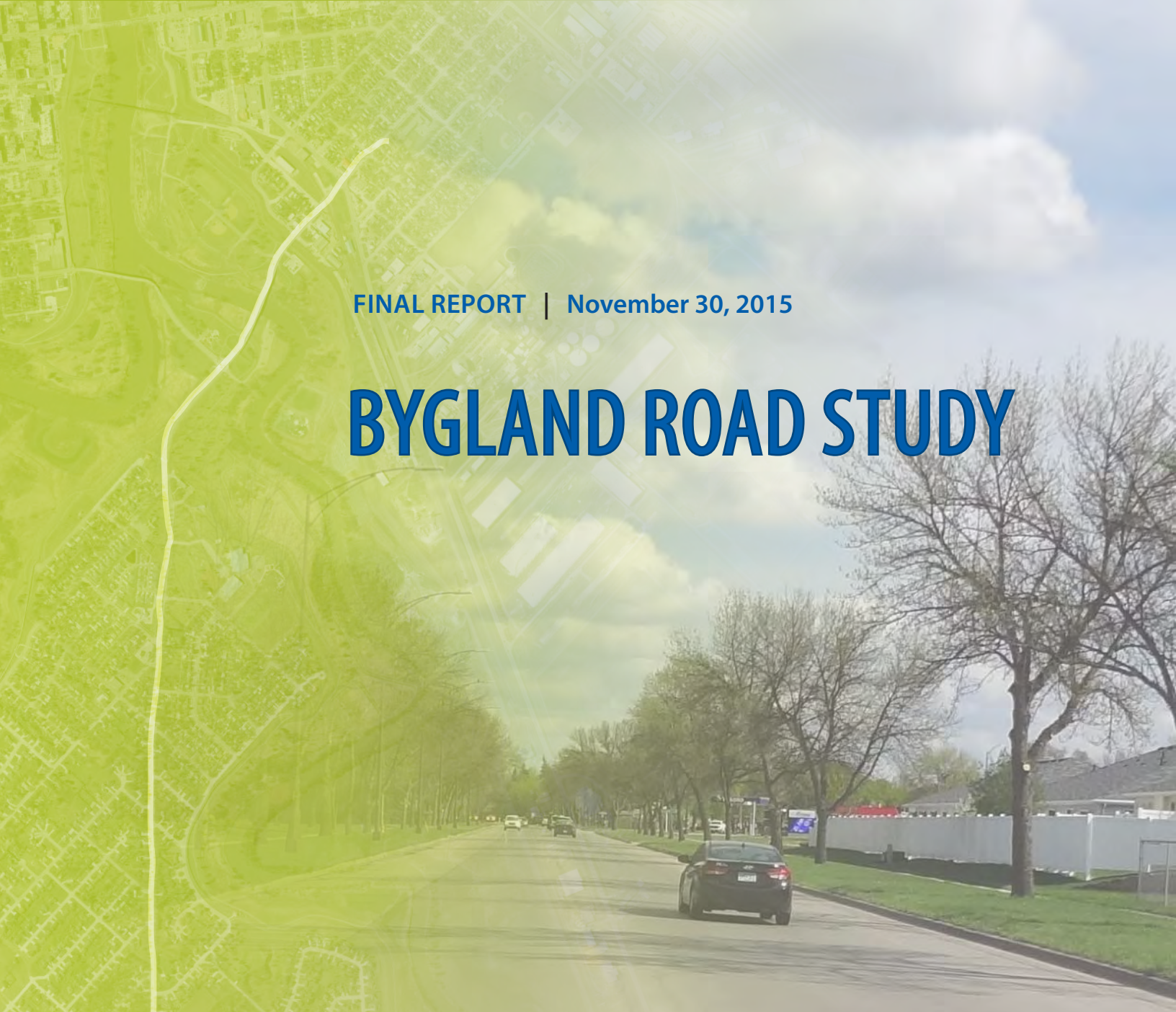
FINAL REPORT | November 30, 2015

BYGLAND ROAD STUDY



Prepared for:
Grand Forks - East Grand Forks
Metropolitan Planning Organization

Grand Forks - East Grand Forks
Metropolitan Planning Organization

Prepared by:
Alliant Engineering, Inc.

ALLIANT

Acknowledgements

Alliant acknowledges and thanks the members of the Study Review Committee for their participation in the study process. Their involvement provided valuable insight and was important to the successful completion of the study. The Bygland Road Study was prepared under the direction of:

Project Team

Teri Kouba, Planner, Grand Forks-East Grand Forks MPO
Earl Haugen, Executive Director, Grand Forks-East Grand Forks MPO

Study Review Committee

Brad Bail, East Grand Forks Engineering (WSN Engineering)
Jairo Viafara, Grand Forks-East Grand Forks MPO
Clarence Vetter, East Grand Forks City Council
David Pace, Superintendent ISD 595
Nancy Ellis, East Grand Forks Planning Department
Mike Hedlund, East Grand Forks Police Department
Jason Stardahl, East Grand Forks Public Works Department
David Murphy, East Grand Forks City Administrator
Patty Olsen, Safe Kids Grand Forks

Consultant

Alliant Engineering, Inc.
Minneapolis, MN

Notice

The preparation of this document was funded in part by the United States Department of Transportation with funding administered through the North Dakota Department of Transportation, Minnesota Department of Transportation, the Federal Highway Administration, and the Federal Transit Administration. Additional funding was provided through local contributions from the governments of Grand Forks, East Grand Forks, Grand Forks County, and Polk County. The United States Government and the States of Minnesota and North Dakota assume no liability for the contents or use thereof.

The document does not constitute a standard specification, or regulation. The United States Government, the States of Minnesota and North Dakota, and the Metropolitan Planning Organization do not endorse products or manufacturers. Trade or manufacturers' names appear herein only because they are considered essential to the objective of the document.

The contents of the document reflect the authors, who are responsible for facts and accuracy of data presented herein. Contents do not necessarily reflect polices of the States and Federal Department of Transportation.

Table of Contents

List of Figures

List of Tables

List of Appendices

Executive Summary

This study evaluates the 2.5-mile segment of Bygland Road from the Red Lake River to the southeastern city limits (just south of the schools). Bygland Road is the backbone for traveling to and from the "point" and serves as an important regional transportation corridor. However, this corridor also traverses through a residential neighborhood and provides access to the City's middle school and elementary school, which serve all of East Grand Forks. This study provides an opportunity for the community to plan for and identify future corridor improvements that will continue to maintain the transportation system importance, and will also provide a non-motorized transportation environment that it is comfortable, calms traffic, appropriate for the adjoining land uses, and safe for all users.

The Grand Forks-East Grand Forks Metropolitan Planning Organization (GF-EGF MPO) 2040 Long Range Transportation Plan (LRTP) has identified Bygland Road for further study. Public feedback on the LRTP and other studies has identified both the difficulty in gaining access to Bygland Road during the morning time period and the desire to better integrate the multimodal transportation alternatives along the corridor as key issues. This study will assist the City of East Grand Forks and the GF-EGF MPO in identifying potential improvement alternatives to address the study goals and key issues raised through the public participation process. The Bygland Road/5th Avenue, Rhinehart Drive and 13th Street intersections are three of the major components. This study will also consider the future bus transit, sidewalk consistency, multi-use trail connections and on street or off-street bicycle facilities within the corridor. Feasible alternatives for the corridor and individual intersections will be presented in this study.

Study Purpose

The GF-EGF MPO 2040 LRTP identifies future capacity deficiencies on the north end of the corridor and the need to address multimodal improvements along Bygland Road between the limits of 1st Street and the south city limits. Due to the wide roadway design, lack of intersection control and high a.m. peak hour traffic volumes associated with the city schools; gaining access to Bygland Road can be difficult and the current pedestrian and bicycle accommodations along the corridor are not comfortable for all users.

Although not currently programmed, the 2040 LRTP also identifies the extension of 32nd Avenue (located in Grand Forks) to the east that will ultimately connect to Bygland Road. The GF-EGF MPO is seeking to identify the appropriate near term and future roadway, intersection, and/or traffic control devices; to manage traffic growth on this roadway, in addition to identifying interim strategies.

The goals of this study are to:

- **Goal 1:** Evaluate feasibility, design options, and desire to provide an on street bike facility along Bygland Road.
- **Goal 2:** Examine traffic operations at key intersections, specifically 5th Avenue, Rhinehart Drive and 13th Street and potential options to improve mobility, access and safety.

- **Goal 3:** Improve pedestrian crossing opportunities and safety at key locations along the corridor.
- **Goal 4:** Examine the Cities Area Transit (CAT) and school bus stops and routes within the study area and potential to improve the modal connections.

A recommended transportation implementation plan will be provided to the GF-EGF MPO with a prioritized set of infrastructure, traffic operation and multimodal improvements that coincide with short term (0-5 years), mid-term (5-15 years) and long term (greater than 15 years) needs.

Public Involvement

The public involvement process included Study Review Committee (SRC) meetings, public open houses and a public feedback survey. The SRC met four times throughout the study process and provided review and guiding direction for the study. Three public open houses were held at key project milestones to encourage citizen participation in the study. Survey Monkey, an online survey software, was used to develop, collect, and analyze a simple survey questionnaire of 28 questions. At the conclusion of the survey, 44 responses were obtained. The 44 respondents who completed the survey provided important feedback relating to the current issues, important priorities and improvements along the project corridor.

A website was established at the beginning of the project to provide another way for the general public to be informed about the project status and to disseminate information. The URL for the site is http://www.theforksmpo.org/.

Corridor Needs

A detailed technical analysis was completed to evaluate the existing roadway, multimodal facilities, the future land use, and transportation network conditions. Key elements include; roadway/intersection safety, land use, planned infrastructure, programmed improvements, planned developments, forecast traffic volumes and traffic operations analysis. Identification of roadway/intersection deficiencies, gaps in pedestrian/bicycle trail connections and future transportation needs, as they relate to both motor vehicle traffic and multimodal facilities, are documented. Key corridor needs include:

1. Multimodal
   - Trail connections between the trailhead on 19th Avenue and the South Point Elementary School.
   - Address the 5th Street and Rhinehart Drive close access spacing and skewed approaches. Also, pedestrian accessibility gaps in the sidewalk forces pedestrians on to the street on the east side of the Bygland Road.
   - The existing sidewalk width along Bygland Road is not suitable to provide a comfortable and quality combined bicycle and pedestrian facility. Separation of the bicycle and pedestrian users would serve to target multiple user types and encourage multimodal opportunities along the corridor.
   - Crossing Bygland Road can be difficult at times. Measures to improve awareness, reduce exposure, and provide protection should be considered.

2. Mobility
    - Enhance corridor safety and corridor mobility effectiveness by considering left turn lanes at key intersections, travel lanes and installation of traffic control devices at key locations.
    - The northbound left turn onto 1st Street sometimes backs up and the lane definition into the turn lane is not clear.
    - Potential need for an additional northbound travel lane to address forecast traffic volumes (without the 32nd Avenue Bridge extension).
    - The existing two-lane pavement markings on Bygland Road are unclear to the motorists. The travel lanes are very wide, and with the absence of an on street parking demand, it is not clear where in the roadway the motorist should travel. At times motorists use the wide lane as two travel lanes.
    - Accessing Bygland Road during the a.m. peak period (7:30 a.m. to 8:15 a.m.) is challenging and the issues raised have been validated.

Alternatives Analysis

To address the existing issues, study goals, and concerns raised through the public participation process, a high level alternatives analysis was completed. The alternatives analysis is intended to identify as many practical solutions as feasible, given their characteristics, and then evaluate them based upon the project goals and other key factors. The control alternatives and conceptual layouts were analyzed to coincide with future land use and long term forecast horizon (year 2025 and year 2040). The alternatives analysis approach consisted of:

- Identifying high level strategies to meet the project multimodal and mobility goals. This included defining the applicable bicycle facility types, pedestrian improvement measures and applicable traffic control devices.
- Development of roadway typical section alternatives to integrate bicycling into the Bygland Road corridor.
- Development of conceptual geometric layouts to address access control and pedestrian safety at key intersections.
- A traffic operation analysis to assess the performance of key conceptual alternatives.

In general, the alternatives identified represent a retrofit of the existing roadway where transportation system trade-offs are required to accommodate a treatment strategy. A full reconstruction of Bygland Road was not considered in this study.

Recommended Implementation Plan

The implementation plan has identified improvement strategies at key locations along Bygland Road. In most cases, implementations of the improvement strategies are mutually exclusive of one another and could be constructed at any time. To address the critical needs of the corridor, the implementation plan has been developed to prioritize the recommendations over near term (within 5 years), mid-term (2020 to 2025) and long term (2026-2040) horizons. Figure ES-1

illustrates the recommended components of the near term implementation plan and Figure ES-2 illustrates the recommended components of the mid-term and long term implementation plan. The following provides a brief summary of the key recommended improvements for the Bygland Road corridor.

- **Goal 1: Evaluate feasibility and design options to integrate an on street bike facility along Bygland Road.**
  - The feasibility analysis identified ten cross-section alternatives to integrate bicycling or improve the street characteristics of Bygland Road. The implementation of standard on street bicycle lanes, and the removal of on street parking along the east side of Bygland Road is recommended.
  - The recommended on street bicycle lanes provide the most economical use of existing infrastructure and efficient reallocation of street space. This alternative provides dedicated space to pedestrians (existing sidewalks), bicycles (separated lane) and motorists with no change in motor vehicle operation. The bike lanes at 7 feet in width provide a comfortable and separated space within the street.
  - The segment of Bygland Road between 6th Street and 13th Street is 48 feet in width and could be marked to provide buffered lanes (by narrowing the parking and travel lanes to the minimum width allowed by Minnesota State Aid Rules). The implementation of buffered lanes will carry a higher cost than denoted in the estimates provided in the next section.
  - The provision of dedicated bicycle lanes also brings motor vehicle lane definition to Bygland Road, which is expected to provide more orderly traffic flow.
  - The establishment of a designated bicycle route that connects the elementary school with the regional trail system (west and east of Bygland Road) should be made.

