	2	1	6	752
05:00 PM	0	11	27	0	0	38	0	25	0	19	0	44	0	2	68	27	0	97	0	0	0	4	0	4	183
05:15 PM	0	11	31	0	2	44	0	15	0	28	0	43	0	2	71	41	0	114	0	1	0	2	0	3	204
05:30 PM	1	17	27	0	0	45	0	21	0	22	0	43	0	0	59	28	0	87	0	0	0	0	0	0	175
05:45 PM	0	10	26	0	0	36	0	16	0	26	1	43	0	0	51	38	0	89	0	1	0	3	0	4	172
Total	1	49	111	0	2	163	0	77	0	95	1	173	0	4	249	134	0	387	0	2	0	9	0	11	734
06:00 PM	0	9	22	0	0	31	0	20	0	18	1	39	0	0	59	35	0	94	0	0	0	0	0	0	164
06:15 PM	0	14	27	0	0	41	0	20	0	21	1	42	0	0	38	27	0	65	0	0	0	0	5	5	153
06:30 PM	0	10	30	0	0	40	0	14	0	10	1	25	0	0	28	23	0	51	0	0	0	0	0	0	116
06:45 PM	0	13	26	0	0	39	0	10	0	19	0	29	0	0	46	19	0	65	0	0	0	0	0	0	133
Total	0	46	105	0	0	151	0	64	0	68	3	135	0	0	171	104	0	275	0	0	0	0	5	5	566
Grand Total	3	610	1656	19	5	2293	1	687	18	571	11	1288	0	35	1495	1186	0	2716	0	13	14	40	6	73	6370
Apprch %	0.1	26.6	72.2	0.8	0.2		0.1	53.3	1.4	44.3	0.9		0	1.3	55	43.7	0		0	17.8	19.2	54.8	8.2		
Total %	0	9.6	26	0.3	0.1	36	0	10.8	0.3	9	0.2	20.2	0	0.5	23.5	18.6	0	42.6	0	0.2	0.2	0.6	0.1	1.1	
Cars +	3	605	1619	15	2	2244	1	672	17	568	8	1266	0	31	1449	1167	0	2647	0	11	14	36	1	62	6219
% Cars +	100	99.2	97.8	78.9	40	97.9	100	97.8	94.4	99.5	72.7	98.3	0	88.6	96.9	98.4	0	97.5	0	84.6	100	90	16.7	84.9	97.6
Trucks	0	5	37	4	3	49	0	15	1	3	3	22	0	4	46	19	0	69	0	2	0	4	5	11	151
% Trucks	0	0.8	2.2	21.1	60	2.1	0	2.2	5.6	0.5	27.3	1.7	0	11.4	3.1	1.6	0	2.5	0	15.4	0	10	83.3	15.1	2.4



# Traffic Data Inc

PO Box 16296  
St. Louis Park, MN 55416

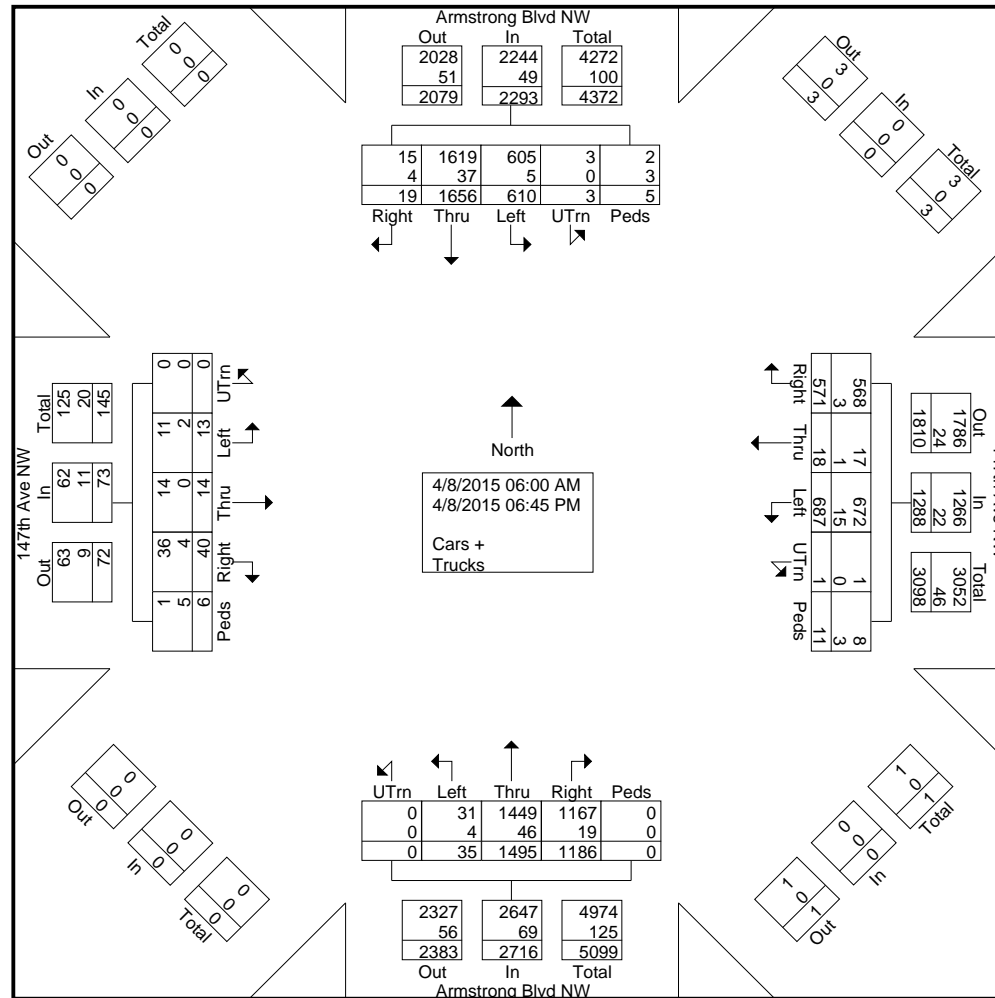
File Name : 4 - Armstrong Blvd NW & 147th Ave NW, 4-8-15, 6am-7pm

Site Code : 4

Start Date : 4/8/2015

Page No : 3

Armstrong Blvd NW and 147th Ave NW  
Ramsey, MN





# Traffic Data Inc

PO Box 16296  
St. Louis Park, MN 55416

File Name : 4 - Armstrong Blvd NW & 147th Ave NW, 4-8-15, 6am-7pm

Site Code : 4

Start Date : 4/8/2015

Page No : 4

Armstrong Blvd NW and 147th Ave NW  
Ramsey, MN

Start Time	Armstrong Blvd NW Southbound						147th Ave NW Westbound					Armstrong Blvd NW Northbound					147th Ave NW Eastbound					Int. Total				
	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru	Right	Peds	App. Total	UTrn	Left	Thru		Right	Peds	App. Total	
Peak Hour Analysis From 06:00 AM to 09:45 AM - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 07:15 AM																										
07:15 AM	0	29	43	0	0	72	0	6	0	1	0	7	0	0	6	26	0	32	0	0	0	0	0	0	0	111
07:30 AM	0	20	60	0	0	80	0	18	0	4	0	22	0	1	12	27	0	40	0	0	1	2	0	0	3	145
07:45 AM	1	17	39	1	0	58	0	7	0	3	0	10	0	1	18	22	0	41	0	0	0	0	0	0	109	
08:00 AM	0	13	45	4	0	62	0	7	1	4	0	12	0	0	9	17	0	26	0	0	1	0	0	0	1	101
Total Volume	1	79	187	5	0	272	0	38	1	12	0	51	0	2	45	92	0	139	0	0	2	2	0	0	4	466
% App. Total	0.4	29	68.8	1.8	0		0	74.5	2	23.5	0		0	1.4	32.4	66.2	0		0	0	50	50	0			
PHF	.250	.681	.779	.313	.000	.850	.000	.528	.250	.750	.000	.580	.000	.500	.625	.852	.000	.848	.000	.000	.500	.250	.000		.333	.803
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 11:15 AM																										
11:15 AM	0	10	26	0	0	36	0	10	1	10	1	22	0	2	21	22	0	45	0	0	3	0	0	0	3	106
11:30 AM	1	14	24	1	0	40	0	10	1	12	0	23	0	2	19	20	0	41	0	0	1	2	0	0	3	107
11:45 AM	0	14	21	1	0	36	0	17	0	9	0	26	0	1	29	27	0	57	0	1	0	1	0	0	2	121
12:00 PM	0	12	23	1	0	36	0	15	0	8	0	23	0	1	22	27	0	50	0	1	0	2	0	0	3	112
Total Volume	1	50	94	3	0	148	0	52	2	39	1	94	0	6	91	96	0	193	0	2	4	5	0	0	11	446
% App. Total	0.7	33.8	63.5	2	0		0	55.3	2.1	41.5	1.1		0	3.1	47.2	49.7	0		0	18.2	36.4	45.5	0			
PHF	.250	.893	.904	.750	.000	.925	.000	.765	.500	.813	.250	.904	.000	.750	.784	.889	.000	.846	.000	.500	.333	.625	.000		.917	.921
Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 04:30 PM																										
04:30 PM	0	11	49	1	1	62	0	26	0	30	1	57	0	1	70	25	0	96	0	3	0	0	0	0	3	218
04:45 PM	0	9	40	0	0	49	0	24	0	19	2	45	0	0	61	36	0	97	0	0	0	0	0	0	0	191
05:00 PM	0	11	27	0	0	38	0	25	0	19	0	44	0	2	68	27	0	97	0	0	0	4	0	0	4	183
05:15 PM	0	11	31	0	2	44	0	15	0	28	0	43	0	2	71	41	0	114	0	1	0	2	0	0	3	204
Total Volume	0	42	147	1	3	193	0	90	0	96	3	189	0	5	270	129	0	404	0	4	0	6	0	0	10	796
% App. Total	0	21.8	76.2	0.5	1.6		0	47.6	0	50.8	1.6		0	1.2	66.8	31.9	0		0	40	0	60	0			
PHF	.000	.955	.750	.250	.375	.778	.000	.865	.000	.800	.375	.829	.000	.625	.951	.787	.000	.886	.000	.333	.000	.375	.000		.625	.913



## APPENDIX C- CRASH REPORTS



# Crash Detail Report

Alpine St & Armstrong (2010-2015)

Report Version 1.0 March 2010

<b>Crash ID:</b> 102370213	<b>Date:</b> 08/25/2010	<b>Time:</b> 1806	<b>Sys:</b> 04-CSAH
<b>County:</b> ANOKA	<b>City:</b> RAMSEY		<b>Route:</b> 02000083 001+00.001

<b>Severity:</b> PROPERTY DAMAGE <b>Road Type:</b> 2 LANES UNDIV 2_WAY <b>Road Char:</b> STRAIGHT AND LEVEL <b>Crash Type:</b> COLL W/MV IN TRANSPORT <b>Surf Cond:</b> DRY <b>Light Cond:</b> DAYLIGHT <b>Weather 1:</b> CLEAR <b>Weather 2:</b> CLEAR	<b>First Event:</b> ON ROADWAY <b>To Junction:</b> INTERSECTION-RELATED <b>Traffic Device:</b> STOP SIGN OTHER <b>Speed Limit:</b> 55 <b>Diagram:</b> OTHER <b>Officer:</b> <b>Reliability:</b> CONFIDENT <b># of Vehicles:</b> 2.00
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<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th style="background-color: #cccccc;">Unit 1</th></tr> <tr><td>Trav Dir: W</td></tr> <tr><td>Veh Act: STRAIGHT AHEAD</td></tr> <tr><td>Veh Type: PASSENGER CAR</td></tr> <tr><td>Age: 44</td></tr> <tr><td>Gender: M</td></tr> <tr><td>Cond: NORMAL</td></tr> <tr><td>Cont Fact: FAIL TO YIELD ROW</td></tr> <tr><td>Cont Fact: DISREGARD TRAFFIC DEVICE</td></tr> </table>	Unit 1	Trav Dir: W	Veh Act: STRAIGHT AHEAD	Veh Type: PASSENGER CAR	Age: 44	Gender: M	Cond: NORMAL	Cont Fact: FAIL TO YIELD ROW	Cont Fact: DISREGARD TRAFFIC DEVICE	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th style="background-color: #cccccc;">Unit 2</th></tr> <tr><td>Trav Dir: N</td></tr> <tr><td>Veh Act: STRAIGHT AHEAD</td></tr> <tr><td>Veh Type: VAN OR MINIVAN</td></tr> <tr><td>Age: 27</td></tr> <tr><td>Gender: M</td></tr> <tr><td>Cond: NORMAL</td></tr> <tr><td>Cont Fact: NO IMPROPER DRIVING</td></tr> <tr><td>Cont Fact: UNKNOWN</td></tr> </table>	Unit 2	Trav Dir: N	Veh Act: STRAIGHT AHEAD	Veh Type: VAN OR MINIVAN	Age: 27	Gender: M	Cond: NORMAL	Cont Fact: NO IMPROPER DRIVING	Cont Fact: UNKNOWN	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th style="background-color: #cccccc;">Unit 3</th></tr> <tr><td> </td></tr> </table>	Unit 3	
Unit 1																						
Trav Dir: W																						
Veh Act: STRAIGHT AHEAD																						
Veh Type: PASSENGER CAR																						
Age: 44																						
Gender: M																						
Cond: NORMAL																						
Cont Fact: FAIL TO YIELD ROW																						
Cont Fact: DISREGARD TRAFFIC DEVICE																						
Unit 2																						
Trav Dir: N																						
Veh Act: STRAIGHT AHEAD																						
Veh Type: VAN OR MINIVAN																						
Age: 27																						
Gender: M																						
Cond: NORMAL																						
Cont Fact: NO IMPROPER DRIVING																						
Cont Fact: UNKNOWN																						
Unit 3																						

<b>Crash ID:</b> 102370225	<b>Date:</b> 08/25/2010	<b>Time:</b> 1942	<b>Sys:</b> 04-CSAH
<b>County:</b> ANOKA	<b>City:</b> RAMSEY		<b>Route:</b> 02000083 001+00.001

<b>Severity:</b> PROPERTY DAMAGE <b>Road Type:</b> 2 LANES UNDIV 2_WAY <b>Road Char:</b> STRAIGHT AND LEVEL <b>Crash Type:</b> COLL W/MV IN TRANSPORT <b>Surf Cond:</b> DRY <b>Light Cond:</b> DAYLIGHT <b>Weather 1:</b> CLEAR <b>Weather 2:</b> NOT SPECIFIED	<b>First Event:</b> ON ROADWAY <b>To Junction:</b> 4-LEGGED INTERSECTION <b>Traffic Device:</b> STOP SIGN OTHER <b>Speed Limit:</b> 55 <b>Diagram:</b> REAR END <b>Officer:</b> <b>Reliability:</b> CONFIDENT <b># of Vehicles:</b> 2.00
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<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th style="background-color: #cccccc;">Unit 1</th></tr> <tr><td>Trav Dir: N</td></tr> <tr><td>Veh Act: STRAIGHT AHEAD</td></tr> <tr><td>Veh Type: PASSENGER CAR</td></tr> <tr><td>Age: 17</td></tr> <tr><td>Gender: F</td></tr> <tr><td>Cond: NORMAL</td></tr> <tr><td>Cont Fact: IMPROPER PASSING</td></tr> <tr><td>Cont Fact: NOT SPECIFIED</td></tr> </table>	Unit 1	Trav Dir: N	Veh Act: STRAIGHT AHEAD	Veh Type: PASSENGER CAR	Age: 17	Gender: F	Cond: NORMAL	Cont Fact: IMPROPER PASSING	Cont Fact: NOT SPECIFIED	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th style="background-color: #cccccc;">Unit 2</th></tr> <tr><td>Trav Dir: N</td></tr> <tr><td>Veh Act: LEFT TURN</td></tr> <tr><td>Veh Type: PASSENGER CAR</td></tr> <tr><td>Age: 22</td></tr> <tr><td>Gender: M</td></tr> <tr><td>Cond: NORMAL</td></tr> <tr><td>Cont Fact: OTHER</td></tr> <tr><td>Cont Fact: NOT SPECIFIED</td></tr> </table>	Unit 2	Trav Dir: N	Veh Act: LEFT TURN	Veh Type: PASSENGER CAR	Age: 22	Gender: M	Cond: NORMAL	Cont Fact: OTHER	Cont Fact: NOT SPECIFIED	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th style="background-color: #cccccc;">Unit 3</th></tr> <tr><td> </td></tr> </table>	Unit 3	
Unit 1																						
Trav Dir: N																						
Veh Act: STRAIGHT AHEAD																						
Veh Type: PASSENGER CAR																						
Age: 17																						
Gender: F																						
Cond: NORMAL																						
Cont Fact: IMPROPER PASSING																						
Cont Fact: NOT SPECIFIED																						
Unit 2																						
Trav Dir: N																						
Veh Act: LEFT TURN																						
Veh Type: PASSENGER CAR																						
Age: 22																						
Gender: M																						
Cond: NORMAL																						
Cont Fact: OTHER																						
Cont Fact: NOT SPECIFIED																						
Unit 3																						

**Crash ID:** 102800070      **Date:** 10/01/2010      **Time:** 1402  
**County:** ANOKA      **City:** RAMSEY

**Sys:** 04-CSAH  
**Route:** 02000083      001+00.001

<b>Severity:</b> PROPERTY DAMAGE	<b>First Event:</b> ON ROADWAY
<b>Road Type:</b> 2 LANES UNDIV 2_WAY	<b>To Junction:</b> 4-LEGGED INTERSECTION
<b>Road Char:</b> STRAIGHT AND LEVEL	<b>Traffic Device:</b> STOP SIGN OTHER
<b>Crash Type:</b> COLL W/MV IN TRANSPORT	<b>Speed Limit:</b> 55
<b>Surf Cond:</b> DRY	<b>Diagram:</b> RIGHT ANGLE
<b>Light Cond:</b> DAYLIGHT	<b>Officer:</b>
<b>Weather 1:</b> CLEAR	<b>Reliability:</b> CONFIDENT
<b>Weather 2:</b> NOT SPECIFIED	<b># of Vehicles:</b> 2.00

	Unit 1	Unit 2	Unit 3
<b>Trav Dir:</b>	W	S	
<b>Veh Act:</b>	START TRAFFIC	STRAIGHT AHEAD	
<b>Veh Type:</b>	PASSENGER CAR	PASSENGER CAR	
<b>Age:</b>	50	37	
<b>Gender:</b>	M	F	
<b>Cond:</b>	NORMAL	NORMAL	
<b>Cont Fact</b>	FAIL TO YIELD ROW	NO IMPROPER DRIVING	
<b>Cont Fact</b>	NOT SPECIFIED	NOT SPECIFIED	

**Crash ID:** 102940180      **Date:** 10/21/2010      **Time:** 1624  
**County:** ANOKA      **City:** RAMSEY

**Sys:** 04-CSAH  
**Route:** 02000083      001+00.001

<b>Severity:</b> POSSIBLE INJURY	<b>First Event:</b> ON ROADWAY
<b>Road Type:</b> 2 LANES UNDIV 2_WAY	<b>To Junction:</b> 4-LEGGED INTERSECTION
<b>Road Char:</b> STRAIGHT AND LEVEL	<b>Traffic Device:</b> NOT APPLICABLE
<b>Crash Type:</b> COLL W/MV IN TRANSPORT	<b>Speed Limit:</b> 55
<b>Surf Cond:</b> DRY	<b>Diagram:</b> RIGHT ANGLE
<b>Light Cond:</b> DAYLIGHT	<b>Officer:</b>
<b>Weather 1:</b> CLEAR	<b>Reliability:</b> CONFIDENT
<b>Weather 2:</b> NOT SPECIFIED	<b># of Vehicles:</b> 2.00

	Unit 1	Unit 2	Unit 3
<b>Trav Dir:</b>	W	S	
<b>Veh Act:</b>	STRAIGHT AHEAD	STRAIGHT AHEAD	
<b>Veh Type:</b>	PASSENGER CAR	PASSENGER CAR	
<b>Age:</b>	27	23	
<b>Gender:</b>	M	F	
<b>Cond:</b>	NORMAL	NORMAL	
<b>Cont Fact</b>	FAIL TO YIELD ROW	NO IMPROPER DRIVING	
<b>Cont Fact</b>	NOT SPECIFIED	NOT SPECIFIED	

**Crash ID:** 110860009      **Date:** 03/26/2011      **Time:** 2233  
**County:** ANOKA      **City:** RAMSEY

**Sys:** 05-MSAS  
**Route:** 31480112      002+00.177

<b>Severity:</b> PROPERTY DAMAGE <b>Road Type:</b> 2 LANES UNDIV 2_WAY <b>Road Char:</b> STRAIGHT AND LEVEL <b>Crash Type:</b> COLL UNDERRIDE SIDE <b>Surf Cond:</b> ICE/PACKED SNOW <b>Light Cond:</b> DARK - UNKNOWN LIGHTING <b>Weather 1:</b> CLEAR <b>Weather 2:</b> NOT SPECIFIED	<b>First Event:</b> ON ROADWAY <b>To Junction:</b> NON-JUNCTION <b>Traffic Device:</b> NOT APPLICABLE <b>Speed Limit:</b> 45 <b>Diagram:</b> UNKNOWN <b>Officer:</b> <b>Reliability:</b> LESS CONFIDENT <b># of Vehicles:</b> 1.00
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<b>Unit 1</b> <b>Trav Dir:</b> EAST <b>Veh Act:</b> STRAIGHT AHEAD <b>Veh Type:</b> PICKUP TRUCK <b>Age:</b> 20 <b>Gender:</b> M <b>Cond:</b> NORMAL <b>Cont Fact:</b> WEATHER <b>Cont Fact:</b> NOT SPECIFIED	<b>Unit 2</b>	<b>Unit 3</b>
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**Crash ID:** 123020017      **Date:** 10/27/2012      **Time:** 2256  
**County:** ANOKA      **City:** RAMSEY

**Sys:** 04-CSAH  
**Route:** 02000083      001+00.001

<b>Severity:</b> PROPERTY DAMAGE <b>Road Type:</b> 2 LANES UNDIV 2_WAY <b>Road Char:</b> STRAIGHT AND LEVEL <b>Crash Type:</b> COLL W/MV IN TRANSPORT <b>Surf Cond:</b> DRY <b>Light Cond:</b> DARK - STREET LIGHTS ON <b>Weather 1:</b> CLEAR <b>Weather 2:</b> NOT SPECIFIED	<b>First Event:</b> ON ROADWAY <b>To Junction:</b> 4-LEGGED INTERSECTION <b>Traffic Device:</b> STOP SIGN OTHER <b>Speed Limit:</b> 55 <b>Diagram:</b> RIGHT ANGLE <b>Officer:</b> <b>Reliability:</b> CONFIDENT <b># of Vehicles:</b> 2.00
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<b>Unit 1</b> <b>Trav Dir:</b> S <b>Veh Act:</b> STRAIGHT AHEAD <b>Veh Type:</b> SPORT UTILITY VEHICLE <b>Age:</b> 54 <b>Gender:</b> F <b>Cond:</b> NORMAL <b>Cont Fact:</b> NO IMPROPER DRIVING <b>Cont Fact:</b> NOT SPECIFIED	<b>Unit 2</b> <b>Trav Dir:</b> W <b>Veh Act:</b> PED. FAIL TO YIELD R/W TO T <b>Veh Type:</b> PASSENGER CAR <b>Age:</b> 17 <b>Gender:</b> M <b>Cond:</b> NORMAL <b>Cont Fact:</b> DISTRACTION <b>Cont Fact:</b> FAIL TO YIELD ROW	<b>Unit 3</b>
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**Crash ID:** 130860106      **Date:** 03/27/2013      **Time:** 1404  
**County:** ANOKA      **City:** RAMSEY

**Sys:** 04-CSAH  
**Route:** 02000083      001+00.001

<b>Severity:</b> INCAPACITATING INJURY	<b>First Event:</b> ON ROADWAY
<b>Road Type:</b> 2 LANES UNDIV 2_WAY	<b>To Junction:</b> 4-LEGGED INTERSECTION
<b>Road Char:</b> STRAIGHT AND LEVEL	<b>Traffic Device:</b> NOT APPLICABLE
<b>Crash Type:</b> COLL W/MV IN TRANSPORT	<b>Speed Limit:</b> 55
<b>Surf Cond:</b> DRY	<b>Diagram:</b> REAR END
<b>Light Cond:</b> DAYLIGHT	<b>Officer:</b>
<b>Weather 1:</b> CLEAR	<b>Reliability:</b> CONFIDENT
<b>Weather 2:</b> NOT SPECIFIED	<b># of Vehicles:</b> 2.00

	Unit 1	Unit 2	Unit 3
<b>Trav Dir:</b>	S	S	
<b>Veh Act:</b>	LEFT TURN	STRAIGHT AHEAD	
<b>Veh Type:</b>	PASSENGER CAR	PASSENGER CAR	
<b>Age:</b>	20	21	
<b>Gender:</b>	M	M	
<b>Cond:</b>	UNKNOWN	NORMAL	
<b>Cont Fact</b>	NO IMPROPER DRIVING	FAIL TO YIELD ROW	
<b>Cont Fact</b>	NOT SPECIFIED	NOT SPECIFIED	

**Crash ID:** 131930115      **Date:** 07/12/2013      **Time:** 0906  
**County:** ANOKA      **City:** RAMSEY

**Sys:** 04-CSAH  
**Route:** 02000083      001+00.001

<b>Severity:</b> POSSIBLE INJURY	<b>First Event:</b> ON ROADWAY
<b>Road Type:</b> 2 LANES UNDIV 2_WAY	<b>To Junction:</b> INTERSECTION-RELATED
<b>Road Char:</b> STRAIGHT AND GRADE	<b>Traffic Device:</b> STOP SIGN OTHER
<b>Crash Type:</b> COLL W/MV IN TRANSPORT	<b>Speed Limit:</b> 55
<b>Surf Cond:</b> DRY	<b>Diagram:</b> RIGHT ANGLE
<b>Light Cond:</b> DAYLIGHT	<b>Officer:</b>
<b>Weather 1:</b> CLEAR	<b>Reliability:</b> CONFIDENT
<b>Weather 2:</b> NOT SPECIFIED	<b># of Vehicles:</b> 2.00

	Unit 1	Unit 2	Unit 3
<b>Trav Dir:</b>	W	S	
<b>Veh Act:</b>	STRAIGHT AHEAD	STRAIGHT AHEAD	
<b>Veh Type:</b>	PASSENGER CAR	SPORT UTILITY VEHICLE	
<b>Age:</b>	16	39	
<b>Gender:</b>	F	F	
<b>Cond:</b>	NORMAL	NORMAL	
<b>Cont Fact</b>	FAIL TO YIELD ROW	NO IMPROPER DRIVING	
<b>Cont Fact</b>	NOT SPECIFIED	NOT SPECIFIED	