- **Goal 2: Examine traffic operations at key intersections, specifically 5th Avenue, Rhinehart Drive and 13th Street and potential options to improve vehicle mobility, left turn access and safety.**
  - The alternatives analysis evaluated traffic signals and roundabout intersection designs to improve access to Bygland Road. Based on the evaluation, roundabout intersection control is recommended.
  - Roundabouts on Bygland Road will provide the overall most efficient traffic control device, with the least overall delay when considering a 24-hour day, weekends and non-school days.
  - Roundabouts are expected to prioritize left turn access onto Bygland Road, which addresses a key issue raised by the community.
  - Federal funding and other funding opportunities can be sought to provide assistance with implementation sooner than could be accomplished with the traffic signal.
  - The intersections can be designed for continuous flow at a low operating speed, which may result in traffic calming along the corridor.
  - Roundabouts improve the pedestrian access and safety over the existing conditions through reduced exposure, the provision of wide median refuge islands, and marked crosswalks.

- **Goal 3: Improve pedestrian crossing opportunities and safety at key locations along the corridor.**
    - Refuge median islands are recommended at the James Avenue, 8th Street and Middle School driveway intersections to provide reduced exposure and two stage crossing of Bygland Road.
    - Installation of curb extensions at the 6th Street intersection will significantly reduce the crossing distance for pedestrians and increase visibility of pedestrians waiting at the intersection corners.
    - To address students crossing at the 13th Street intersection, prior to the future installation of a roundabout, a HAWK signal is recommended. The HAWK is expected to provide the greatest protection (similar to a traffic signal); however, it is far more efficient since it will be deactivated when no pedestrians are present and the intersection can continue to operate as a two way stop control.
    - A sidewalk should be established on the west side of Bygland Road that connects 5th Avenue with the regional trail system.
    - Narrow segments of sidewalk (e.g., Metro Court to 4th Street) should be widened to a minimum of 5 feet.
    - The above improvement measures, coupled with the future intersection control improvements at 5th Avenue and Rhinehart Drive, result in improved pedestrian access at frequent locations along Bygland Road, and should greatly improve the pedestrian environment of the corridor.

- **Goal 4: Examine Cities Area Transit (CAT) and school bus stops and routes within the study area and potential to improve the modal connections.**
    - With the construction of the roundabout at Rhinehart Drive, it is recommended that Route 11 be realigned to access Bygland Road via Rhinehart Drive instead of 6th Street.
    - Further study is necessary to explore the demand for extending transit service further south into the “point” neighborhood. Public feedback indicated a low desire for additional transit service along the corridor.
    - The GF-EGF MPO should consider replacing Route 11 bus transit with an on-demand transit service within the “point” area.
    - School bus stops should continue to be provided on the cross-street stopped approaches.

Implementation Cost

Table ES-1 documents the estimated construction, project design and administration costs for each recommended improvement. The costs have been estimated for the average year of expenditure and include a 5 percent per year inflation factor.

Table ES-1. Implementation Cost Summary

Near Term Improvements (Year 2016 to 2020)

Element	Intersecton or Roadway Segment	Improvement Description	Construction Cost [1]	Engineering, Admin, Utilities and Inspection [2]	Total Cost
1	Bygland Road - 1st Street to South City Limits	On Street Bike Lane	Paint - $172,000 Epoxy - $210,000 GR IN Poly - $500,000	$43,000	Paint - $215,000 Epoxy - $253,000 GR IN Poly - $543,000
2	19th Avenue S, Greenway Boulevard and 13th Street	Establish Bike Route Connection Between Elementary School and Regional Trails	$20,000	$5,000	$25,000
3	Bygland Road at 1st Street N	Install Green Left Turn Arrow (with Flashing Yellow Arrow Indications)	$50,000	$12,500	$62,500
4	CAT Route 11	Re-route CAT Route 11 to Bygland Road/Rhinehart Drive Intersection.	$0	$0	$0
5	Bygland Road at Rhinehart Drive	Construct Roundabout [3]	$1,100,000	$275,000	$1,375,000
6	Bygland Road - Regional Trail (South of 1st Street) to 5th Avenue	Construct Sidewalk	$57,000	$14,250	$71,250
7	Bygland Road at 13th Street	Install HAWK Signal System	$225,000	$56,250	$281,250
Total			**$1,624,000 to $1,952,000**	**$406,000**	**$2,030,000 to $2,358,000**

Mid Term Improvements (Year 2021 to 2025)

Element	Intersecton or Roadway Segment	Improvement Description	Construction Cost [1]	Engineering, Admin, Utilities and Inspection [2]	Total Cost
8	Bygland Road at Middle School Access	Construct Refuge Median	$115,000	$28,750	$143,750
9	Bygland Road at 5th Avenue	Persue 5th Avenue Realignment [4] (Maintain Stop Control)	$655,000	$163,750	$818,750
10	Bygland Road - 4th Street to Metro Court (East Side)	Widen Existing 4 foot Sidewalk to 5 foot Sidewalk	$50,000	$12,500	$62,500
Total			**$820,000**	**$205,000**	**$1,025,000**

Long Term Improvements (Year 2026 to 2040)

Element	Intersecton or Roadway Segment	Improvement Description	Construction Cost [1]	Engineering, Admin, Utilities and Inspection [2]	Total Cost
11	Bygland Road at 13th Street	Construct Roundabout	$2,800,000	$700,000	$3,500,000
12	13th Street - Bygland Road to Elementary School	Construct Sidewalk on South Side of Street	$325,000	$81,250	$406,250
13	Bygland Road at 6th Street	Construct Curb Extensions	$420,000	$105,000	$525,000
14	Bygland Road at James Street and 8th Street	Construct Refuge Medians	$195,000	$48,750	$243,750
15	Bygland Road at 5th Avenue	Construct Roundabout	$1,500,000	$375,000	$1,875,000
Total			**$3,740,000**	**$935,000**	**$4,675,000**

(1) Construction costs are estimated year of expenditure (YOE) with an assumed 5% per year inflation rate
(2) Engineering, Administration, Utilities and Inspection are assumed to be 25% of the YOE construction cost.
(3) Rhinehart Roundabout requires an estimated 1,500 SF easement for relocation of the gas station driveway and an estimated 1,600 SF of right of way acquisition (2 parcels) to accommodate potential future expansion
(4) The future realignment of 5th Avenue requires an estimated 20,500 SF of right of way acquisition (1 parcel).

Bygland Road Study: Prioritized Improvement Plan

Near Term Improvements (Within 5 Years) High Priority

Location 1
Stripe Bike Lanes on Bygland Road (1st Street to South City Limits). Establish No Parking Zone on East Side.

Location 2
Designate bike route between Elementary School and Regional Trail (Shared Lane Markings and Signing) and bike route along Greenway between Regional Trail access and Bygland (Shared Lane Markings and Signing)

Near Term Improvements (Within 5 Years)

Location 3
Install Green Left Turn Arrow (with Flashing Yellow Arrow Indications) at 1st Street N

Location 4
Reroute Route 11 to Bygland Road/Rhinehart Drive Concurrent with Roundabout

Location 5
Preliminary Design and Construction of Roundabout at Rhinehart Drive

Location 6
Construct Sidewalk between 5th Avenue and Regional Trail

Location 7
Install HAWK signal at 13th Street

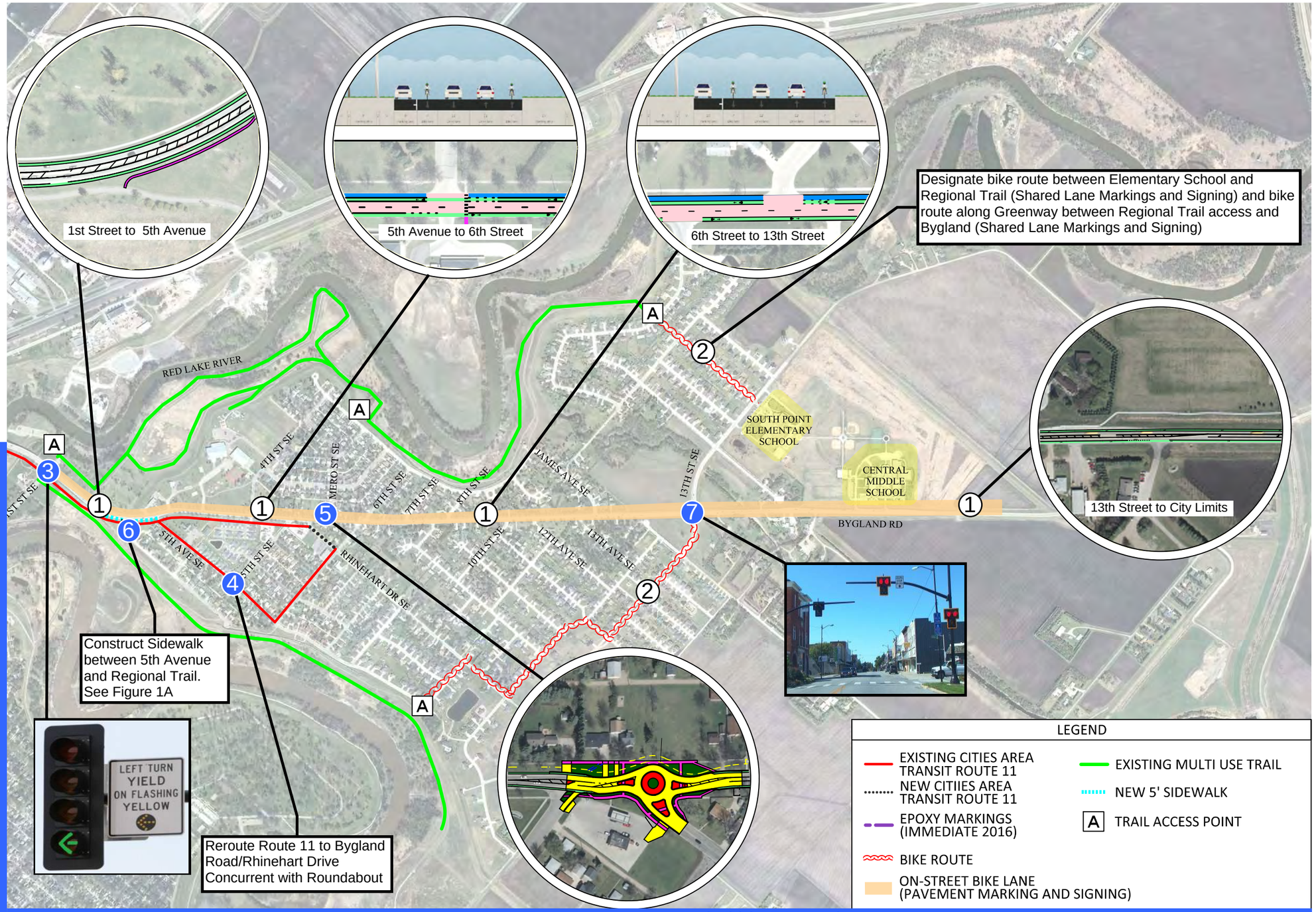


FIGURE ES-1
NEAR TERM IMPLEMENTATION PLAN

ALLIANT ENGINEERING

Bygland Road Study: Prioritized Improvement Plan

Mid Term Improvements (2021-2025)

Location 8
Construct refuge median to provide bike access to Middle School

Location 9
Pursue 5th Avenue realignment (ROW Acquisition Required), maintain stop control

Location 10
Widen existing 4’ Sidewalk to 5’ sidewalk between 4th Street and Metro Court

Long Term Improvements (2026-2040)

Location 11
Construct Roundabout at 13th Avenue

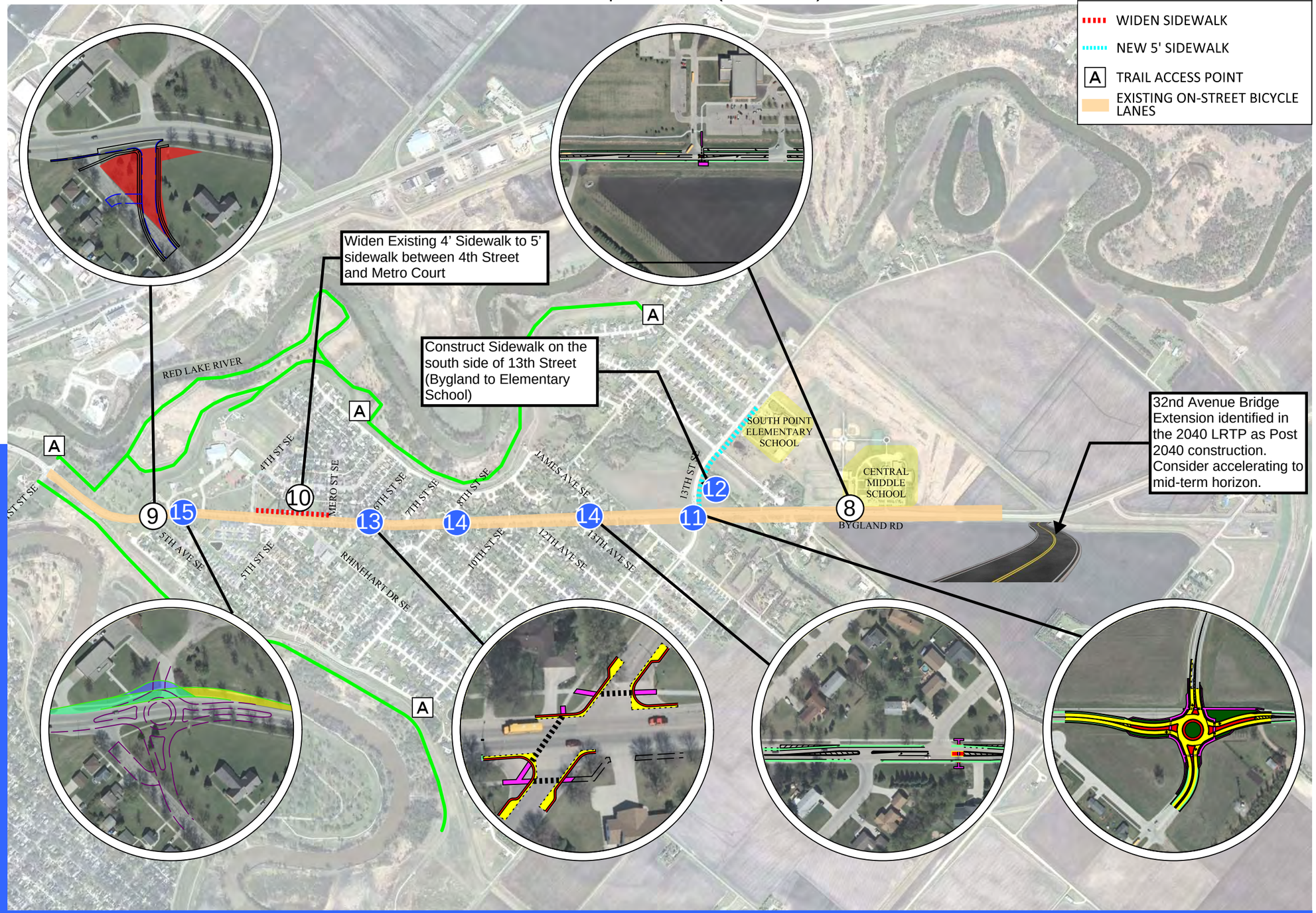
Location 12
Construct Sidewalk on the south side of 13th Street (Bygland to Elementary School)

Location 13
Construct Curb Extensions at 6th Street

Location 14
Add Median/Left Turn Lanes at James and 8th Street

Location 15
Construct Roundabout at 5th Avenue

Mid Term Improvements (2021-2025)



Long Term Improvements (2026-2040)

FIGURE ES-2
MID TERM AND LONG TERM IMPLEMENTATION PLAN

ALLIANT ENGINEERING

1.0 Introduction

This study evaluates the 2.5 mile segment of Bygland Road from the Red Lake River to the southeastern city limits (just south of the schools). Bygland Road is the backbone for traveling to and from the "point" and serves as an important regional transportation corridor. However, this corridor also traverses through a residential neighborhood and provides access to the City's middle school and elementary school, which serve all of East Grand Forks. This study provides an opportunity for the community to plan for and identify future corridor improvements that will continue to maintain the transportation system importance, and will also provide a non-motorized transportation environment that is comfortable, calms traffic, appropriate for the adjoining land uses, and safe for all users.