**Crash ID:** 132210084      **Date:** 08/09/2013      **Time:** 1316  
**County:** ANOKA      **City:** RAMSEY

**Sys:** 04-CSAH  
**Route:** 02000083      001+00.001

<b>Severity:</b> PROPERTY DAMAGE	<b>First Event:</b> ON ROADWAY
<b>Road Type:</b> 2 LANES UNDIV 2_WAY	<b>To Junction:</b> 4-LEGGED INTERSECTION
<b>Road Char:</b> STRAIGHT AND LEVEL	<b>Traffic Device:</b> STOP SIGN OTHER
<b>Crash Type:</b> COLL W/MV IN TRANSPORT	<b>Speed Limit:</b> 55
<b>Surf Cond:</b> DRY	<b>Diagram:</b> RIGHT ANGLE
<b>Light Cond:</b> DAYLIGHT	<b>Officer:</b>
<b>Weather 1:</b> CLEAR	<b>Reliability:</b> CONFIDENT
<b>Weather 2:</b> NOT SPECIFIED	<b># of Vehicles:</b> 2.00

	Unit 1	Unit 2	Unit 3
<b>Trav Dir:</b>	N	W	
<b>Veh Act:</b>	00	PED. FAIL TO YIELD R/W TO T	
<b>Veh Type:</b>	VAN OR MINIVAN	SPORT UNTILITY VEHICLE	
<b>Age:</b>	47	70	
<b>Gender:</b>	F	M	
<b>Cond:</b>	NORMAL	NORMAL	
<b>Cont Fact</b>	NO IMPROPER DRIVING	FAIL TO YIELD ROW	
<b>Cont Fact</b>	NOT SPECIFIED	NOT SPECIFIED	

**Crash ID:** 140370338      **Date:** 02/05/2014      **Time:** 1818  
**County:** ANOKA      **City:** RAMSEY

**Sys:** 04-CSAH  
**Route:** 02000083      001+00.001

<b>Severity:</b> PROPERTY DAMAGE	<b>First Event:</b> ON ROADWAY
<b>Road Type:</b> 2 LANES UNDIV 2_WAY	<b>To Junction:</b> 4-LEGGED INTERSECTION
<b>Road Char:</b> STRAIGHT AND LEVEL	<b>Traffic Device:</b> STOP SIGN OTHER
<b>Crash Type:</b> COLL W/MV IN TRANSPORT	<b>Speed Limit:</b> 55
<b>Surf Cond:</b> ICE/PACKED SNOW	<b>Diagram:</b> RIGHT ANGLE
<b>Light Cond:</b> DARK - NO STREET LIGHTS	<b>Officer:</b>
<b>Weather 1:</b> CLEAR	<b>Reliability:</b> CONFIDENT
<b>Weather 2:</b> NOT SPECIFIED	<b># of Vehicles:</b> 2.00

	Unit 1	Unit 2	Unit 3
<b>Trav Dir:</b>	EAST	N	
<b>Veh Act:</b>	PED. FAIL TO YIELD R/W TO	STRAIGHT AHEAD	
<b>Veh Type:</b>	PASSENGER CAR	VAN OR MINIVAN	
<b>Age:</b>	49	50	
<b>Gender:</b>	F	F	
<b>Cond:</b>	NORMAL	NORMAL	
<b>Cont Fact</b>	FAIL TO YIELD ROW	NO IMPROPER DRIVING	
<b>Cont Fact</b>	NOT SPECIFIED	NOT SPECIFIED	

**Crash ID:** 141050144      **Date:** 04/15/2014      **Time:** 1639  
**County:** ANOKA      **City:** RAMSEY

**Sys:** 04-CSAH  
**Route:** 02000083      001+00.001

<b>Severity:</b> PROPERTY DAMAGE	<b>First Event:</b> ON ROADWAY
<b>Road Type:</b> 2 LANES UNDIV 2_WAY	<b>To Junction:</b> 4-LEGGED INTERSECTION
<b>Road Char:</b> STRAIGHT AND LEVEL	<b>Traffic Device:</b> STOP SIGN OTHER
<b>Crash Type:</b> COLL W/MV IN TRANSPORT	<b>Speed Limit:</b> 55
<b>Surf Cond:</b> DRY	<b>Diagram:</b> RIGHT ANGLE
<b>Light Cond:</b> DAYLIGHT	<b>Officer:</b>
<b>Weather 1:</b> CLEAR	<b>Reliability:</b> CONFIDENT
<b>Weather 2:</b> NOT SPECIFIED	<b># of Vehicles:</b> 2.00

	Unit 1	Unit 2	Unit 3
<b>Trav Dir:</b>	N	W	
<b>Veh Act:</b>	STRAIGHT AHEAD	STRAIGHT AHEAD	
<b>Veh Type:</b>	SPORT UTILITY VEHICLE	PASSENGER CAR	
<b>Age:</b>	32	32	
<b>Gender:</b>	F	F	
<b>Cond:</b>	NORMAL	NORMAL	
<b>Cont Fact</b>	NO IMPROPER DRIVING	FAIL TO YIELD ROW	
<b>Cont Fact</b>	NOT SPECIFIED	NOT SPECIFIED	

**Crash ID:** 141440014      **Date:** 05/22/2014      **Time:** 1806  
**County:** ANOKA      **City:** RAMSEY

**Sys:** 04-CSAH  
**Route:** 02000083      001+00.001

<b>Severity:</b> NON-INCAPACITATING INJURY	<b>First Event:</b> ON ROADWAY
<b>Road Type:</b> 2 LANES UNDIV 2_WAY	<b>To Junction:</b> 4-LEGGED INTERSECTION
<b>Road Char:</b> STRAIGHT AND GRADE	<b>Traffic Device:</b> NOT APPLICABLE
<b>Crash Type:</b> COLL W/MV IN TRANSPORT	<b>Speed Limit:</b> 55
<b>Surf Cond:</b> DRY	<b>Diagram:</b> LEFT TURN INTO TRAFFIC
<b>Light Cond:</b> DAYLIGHT	<b>Officer:</b>
<b>Weather 1:</b> CLEAR	<b>Reliability:</b> CONFIDENT
<b>Weather 2:</b> NOT SPECIFIED	<b># of Vehicles:</b> 2.00

	Unit 1	Unit 2	Unit 3
<b>Trav Dir:</b>	N	S	
<b>Veh Act:</b>	LEFT TURN	STRAIGHT AHEAD	
<b>Veh Type:</b>	PASSENGER CAR	PASSENGER CAR	
<b>Age:</b>	40	33	
<b>Gender:</b>	F	M	
<b>Cond:</b>	NORMAL	NORMAL	
<b>Cont Fact</b>	FAIL TO YIELD ROW	NO IMPROPER DRIVING	
<b>Cont Fact</b>	VISION OBSCURED - SUN OR H	NOT SPECIFIED	

**Crash ID:** 141980169      **Date:** 07/17/2014      **Time:** 1709  
**County:** ANOKA      **City:** RAMSEY

**Sys:** 04-CSAH  
**Route:** 02000083      001+00.001

<b>Severity:</b> POSSIBLE INJURY	<b>First Event:</b> ON ROADWAY
<b>Road Type:</b> 2 LANES UNDIV 2_WAY	<b>To Junction:</b> INTERSECTION-RELATED
<b>Road Char:</b> STRAIGHT AND LEVEL	<b>Traffic Device:</b> STOP SIGN OTHER
<b>Crash Type:</b> COLL W/MV IN TRANSPORT	<b>Speed Limit:</b> 55
<b>Surf Cond:</b> DRY	<b>Diagram:</b> SIDESWIPE OPPOSING
<b>Light Cond:</b> DAYLIGHT	<b>Officer:</b>
<b>Weather 1:</b> CLEAR	<b>Reliability:</b> CONFIDENT
<b>Weather 2:</b> NOT SPECIFIED	<b># of Vehicles:</b> 2.00

	Unit 1	Unit 2	Unit 3
<b>Trav Dir:</b>	W	N	
<b>Veh Act:</b>	PED. FAIL TO YIELD R/W TO	STRAIGHT AHEAD	
<b>Veh Type:</b>	SPORT UNTILITY VEHICLE	TRUCK W/ SEMI TRAILER	
<b>Age:</b>	37	60	
<b>Gender:</b>	F	M	
<b>Cond:</b>	NORMAL	NORMAL	
<b>Cont Fact</b>	FAIL TO YIELD ROW	NO IMPROPER DRIVING	
<b>Cont Fact</b>	NOT SPECIFIED	NOT SPECIFIED	

**Crash ID:** 143000098      **Date:** 10/27/2014      **Time:** 1150  
**County:** ANOKA      **City:** RAMSEY

**Sys:** 04-CSAH  
**Route:** 02000083      001+00.001

<b>Severity:</b> PROPERTY DAMAGE	<b>First Event:</b> ON ROADWAY
<b>Road Type:</b> 2 LANES UNDIV 2_WAY	<b>To Junction:</b> 4-LEGGED INTERSECTION
<b>Road Char:</b> STRAIGHT AND GRADE	<b>Traffic Device:</b> STOP SIGN OTHER
<b>Crash Type:</b> COLL W/MV IN TRANSPORT	<b>Speed Limit:</b> 55
<b>Surf Cond:</b> DRY	<b>Diagram:</b> RIGHT ANGLE
<b>Light Cond:</b> DAYLIGHT	<b>Officer:</b>
<b>Weather 1:</b> CLOUDY	<b>Reliability:</b> CONFIDENT
<b>Weather 2:</b> CLOUDY	<b># of Vehicles:</b> 2.00

	Unit 1	Unit 2	Unit 3
<b>Trav Dir:</b>	S	N	
<b>Veh Act:</b>	STRAIGHT AHEAD	LEFT TURN	
<b>Veh Type:</b>	PASSENGER CAR	TRUCK WITH 1 TRAILER	
<b>Age:</b>	25	30	
<b>Gender:</b>	F	M	
<b>Cond:</b>	NORMAL	NORMAL	
<b>Cont Fact</b>	NO IMPROPER DRIVING	FAIL TO YIELD ROW	
<b>Cont Fact</b>	NO IMPROPER DRIVING	DISTRACTION	

**Selection Filter:**

WORK AREA: COUNTY\_CODE('02') - FILTER: CRASH\_YEAR('2010','2011','2012','2013','2014','2015') - SPATIAL FILTER APPLIED

**Analyst:**

Jeremy Melquist

**Notes:**



# Crash Detail Report

Armstrong Blvd & 147th Ave (2010-2015)

Report Version 1.0 March 2010

<b>Crash ID:</b> 101570144	<b>Date:</b> 06/06/2010	<b>Time:</b> 1439	<b>Sys:</b> 04-CSAH
<b>County:</b> ANOKA	<b>City:</b> RAMSEY		<b>Route:</b> 02000083      000+00.137

<b>Severity:</b> PROPERTY DAMAGE <b>Road Type:</b> 2 LANES UNDIV 2_WAY <b>Road Char:</b> STRAIGHT AND LEVEL <b>Crash Type:</b> COLL W/MV IN TRANSPORT <b>Surf Cond:</b> WET <b>Light Cond:</b> DAYLIGHT <b>Weather 1:</b> RAIN <b>Weather 2:</b> CLOUDY	<b>First Event:</b> ON ROADWAY <b>To Junction:</b> NON-JUNCTION <b>Traffic Device:</b> NOT APPLICABLE <b>Speed Limit:</b> 55 <b>Diagram:</b> REAR END <b>Officer:</b> <b>Reliability:</b> CONFIDENT <b># of Vehicles:</b> 2.00
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<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th style="background-color: #cccccc;">Unit 1</th></tr> <tr><td>Trav Dir: S</td></tr> <tr><td>Veh Act: STRAIGHT AHEAD</td></tr> <tr><td>Veh Type: PASSENGER CAR</td></tr> <tr><td>Age: 24</td></tr> <tr><td>Gender: F</td></tr> <tr><td>Cond: NORMAL</td></tr> <tr><td>Cont Fact: NO IMPROPER DRIVING</td></tr> <tr><td>Cont Fact: NOT SPECIFIED</td></tr> </table>	Unit 1	Trav Dir: S	Veh Act: STRAIGHT AHEAD	Veh Type: PASSENGER CAR	Age: 24	Gender: F	Cond: NORMAL	Cont Fact: NO IMPROPER DRIVING	Cont Fact: NOT SPECIFIED	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th style="background-color: #cccccc;">Unit 2</th></tr> <tr><td>Trav Dir: S</td></tr> <tr><td>Veh Act: STRAIGHT AHEAD</td></tr> <tr><td>Veh Type: PASSENGER CAR</td></tr> <tr><td>Age: 53</td></tr> <tr><td>Gender: M</td></tr> <tr><td>Cond: UNDER THE INFLUENCE</td></tr> <tr><td>Cont Fact: CHEMICAL IMPAIRMENT</td></tr> <tr><td>Cont Fact: NOT SPECIFIED</td></tr> </table>	Unit 2	Trav Dir: S	Veh Act: STRAIGHT AHEAD	Veh Type: PASSENGER CAR	Age: 53	Gender: M	Cond: UNDER THE INFLUENCE	Cont Fact: CHEMICAL IMPAIRMENT	Cont Fact: NOT SPECIFIED	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th style="background-color: #cccccc;">Unit 3</th></tr> <tr><td> </td></tr> </table>	Unit 3	
Unit 1																						
Trav Dir: S																						
Veh Act: STRAIGHT AHEAD																						
Veh Type: PASSENGER CAR																						
Age: 24																						
Gender: F																						
Cond: NORMAL																						
Cont Fact: NO IMPROPER DRIVING																						
Cont Fact: NOT SPECIFIED																						
Unit 2																						
Trav Dir: S																						
Veh Act: STRAIGHT AHEAD																						
Veh Type: PASSENGER CAR																						
Age: 53																						
Gender: M																						
Cond: UNDER THE INFLUENCE																						
Cont Fact: CHEMICAL IMPAIRMENT																						
Cont Fact: NOT SPECIFIED																						
Unit 3																						

<b>Crash ID:</b> 102180091	<b>Date:</b> 08/06/2010	<b>Time:</b> 0904	<b>Sys:</b> 04-CSAH
<b>County:</b> ANOKA	<b>City:</b> RAMSEY		<b>Route:</b> 02000083      000+00.147

<b>Severity:</b> POSSIBLE INJURY <b>Road Type:</b> 2 LANES UNDIV 2_WAY <b>Road Char:</b> STRAIGHT AND LEVEL <b>Crash Type:</b> COLL W/MV IN TRANSPORT <b>Surf Cond:</b> DRY <b>Light Cond:</b> DAYLIGHT <b>Weather 1:</b> CLEAR <b>Weather 2:</b> NOT SPECIFIED	<b>First Event:</b> ON ROADWAY <b>To Junction:</b> 4-LEGGED INTERSECTION <b>Traffic Device:</b> NOT APPLICABLE <b>Speed Limit:</b> 55 <b>Diagram:</b> REAR END <b>Officer:</b> <b>Reliability:</b> CONFIDENT <b># of Vehicles:</b> 2.00
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<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th style="background-color: #cccccc;">Unit 1</th></tr> <tr><td>Trav Dir: S</td></tr> <tr><td>Veh Act: STOPPED TRAFFIC</td></tr> <tr><td>Veh Type: MOTORCYCLE</td></tr> <tr><td>Age: 30</td></tr> <tr><td>Gender: F</td></tr> <tr><td>Cond: NORMAL</td></tr> <tr><td>Cont Fact: NO IMPROPER DRIVING</td></tr> <tr><td>Cont Fact: NOT SPECIFIED</td></tr> </table>	Unit 1	Trav Dir: S	Veh Act: STOPPED TRAFFIC	Veh Type: MOTORCYCLE	Age: 30	Gender: F	Cond: NORMAL	Cont Fact: NO IMPROPER DRIVING	Cont Fact: NOT SPECIFIED	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th style="background-color: #cccccc;">Unit 2</th></tr> <tr><td>Trav Dir: S</td></tr> <tr><td>Veh Act: STRAIGHT AHEAD</td></tr> <tr><td>Veh Type: PASSENGER CAR</td></tr> <tr><td>Age: 22</td></tr> <tr><td>Gender: F</td></tr> <tr><td>Cond: NORMAL</td></tr> <tr><td>Cont Fact: DISTRACTION</td></tr> <tr><td>Cont Fact: FOLLOWING TOO CLOSELY</td></tr> </table>	Unit 2	Trav Dir: S	Veh Act: STRAIGHT AHEAD	Veh Type: PASSENGER CAR	Age: 22	Gender: F	Cond: NORMAL	Cont Fact: DISTRACTION	Cont Fact: FOLLOWING TOO CLOSELY	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th style="background-color: #cccccc;">Unit 3</th></tr> <tr><td> </td></tr> </table>	Unit 3	
Unit 1																						
Trav Dir: S																						
Veh Act: STOPPED TRAFFIC																						
Veh Type: MOTORCYCLE																						
Age: 30																						
Gender: F																						
Cond: NORMAL																						
Cont Fact: NO IMPROPER DRIVING																						
Cont Fact: NOT SPECIFIED																						
Unit 2																						
Trav Dir: S																						
Veh Act: STRAIGHT AHEAD																						
Veh Type: PASSENGER CAR																						
Age: 22																						
Gender: F																						
Cond: NORMAL																						
Cont Fact: DISTRACTION																						
Cont Fact: FOLLOWING TOO CLOSELY																						
Unit 3																						

**Crash ID:** 102250199      **Date:** 08/13/2010      **Time:** 1827  
**County:** ANOKA      **City:** RAMSEY

**Sys:** 04-CSAH  
**Route:** 02000083      000+00.147

<b>Severity:</b> PROPERTY DAMAGE	<b>First Event:</b> ON ROADWAY
<b>Road Type:</b> 4_6 LANES UNDIV 2_WAY	<b>To Junction:</b> 4-LEGGED INTERSECTION
<b>Road Char:</b> STRAIGHT AND LEVEL	<b>Traffic Device:</b> STOP SIGN OTHER
<b>Crash Type:</b> COLL W/MV IN TRANSPORT	<b>Speed Limit:</b> 55
<b>Surf Cond:</b> DRY	<b>Diagram:</b> RIGHT ANGLE
<b>Light Cond:</b> DAYLIGHT	<b>Officer:</b>
<b>Weather 1:</b> CLOUDY	<b>Reliability:</b> CONFIDENT
<b>Weather 2:</b> CLOUDY	<b># of Vehicles:</b> 2.00

	<b>Unit 1</b>	<b>Unit 2</b>	<b>Unit 3</b>
<b>Trav Dir:</b>	S	W	
<b>Veh Act:</b>	OVERTAKING/PASSING	STRAIGHT AHEAD	
<b>Veh Type:</b>	PASSENGER CAR	SPORT UNTILITY VEHICLE	
<b>Age:</b>	16	21	
<b>Gender:</b>	F	F	
<b>Cond:</b>	NORMAL	NORMAL	
<b>Cont Fact</b>	IMPROPER LANE	NO IMPROPER DRIVING	
<b>Cont Fact</b>	INEXPERIENCE	NO IMPROPER DRIVING	

**Crash ID:** 150060294      **Date:** 01/06/2015      **Time:** 1120  
**County:** ANOKA      **City:** RAMSEY

**Sys:** 05-MSAS  
**Route:** 31480104      000+00.900

<b>Severity:</b> PROPERTY DAMAGE	<b>First Event:</b> OTHER
<b>Road Type:</b> OTHER	<b>To Junction:</b> TRF CIRCLE OR ROUNDABOUT
<b>Road Char:</b> STRAIGHT AND LEVEL	<b>Traffic Device:</b> NOT APPLICABLE
<b>Crash Type:</b> COLL W/LIGHT POLE	<b>Speed Limit:</b> 30
<b>Surf Cond:</b> ICE/PACKED SNOW	<b>Diagram:</b> HEAD ON
<b>Light Cond:</b> DAYLIGHT	<b>Officer:</b>
<b>Weather 1:</b> CLEAR	<b>Reliability:</b> CONFIDENT
<b>Weather 2:</b> CLEAR	<b># of Vehicles:</b> 1.00

	<b>Unit 1</b>	<b>Unit 2</b>	<b>Unit 3</b>
<b>Trav Dir:</b>	EAST		
<b>Veh Act:</b>	RIGHT TURN		
<b>Veh Type:</b>	PASSENGER CAR		
<b>Age:</b>	45		
<b>Gender:</b>	F		
<b>Cond:</b>	NORMAL		
<b>Cont Fact</b>	WEATHER		
<b>Cont Fact</b>	UNKNOWN		

**Selection Filter:**

WORK AREA: COUNTY\_CODE('02') - FILTER: CRASH\_YEAR('2010','2011','2012','2013','2014','2015') - SPATIAL FILTER APPLIED

**Analyst:**

Jeremy Melquist

**Notes:**



# Crash Detail Report

Armstrong Blvd & Bunker Lake Blvd (2010-2015)

Report Version 1.0 March 2010

<b>Crash ID:</b> 140950029	<b>Date:</b> 04/04/2014	<b>Time:</b> 0832	<b>Sys:</b> 04-CSAH
<b>County:</b> ANOKA	<b>City:</b> RAMSEY	<b>Route:</b> 02000116	000+00.017

<b>Severity:</b> PROPERTY DAMAGE	<b>First Event:</b> ON ROADWAY
<b>Road Type:</b> 2 LANES UNDIV 2_WAY	<b>To Junction:</b> 4-LEGGED INTERSECTION
<b>Road Char:</b> STRAIGHT AND LEVEL	<b>Traffic Device:</b> TRAFFIC SIGNALS
<b>Crash Type:</b> COLL W/MV IN TRANSPORT	<b>Speed Limit:</b> 55
<b>Surf Cond:</b> ICE/PACKED SNOW	<b>Diagram:</b> REAR END
<b>Light Cond:</b> DAYLIGHT	<b>Officer:</b>
<b>Weather 1:</b> SNOW	<b>Reliability:</b> CONFIDENT
<b>Weather 2:</b> NOT SPECIFIED	<b># of Vehicles:</b> 2.00

	Unit 1	Unit 2	Unit 3
<b>Trav Dir:</b>	W	W	
<b>Veh Act:</b>	RIGHT TURN	RIGHT TURN	
<b>Veh Type:</b>	PASSENGER CAR	BUS (16+ SEATS)	
<b>Age:</b>	20	58	
<b>Gender:</b>	M	F	
<b>Cond:</b>	NORMAL	NORMAL	
<b>Cont Fact</b>	FAIL TO YIELD ROW	NO IMPROPER DRIVING	
<b>Cont Fact</b>	ILLEGAL SPEED	NOT SPECIFIED	

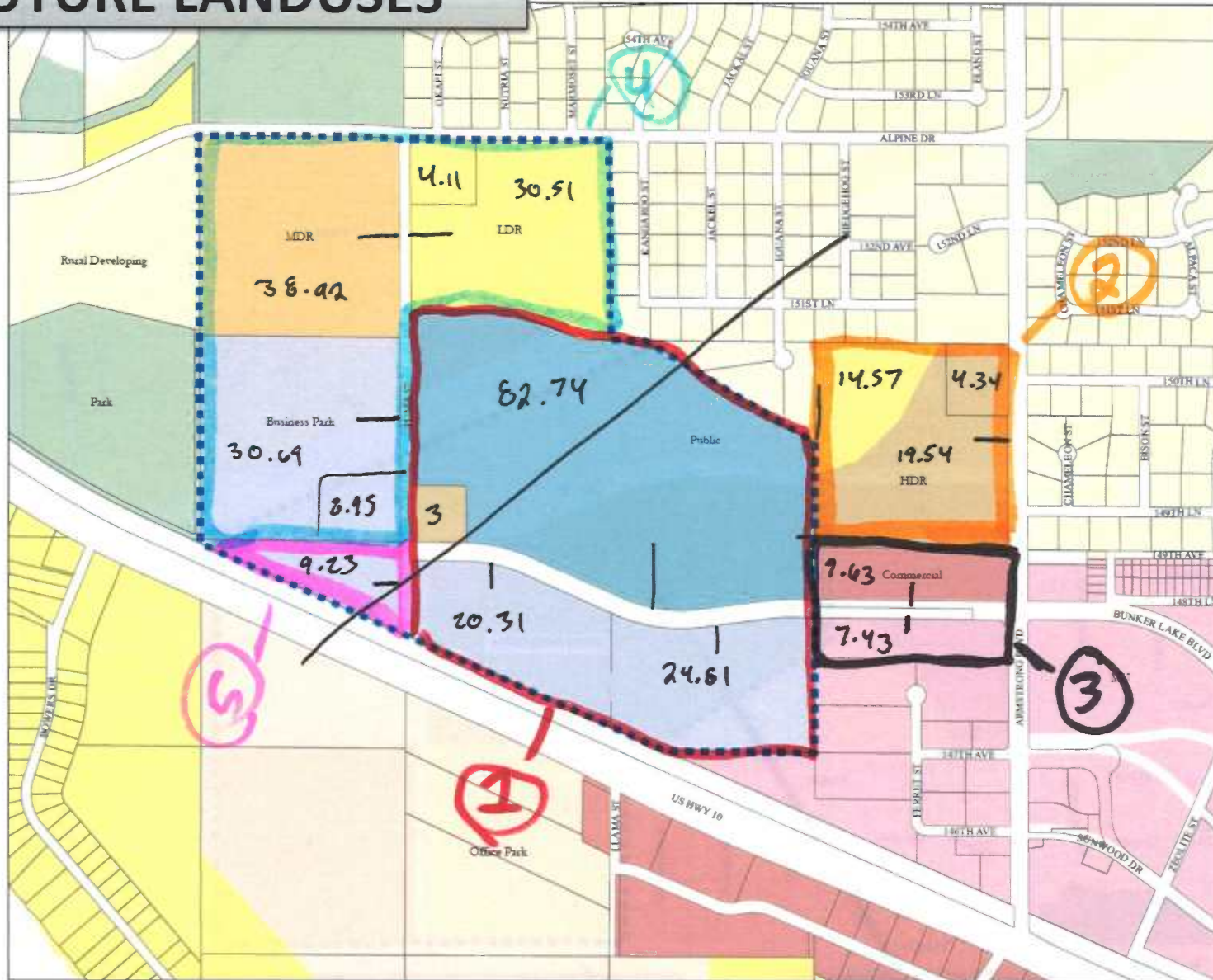
**Selection Filter:**  
 WORK AREA: COUNTY\_CODE('02') - FILTER: CRASH\_YEAR('2010','2011','2012','2013','2014','2015') - SPATIAL FILTER APPLIED

**Analyst:** Jeremy Melquist  
**Notes:**



**APPENDIX D-**  
**TRIP GENERATION FOR FUTURE**  
**BUSINESS PARK DEVELOPMENT**

# FUTURE LANDUSES



## 2030 Comprehensive Plan Future Land Use Map PENDING

-  Study Area
- Future Land Use**
-  Low Density Residential
-  Medium Density Residential
-  High Density Residential
-  Office Park
-  Commercial
-  MU
-  Business Park
-  Public
-  Rural Developing
-  Rural Preserve
-  Park



0 300 600 Feet  
1 inch = 600 ft on 11 x 17

This map has been prepared using information generated from various governmental offices and other sources and is to be used for reference purposes only. It is neither a legally recorded map nor a survey and is not intended for use as one. The Geographic Information System (GIS) data used to develop this map is not accompanied by the City as being erroneous.