The Grand Forks-East Grand Forks Metropolitan Planning Organization (GF-EGF MPO) 2040 Long Range Transportation Plan (LRTP) has identified Bygland Road for further study. Public feedback on the LRTP and other studies has identified difficulty in gaining access to Bygland Road during the morning time period and the desire to better integrate the multimodal transportation alternatives along the corridor as key issues. This study will assist the City of East Grand Forks and the GF-EGF MPO in identifying potential improvement alternatives to address the study goals and key issues raised through the public participation process. The Bygland Road/5th Avenue, Rhinehart Drive and 13th Street intersections are three of the major components. This study will also consider the future bus transit, sidewalk consistency, multi-use trail connections and on street or off-street bicycle facilities within the corridor. Feasible alternatives for the corridor and individual intersections will be presented in this study.

The technical analysis will be supplemented by stakeholder input throughout the study process. A diverse Steering Committee, comprised of local government officials and school representatives participated in the development of alternatives and the study recommendations.

1.1 Project Location

The study area includes the southern area of East Grand Forks bordered by the Red River and 1st Street on the west, Red Lake River and 1st Street on the east, Bygland Road and Central Middle School on the south. As part of the study, all intersections along the corridor were evaluated. Through the study development process, conceptual alternatives were developed for the following intersections:

- Bygland Road and 1st Street
- Bygland Road and 5th Avenue
- Bygland Road and 5th Street/Rhinehart Drive
- Bygland Road and 8th Street
- Bygland Road and James Avenue
- Bygland Road and 13th Street

Figure 1.1 illustrates the study area and intersections in the southeast portion of the City of East Grand Forks.

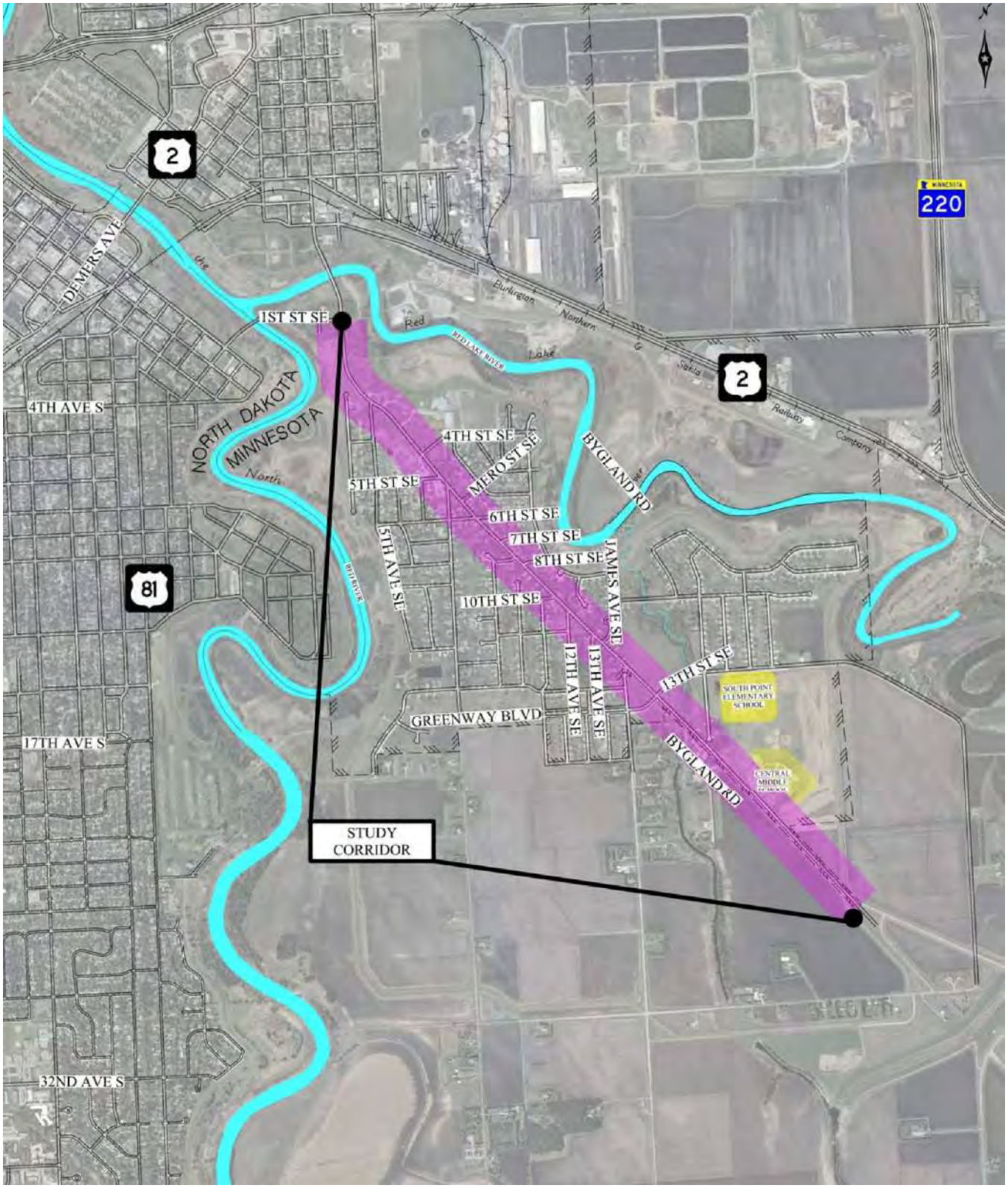


Figure 1.1 Study Area

1.2 Study Purpose

The GF-EGF MPO 2040 LRTP identifies future capacity deficiencies on the north end of the corridor and the need to address multimodal improvements along Bygland Road between the limits of 1st Street and the south city limits. Due to the wide roadway design, lack of intersection control and high a.m. peak hour traffic volumes associated with the city schools, gaining access to Bygland Road can be difficult and the current pedestrian and bicycle accommodations along the corridor are not comfortable for all users.

Although not currently programmed, the 2040 LRTP also identifies the a potential bridge over the Red River, and extension of 32nd Avenue (located in Grand Forks) to the east, that will ultimately connect to Bygland Road. The GF-EGF MPO is seeking to identify the appropriate near term and long term roadway, intersection, and traffic control devices; and to also identify interim strategies to manage traffic growth on this roadway.

The goals of this study are to:

- **Goal 1:** Evaluate feasibility, design options, and desire to provide an on street bike facility along Bygland Road.
- **Goal 2:** Examine traffic operations at key intersections, specifically 5th Avenue, Rhinehart Drive and 13th Street and potential options to improve mobility, access and safety.
- **Goal 3:** Improve pedestrian crossing opportunities and safety at key locations along the corridor.
- **Goal 4:** Examine Cities Area Transit (CAT) and school bus stops and routes within the study area and potential to improve the modal connections.

The outcome of the study will provide a recommended transportation plan showing future infrastructure improvements, capital improvement programming costs and an implementation plan.

1.3 Stakeholder and Public Involvement

A key part to the completion of the study is the stakeholder and public involvement process, which included the following:

- Study Review Committee (SRC)
- Public Meetings
- Project Website

1.3.1 Study Review Committee

The SRC consisted of members of the East Grand Forks School District, East Grand Forks Engineering, East Grand Forks Public Works – Streets and Planning and the GF-EGF MPO. The SRC was at the center of the public involvement process and provided review and guiding direction for the study. They were given the opportunity to provide feedback on technical analysis, make recommendations on improvement alternatives, and guide the development of the study recommendations.

The SRC met four times over the course of the study and was an integral part in determining recommendations for the study area.

- **SRC Meeting 1** – discussed the project goals, the major issues of concern, challenges and set a framework for key assumptions in the development of the future improvement alternatives.
- **SRC Meeting 2** – presented a wide range of improvement alternatives to address the key mobility concerns, bicycle facility design options, pedestrian improvements and traffic control devices that address mobility concerns. Feedback and direction on key alternatives and alternative ideas was obtained.
- **SRC Meeting 3** – held following the second open house with the goal of identifying the alternatives, improvement prioritization and funding, and setting the framework for the implementation plan.
- **SRC Meeting 4** – provided a final summary of improvements for each key study area, project goals and finalized the study recommendations and implementation plan.

1.3.2 Public Meetings

Three public open houses were held to encourage citizen participation in the study. The goal of the public open houses was to provide a forum that allowed interested citizens the opportunity to:

- Be actively engaged in the planning process;
- Provide comment and express ideas;
- Distribute and present information; and
- Serve as listening sessions for the project team

Comments and feedback received throughout the public meeting process have been incorporated as appropriate throughout the study recommendations. The public open houses were advertised through a press release, neighborhood association meetings the MPO website and other venues. The following provides details of each meeting:

- **1st Public Open House** – Held on May 12th at the East Grand Forks Senior Center. The existing conditions and deficiencies of the study area were presented. In addition, background information on bicycle facility types and pedestrian improvement strategies were discussed. The meeting participants were given the opportunity to provide areas of concerns, outline key issues and to discuss important priorities for the corridor.
- **2nd Public Open House** – Held on July 23rd at the East Grand Forks Senior Center. All alternatives for each key focus area, identified issues and study objectives were presented and discussed. The pros and cons of each alternative and traffic control device, including the range of construction costs were discussed.
- **3rd Public Open House** – Held on September 23rd at the East Grand Forks Senior Center. A synopsis of the study process was presented along with the key components of the recommended transportation plan. Project cost estimates and the implementation strategy were also discussed.

Questions and comments from the Public Meetings are included in Appendix A.

1.3.3 Public Survey

Throughout the entire Bygland Road Study, community outreach was prioritized in an effort to maximize involvement and input from community and stakeholders. Survey Monkey, an online survey software, was used to develop, collect, and analyze a simple survey questionnaire of 28 questions. The survey was advertised through the city utility billing mailing, which reached the majority of citizens within the area. In addition, a prominent banner and icon were added to the Bygland Road Study website homepage directing site visitors to participate in the survey. The survey period was offered during the months of May and June 2015

At the conclusion of the survey, 44 responses were obtained. The 44 respondents who completed the survey were providing important feedback relating to the current issues, important priorities and improvements along the project corridor. Figure 1.2 shows how the respondents rated the important corridor priorities.

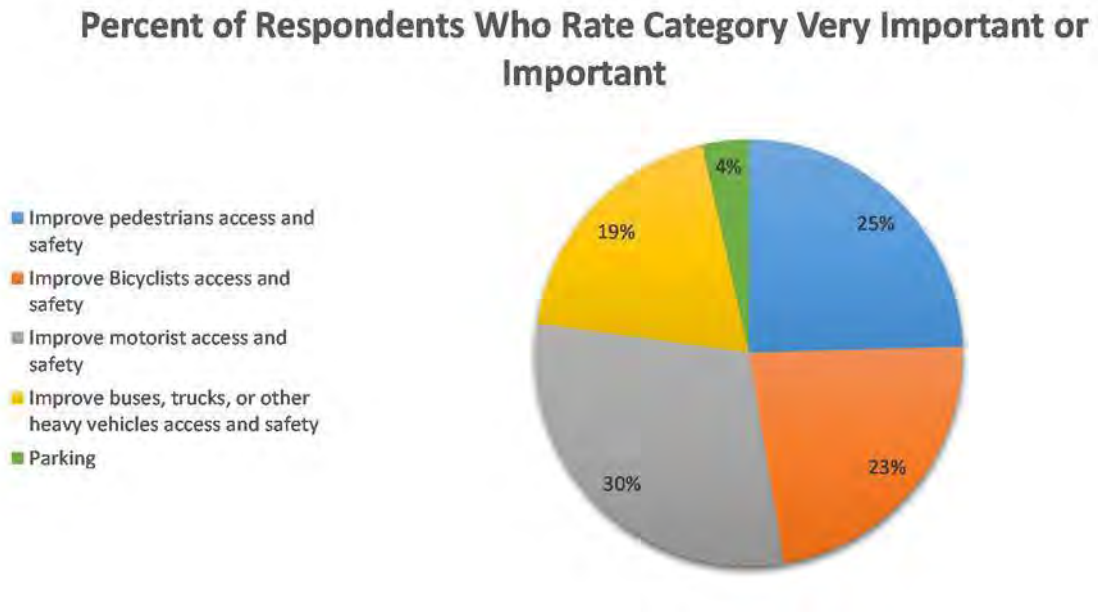


Figure 1.2 Survey Response Summary – Important Priorities

Key conclusions include:

- The community's highest concern is related to mobility with 30 percent of respondents viewing motorist access and safety upgrades as very important or important. Parking along the corridor was deemed the least important with 4 percent of respondents rating parking along Bygland Road as very important to important.
- The biggest concern related to specific intersection concerns was traffic volume, with 41 – 52 percent of respondents rating this as very important or important to fix. Left turn movements were second with a 41 – 49 percent rating as very important to important. Bicycle and pedestrian upgrades were rated as the most important or important priority by 16- 38 percent of the respondents.