The City does not represent that the GIS data can be used for exact measurement of distance or direction or precision in the location of geographic features. If errors or discrepancies are found, please contact (763) 427-0465.

The City of Ramsey disclaims any responsibility for or liability for the accuracy of the information on any form of data created with a GIS in which the public has general access. The preceding disclaimer is provided pursuant to Minnesota Statute 462.02, Sub. 2 (2006) and the user of this map acknowledges that the City of Ramsey is immune from any and all claims brought by the user, its employees or agents, or third parties and in any case of the user's access of the data.

**Ramsey EDA Traffic Assumptions**  
Zone 1 Alternative A: High School

**Ramsey EDA Traffic Assumptions**  
Zone 1 Alternative 1A: High School

**High School**

		180 K ft <sup>2</sup>	86.42 Acres		ITE Code 530		Internal-to-Internal Reduction			
Based on Square Feet		#	% enter	% exit	entering	exiting	entering	exiting	entering	exiting
Average Rate										
AM	3.06	551	71	29	391	160	0%	392	160	0%
Afternoon	2.12	382	31	69	118	264	0%	119	264	0%
PM	0.97	175	54	46	95	81	0%	95	81	0%
Weekday	12.89	2321	50	50	1161	1161	0%	1161	1161	0%

Pass-by		New Trips	
entering	exiting	entering	exiting
0	0	392	160
0	0	119	264
0	0	95	81
0	0	1161	1161

**Business Park**

		45.12 Acres	ITE Code 130		Internal-to-Internal Reduction					
Based on Acres		#	% enter	% exit	entering	exiting	entering	exiting	entering	exiting
Average Rate										
AM	8.55	386	83	17	320	66	10%	289	60	0%
Afternoon	4.42	200	50	50	100	100	10%	90	90	0%
PM	8.84	399	21	79	84	315	10%	76	284	0%
Weekday	63.11	2848	50	50	1424	1424	15%	1211	1211	0%

Pass-by		New Trips	
entering	exiting	entering	exiting
0	0	289	60
0	0	90	90
0	0	76	284
0	0	1211	1211

AM	937	712	225
Afternoon	582	218	364
PM	574	178	396
Weekday	5169	2585	2585

		Pass-by		New Trips	
		entering	exiting	entering	exiting
AM	0	0	681	220	
Afternoon	0	0	209	354	
PM	0	0	171	365	
Weekday	0	0	2372	2372	

**Ramsey EDA Traffic Assumptions**

Zone 1 Alternative 1B: K-12 School

86.42 Acres

**Elementary School**

50 K ft<sup>2</sup>

ITE Code

520

Internal-to-Internal Reduction

Based on Square Feet

	Average Rate	#	% enter	% exit	entering	exiting		entering	exiting	
AM	5.2	260	56	44	146	114	10%	132	103	0%
Afternoon	3.11	156	44	56	69	87	10%	62	79	0%
PM	1.21	61	45	55	27	34	10%	25	31	0%
Weekday	15.43	772	50	50	386	386	10%	348	348	0%

Pass-by		New Trips	
entering	exiting	entering	exiting
0	0	132	103
0	0	62	79
0	0	25	31
0	0	348	348

**Middle School**

50 K ft<sup>2</sup>

ITE Code

522

Internal-to-Internal Reduction

Based on Square Feet

	Average Rate	#	% enter	% exit	entering	exiting		entering	exiting	
AM	4.35	218	55	45	120	98	10%	108	89	0%
Afternoon	2.52	126	45	55	57	69	10%	52	63	0%
PM	1.19	60	52	48	31	29	10%	29	26	0%
Weekday	13.78	689	50	50	345	345	10%	311	311	0%

Pass-by		New Trips	
entering	exiting	entering	exiting
0	0	108	89
0	0	52	63
0	0	29	26
0	0	311	311

**High School**

80 K ft<sup>2</sup>

ITE Code

530

Internal-to-Internal Reduction

Based on Square Feet

	Average Rate	#	% enter	% exit	entering	exiting		entering	exiting	
AM	3.06	245	71	29	174	71	10%	157	64	0%
Afternoon	2.12	170	31	69	53	117	10%	48	106	0%
PM	0.97	78	54	46	42	36	10%	38	33	0%
Weekday	12.89	1032	50	50	516	516	10%	465	465	0%

Pass-by		New Trips	
entering	exiting	entering	exiting
0	0	157	64
0	0	48	106
0	0	38	33
0	0	465	465

**Business Park**

45.12 Acres

ITE Code

130

Internal-to-Internal Reduction

Based on Acres

	Average Rate	#	% enter	% exit	entering	exiting		entering	exiting	
AM	8.55	386	83	17	320	66	10%	289	60	0%
Afternoon	4.42	200	50	50	100	100	10%	90	90	0%
PM	8.84	399	21	79	84	315	10%	76	284	0%
Weekday	63.11	2848	50	50	1424	1424	15%	1211	1211	0%

Pass-by		New Trips	
entering	exiting	entering	exiting
0	0	289	60
0	0	90	90
0	0	76	284
0	0	1211	1211

AM	1109	760	349
Afternoon	652	278	374
PM	598	185	413
Weekday	5341	2671	2671

	Pass-by		New Trips	
	entering	exiting	entering	exiting
AM	0	0	686	316
Afternoon	0	0	252	338
PM	0	0	168	374
Weekday	0	0	2335	2335

**Ramsey EDA Traffic Assumptions**  
 Zone 1 Alternative 2: Business Park

Business Park	Based on Acres	131.54 Acres		ITE Code		130		Internal-to-Internal Reduction			Pass-by		New Trips	
		Average Rate	#	% enter	% exit	entering	exiting	entering	exiting	%	entering	exiting	entering	exiting
AM	8.55	1125	83	17	934	191	10%	841	173	0%	0	0	841	173
Afternoon	4.42	582	50	50	291	291	10%	262	262	0%	0	0	262	262
PM	8.84	1163	21	79	244	919	10%	220	827	0%	0	0	220	827
Weekday	63.11	8302	50	50	4151	4151	15%	3529	3529	0%	0	0	3529	3529

AM	1125	934	191
Afternoon	582	291	291
PM	1163	244	919
Weekday	8302	4151	4151

	Pass-by		New Trips	
	entering	exiting	entering	exiting
AM	0	0	841	173
Afternoon	0	0	262	262
PM	0	0	220	827
Weekday	0	0	3529	3529

**Ramsey EDA Traffic Assumptions**

Zone 1 Alternative 3: Low Density Residential

<b>Single Family Detached Housing</b>		260 units	ITE Code		210	86.42 Acres		3 Units per Acre		New Trips	
Based on Dwelling Units		rate	#	% enter	% exit	entering	exiting	entering	exiting	entering	exiting
AM	0.75	192	25	75	48	144			48	144	
Afternoon	0.51	0	31	69	0	0			0	0	
PM	1.01	249	63	37	157	92			157	92	
Weekday	9.57	2505	50	50	1253	1253			1253	1253	

<b>Business Park</b>		45.12 Acres	ITE Code		130	Internal-to-Internal Reduction		Pass-by		New Trips				
Based on Acres		Average Rate	#	% enter	% exit	entering	exiting	entering	exiting	entering	exiting			
AM	8.55	386	83	17	320	66	10%	289	60	0%	0	0	289	60
Afternoon	4.42	200	50	50	100	100	10%	90	90	0%	0	0	90	90
PM	8.84	399	21	79	84	315	10%	76	284	0%	0	0	76	284
Weekday	63.11	2848	50	50	1424	1424	15%	1211	1211	0%	0	0	1211	1211

AM	578	368	210
Afternoon	200	100	100
PM	648	241	407
Weekday	5353	2677	2677

	Pass-by		New Trips	
	entering	exiting	entering	exiting
AM	0	0	337	204
Afternoon	0	0	90	90
PM	0	0	233	376
Weekday	0	0	2464	2464

**Ramsey EDA Traffic Assumptions**

Zone 2 off of Armstrong

**Single Family Detached Housing**

	Based on Dwelling Units	44 units		ITE Code	210	
	rate	#	% enter	% exit	entering	exiting
AM	0.75	41	25	75	10	31
Afternoon	0.51	23	31	69	7	16
PM	1.01	51	63	37	32	19
Weekday	9.57	489	50	50	245	245

14.57 Acres  
3 Units per Acre

New Trips	
entering	exiting
10	31
7	16
32	19
245	245

**Low Rise Apartment**

	Based on Dwelling Units	235 units		ITE Code	221	
	Average Rate	#	% enter	% exit	entering	exiting
AM	0.46	111	21	79	23	88
Afternoon	0.29	69	31	69	21	48
PM	0.58	144	65	35	94	50
Weekday	6.59	1591	50	50	796	796

19.54 Acres  
7 to 15 Units per Acre  
Assume 12 Units per Acre

New Trips	
entering	exiting
23	88
21	48
94	50
796	796

AM	152	34	118
Afternoon	92	29	63
PM	195	126	69
Weekday	2080	1040	1040

	Pass-by		New Trips	
	entering	exiting	entering	exiting
AM	0	0	34	118
Afternoon	0	0	29	63
PM	0	0	126	69
Weekday	0	0	1040	1040

**Ramsey EDA Traffic Assumptions**  
 Zone 3: Off of Bunker Lake Blvd

Retail/Commercial	Based on Square Feet Average Rate	170.9 K ft <sup>2</sup>		17.06 Acres		ITE Code	X	Internal-to-Internal Reduction			Pass-by		New Trips	
		#	% enter	% exit	entering			exiting	entering	exiting	%	entering	exiting	entering
AM	7.41	1267	53	47	672	595	20%	538	477	46%	248	220	290	257
Afternoon	5.46	934	50	50	467	467	20%	374	374	40%	150	150	224	224
PM	10.91	1865	51	49	951	914	20%	761	732	39%	297	286	464	446
Weekday	124.59	21296	50	50	10648	10648	30%	7454	7454	39%	2908	2908	4546	4546

AM	1267	672	595
Afternoon	934	467	467
PM	1865	951	914
Weekday	21296	10648	10648

	Pass-by		New Trips	
	entering	exiting	entering	exiting
AM	248	220	290	257
Afternoon	150	150	224	224
PM	297	286	464	446
Weekday	2908	2908	4546	4546

**Ramsey EDA Traffic Assumptions**

Zone 4: Off of Puma St

<b>Business Park</b>		39.64 Acres			ITE Code 130		Internal-to-Internal Reduction				Pass-by		New Trips		
Based on Acres		#	% enter	% exit	entering	exiting	entering	exiting	%	entering	exiting	entering	exiting	entering	exiting
Average Rate	entering											exiting			
AM	8.55	339	83	17	281	58	10%	254	52	0%	0	0	254	52	
Afternoon	4.42	176	50	50	88	88	10%	80	80	0%	0	0	80	80	
PM	8.84	351	21	79	74	277	10%	67	250	0%	0	0	67	250	
Weekday	63.11	2502	50	50	1251	1251	15%	1064	1064	0%	0	0	1064	1064	

<b>Single Family Detached Housing</b>		104 units			ITE Code 210		34.62 Acres 3 Units per Acre				New Trips		
Based on Dwelling Units		#	% enter	% exit	entering	exiting	entering	exiting	%	entering	exiting	entering	exiting
rate	entering											exiting	
AM	0.75	83	25	75	21	62						21	62
Afternoon	0.51	53	31	69	16	37						16	37
PM	1.01	109	63	37	69	40						69	40
Weekday	9.57	1078	50	50	539	539						539	539

<b>Residential Townhouse</b>		234 units			ITE Code 230		38.92 Acres 3 to 7 Units per Acre Assume 6 Units per Acre				New Trips		
Based on Dwelling Units		#	% enter	% exit	entering	exiting	entering	exiting	%	entering	exiting	entering	exiting
Average Rate	entering											exiting	
AM	0.44	102	17	83	17	85						17	85
Afternoon	0.26	61	31	69	19	42						19	42
PM	0.52	121	67	33	81	40						81	40
Weekday	5.81	1348	50	50	674	674						674	674

		Pass-by		New Trips	
		entering	exiting	entering	exiting
AM	524	0	0	292	199
Afternoon	290	0	0	115	159
PM	581	0	0	217	330
Weekday	4928	0	0	2277	2277

**Ramsey EDA Traffic Assumptions**

Zone 5: Off of Ruma EB & NB (Split 50/50)

Business Park	Based on Acres	9.23 Acres			ITE Code 130		Internal-to-Internal Reduction				Pass-by		New Trips	
		Average Rate	#	% enter	% exit	entering	exiting	entering	exiting	%	entering	exiting	entering	exiting
AM	8.55	79	83	17	66	13	10%	60	13	0%	0	0	60	13
Afternoon	4.42	41	50	50	21	21	10%	19	19	0%	0	0	19	19
PM	8.84	82	21	79	17	65	10%	16	59	0%	0	0	16	59
Weekday	63.11	583	50	50	292	292	15%	248	248	0%	0	0	248	248

AM	79	66	13
Afternoon	41	21	21
PM	82	17	65
Weekday	583	292	292

	Pass-by		New Trips	
	entering	exiting	entering	exiting
AM	0	0	60	13
Afternoon	0	0	19	19
PM	0	0	16	59
Weekday	0	0	248	248

**Ramsey EDA Traffic Assumptions**

Alternative 1: High School

High School	Based on Square Feet	180 K ft <sup>2</sup>			ITE Code	530	Internal-to-Internal Reduction				Pass-by		New Trips		
		86.42 Acres					entering	exiting	entering	exiting	%	entering	exiting	entering	exiting
		Average Rate	#	% enter											
AM	3.06	551	71	29	391	160	0%	392	160	0%	0	0	392	160	
Afternoon	2.12	382	31	69	118	264	0%	119	264	0%	0	0	119	264	
PM	0.97	175	54	46	95	81	0%	95	81	0%	0	0	95	81	
Weekday	12.89	2321	50	50	1161	1161	0%	1161	1161	0%	0	0	1161	1161	

Business Park	Based on Acres	93.99 Acres			ITE Code	130	Internal-to-Internal Reduction				Pass-by		New Trips	
		Average Rate	#	% enter			% exit	entering	exiting	%	entering	exiting	entering	exiting
Afternoon	4.42	416	50	50	208	208	10%	188	188	0%	0	0	188	188
PM	8.84	831	21	79	175	656	10%	158	591	0%	0	0	158	591
Weekday	63.11	5932	50	50	2966	2966	15%	2522	2522	0%	0	0	2522	2522

Retail/Commercial	Based on Square Feet	170.9 K ft <sup>2</sup>			ITE Code	X	Internal-to-Internal Reduction				Pass-by		New Trips		
		17.06 Acres					entering	exiting	entering	exiting	%	entering	exiting	entering	exiting
		Average Rate	#	% enter											
AM	7.41	1267	53	47	672	595	20%	538	477	46%	248	220	290	257	
Afternoon	5.46	934	50	50	467	467	20%	374	374	40%	150	150	224	224	
PM	10.91	1865	51	49	951	914	20%	761	732	39%	297	286	464	446	
Weekday	124.59	21296	50	50	10648	10648	30%	7454	7454	39%	2908	2908	4546	4546	

Single Family Detached Housing	Based on Dwelling Units	104 units			ITE Code	210	34.62 Acres				New Trips	
		3 Units per Acre					entering	exiting	entering	exiting	entering	exiting
		rate	#	% enter								
AM	0.75	83	25	75	21	62					21	62
Afternoon	0.51	53	31	69	16	37					16	37
PM	1.01	109	63	37	69	40					69	40
Weekday	9.57	1078	50	50	539	539					539	539

Single Family Detached Housing	Based on Dwelling Units	44 units			ITE Code	210	14.57 Acres				New Trips	
		3 Units per Acre					entering	exiting	entering	exiting	entering	exiting
		rate	#	% enter								
AM	0.75	41	25	75	10	31					10	31
Afternoon	0.51	53	31	69	16	37					16	37
PM	1.01	51	63	37	32	19					32	19
Weekday	9.57	489	50	50	245	245					245	245

Residential Townhouse	Based on Dwelling Units	234 units			ITE Code	230	38.92 Acres				New Trips	
		3 to 7 Units per Acre					entering	exiting	entering	exiting	entering	exiting
		Assume 6 Units per Acre										
AM	0.44	102	17	83	17	85					17	85
Afternoon	0.26	61	31	69	19	42					19	42
PM	0.52	121	67	33	81	40					81	40
Weekday	5.81	1348	50	50	674	674					674	674

Low Rise Apartment	Based on Dwelling Units	235 units			ITE Code	221	19.54 Acres				New Trips	
		7 to 15 Units per Acre					entering	exiting	entering	exiting	entering	exiting
		Assume 12 Units per Acre										
AM	0.46	111	21	79	23	88					23	88
Afternoon	0.29	69	31	69	21	48					21	48
PM	0.58	144	65	35	94	50					94	50
Weekday	6.59	1591	50	50	796	796					796	796

	Pass-by		New Trips	
	entering	exiting	entering	exiting
AM	248	220	1355	806
Afternoon	150	150	604	839
PM	297	286	992	1268
Weekday	2908	2908	10482	10482

West of Commercial Area

	Pass-by		New Trips	
	entering	exiting	entering	exiting
AM	0	0	1031	431
Afternoon	0	0	342	531
PM	0	0	403	752
Weekday	0	0	4896	4896

**Ramsey EDA Traffic Assumptions**

Alternative 1B: K-12 School

86.42 Acres

<b>Elementary School</b>		50 K ft <sup>2</sup>	ITE Code	520	Internal-to-Internal Reduction					Pass-by		New Trips		
Based on Square Feet		Average Rate	#	% enter	% exit	entering	exiting	entering	exiting	%	entering	exiting	entering	exiting
AM	5.2	260	56	44	146	114	10%	132	103	0%	0	0	132	103
Afternoon	3.11	156	44	56	69	87	10%	62	79	0%	0	0	62	79
PM	1.21	61	45	55	27	34	10%	25	31	0%	0	0	25	31
Weekday	15.43	772	50	50	386	386	10%	348	348	0%	0	0	348	348

<b>Middle School</b>		50 K ft <sup>2</sup>	ITE Code	522	Internal-to-Internal Reduction					Pass-by		New Trips		
Based on Square Feet		Average Rate	#	% enter	% exit	entering	exiting	entering	exiting	%	entering	exiting	entering	exiting
AM	4.35	218	55	45	120	98	10%	108	89	0%	0	0	108	89
Afternoon	2.52	126	45	55	57	69	10%	52	63	0%	0	0	52	63
PM	1.19	60	52	48	31	29	10%	29	26	0%	0	0	29	26
Weekday	13.78	689	50	50	345	345	10%	311	311	0%	0	0	311	311

<b>High School</b>		80 K ft <sup>2</sup>	ITE Code	530	Internal-to-Internal Reduction					Pass-by		New Trips		
Based on Square Feet		Average Rate	#	% enter	% exit	entering	exiting	entering	exiting	%	entering	exiting	entering	exiting
AM	3.06	245	71	29	174	71	10%	157	64	0%	0	0	157	64
Afternoon	2.12	170	31	69	53	117	10%	48	106	0%	0	0	48	106
PM	0.97	78	54	46	42	36	10%	38	33	0%	0	0	38	33
Weekday	12.89	1032	50	50	516	516	10%	465	465	0%	0	0	465	465

<b>Business Park</b>		93.99 Acres	ITE Code	130	Internal-to-Internal Reduction					Pass-by		New Trips		
Based on Acres		Average Rate	#	% enter	% exit	entering	exiting	entering	exiting	%	entering	exiting	entering	exiting
AM	8.55	428	83	17	355	73	10%	320	66	0%	0	0	320	66
Afternoon	4.42	221	50	50	111	111	10%	100	100	0%	0	0	100	100
PM	8.84	442	21	79	93	349	10%	84	315	0%	0	0	84	315
Weekday	63.11	3156	50	50	1578	1578	15%	1342	1342	0%	0	0	1342	1342

<b>Retail/Commercial</b>		170.9 K ft <sup>2</sup>	17.06 Acres	ITE Code	X	Internal-to-Internal Reduction					Pass-by		New Trips	
Based on Square Feet		Average Rate	#	% enter	% exit	entering	exiting	entering	exiting	%	entering	exiting	entering	exiting
AM	7.41	1267	53	47	672	595	20%	538	477	46%	248	220	290	257
Afternoon	5.46	934	50	50	467	467	20%	374	374	40%	150	150	224	224
PM	10.91	1865	51	49	951	914	20%	761	732	39%	297	286	464	446
Weekday	124.59	21296	50	50	10648	10648	30%	7454	7454	39%	2908	2908	4546	4546

<b>Single Family Detached Housing</b>		104 units	ITE Code	210	34.62 Acres					New Trips	
Based on Dwelling Units		rate	#	% enter	% exit	entering	exiting	3 Units per Acre		entering	exiting
AM	0.75	83	25	75	21	62			21	62	
Afternoon	0.51	48	31	69	15	33			15	33	
PM	1.01	109	63	37	69	40			69	40	
Weekday	9.57	1078	50	50	539	539			539	539	

<b>Single Family Detached Housing</b>		44 units	ITE Code	210	14.57 Acres					New Trips	
Based on Dwelling Units		rate	#	% enter	% exit	entering	exiting	3 Units per Acre		entering	exiting
AM	0.75	41	25	75	10	31			10	31	
Afternoon	0.51	48	31	69	15	33			15	33	
PM	1.01	51	63	37	32	19			32	19	
Weekday	9.57	489	50	50	245	245			245	245	

<b>Residential Townhouse</b>		234 units	ITE Code	230	38.92 Acres					New Trips	
Based on Dwelling Units		Average Rate	#	% enter	% exit	entering	exiting	3 to 7 Units per Acre		entering	exiting
								Assume 6 Units per Acre			
AM	0.44	102	17	83	17	85			17	85	
Afternoon	0.26	61	31	69	19	42			19	42	
PM	0.52	121	67	33	81	40			81	40	
Weekday	5.81	1348	50	50	674	674			674	674	

<b>Low Rise Apartment</b>		235 units	ITE Code	221	19.54 Acres					New Trips	
Based on Dwelling Units		Average Rate	#	% enter	% exit	entering	exiting	7 to 15 Units per Acre		entering	exiting
								Assume 12 Units per Acre			
AM	0.46	111	21	79	23	88			23	88	
Afternoon	0.29	69	31	69	21	48			21	48	
PM	0.58	144	65	35	94	50			94	50	
Weekday	6.59	1591	50	50	796	796			796	796	

AM	2714	1528	1186
Afternoon	1785	811	974
PM	2880	1388	1492
Weekday	30962	15481	15481

	Pass-by		New Trips	
	entering	exiting	entering	exiting
AM	248	220	1079	844
Afternoon	150	150	556	728
PM	297	286	915	1001
Weekday	2908	2908	9265	9265

West of Commercial Area

	Pass-by		New Trips	
	entering	exiting	entering	exiting
AM	0	0	755	469
Afternoon	0	0	296	423
PM	0	0	326	485
Weekday	0	0	3679	3679

**Ramsey EDA Traffic Assumptions**  
Alternative 2: Business Park

High School	Based on Square Feet	0 K ft <sup>2</sup>			ITE Code	530	Internal-to-Internal Reduction				Pass-by		New Trips	
		Average Rate	#	% enter			% exit	entering	exiting	entering	exiting	entering	exiting	entering
AM	3.06	0	71	29	0	0	0%	0	0	0%	0	0	0	0
Afternoon	2.12	0	31	69	0	0	0%	0	0	0%	0	0	0	0
PM	0.97	0	54	46	0	0	0%	0	0	0%	0	0	0	0
Weekday	12.89	0	50	50	0	0	0%	0	0	0%	0	0	0	0

Business Park	Based on Acres	180.41 Acres			ITE Code	130	Internal-to-Internal Reduction				Pass-by		New Trips	
		Average Rate	#	% enter			% exit	entering	exiting	entering	exiting	entering	exiting	entering
AM	8.55	1543	83	17	1281	262	10%	1153	237	0%	0	0	1153	237
Afternoon	4.42	798	50	50	399	399	10%	360	360	0%	0	0	360	360
PM	8.84	1595	21	79	335	1260	10%	302	1135	0%	0	0	302	1135
Weekday	63.11	11386	50	50	5693	5693	15%	4840	4840	0%	0	0	4840	4840

Retail/Commercial	Based on Square Feet	170.9 K ft <sup>2</sup>			ITE Code	X	Internal-to-Internal Reduction				Pass-by		New Trips	
		Average Rate	#	% enter			% exit	entering	exiting	entering	exiting	entering	exiting	entering
AM	7.41	1267	53	47	672	595	20%	538	477	46%	248	220	290	257
Afternoon	5.46	934	50	50	467	467	20%	374	374	40%	150	150	224	224
PM	10.91	1865	51	49	951	914	20%	761	732	39%	297	286	464	446
Weekday	124.59	21296	50	50	10648	10648	30%	7454	7454	39%	2908	2908	4546	4546

Single Family Detached Housing	Based on Dwelling Units	104 units			ITE Code	210	34.62 Acres				New Trips		
		rate	#	% enter			% exit	entering	exiting	entering	exiting	entering	exiting
AM	0.75	83	25	75	21	62						21	62
Afternoon	0.51	53	31	69	16	37						16	37
PM	1.01	109	63	37	69	40						69	40
Weekday	9.57	1078	50	50	539	539						539	539

Single Family Detached Housing	Based on Dwelling Units	44 units			ITE Code	210	14.57 Acres				New Trips		
		rate	#	% enter			% exit	entering	exiting	entering	exiting	entering	exiting
AM	0.75	41	25	75	10	31						10	31
Afternoon	0.51	53	31	69	16	37						16	37
PM	1.01	51	63	37	32	19						32	19
Weekday	9.57	489	50	50	245	245						245	245

Residential Townhouse	Based on Dwelling Units	234 units			ITE Code	230	38.92 Acres				New Trips		
		Average Rate	#	% enter			% exit	entering	exiting	entering	exiting	entering	exiting
AM	0.44	102	17	83	17	85						17	85
Afternoon	0.26	61	31	69	19	42						19	42
PM	0.52	121	67	33	81	40						81	40
Weekday	5.81	1348	50	50	674	674						674	674

Low Rise Apartment	Based on Dwelling Units	235 units			ITE Code	221	19.54 Acres				New Trips		
		Average Rate	#	% enter			% exit	entering	exiting	entering	exiting	entering	exiting
AM	0.46	111	21	79	23	88						23	88
Afternoon	0.29	69	31	69	21	48						21	48
PM	0.58	144	65	35	94	50						94	50
Weekday	6.59	1591	50	50	796	796						796	796

	Pass-by		New Trips	
	entering	exiting	entering	exiting
AM	248	220	1515	759
Afternoon	150	150	657	747
PM	297	286	1041	1731
Weekday	2908	2908	11639	11639

West of Commercial Area

	Pass-by		New Trips	
	entering	exiting	entering	exiting
AM	0	0	1191	384
Afternoon	0	0	395	439
PM	0	0	452	1215
Weekday	0	0	6053	6053