- Overwhelming, the community's highest preference is to install a traffic control device at the Bygland Road/Rhinehart Drive-5th Street and/or Bygland Road/13th Street intersections to help slow down drivers, allow more gaps for cross street traffic to enter the intersection and help facilitate safer bicycle and pedestrian crossings.

A memorandum summarizing the survey responses and the detailed responses to each survey question is provided in Appendix B.

1.3.4 Project Website

A website was established at the beginning of the project. The URL for the site is http://www.theforksmpo.org/Pages/Projects.htm. The purpose of the website is to provide another way for the general public to be informed about the project status and to disseminate information. All documents prepared for the project and public meetings have been posted to the website.

1.4 Previous Studies Completed for the Area

Many components of this study are built from information presented in previous studies completed for the area. The following is a list of the previous studies that apply:

- *Street and Highway Plan*[1]
- *Transit Development Plan*[2]
- *GF-EFG Bike/Pedestrian Plan*[3]

1.5 Environmental Justice

Environmental Justice is an important part of the transportation planning process. Figure 1.3 illustrates the Environmental Justice areas within the Grand Forks and East Grand Forks region. The three primary principles of Environmental Justice include:

- Avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects. Including social and economic effects, on minority populations and/or low-income populations
- Ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
- Prevent the denial of, reduction in, or significantly delay in the receipt of benefits by minority populations and/or low-income populations.

The public participation process upholds the three principles of Environmental Justice and the alternatives described in this study are not expected to result in any disproportionately high or adverse effects on minority or low-income populations. Three open house meetings were conducted to obtain public feedback throughout the study process. The meetings were held within the community of impact and the meetings were advertised through press releases, utility mailings,

[1] *Grand Forks-East Grand Forks Long Range Transportation Plan Update*, Street & Highway Plan, December 2013
[2] *Grand Forks-East Grand Forks Long Range Transportation Plan Update*, Transit Development Plan, January 2014
[3] *Grand Forks-East Grand Forks Long Range Transportation Plan Update*, Bike & Pedestrian Plan, December 2013

website postings and neighborhood association meetings. The goal of the advertisement was to reach all demographics and areas of the community. In addition, an online survey was conducted to understand the existing concerns of the public, conflict areas, and roadway usage which was distributed using public utility bill mailings. A project page hosted on the GF-EGF MPO website, which is accessible to all public, was created and kept up to date with study documents and meeting notices.

Table 1.1 lists the census data gathered using the sign in sheets filled out on the North Dakota Department of Transportation (NDDOT) Title VI Public Participation Survey from all of the open houses conducted.

Table 1.1 Open House Participation Survey Summary

Location	Percent Male	Percent Female	Average Age	Percent Racial Minority	Percent Disabled	Percent Public Assistances
Senior Citzens Center	60%	40%	Over 55	0%	20%	0%

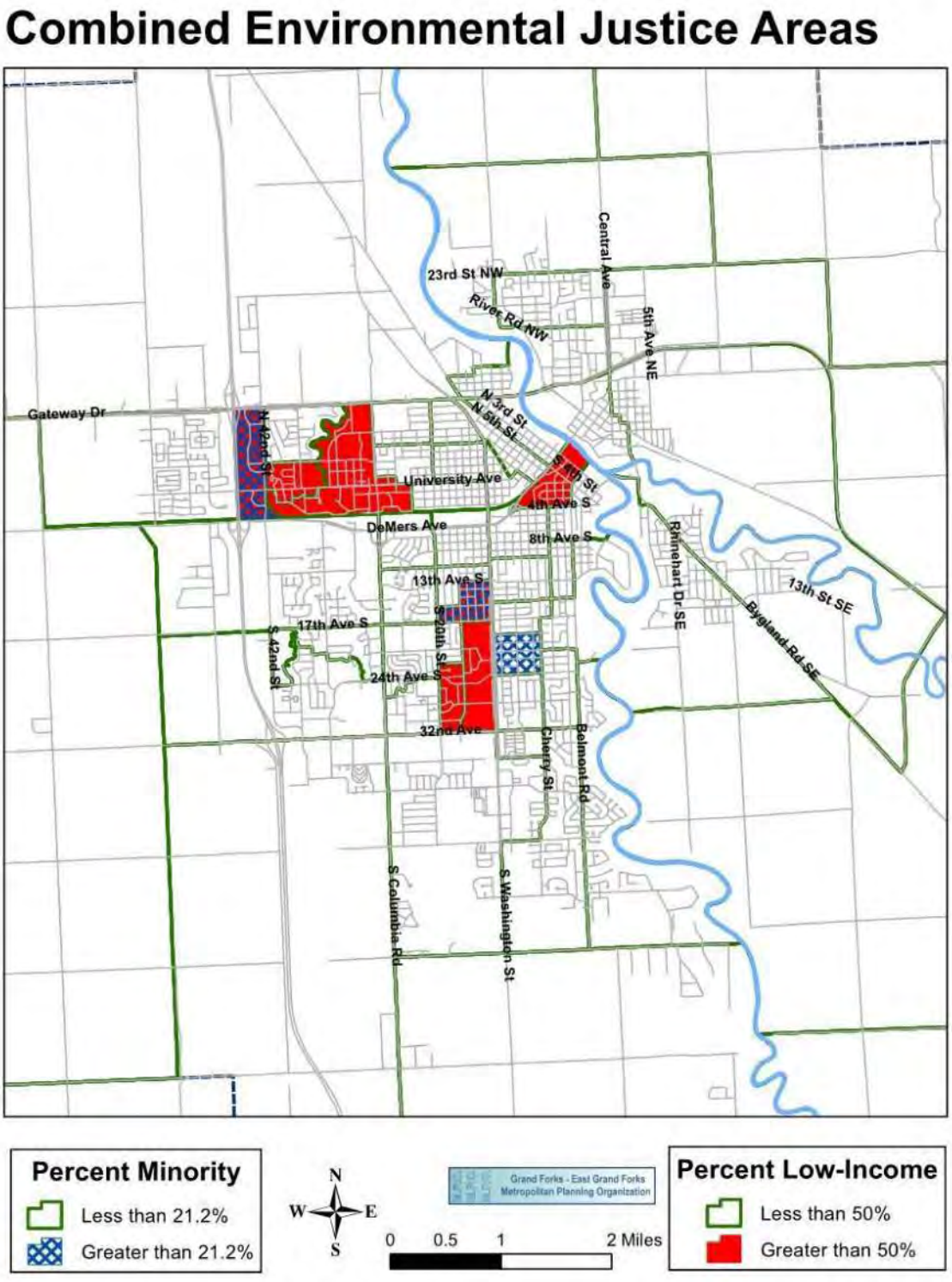


Figure 1.3 Environmental Justice Areas

2.0 Existing and Future Conditions

Key components of the existing and future conditions for the Bygland Road Study include land use, corridor characteristics, mobility (traffic operations) and roadway safety. The existing and future transportation network conditions are defined in the following sections.

2.1 Land Use

The study area is primary residential with a mix of commercial and park space. Commercial land uses consist of Orton's Gas and Frandsen Bank & Trust at the Bygland Road/Rhinehart Drive intersection. Residential land uses are mainly located between the Red River and Red Lake River. Figure 2.1 shows the existing land use inventory from 2010 as detailed in the City of East Grand Forks 2040 Land Use Plan[4].

Figure 2.1 Existing Land Use

[4] City of East Grand Forks 2040 Land Use Plan, http://www.egf.mn/DocumentView.aspx?DID=799

2.2 Corridor Characteristics

The following sections define the key roadway characteristics including the functional classification, roadway geometrics, and traffic control devices.

2.2.1 Functional Class

Roadways serve two major functions: access and mobility. The function of a roadway is dependent on its classification. Interstates and principal arterials provide the highest degree of mobility but are limited in providing land access. Local streets provide a high degree of land access with less mobility. Figure 2.2 shows a comparison of the different functional classifications relating access to mobility.

Source: FHWA Publications No. FHWA-RD-91-044 (Nov 1992)

Figure 2.2 Access and Mobility Relationship to Functional Classification

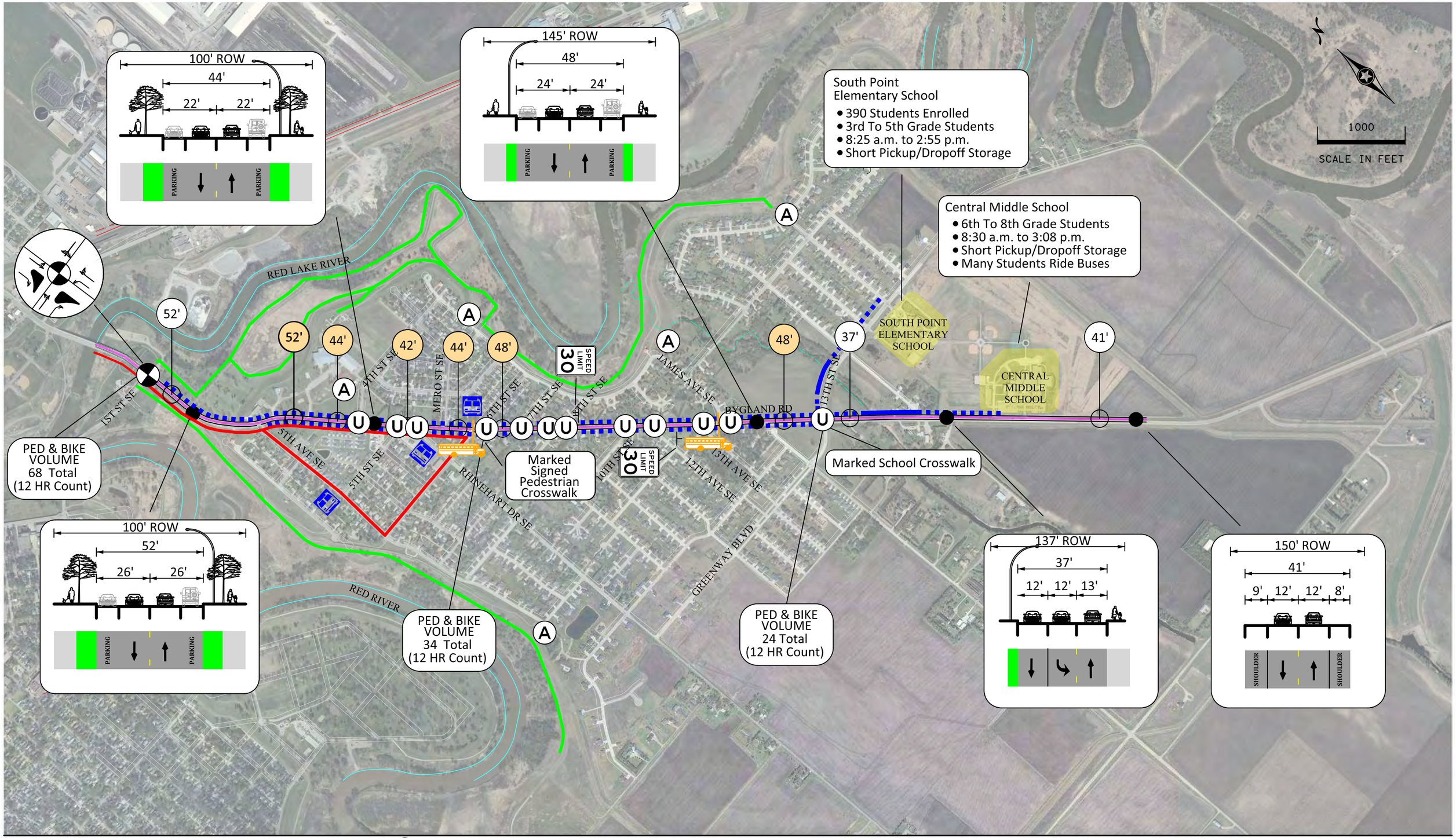
The Bygland Road corridor is defined as a Minor Arterial. The corridor functions similar to a state aid arterial where mobility is prioritized, but more emphasis on access is provided. It is noted that Bygland Road is the primary north-south arterial in the City of East Grand Forks. Figure 2.3 shows

the transportation system is functional classification of the surrounding roadway network as defined in the GF-EGF LRTP.

Figure 2.3 Transportation System Functional Classification

2.2.2 Key Geometrics and Multimodal Features

Bygland Road is a wide two lane roadway, with varying right of way (ROW) greater than 100 feet, along the length of the corridor. On street parking is allowed along both sides of Bygland Road; however, is lightly utilized. Other important existing corridor characteristics include the location and type of traffic control devices, street width, bicycle network (trails), location of bus stops, and pedestrian access and sidewalks. School buses currently stop at two locations along Bygland Road corridor; however, the stops occur on the side street approaches. Figure 2.4 illustrates the existing roadway and corridor characteristics within the Bygland Road study area.



BYGLAND ROAD STUDY

ALLIANT ENGINEERING

Traffic Signal
Minor Arterial
Cities Area Transit Route 11
Two-Way Stop Controlled
Cities Area Transit Route 11 Bus Stop
Multi Use Trail
Greenway Access Point
Existing Sidewalk (Back Of Curb)
Existing Sidewalk (W/Blvd)
School Bus Stop
School Safe Route Crossing
52' Roadway Width (No Parking)
42' Roadway Width (Parking Allowed)

FIGURE 2.4
EXISTING CORRIDOR CHARACTERISTICS

2.3 Roadway Safety

The number and locations of crashes in the study area were analyzed to help identify and address safety problem areas. Crash data can be analyzed to identify problem locations or segments, crash patterns, and probable causes. If root causes and locations can be identified, the means to reduce the number and severity of crashes may be developed. A review of the corridor crash records was conducted to evaluate the safety characteristics of the roadway. Historical crash data from the most recent 5 years, 2010 to 2014, was obtained from MnDOT's Crash Mapping Analysis Tool (MnCMAT).