**Ramsey EDA Traffic Assumptions**  
Alternative 3: Low Density Residential

High School	Based on Square Feet	0 K ft <sup>2</sup>			ITE Code	530	Internal-to-Internal Reduction				Pass-by		New Trips			
		Average Rate	#	% enter			% exit	entering	exiting	entering	exiting	%	entering	exiting	entering	exiting
AM	3.06	0	71	29	0	0	0%	0	0	0%	0	0	0	0		
Afternoon	2.12	0	31	69	0	0	0%	0	0	0%	0	0	0	0		
PM	0.97	0	54	46	0	0	0%	0	0	0%	0	0	0	0		
Weekday	12.89	0	50	50	0	0	0%	0	0	0%	0	0	0	0		

Business Park	Based on Acres	93.99 Acres			ITE Code	130	Internal-to-Internal Reduction				Pass-by		New Trips			
		Average Rate	#	% enter			% exit	entering	exiting	entering	exiting	%	entering	exiting	entering	exiting
AM	8.55	804	83	17	667	137	10%	601	124	0%	0	0	601	124		
Afternoon	4.42	416	50	50	208	208	10%	188	188	0%	0	0	188	188		
PM	8.84	831	21	79	175	656	10%	158	591	0%	0	0	158	591		
Weekday	63.11	5932	50	50	2966	2966	15%	2522	2522	0%	0	0	2522	2522		

Retail/Commercial	Based on Square Feet	170.9 K ft <sup>2</sup>			ITE Code	X	Internal-to-Internal Reduction				Pass-by		New Trips			
		Average Rate	#	% enter			% exit	entering	exiting	entering	exiting	%	entering	exiting	entering	exiting
AM	7.41	1267	53	47	672	595	20%	538	477	46%	248	220	290	257		
Afternoon	5.46	934	50	50	467	467	20%	374	374	40%	150	150	224	224		
PM	10.91	1865	51	49	951	914	20%	761	732	39%	297	286	464	446		
Weekday	124.59	21296	50	50	10648	10648	30%	7454	7454	39%	2908	2908	4546	4546		

Single Family Detached Housing	Based on Dwelling Units	364 units			ITE Code	210	121.04 Acres				New Trips		
		rate	#	% enter			% exit	entering	exiting	3 Units per Acre		entering	exiting
AM	0.75	265	25	75	66	199			66	199			
Afternoon	0.51	184	31	69	57	127			57	127			
PM	1.01	337	63	37	212	125			212	125			
Weekday	9.57	3414	50	50	1707	1707			1707	1707			

Single Family Detached Housing	Based on Dwelling Units	44 units			ITE Code	210	14.57 Acres				New Trips		
		rate	#	% enter			% exit	entering	exiting	3 Units per Acre		entering	exiting
AM	0.75	41	25	75	10	31			10	31			
Afternoon	0.51	184	31	69	57	127			57	127			
PM	1.01	51	63	37	32	19			32	19			
Weekday	9.57	489	50	50	245	245			245	245			

Residential Townhouse	Based on Dwelling Units	234 units			ITE Code	230	38.92 Acres				New Trips		
		Average Rate	#	% enter			% exit	entering	exiting	3 to 7 Units per Acre		entering	exiting
										Assume 6 Units per Acre			
AM	0.44	102	17	83	17	85			17	85			
Afternoon	0.26	61	31	69	19	42			19	42			
PM	0.52	121	67	33	81	40			81	40			
Weekday	5.81	1348	50	50	674	674			674	674			

Low Rise Apartment	Based on Dwelling Units	235 units			ITE Code	221	19.54 Acres				New Trips		
		Average Rate	#	% enter			% exit	entering	exiting	7 to 15 Units per Acre		entering	exiting
										Assume 12 Units per Acre			
AM	0.46	111	21	79	23	88			23	88			
Afternoon	0.29	69	31	69	21	48			21	48			
PM	0.58	144	65	35	94	50			94	50			
Weekday	6.59	1591	50	50	796	796			796	796			

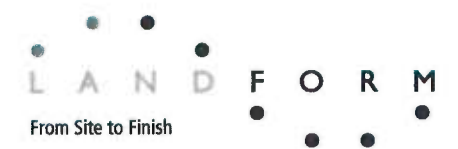
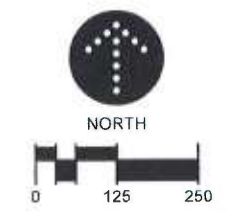
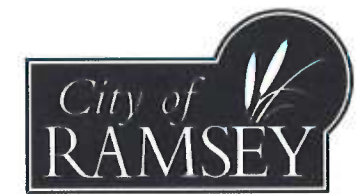
	Pass-by		New Trips	
	entering	exiting	entering	exiting
AM	248	220	1008	783
Afternoon	150	150	566	756
PM	297	286	1041	1271
Weekday	2908	2908	10489	10489

West of Commercial Area

	Pass-by		New Trips	
	entering	exiting	entering	exiting
AM	0	0	685	407
Afternoon	0	0	264	357
PM	0	0	451	756
Weekday	0	0	4903	4903



**APPENDIX E-**  
**TRIP GENERATION FOR COR**  
**DEVELOPMENT**



**EXHIBIT 5  
TAZ MAP**

05.21.2012  
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**Table 1 - Land Uses and Traffic Generation**

Zone/Block	Code	Land Use	Dwelling Units	Sq. ft.	Park Area <sup>1</sup> (sq. ft.)	ITE Code <sup>2</sup>	AM Peak			PM Peak			Daily Total
							Total	In	Out	Total	In	Out	
1a	3	Retail		11,882		820	10	6	4	35	17	18	408
1b	3	Retail		9,022		820	7	4	3	27	13	14	310
1c	3	Supermarket		62,396		850	179	109	70	524	267	257	5103
1d	3	Retail		13,283		820	11	6	4	40	19	20	456
1e	3	Retail		7,300		820	6	4	2	22	11	11	251
2a	3	Retail		5,248		820	4	3	2	16	8	8	180
2b	3	Retail		39,000		820	31	19	12	116	57	59	1340
2c	2	Daycare Center		10,320		565	101	54	48	103	48	55	654
2d	1	Senior Housing - Assisted Living	84			254	9	6	3	15	7	8	179
3a	1	Luxury Apartments / Townhomes	230			220	94	19	75	114	74	40	1224
3a	3	Retail		67,085		820	54	33	21	200	98	102	2305
3b	2	Government Office Building		49,107		730	231	194	37	48	15	33	2708
3c	0	Park & Ride (Northstar) <sup>3</sup>											
4a	2	Clinic		50,092		720	92	73	19	139	37	101	1448
4b	3	Sit Down Restaurant		9,037		931	6	3	3	54	36	18	650
4c	3	Hotel <sup>4</sup>		24,900		310	14	9	6	15	8	7	209
4d	2	Office Park		110,000		770	136	120	16	131	22	109	969
5a	2	Mortuary <sup>5</sup>		17,598		710	3	2	1	17	6	11	139
5b	2	Business Park		93,871		770	107	90	17	97	22	75	958
6a	2	Office Park		44,827		770	56	49	7	53	9	44	395
6b	3	Retail		13,070		820	10	6	4	39	19	20	449
6c	2	General Office		17,987		710	22	20	3	21	4	18	158
6d	2	General Office		17,987		710	22	20	3	21	4	18	158
7a	2	Charter School <sup>6</sup>		50,511		534	468	258	211	264	129	135	1405
7b	2	Medical Office		33,374		720	61	49	13	92	25	67	965
7c	3	Retail		24,780		820	20	12	8	74	36	38	851
8a	0	City Park w/ Lake			430,000								
8b	2	General Office		43,584		710	54	48	6	52	9	43	384
8c	2	General Office		43,584		710	54	48	6	52	9	43	384
9a	0	City Park w/ Lake			171,445								
9b	1	Apartments	95			220	39	8	31	47	31	16	505
9c	1	Apartments	200			220	82	16	65	99	64	35	1064
9d	2	General Office		59,696		710	74	65	9	71	12	59	526
9e	2	General Office		42,765		710	53	47	6	51	9	42	377
9f	2	General Office		59,208		710	73	65	9	71	12	59	522
10a	2	General Office		8,400		710	10	9	1	10	2	8	74
10a	1	Apartments	20			220	8	2	7	10	6	3	106
10b	2	General Office		8,400		710	10	9	1	10	2	8	74
10b	3	Specialty Retail		4,200		820	3	2	1	13	6	6	144
10b	1	Apartments	30			220	12	2	10	15	10	5	160
10c	1	Apartments - Senior	90			220	9	3	6	12	7	5	251
10c	1	Apartments	90			220	37	7	29	45	29	16	479
10d	2	General Office		11,500		710	14	13	2	14	2	11	101
10d	3	Specialty Retail		11,500		820	9	6	4	34	17	18	395
10e	2	General Office		8,500		710	11	9	1	10	2	8	75
10e	3	Specialty Retail		4,250		820	3	2	1	13	6	6	146
10f	2	General Office		11,900		710	15	13	2	14	2	12	105
10f	3	Specialty Retail		8,500		820	7	4	3	25	12	13	292
10f	1	Apartments	14			220	6	1	5	7	5	2	74
10g	3	Specialty Retail		7,600		820	6	4	2	23	11	12	261
10g	2	General Office		7,600		710	9	8	1	9	2	8	67
10g	1	Apartments	36			220	15	3	12	18	12	6	192
10h	3	Specialty Retail		6,300		820	5	3	2	19	9	10	216
10i	3	Specialty Retail		6,100		820	5	3	2	18	9	9	210
10i	2	General Office		6,100		710	8	7	1	7	1	6	54
10i	1	Apartments	26			220	11	2	8	13	8	5	138
11a	3	Specialty Retail		17,000		820	14	8	5	51	25	26	584
11a	1	Apartments	118			220	48	10	39	59	38	20	628
11b	2	General Office		11,000		710	14	12	2	13	2	11	97
11b	1	Apartments	26			220	11	2	8	13	8	5	138
11c	2	General Office		20,700		710	26	23	3	25	4	20	182
11c	1	Apartments	50			220	20	4	16	25	16	9	266
11d	2	General Office		10,700		710	13	12	2	13	2	11	94
11d	3	Specialty Retail		10,700		820	9	5	3	32	16	16	368
11d	1	Apartments	26			220	11	2	8	13	8	5	138
11e	2	General Office		5,900		710	7	6	1	7	1	6	52
11e	3	Specialty Retail		11,800		820	9	6	4	35	17	18	405
11e	1	Apartments	44			220	18	4	14	22	14	8	234
11f	3	Specialty Retail		11,800		820	9	6	4	35	17	18	405
11f	2	General Office		5,900		710	7	6	1	7	1	6	52
11f	1	Apartments	44			220	18	4	14	22	14	8	234
11g	0	City Park			82,804								
12a	3	Sit Down Restaurant		12,000		931	8	4	4	72	48	24	864
12b	3	Community Center		160,000		310	207	126	81	186	69	117	2929
13a	3	Retail		19,200		820	15	9	6	57	28	29	660
13b	3	Retail		16,664		820	13	8	5	50	24	25	572
14a	3	Gas Station w/Convenience Store <sup>7</sup>		5,000		945	317	162	155	388	194	194	1563
14b	3	Retail		10,628		820	9	5	3	32	16	16	365

**Table 1 - Land Uses and Traffic Generation**

Zone/Block	Code	Land Use	Dwelling Units	Sq. ft.	Park Area <sup>1</sup> (sq. ft.)	ITE Code <sup>2</sup>	AM Peak			PM Peak			Daily
							Total	In	Out	Total	In	Out	Total
14c	3	Fast Food Restaurant w/Drive-Through		4,800		934	190	97	93	129	67	62	1905
15	3	Shopping Center		135,986		820	109	66	42	406	199	207	4671
16	3	Retail		94,960		820	76	46	30	283	139	145	3262
17a	3	Sit Down Restaurant		6,000		931	4	2	2	36	24	12	432
17b	3	Sit Down Restaurant		5,470		931	4	2	2	33	22	11	394
17c	3	Sit Down Restaurant		5,470		931	4	2	2	33	22	11	394
17d	0	City Park w/ Lake			480,000								
18a	1	Condos	80			230	28	5	23	33	22	11	372
18b	1	Condos	69			230	24	4	20	29	19	9	321
18c	1	Condos	48			230	17	3	14	20	13	7	223
18d	1	Townhomes	32			230	11	2	9	13	9	4	149
19a	1	Townhomes	52			230	18	3	15	22	14	7	242
19b	1	Single Family - Detached	14			210	8	2	6	11	7	4	107
19c	1	Townhomes	31			230	11	2	9	13	9	4	144
20a	1	Townhomes	42			230	15	3	12	17	12	6	195
20b	1	Single Family - Detached	14			210	8	2	6	11	7	4	107
20c	1	Townhomes	28			230	10	2	8	12	8	4	130
21a	1	Townhomes	77			230	27	5	22	32	21	11	358
21b	1	Townhomes	90			230	32	5	26	37	25	12	418
22a	1	Single Family - Detached	23			210	14	3	10	19	12	7	176
22b	1	Townhomes	72			230	25	4	21	30	20	10	335
23a	1	Single Family - Detached	44			210	26	7	20	36	22	13	337
23b	1	Single Family - Detached	19			210	11	3	9	15	10	6	145
24a	1	Single Family - Detached	7			210	4	1	3	6	4	2	54
24b	0	City Park w/ Lake & Amphitheater			320,000								
24c	1	Single Family - Detached	17			210	10	3	8	14	9	5	130
<b>Total</b>			1,982	1,724,042	1,484,249		3,889	2,272	1,618	5,502	2,578	2,924	57,079
<b>Residential Total (Code 1)</b>			1,982	0			748	153	595	916	595	322	9,953
<b>Office Total (Code 2)</b>			0	861,111			1,755	1,326	429	1,422	395	1,027	13,177
<b>Retail Total (Code 3)</b>			0	862,931			1,386	792	594	3,164	1,588	1,576	33,949
			1,982	1,724,042			3,889	2,272	1,618	5,502	2,578	2,924	57,079

**Notes:**

<sup>1</sup> Due to the minimal amount of traffic generated by parks, they were not considered traffic generators in the original study. Likewise, parks are not considered traffic generators in this forecast.