2.3.1 Key Factors in Safety Analysis

In examining these crashes, four key factors were considered: (1) crash rates, (2) critical crash rates, (3) crash severity, and (4) distribution of crashes.

Crash Rate

History has proven that crashes are a function of exposure. Roadways with higher traffic volumes experience more crashes than similar roadways with lower volumes. Rather than documenting the number of crashes that occur in a particular segment or at a particular intersection, the crash rate must be considered. Crash rates normalize different locations with varying traffic volumes, providing a useful tool in comparing the locations with respect to safety.

The first key factor in safety analysis is the crash rate. Intersection crash rates are defined by the number of crashes occurring per million entering vehicles (MEV). Intersections with high volumes can be compared to intersections with low volumes using the intersection crash rate. Actual crash rates at specific locations can be compared to average or typical values for a roadway of the same type.

Critical Crash Rate

Crash occurrence is somewhat random by nature. Identifying every intersection with a crash rate above the average value in an analysis would produce a large amount of data that may not be statistically relevant with respect to safety deficiencies. The critical crash rate, the second key factor in safety analysis, identifies those locations that have a crash rate higher than similar facilities by a statistically significant amount. The critical crash rate is calculated by adjusting the system wide average based on the amount of exposure and a statistical constant indicating level of confidence. Although varying confidence levels are typically utilized, the 99.5 percentile confidence interval was selected for all safety calculations for this study. At locations where the actual crash rate exceeds the critical crash rate, it is 99.5 percent certain that the crashes are a result of deficiencies in the segment or intersection design.

Crash Severity

The third key factor in establishing safety deficiencies is crash severity. Crash severity quantifies how severe the crashes are at a particular location. In the crash information obtained from MnCMAT, crashes are categorized into five major categories of severity:

- Property Damage – no injuries occurred
- Possible Injury – an injury might have occurred

- Non-Incapacitating Injury – a minor injury occurred
- Incapacitation Injury – an injury occurred that caused impairment
- Fatal– a fatality occurred in the crash

The purpose for analyzing this statistic is to identify locations that experience a low crash rate but have a high percentage of injury or fatal crashes. Conversely, locations which have high crash rates with a large proportion of property damage crashes may not warrant as much priority when deficiencies are being addressed.

Distribution of Crash Type

The fourth key factor in safety analysis is the distribution of crash type. Each crash is classified with a crash type. Crashes are classified into one of the following types:

- Rear End
- Sideswipe (Passing)
- Right Angle
- Head On
- Sideswipe (Opposite Direction)
- Other

The crash type distribution for the critical intersections was investigated to determine if there are any underlying factors that could be creating the unsafe conditions.

2.3.2 Crash Summary

During the time period between January 2010 and January 2014, there were 17 total crashes. Fifteen of these crashes were property damage only and two crashes resulted in a motorist injury. A significant number of these crashes occurred near Bygland Road and 1st Street intersection. This intersection accounts for the majority of conflict points in the corridor due to the higher volumes of traffic entering and exiting the "point." The intersection crash characteristics are illustrated on Figure 2.5.

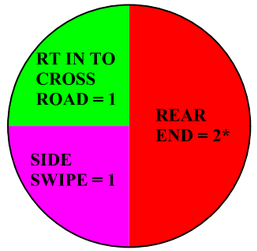
The crash rates experienced along Bygland Road compare favorably or are less than the critical crash rate. Based on a review of the crash data, the crash experience along Bygland Road does not appear out of the ordinary, and no unusual safety characteristics or hazards were identified.

BYGLAND RD & 1ST ST SE INTERSECTION
• TRAFFIC SIGNAL
• 9 CRASHES (2010-2014)

CRASH TYPE

BYGLAND RD & 4TH ST SE INTERSECTION
• SIDE-STREET STOP-CONTROL
• 4 CRASHES (2010-2014)

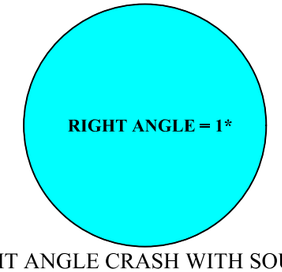
CRASH TYPE



* BOTH REAR END CRASHES OCCURRED IN THE SOUTHEAST BOUND DIRECTION

BYGLAND RD & 5TH AV SE INTERSECTION
• SIDE-STREET STOP-CONTROL
• 1 CRASH (2010-2014)

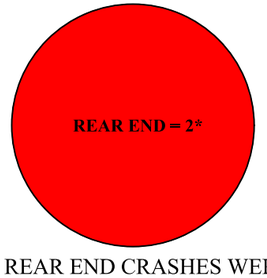
CRASH TYPE



* RIGHT ANGLE CRASH WITH SOUTEAST BOUND RIGHT TURNING VEHICLE AND STOPPED NORTHBOUND VEHICLE

BYGLAND RD & 5TH ST SE INTERSECTION
• SIDE-STREET STOP-CONTROL
• 2 CRASHES (2010-2014)

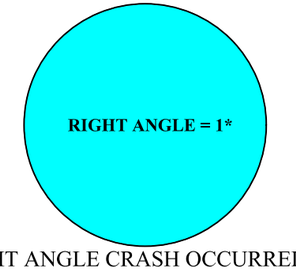
CRASH TYPE



* BOTH REAR END CRASHES WERE IN THE NORTHWEST BOUND DIRECTION

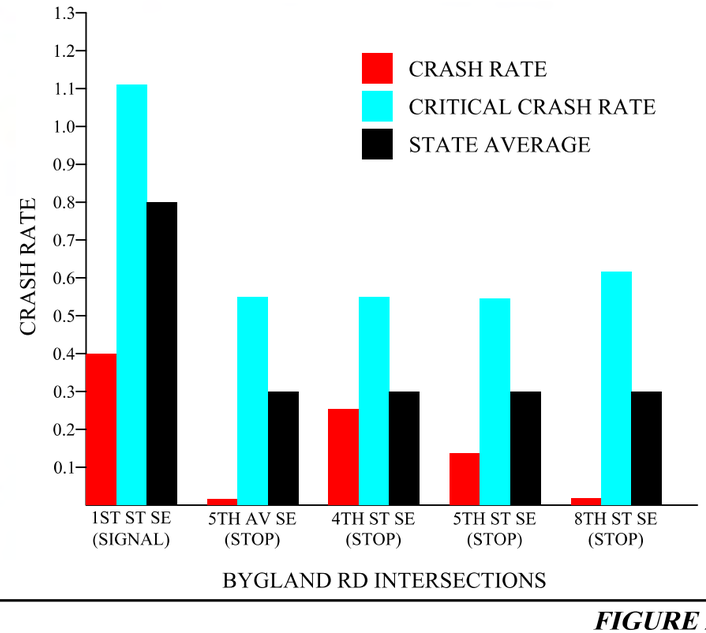
BYGLAND RD & 8TH ST SE INTERSECTION
• SIDE-STREET STOP-CONTROL
• 1 CRASH (2010-2014)

CRASH TYPE



* RIGHT ANGLE CRASH OCCURRED ON 8TH ST SE DUE TO A VEHICLE BACKING OUT OF FIRST DRIVEWAY INTO A VEHICLE TRAVELING EASTBOUND

INTERSECTION CRASH RATE VS STATEWIDE AVERAGE



RED LAKE RIVER
RED RIVER
1ST ST SE
4TH ST SE
MERO ST SE
6TH ST SE
7TH ST SE
8TH ST SE
JAMES AVE SE
13TH ST SE
BYGLAND RD
SOUTH POINT ELEMENTARY SCHOOL
CENTRAL MIDDLE SCHOOL
5TH AVE SE
5TH ST SE
RHINEHART DR SE
10TH ST SE
13TH AVE SE
12TH AVE SE
GREENWAY BLVD

Ⓤ Side-Street Stop-Control Traffic Signal

BYGLAND ROAD STUDY

ALLIANT ENGINEERING

FIGURE 2.5
INTERSECTION SAFETY

2.4 Mobility

Persevering and improving the mobility of Bygland Road is an important priority and goal for the study. An assessment of the existing quality of mobility (traffic operations) for the existing intersections was completed.

2.4.1 Existing Traffic Volumes

In April, GF-EGF MPO collected a variety of traffic data for Bygland Road. The field counts were collected on April 14th, 2015 using a machine counting method, which included full-intersection turning movements for the a.m. and p.m. peak hours at 15 intersections. Figure 2.6 illustrates the hourly traffic volume profile along Bygland Road. As shown, the highest peaks in traffic volumes occurs between 7:30 a.m. and 8:15 a.m. in the morning, 2:45 p.m. and 3:45 p.m. during school dismissal, and 4:45 p.m. and 5:45 p.m. in the evening. The existing a.m. and p.m. peak our turning movement counts are shown in Figure 2.7.

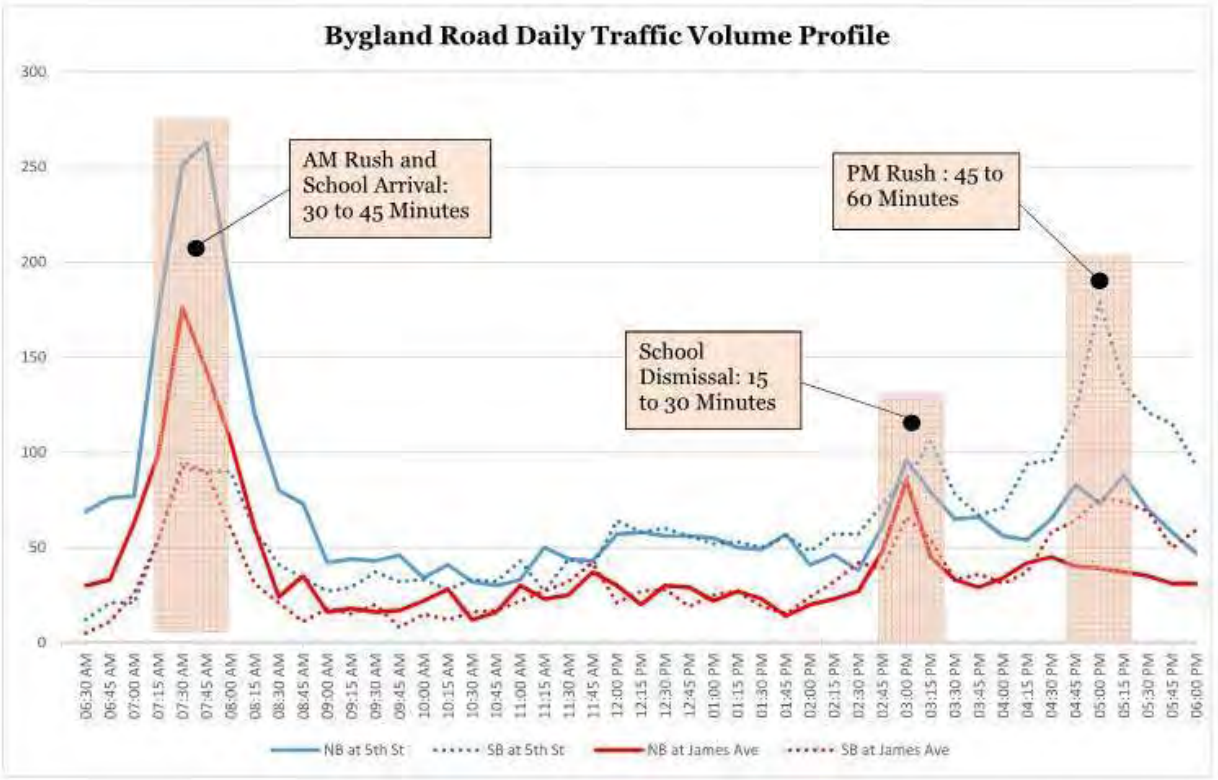


Figure 2.6 Hourly Traffic Volume Profile

Figure 2.6 illustrates that the peak 45 minute traffic volume occurs during the 7:30 to 8:15 time period. This condition is critical to assessing the mobility needs of the corridor. For example, routes that have higher directional splits usually reach capacity limits more quickly. This is evident by the Bygland Road directional split, which shows majority of the peak hour volumes going northbound in the morning and southbound in the evening. The morning traffic volume is the result of two all city schools being located on the south end of the city, with start times that overlap with the start of the business day. Residents travel into the Bygland Road area to drop off

students, then must travel back north to access either East Grand Forks or Grand Forks, concurrent with "point residents" that are traveling north to their places of employment. This results in a significant northbound traffic volume during this time period. The p.m. peak period is much less pronounced since the schools both let out prior to the close of most places of employment. Outside of the a.m. peak period, the traffic volume level along Bygland Road is relatively low and would be comparable to many residential collector streets.

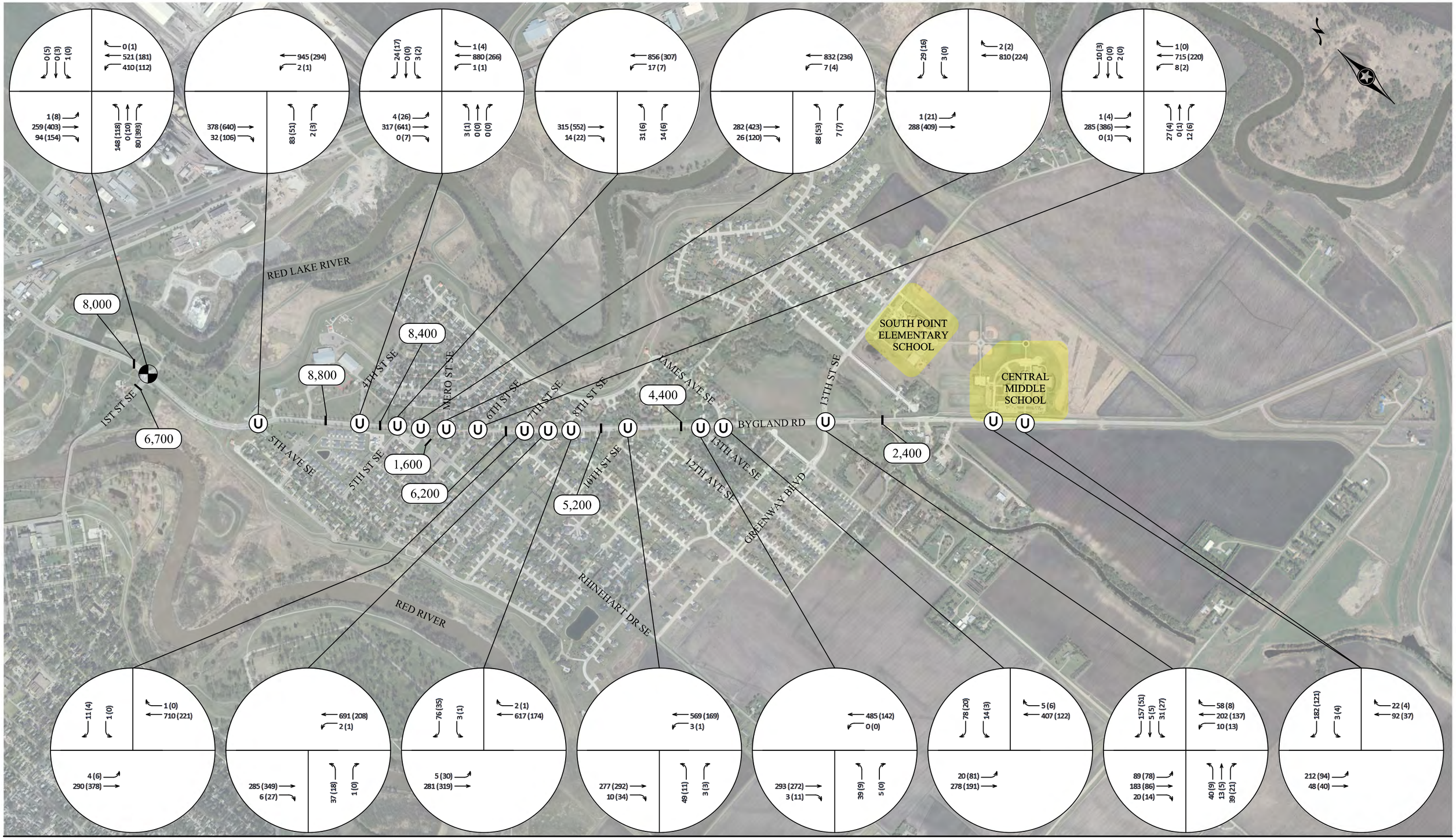
2.4.2 Future Traffic Volumes

The forecast traffic volumes are based on the travel demand model (TDM) developed for the 2040 LRTP. The TDM incorporates existing and expected socioeconomic data and existing and expected roadway facilities to forecast the traffic volumes. This model provides forecast daily traffic forecasts for the study corridor for the year 2025 and 2040. In addition to the TDM traffic forecasts, the future traffic volumes consider the following potential land use and infrastructure changes:

- The addition of 154 single family residential homes by 2025 and another 211 single family homes by 2040 will be located in the "Point" area of East Grand Forks.
- The extension of 32nd Avenue to the east from Grand Forks, connecting to Bygland Road by year 2040. It should be noted that the 2040 scenario evaluated both the with and without the 32nd Avenue (Grand Forks) roadway extension across the Red River.

The forecast ADT for year 2025, 2040, and 2040 with the 32nd Avenue extension are illustrated in Figure 2.8. Localized, site-generated trips are dependent upon the intensity and type of future land development. The site-generated trips for the planned future residential homes were distributed along Bygland Road based upon the site's geographic location and the resident's anticipated access to the corridor. Based on the existing traffic volumes, forecast daily traffic volumes and the planned residential developments, intersection forecasts were developed. The forecast a.m. and p.m. peak hour 2025, 2040, and 2040 with 32nd Avenue extension are illustrated in Figure 2.9, Figure 2.10 and Figure 2.11, respectively.

The future extension of 32nd Avenue with connection to Bygland Road is expected to change the traffic patterns and directional distribution of traffic flow along the corridor. Currently, folks enter the "point" to drop off students at the East Grand Forks schools, and then return northbound back into East Grand Forks and Grand Forks. This pattern occurs concurrent with the "point" residents traveling northbound to their places of employment. With access into Grand Forks provided via the future extension, it is expected that many of these motorists would continue on or make the trip into Grand Forks via southbound Bygland Road to the new bridge. In other words, the northbound traffic volume along Bygland Road during the a.m. peak period would be expected to reduce, while the northbound traffic volume would increase during the p.m. peak period. Based on the forecast ADT, an estimated 30 percent reduction in northbound traffic volume along Bygland Road might be expected. It would be expected that this same traffic volume would then make their return trip northbound along Bygland in the afternoon.



BYGLAND ROAD STUDY

ALLIANT ENGINEERING

Traffic Signal

Through - Stop Controlled Intersection

XXX Existing ADT

xxx (xxx) AM Peak Hour Volume (PM Peak Hour Volume)

FIGURE 2.7
EXISTING TRAFFIC VOLUMES

1000

SCALE IN FEET

(YEAR 2025)*
100 ADDED HOUSES

RED LAKE RIVER

8,000
7,860
9,280
7,940

8,400
12,610
15,010
10,980

6,200
8,920
8,880
6,940

4,400
2,220
2,290
2,070

SOUTH POINT ELEMENTARY SCHOOL

CENTRAL MIDDLE SCHOOL

1ST ST SE

4TH ST SE

MERO ST SE

6TH ST SE

7TH ST SE

8TH ST SE

JAMES AVE SE

13TH ST SE

BYGLAND RD

6,700
9,580
11,380
4,790

5TH AVE SE

5TH ST SE

RHINEHART DR SE

10TH ST SE

12TH AVE SE

13TH AVE SE

GREENWAY BLVD

8,800
13,610
15,960
13,280

1,600
3,950
6,330
6,341

5,200
3,740
3,780
3,209

2,400
1,750
1,600
1,408

5,920

RED RIVER

(YEAR 2040)*
211 ADDED HOUSES

(YEAR 2040)
POTENTIAL
32ND AVE EXTENSION

(YEAR 2025)*
54 ADDED HOUSES

***Infrastructure based on Grand Forks - East Grand Forks Metropolitan Planning Organization (GF-EGF MPO) 2040 Long Range Transportation Plan (Shaded areas are approximate)**

BYGLAND ROAD STUDY

ALLIANT ENGINEERING

XXX EXISTING ADT (FROM 2015 EXISTING TURNING MOVEMENT COUNTS)
XXX 2025 ADT
XXX 2040 ADT
XXX 2040 ADT WITH 32ND AVE EXTENSION

2025 LAND USE
2040 LAND USE
2040 32ND AVE ROADWAY EXTENSION

FIGURE 2.8
FUTURE LAND USE AND TRAFFIC VOLUMES

BYGLAND ROAD STUDY

ALLIANT ENGINEERING

Traffic Signal

(U) Through - Stop Controlled Intersection

XXX 2025 ADT

xxx (xxx) AM Peak Hour Volume (PM Peak Hour Volume)

XX / XX AM Peak Hour Overall LOS / Worst Movement LOS
PM Peak Hour Overall LOS / Worst Movement LOS

FIGURE 2.9
FORECAST 2025 YEAR TRAFFIC VOLUMES

BYGLAND ROAD STUDY

ALLIANT ENGINEERING

Traffic Signal

(U) Through - Stop Controlled Intersection

(XXX) 2040 ADT

xxx (xxx) AM Peak Hour Volume (PM Peak Hour Volume)

FIGURE 2.10
FORECAST 2040 YEAR
TRAFFIC VOLUME

BYGLAND ROAD STUDY

ALLIANT ENGINEERING

Traffic Signal

(U) Through - Stop Controlled Intersection

XXX 2040 ADT w/32nd Ave Bridge

xxx (xxx) AM Peak Hour Volume (PM Peak Hour Volume)

FIGURE 2.11
FORECAST 2040 WITH 32ND AVE BRIDGE TRAFFIC VOLUMES

2.4.3 Traffic Operations Analysis

The quality of traffic flow and mobility was measured using Level of Service (LOS) methodology. LOS calculations were performed for the study area intersections for each of the study design years (existing, 2025, 2040 and 2040 with 32nd Avenue extension). A discussion of the capacity including LOS is included in the following sections.

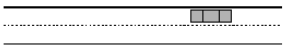
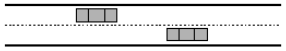
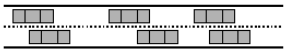
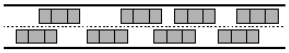
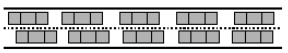
Level of Service by Facility Type

The concept of LOS is a method to estimate the quality of traffic flow through intersections and along segments of roadway. In general, the capacity of a street is a measure of its ability to accommodate a certain volume of moving vehicles. Typically, street capacity refers to the maximum number of vehicles that can be expected to be accommodated in a given time period under the prevailing roadway characteristics and conditions. The LOS methodology is standardized by the Transportation Research Board (TRB) and is applied uniformly regardless of jurisdictional boundaries. The method uses algorithms that are based on delay and drivers' expectations of acceptable delay or traffic flow to assign a LOS for particular conditions.

The corridor was analyzed to determine the operating LOS, a quantitative analysis that compares the vehicle flow of traffic on a roadway or through an intersection with the vehicle flow capacity of that particular roadway. The results are then categorized on an LOS A to LOS F scale. LOS A represents high quality traffic operations where motorists experience little or no delay (i.e. free flow conditions). Conversely, LOS F corresponds to low quality operations with higher delays or potentially congestion. This study used the LOS C/D boundary, as directed by the GF-EGF MPO, as the lowest accepted level of service.

Although the measure of effectiveness used in determining LOS for each facility (i.e., arterial street vs. rural highway vs. signalized intersection) may differ, the concept of the LOS grade is the same. The general relationship between capacity and LOS are graphically displayed in Table 2.1.

Table 2.1 Level of Service Description

Level of Service		Description	Volume/Capacity Ratio
A		**Free Flow.** Low volumes and no delays.	**0.6**
B		**Stable Flow.** Speeds restricted by travel conditions, minor delays.	**0.7**
C		**Stable Flow.** Speeds and manueverability closely controlled due to higher volumes.	**0.8**
D		**Stable Flow.** Speeds considerably affected by change in operating conditions. High density traffic restricts manueverability, volume near capacity.	**0.9**
E		**Unstable Flow.** Low speeds, considerable delay, volume at or slightly over capacity.	**1.0**
F		**Forced Flow.** Very low speeds, volumes exceed capacity, long delays with stop and go traffic.	**> 1.0**

Bygland Road is a two lane roadway with no traffic control devices to interrupt the mainline traffic flow. An assessment was completed to determine whether or not the current two lane facility will be sufficient to accommodate the future traffic volumes or if additional travel lanes may be required. The assessment is a planning level analysis that compares the existing and forecast daily traffic volumes (ADT) against estimated capacity thresholds for various facility types. Figure 2.12 illustrates the anticipated corridor level of service for both a two lane and a three lane facility. A bandwidth of Bygland Road's ADT volumes, west of 5th Ave SE and East of 5th Ave SE are plotted to help illustrate the estimated daily traffic volume capacity thresholds for Bygland Road.

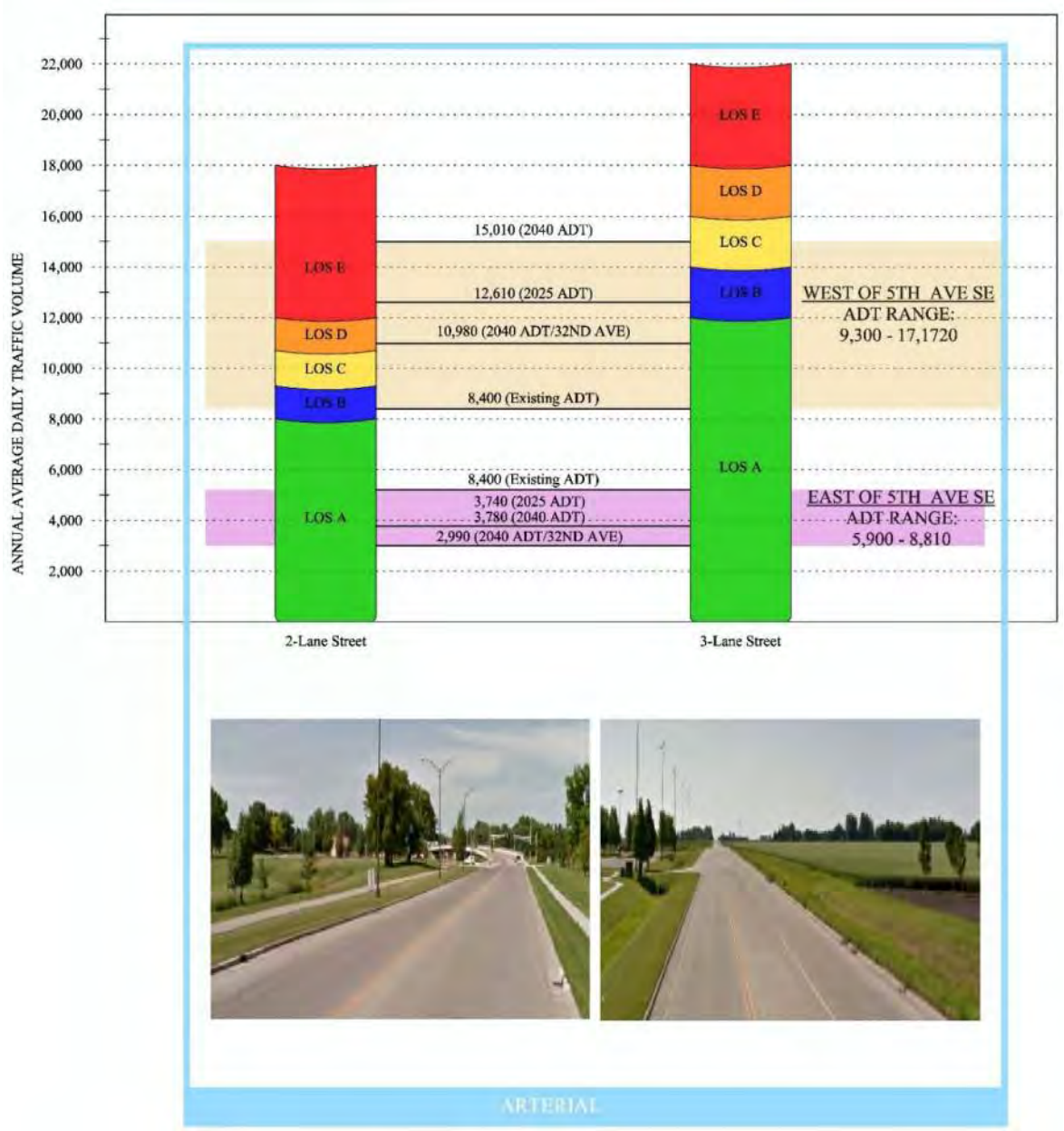


Figure 2.12 Bygland Road Corridor Capacity Assessment by Facility Type

As shown in Figure 2.12, the forecast daily traffic volume on Bygland Road may be expected to necessitate a three lane facility on the northern end of the study corridor. It should also be noted that the need for a third lane (i.e., center left turn lane or a second northbound travel lane) is dependent upon the traffic volume characteristics and type of traffic control device. Absent the installation of any new traffic control devices that would stop traffic flow on Bygland Road, additional travel lanes are not expected to be necessary. Also, with the exception of a few locations (e.g., 1st Street, and 13th Street, the left turn traffic volume along Bygland Road is very low, representing less than 1 percent of the daily traffic volume. The addition of left turn lanes alone would not be expected to provide much more corridor capacity than the current two lane cross-section.