<sup>2</sup> The trip generation was based on the methods and average rates published in the *Institute of Transportation Engineers (ITE) Trip Generation Manual, 8th Edition*.

<sup>3</sup> The traffic generated by the park and ride was included in the analysis of the original study, however the unspecified volumes were added directly to the intersection traffic assignment instead of being listed with the other trip generation numbers. Accordingly, the traffic volumes generated by the park and ride facility are not considered with the rest of the generated traffic in this forecast.

<sup>4</sup> The number of dwelling units (DU) for the hotel was obtained by proportioning the proposed hotel to the hotel in the original study via their respective footprints. The hotel was modeled as having 32 rooms.

<sup>5</sup> Mortuary is assumed to operate similarly to a cemetery with 3 employees (ITE Land Use Code 566).

<sup>6</sup> Currently, there is no data for daily traffic volumes generated by 534 - Private School (K-8). For public elementary, junior high, and high schools, the ratio of the total daily traffic to the A.M. peak hour traffic is approximately 3.0. The total daily traffic generated by the charter school was calculated by multiplying the A.M. peak hour traffic by a factor of 3.0.

<sup>7</sup> Due to the lack of data for total weekday trips generated by 945 - Gas Station w/Convenience Store using square footage, the total weekday trips were calculated using the number of fueling positions. Based on the typical size of gas stations currently being constructed, it was assumed that new gas station will have 12 fueling positions.

The forecasts reflect a 20% internal capture rate consistent with the original AUAR's traffic impact study.



**APPENDIX F-**  
**OPERATIONS ANALYSIS (AVAILABLE**  
**UPON REQUEST)**



- Civil & Municipal Engineering
- Water & Wastewater Treatment
- Transportation Planning & Engineering Services
  - Aviation Services
- Water Resources Engineering
  - Landscape Architecture
- Environmental Review Services
- Cultural Resource Management
  - Land Surveying
- Geographic Information System Services
  - Project Funding & Financing



## APPENDIX C- STORM WATER ANALYSIS



# BOLTON & MENK, INC.

## Consulting Engineers & Surveyors

2035 County Road D East • Suite B • Maplewood, MN 55109-5314

Phone (651) 704-9970 • Fax (651) 704-9971

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June 25, 2015

Patrick Brama  
Economic Development Manager  
City of Ramsey  
7550 Sunwood Drive NW  
Ramsey, Minnesota 550303

RE: Future Business Park  
City of Ramsey  
Project No.: R16.109828

Dear Mr. Brama,

### **Project Background**

The city of Ramsey is considering the area west of Armstrong Boulevard, East of Plum Street, north of T.H. 10 and south of Alpine Drive, for future development. Storm water retention ponds will ultimately be required to control the runoff from the study area into the COR in accordance with the City's Surface Water Management Plan requirements. The following report summarizes the existing conditions and proposed pond layout options.

The site is situated in the Lower Rum River WMO (LRRWMO). Therefore, hydraulics, water quality, rate control, and volume reduction will be considered based on WMO and City requires. For the purposes of this study, preliminary regional stormwater management facilities were design based on assumed land uses and specific design requirements defined by LRRWMO.

### **Hydrologic and Hydraulic Modeling**

For this study, Bolton & Menk analyzed the existing and proposed conditions using Storm and Sanitary Analysis (SSA) developed by Autodesk, Inc. which utilizes NRCS TR-20 hydrology methodologies to hydrodynamically route stormwater through the drainage system. For this study, the 2-year, 10-year, and 100-year rainfall return intervals were analyzed using Atlas 14 rainfall depths and the US Soils Conservation Services (SCS) Type II 24-hour standard rainfall distribution. The corresponding rainfall depths are 2.86", 4.26", and 7.11", respectively. Modeling for future development was tied into existing regional modeling provided by the city.

### **Existing Conditions**

Drainage from the Lake Itasca outfall is directed toward the study area upstream of Alpine Dr. Overland flow passes through a series of culverts under Alpine Dr., Puma St. NW, and Armstrong Blvd. Flow at the Armstrong crossing is particularly critical as discharge enters the COR area. New development and stormwater management has been designed and constructed around the total contributing flow rate from

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the areas upstream of Armstrong Blvd.

It is our understanding that a storm sewer system installed in Bunker Lake Boulevard to manage the stormwater runoff within the right of way.

The City's regional hydrology and hydraulics model for the WMISS watershed was utilized to develop the existing peak flow rates into the COR area. Table 1 summarizes the peak inflow for a variety of rainfall return intervals.

*Table 1: Summary of Peak Flow Under Armstrong Blvd.*

Rainfall Event	Rainfall Depth	Peak Flow Through Armstrong Blvd.
	(in)	(cfs)
2-Year	2.86	10.1
10-Year	4.26	19.1
100-Year	7.1	22.1

### **Proposed Conditions**

The study area can was delineated three main areas based on land use as defined in Figure 1. These areas are further described below.

Potential regional pond locations were identified (Figure 1). Initially, ponds are assumed to be wet basins with dead storage sized equal to the runoff volume from a 2.5" rainfall event per LRRWMO. Therefore, volume reduction and water quality would be accommodated on site by the developer. These parameters may be changed as final land uses are established and as stormwater management goals are confirmed. For example:

- The basins could be converted to dry ponds and accommodate volume control.
- Ground water elevations should be confirmed to ensure that 3' separation from the water table can be achieved.
- The basins may be used as regional rate control, water quality, and volume reduction thereby eliminating the need for additional stormwater management on site.

### **Area 1: Public/Quasi-Public Area**

This area is defined as Public/Quasi-Public. Currently, the site has been proposed to house the Legacy Christian Academy campus. However, development may change. Therefore we have determined the total inflow and approximate sizing requirements per Lower Rum River WMO (LRRWMO) for each assumed rate of impervious area construction including the school site, single family residential, and employment district. Table 2 summarizes required dead storage and volume reduction for each land use option based on LRRWMO requirements.

Suggested areas for ponding include the northwest corner of the site, and the existing pond on the



southeast portion of the site. If development plans change, these ponds can easily be relocated. Also, sizing requirements may change if the area becomes multi-use.

*Table 2: Summary of Pond Volume Requirements for Multiple Uses in the Public/Quasi-Public Area.*

Future Land Use	Assumed Impervious Area	Dead Storage	1" Volume
	(ac)	(ft <sup>3</sup> )	(ft <sup>3</sup> )
School	40.5	500339	146979
Residential	34.2	434558	124110
Employment District	76.5	632759	277586

**Area 2: Residential Area**

North of the 150<sup>th</sup> Ln NW and on both east and west sides of Puma Street, the land use is proposed as single family residential. East of Puma, the proposed site is approximately 49 acres of which about 38% will be impervious. Pond volume requirements for dead storage and volume reduction are, 88,200 cubic feet and 67,590 cubic feet respectively. Proposed ponding for this site is in the south west corner of the proposed development.

West of Puma, the proposed site is approximately 47 acres of which about 38% will be impervious. Pond volume requirements for dead and live storage are, 84,600 cubic feet and 64,832 cubic feet respectively.

The proposed area for ponding is in the southeast corner of the site. The proposed ponds would overflow into the existing wetland, maintaining the existing flow paths through the downstream corridor.

**Employment District Area (Area 3)**

South of 150<sup>th</sup> Ln NW and west of Puma Street, the city is proposing to use this land for future industrial/commercial development. This area totals 51 acres, of which 85% will be new impervious, resulting in pond volumes of 91,800 cubic feet for dead storage and 157,361 cubic feet for volume reduction.

South of Bunker Lake Boulevard, the city plans to use the 79 acres for further commercial/industrial development, 85% of which will be new impervious area. This will require 142,400 cubic feet and 243,210 cubic feet of dead storage and volume reduction, respectively. Drainage from this area will ultimately connect into the storm sewer system along Bunker Lake and discharge into the pond in the southeast corner of the school property.

**Recommendations**



The ponds as laid out in this report indicate areas that are best suited for regional rate control basins only. It is recommended that additional design parameters and regional stormwater management planning be further refined as the areas begin to develop. These may include the following.

- Create regional facilities that accommodate rate control, water quality, and volume reduction and assess property owners to alleviate the City's upfront investment.
- Develop drainage and utility easements for the required pond foot print for ultimate build-out and require the developer to increase the size of the basin based on a percentage of developed area and/or impervious surface.
- Establish maximum rates of impervious surface construction per land use. Anything above those rates would have to accommodate rate control, water quality, and volume reduction on site.
- Trunk storm sewer lines should also be preliminarily sized to serve future development, routed to regional pond locations, and dedicated to drainage and utility easement.

Cost estimates have not been developed for the regional pond construction or internal site storm sewer conveyance. It is anticipated that costs associated with pond construction will be determined by the developer as site grading. Also, it is assumed that internal drainage will be accommodated by dry swales and ditch systems to reduce storm sewer costs.

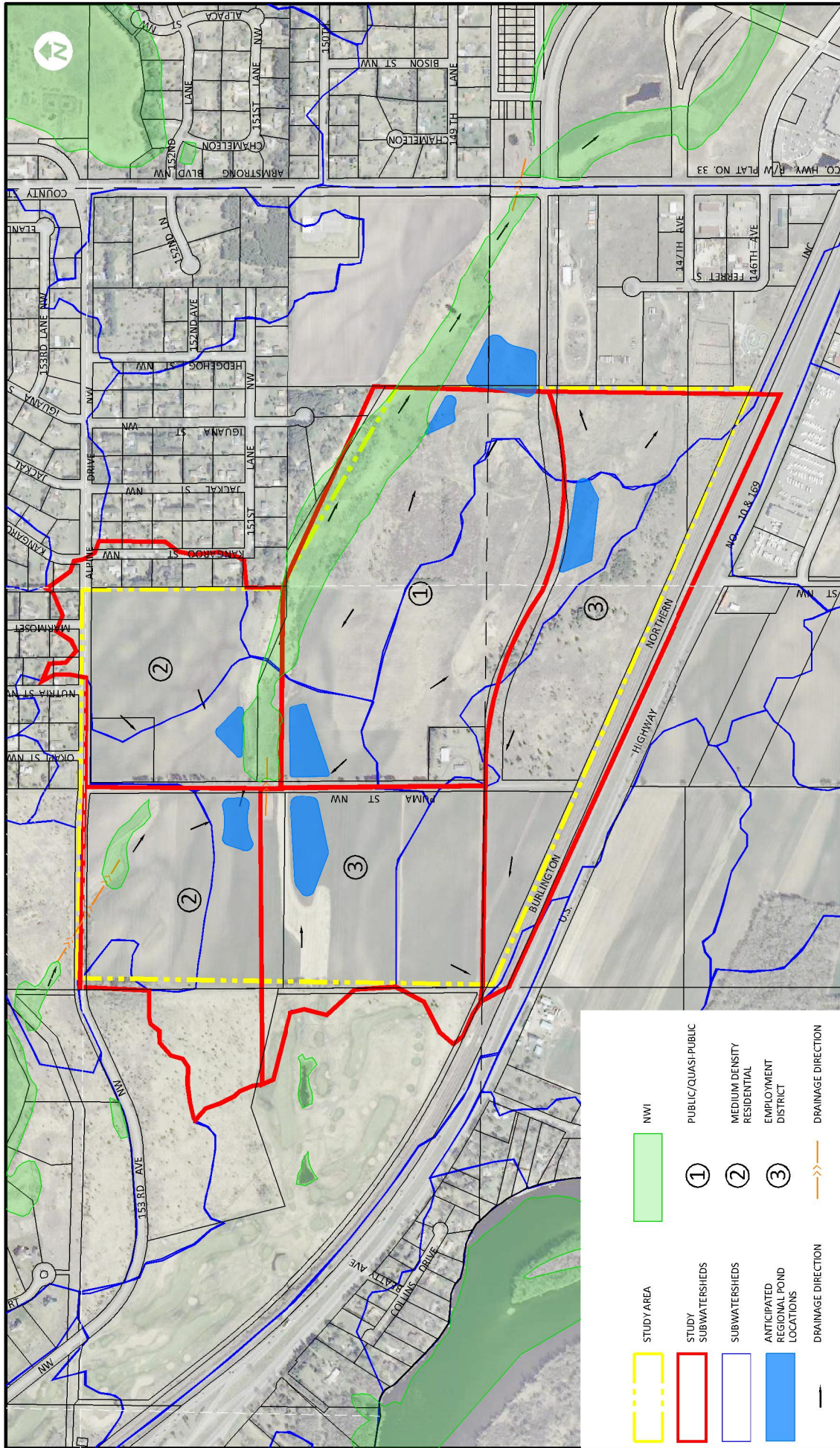
We appreciate the opportunity to present this preliminary report of findings. If you have any questions, please contact me at 651-704-9970 or [timol@bolton-menk.com](mailto:timol@bolton-menk.com) at your convenience.

Sincerely,

BOLTON & MENK, INC.

A handwritten signature in black ink that reads "Timothy J. Olson". The signature is written in a cursive, flowing style.

Timothy J. Olson, PE, CFM  
Water Resources Project Manager



**FUTURE BUSINESS PARK  
CITY OF RAMSEY, MINNESOTA**  
 FIGURE 16 - Regional Stormwater Considerations  
 June 2015