Intersection Level of Service

The LOS grade for an intersection as a whole is based on a weighted average delay of each movement. The delays can vary greatly based on traffic volume, lane geometry and intersection traffic control (traffic signal, through-stop and all-way-stop). Grades are different at unsignalized and signalized intersections; due to the fact the drivers anticipate longer delays at signalized intersections. Table 2.2 details the ranges for each letter grade for both types of intersection, in seconds of average delay per vehicle. This is based on the 2010 Highway Capacity Manual (HCM)[5].

Table 2.2 Level of Service vs. Average Delay – Signalized and Unsignalized Intersections

Unsignalized Intersections		Signalized Intersections	
Level of Service	Average Delay per Vehicle (Seconds)	Level of Service	Average Delay per Vehicle (Seconds)
A	0 – 10	A	0 – 10
B	10 – 15	B	10 – 20
C	15 – 25	C	20 – 35
D	25 – 35	D	35 – 55
E	35 – 50	E	55 – 80
F	50 – and up	F	80 – and up

The a.m. and p.m. peak hour LOS was calculated at each of the 15 key intersections identified were analyzed.

The intersection traffic operations analysis was completed for the existing and future conditions for both the a.m. and p.m. peak hours using the SimTraffic8 software package. Table 2.3 summarizes the existing overall intersection LOS and the worst performing movement (i.e., the stop controlled left turn or crossing through movement) for the study area intersections for existing, 2025, and 2040 conditions. At unsignalized intersections, it is common for the overall intersection to operate at a LOS A, since the through traffic does not stop, and for the stop approached left turn (or through movement) to have the highest delay. It should also be noted, the delay reported is the average of all vehicles. Some motorists, may experience delays much higher while waiting at the stop sign and others wait less.

[5] 2010 Highway Capacity Manual (HCM), Published by the Transportation Research Board.

Table 2.3 Existing 2014, 2025, and 2040 Intersection LOS

Intersection	Control	MOE	2015 Existing Conditions		2025 NoBuild Conditions		2040 NoBuild Conditions		2040 Bridge Extension - NoBuild Conditions	
			AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
3rd Ave SE & 1st St S	Traffic Signal	Delay/Veh	12.6	9.3	18.1	10.1	37.9	20.3	6.1	7.8
		LOS	B	A	B	B	D	C	A	A
Bygland Rd & 5th Av S	Side-Street Stop	Delay/Veh	4.1 / 55.2	5.5 / 12.7	8.8 / 119.2	5.6 / 16.6	33.9 / 460.5	6.3 / 25.7	3.0 / 16.8	4.7 / 24.4
		LOS	A / **F**	A / B	A / **F**	A / C	D / **F**	A / D	A / C	A / C
Bygland Rd & 4th St S	Side-Street Stop	Delay/Veh	1.3 / 19.5	1.6 / 11.1	1.4 / 20.0	1.8 / 18.0	2.8 / 52.4	2.0 / 41.1	1.0 / 13.5	1.6 / 20.3
		LOS	A / C	A / B	A / C	A / C	A / **F**	A / **E**	A / B	A / C
Bygland Rd & 5th St S	Side-Street Stop	Delay/Veh	1.5 / 26.3	0.9 / 8.7	2.0 / 48.1	1.1 / 9.0	4.0 / 107.5	1.3 / 22.3	1.1 / 15.5	1.2 / 28.7
		LOS	A / D	A / A	A / **E**	A / A	A / **F**	A / C	A / C	A / D
Bygland Rd & Rhinehart Dr SE	Side-Street Stop	Delay/Veh	2.9 / 30.2	1.2 / 9.2	14.4 / 149.4	1.5 / 11.9	31.4 / 240.4	2.9 / 18.4	13.0 / 60.0	3.3 / 21.4
		LOS	A / D	A / A	B / **F**	A / B	D / **F**	A / C	B / **F**	A / C
Bygland Rd & Metro Ct	Side-Street Stop	Delay/Veh	1.0 / 7.9	0.6 / 3.0	1.3 / 13.3	0.7 / 4.3	1.4 / 21.3	0.7 / 3.9	0.7 / 13.6	0.8 / 4.0
		LOS	A / A	A / A	A / B	A / A	A / C	A / A	A / B	A / A
Bygland Rd & 6th St S	Side-Street Stop	Delay/Veh	1.7 / 29.9	0.5 / 11.9	2.1 / 39.1	0.6 / 13.9	2.3 / 43.5	0.7 / 10.1	1.2 / 12.9	0.9 / 16.6
		LOS	A / D	A / B	A / **E**	A / B	A / **E**	A / B	A / B	A / C
Bygland Rd & 7th St S	Side-Street Stop	Delay/Veh	0.7 / 30.7	0.5 / 2.6	0.8 / 24.9	0.7 / 3.8	0.9 / 13.3	0.7 / 3.2	0.5 / 5.4	0.6 / 5.3
		LOS	A / D	A / A	A / C	A / A	A / B	A / A	A / A	A / A
Bygland Rd & 8th St S (North Intersection)	Side-Street Stop	Delay/Veh	0.9 / 12.5	0.5 / 7.2	0.9 / 14.2	0.5 / 7.5	0.8 / 12.8	0.5 / 8.2	0.7 / 8.7	0.5 / 8.5
		LOS	A / B	A / A	A / B	A / A	A / B	A / A	A / A	A / A
Bygland Rd & 8th St S (South Intersection)	Side-Street Stop	Delay/Veh	1.3 / 8.5	0.5 / 2.6	1.6 / 11.2	0.5 / 2.6	1.5 / 9.7	0.6 / 4.5	1.1 / 9.3	0.8 / 6.3
		LOS	A / A	A / A	A / B	A / A	A / A	A / A	A / A	A / A
Bygland Rd & 10th St S	Side-Street Stop	Delay/Veh	1.5 / 12.3	0.8 / 7.9	1.7 / 14.7	0.8 / 8.3	1.6 / 14.0	0.8 / 6.6	1.2 / 8.6	0.8 / 7.7
		LOS	A / B	A / A	A / B	A / A	A / B	A / A	A / A	A / A
Bygland Rd & 13th Av S	Side-Street Stop	Delay/Veh	1.0 / 9.7	0.8 / 5.6	1.0 / 9.9	0.9 / 6.0	1.2 / 10.7	0.9 / 7.0	1.0 / 7.4	0.7 / 6.8
		LOS	A / A	A / A	A / A	A / A	A / B	A / A	A / A	A / A
Bygland Rd & James Av	Side-Street Stop	Delay/Veh	1.4 / 10.2	0.8 / 7.0	1.5 / 11.4	0.8 / 4.8	1.5 / 10.3	0.8 / 6.7	1.2 / 7.5	1.0 / 6.9
		LOS	A / B	A / A	A / B	A / A	A / B	A / A	A / A	A / A
Bygland Rd & 13th St	Side-Street Stop	Delay/Veh	3.8 / 14.3	2.1 / 7.5	4.2 / 16.4	2.7 / 8.7	3.9 / 13.2	2.6 / 9.7	4.1 / 11.3	3.4 / 8.3
		LOS	A / B	A / A	A / C	A / A	A / B	A / A	A / B	A / A
Bygland Rd & School Accesses	Side-Street Stop	Delay/Veh	2.9 / 12.3	2.6 / 5.7	3.0 / 6.2	2.4 / 5.7	2.8 / 11.2	2.5 / 7.2	2.8 / 5.7	2.5 / 8.1
		LOS	A / B	A / A	A / A	A / A	A / B	A / A	A / A	A / A

*The delay/vehicle is an average of 5 SimTraffic simulations.

* For 2040 AM conditions the signal at 1st St experiences failing operations for the peak 15-min period (7:30 to 7:45 AM). In particular the northbound left turn movement is failing and creating long queues that extend back to 5th Av.

2.5 Identification of Deficiencies

Through review of the existing conditions and comments from the SRC, public meetings, and public survey feedback, several multimodal, roadway and safety deficiencies have been revealed in the existing roadway network. The following summarizes the key multimodal and mobility deficiencies identified.

1. Multimodal Deficiencies
   - There are no trail connections between the trailhead on 19th Avenue and the South Point Elementary School.
   - 5th Street at Rhinehart Drive has close access spacing and skewed approaches. Also, pedestrian accessibility gaps in the sidewalk force pedestrians on to the street on the east side of the Bygland Road.

- The existing sidewalk width along Bygland Road is not suitable to provide a comfortable and quality combined bicycle and pedestrian facility. Separation of the bicycle and pedestrian users would serve to target multiple user types and encourage multimodal opportunities along the corridor.
- Crossing Bygland Road may be difficult at times. Measures to improve awareness, reduce exposure and provide protection should be considered.
- There are no established city bus routes that extend to the schools or south of 6th Street.
- Transit vehicles have a difficult time accessing Bygland Road via their current route along 6th Street.

2. Mobility Deficiencies
   - Enhance corridor safety and corridor mobility effectiveness by considering left turn lanes at key intersections, travel lanes, and the installation of traffic control devices at key locations.
   - The northbound left turn onto 1st Street sometimes backs up and the lane definition into the turn lane is not clear.
   - Forecast 2040 traffic volumes indicate potential need for an additional northbound travel lane.
   - The existing two lane pavement markings on Bygland Road is unclear to the motorists. The travel lanes are very wide and with the absence of an on street parking demand, it is not clear where in the roadway the motorist should travel and at times motorists use the wide lane as two travel lanes.
   - Based on the traffic operation analysis and field observations, accessing Bygland Road during the a.m. peak period (7:30 a.m. to 8:15 a.m.) is challenging and the issues raised have been validated.

North of 1st St SE
- 2040 analysis indicates a potential capacity constraint

Future ADT indicates potential need for additional lane

- Curved roadway approach limits sightlines
- Potential traffic control change may be neccesary

5th St SE and Rhinehart Dr SE
- Pedestrian Accessibility Gap
- Sidewalk Alignment Forces Pedestrians Into Street

Exisitng 44' 2-Lane Segment

5th St at Rhinehart Dr
- Close Access Spacing and Skewed Approaches
- Potential traffic control change may be neccessary

Existing 2-Lane Roadway
- Wide roadway with only centerline marking unclear lane use
- Accessing Bygland Road during the AM peaks (7:30 am to 8:00 am) is challenging. Few traffic gaps.

Traffic Control Change May Be Necessary
- Heavy AM peak traffic correlates with school arrival/dismissal

Bridge
- Width constraint - 37' Roadway

South Point Elementary and Central Middle School
- No bike connections to schools

RED LAKE RIVER

RED RIVER

1ST ST SE

4TH ST SE

5TH ST SE

5TH AVE SE

RHINEHART DR SE

6TH ST SE

7TH ST SE

8TH ST SE

10TH ST SE

JAMES AVE SE

BYGLAND RD

12TH AVE SE

13TH AVE SE

GREENWAY BLVD

13TH ST SE

SOUTH POINT ELEMENTARY SCHOOL

CENTRAL MIDDLE SCHOOL

52' 52' 44' 42' 44' 48' 48' 37' 41'

BYGLAND ROAD STUDY

ALLIANT ENGINEERING

Cities Area Transit Route 11 Bus Stop

Cities Area Transit Route 11

52' Roadway Width (No Parking)

42' Roadway Width (Parking Allowed)

Traffic Signal

Highest Turning Traffic Intersection - Locations For Possible Turn Lane Consideration

FIGURE 2.13
EXISTING AND FUTURE CONSTRAINTS AND DEFICIENCIES

3.0 Analysis of Alternatives

To address the existing issues, study goals and concerns raised through the public participation process, a high level alternatives analysis was completed. The alternatives analysis is intended to identify as many practical solutions (including a no build scenario) as feasible, given their characteristics, and then evaluate them based upon the project goals and other key factors. The control alternatives and conceptual layouts were analyzed to coincide with future land use and long term forecast horizon (year 2025 and year 2040). This section documents the alternatives analysis process, which consist of:

- High level strategies to meet the project multimodal and mobility goals.
- Development of roadway typical section alternatives to integrate bicycling into the Bygland Road corridor.
- Development of conceptual geometric layouts to address access control and pedestrian safety at key intersections.
- A traffic operation analysis to assess the performance of key conceptual alternatives.

One goal of the alternatives analysis is to determine the feasibility of implementing a bicycle facility within Bygland Road and to identify strategies to improve pedestrian safety and motor vehicle accessibility. Each block along Bygland Road has changing characteristics; therefore, changes to rebalance the transportation mode or to generate additional width for dedicated bicycle lanes may require street use trade-offs or major reconstruction. In general, the alternatives identified represent a retrofit of the existing roadway where transportation system trade-offs are required to accommodate a treatment strategy. A full reconstruction of Bygland Road was not considered in this study.

3.1 High Level Multimodal and Mobility Improvement Strategies

Improvement strategies for the three primary transportation modes – bicycle, pedestrians and motor vehicles - will be specifically addressed through the alternatives analysis process. However, to provide some context for alternatives being considered, the following sections discuss high level facility design treatments and considerations.

3.1.1 Bicycle Facility

The integration of a bicycle facility within the Bygland Road corridor could range from providing a shared space with motor vehicles (shared lane design) to a complete separation of the travel modes (off street trail). The application of any of the potential bicycle treatments requires understanding of street characteristics, infrastructure, intended demographics of the users, and implementation cost considerations. Table 3.1 provides a summary of the key bicycle facility types, pros and cons and typical installation costs.

Table 3.1 Bicycle Facility Types

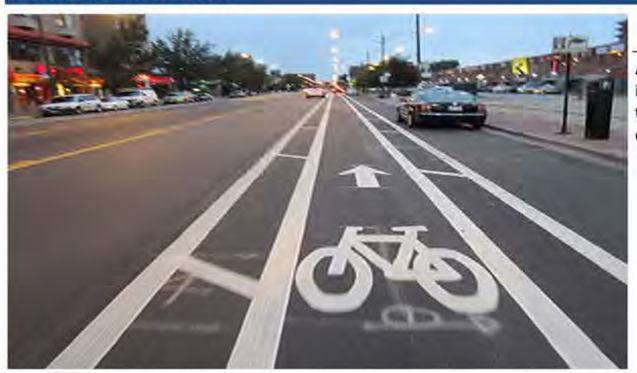
Shared Bike Lane

Description	Pros and Cons	Considerations	Estimated Cost
Shared lane markings or "sharrows" (derived from "Shared" and "Arrows") are pavement markings used to mark a designated bike route. Placed in the travel lane, they encourage bicyclists to ride in a safe position outside of the door zone (where driver's side doors of parked cars open).	Pros 1. Maintain existing street lane use and parking 2. Inexpensive 3. Denotes expected location in roadway for cyclist to travel and for motorist to expect to see cyclists. Cons 1. Can slow traffic and interrupt regular flow 2. No physical separation from cars 3. Not suitable for inexperienced or younger cyclists	1. Motor vehicle ADT. Most suitable for lower traffic volume streets. 2. Bicycle rider type and destinations 3. On-street parking and utilization	Typical costs range from requires $12,000 to $25,000 per mile depending on material

Standard Bike Lane

Description	Pros and Cons	Considerations	Estimated Cost
Designated exclusively for bicycle travel, bike lanes are separated from vehicle travel lanes with striping and pavement stencils. Bike lanes may increase safety and reduce wrong-way riding.	Pros 1. Defines road space for bicyclists and motorists, reducing the possibility that motorists will stray into cyclists' path 2. Discourages bicyclists from riding on the sidewalk 3. Reminds motorists that bicyclists have a right to the road Cons 1. Additional street signage 2. Dedicated street space may require other street use trade off 3. Cost to restripe road 4. No physical separation from cars 5. May not be comfortable for younger or inexperienced cyclist	1. Suitable for roadways with ADT > 2000 2. Curb and Gutter considerations 3. Design treatment for high volume right turn intersections 4. Street width and other street and lane uses 5. Bicycle rider type and destinations	Typical costs range from requires $20,000 to $120,000 (depending on type of markings) per mile for restriping

Buffered Bike Lane



Description	Pros and Cons	Considerations	Estimated Cost
A buffered bike lane is similar to a regular bike lane, but also includes a marked buffer between the bike lane and adjacent travel lanes. The purpose of a buffered bike lane is to provide extra elbow room for bicyclists to increase comfort.	Pros 1. Allows motorists greater separation form bicyclists in the bike lane. 2. Provides space for cyclists to pass one another without encroaching into the travel lane 3. Can provide additional space next to parked cars Cons 1. Requires more roadway width so there may be transportation trade-offs between parking, number of travel lanes, lane width, and/or widening of the roadway. 2. Additional maintenance costs.	1. Street width and lane use needs 2. On-street paring utilization. May not be cost effective for street with low parking utilization 3. Rider type and destinations 4. Suitable for higher volume ADT roadways	Typical costs range from $40,000 to $200,000 (depending on type of markings) per mile for restriping

Table 3.1 Bicycle Facility Types Cont'd

Protected Bike Lane

Description	Pros and Cons	Considerations	Estimated Cost
Protected cycle tracks are on-street bikeway facilities that provide the safety and comfort of multi-use paths within the street space. This can be accomplished by combining a painted buffer with a physical barrier such raised median, flexible bollards, a landscaped buffer, or a parking lane.	Pros 1. Provides a physical barrier between bicyclists and moving vehicles. 2. Increases comfort and safety for bicyclists. 3. Can be suitable for younger or inexperienced cyclists 4. Suitable for high volume roadways Cons 1. Requires more roadway width so there may be transportation trade-offs between parking, number of travel lanes, lane width, and/or widening of the roadway. 2. Additional maintenance costs with snow removal 3. Interactions with bus stops. 4. Right turn movement conflicts at intersections 5. Cost	1. Number of intersection or driveway crossings. Higher number of obstructions can reduce effectiveness 2. Barrier treatment design. Can have a significant impact on cost & street width need 3. On-street parking 4. Rider type, street use, and destinations	Typical costs range from $180,000 to $280,000 per mile depending on material

Shared-Use Path

Description	Pros and Cons	Considerations	Estimated Cost
Shared-use paths serve a variety of important purposes, such as providing an alternative to on street lanes on a busy thoroughfare or controlled-access corridor. Shared-use paths play an important role in providing continuity for the overall bicycle network by creating connections where there are missing links, or creating a route through a neighborhood to a nearby destination.	Pros 1. Dedicates and protects space for bicyclists and improves perceived comfort and safety 2. Provides complete separation from motor vehicle and does not require street space trade offs 3. Most comfortable for youngers or inexperienced cyclists Cons 1. Additional maintenance costs with snow removal 2. Cost 3. May impact boulevard infrastructure (Trees, Lights, etc...)	1. Location and frequency of driveways and other access points crossing the shared-use path 2. Safety of bicyclist and pedestrians crossing the road 3. Access for bicyclists and pedestrians to destinations along the route 4. Availability of suitable right of way for the shared-use path.	Typical costs range from $350,000 to $400,000 per mile depending on material

3.1.2 Pedestrian Improvements

To improve pedestrian crossing safety, comfort and environment, the strategies could range from establishing connections and improving accessibility, improving visibility, reducing exposure, enhancing awareness or providing protection. The implementation of such strategies are dependent upon intersection characteristics, but are typically considered in the hierarchy of least restrictive measures first to the most restrictive measures only when warranted. Although there are many treatments that fit into each strategy category, Table 3.2 illustrates and discusses a few treatments that might be most beneficial to Bygland Road.

3.1.3 Traffic Control Devices

A primary issue heard through the public participation process was the need to improve access to Bygland Road. To improve access (i.e., reduce the delay to make a left turn from the stop sign), a change in intersection traffic control may be advantageous. The two primary traffic control devices considered for installation include a traffic signal system and a roundabout. The intersections of Bygland Road at 5th Avenue, Rhinehart Drive and 13th Street were the three intersections where a traffic control device may be feasible. Table 3.3 provides a pros and cons comparison of each traffic control device that require consideration before any decision to change the intersection operation.

An important consideration in evaluating the need for a traffic signal system, is whether or not the Minnesota Manual on Uniform Traffic Control Devices (MMUTCD) warrants for installation are met. Without specifically meeting the MMUTCD warrants, the installation of a traffic signal may not qualify for federal funding and would become a city cost burden. Alternatively, the installation of a traffic signal would be delayed until such time warrants are satisfied and an engineering study recommends the installation. A traffic signal warrant analysis was performed to determine the initial feasibility of installing a traffic signal at the key intersections. Table 3.4, (on page 37) presents a summary of the MMUTCD warrant analysis results for the existing volumes, 2025 and year 2040 scenarios at the Bygland Road/5th Avenue, Bygland Road/Rhinehart Drive, and Bygland Road/13th Street intersections.

As shown Table 3.4, Warrant 3 is met at the Bygland Road/5th Avenue intersection under existing and forecast volumes. For Bygland Road/Rhinehart, Warrant 1, Warrant 2, and Warrant 3 are not met until the forecast year 2040 traffic volumes occur. Warrant 3 is expected to be met with the development of the planned residential homes by year 2025. At the Bygland Road/13th Avenue intersection none of the warrants are expected to be met under any of the traffic volume scenarios. Although some signal warrants are met under the existing and forecast 2025 or 2040 approach volumes, this alone may not justify the immediate installation of a traffic signal system. Many other considerations, including safety, off peak operations, maintenance and cost need to be made.

Table 3.2 Pedestrian Improvement Strategies

Wide Sidewalk

Description	Benefits	Considerations	Estimated Cost
A sidewalk is a path for pedestrian travel placed along the side of a roadway, usually separated from roadway traffic lanes by curb and gutter and sometimes by a planting strip or buffer zone.	1. Wider sidewalks in urban areas where there are high volumes can carry substantial volumes of pedestrians. 2. The safety benefits of sidewalks come from the ability to provide pedestrians with their own travel space that is separated from the traffic on a roadway.	1. The effort of planning for a network of sidewalks should include an audit of the current sidewalk system. The audit should document the accessibility of transit stops/service, schools, public buildings, and parks, etc., to pedestrians and should include consideration of sidewalk design issues, including obstructions (e.g., fire hydrants, signposts, etc.) and compliance with Americans with Disabilities Act (ADA) Standards for Accessible Design (see PROWAG guidelines).	Typical costs for implementation of sidewalks vary depending on the location,amount of available right-of-way, and materials used, but are generally in the range of $4 to $5 per square foot for a concrete sidewalk, excluding costs for purchasing additional right-of-way.

ADA Ramps & Connections

Description	Benefits	Considerations	Estimated Cost
To address connectivity of existing pedestrian routes and paths to eliminate gaps in connectivity. A curb ramp will help provide an accessible route that people with disabilities can use to safely transition from a roadway to a curbed sidewalk and vice versa.	1. It is often difficult or impossible for a person using a wheelchair, scooter, walker, or other mobility device to cross a street if the sidewalk on either side of the street ends without a curb ramp. 2. If curb ramps are not provided, these individuals are forced to make a difficult choice. 3. Will establish a connection for pedestrians between streets, schools, regional trials, and parks. 4. Adding sidewalks will address sidewalk connectivity. 5. Improving pedestrian access to transit routes will improve a multimodal transportation environment. 6. Increasing the existing sidewalk network will enable pedestrian usage to businesses and popular destinations.	1. Gaps in connectivity can be unsafe and reduces access for the elderly and disabled. 2. Walking can be difficult for pedestrians in the neighborhood due to lack of sidewalks. 3. Curb ramps would be placed to enable a person with a mobility disability to travel from a sidewalk on one side of the street, over or through any curbs or traffic islands, to the sidewalk on the other side of the street. 4. Follow Americans with Disabilities Act (ADA) design guidelines. 5. Texture patterns must be detectable to visually impaired pedestrians. 6. Curb ramps can be easily accommodated within curb extensions.	The cost of adding sidewalk connections is approximtley $4 to $5 per foot for standard walk. The addition of ADA compliant pedestrian ramps range from $8,000 to $15,000 per corner.

Street Lighting

Description	Benefits	Considerations	Estimated Cost
This strategy involves the installation of street lights at intersections and crosswalks. In practice, the design of the street lights can vary from low-level, pedestrian-scale decorative lighting to a typical highway intersection style that consists of a luminaire mounted on a davit arm on top of a 30- to 40-foot vertical pole. Street lights can also be located at individual intersections or crosswalks or can be continuous along roadway corridors.	1. Street lights can contribute to safety by providing an advance warning to drivers that they are approaching a point of potential conflict with crossing pedestrians and bicyclists. 2. Driver recognition of pedestrians and bicyclists is also improved because street lights illuminate them when it is dark.	1. While street light installation costs may be eligible to be covered by federal and state funds, ongoing maintenance and power costs are not eligible. One approach to addressing ongoing costs is use of an innovative contracting approach that includes installation as well as the maintenance and power for a specified period of time as part of the construction project contract. 2. Isolated intersections with crosswalks that are not along continuously lit roadways and mid-block crosswalks are prime candidates for installation of street lights. In both cases, the street lights would draw attention to what might be an unexpected situation for motorists—pedestrians and bicyclists crossing the road in the dark.	Typical costs for street lighting are approximatley $8,000 per pole, which include electrical and service connections.

High Visibility Markings

Description	Benefits	Considerations	Estimated Cost
A marked crosswalk is a type of pavement marking that indicates to pedestrians the recommended location to cross the roadway and also alerts approaching motorists as to where pedestrians may be crossing the street.	1. Providing highly visible crosswalk locations can serve to bring greater attention to the motorist to expect pedestrian activity. However, an overabundance of crosswalk markings will reduce effectiveness. 2. Marked crosswalks at uncontrolled intersections without related enhancements are unlikely to increase pedestrian safety	1. Pavement marking material type is importance. 2. Design style (i.e., parallel bar, zebra or other). 3. Crosswalks with vehicle stop lines should be considered at all signalized intersections where an engineering study finds that pedestrians would benefit	Standard (parallel-line) crosswalk: $100 to $200 each Ladder crosswalk: $300 High-visibility crosswalk: $600 to $5,000 Patterned, stamped, or stained concrete crossings can cost up to $3,000 Typical signing and markings for a parallel-line crosswalk costs approximately $2,000

Curb Extension

Description	Benefits	Considerations	Estimated Cost
A curb extension is an extension of the sidewalk into the roadway that reduces the crossing distance of a roadway for pedestrians and their exposure to vehicular traffic.	1. Curb extensions can improve the safety of pedestrian crossings by reducing the pedestrian crossing distance, improving the visibility of pedestrians (by positioning them in front of parked cars, traffic, signs, streetlights, etc.), and reducing the time and distance that pedestrians are in the street. 2. Drivers are encouraged to reduce speeds at intersections or midblock locations with curb extensions, because the restricted street width sends a visual cue to drivers and the tight curb radii results in slower turning speeds. 3. The reduction in the street cross section caused by curb extensions can also eliminate improper passing of turning vehicles by through movement vehicle.	1. On streets with parking, the curb extension should typically extend to the edge of the parked vehicles. The turning needs of larger vehicles such as trucks and school buses, need to be considered in curb extension design.	Curb extensions cost from $5,000 to $40,000 per corner, depending on design and site conditions. Drainage is usually the most significant determinant of costs. If the curb extension area is large and special pavement and street furnishings and plantings are included, costs could be higher.

Table 3.2 Pedestrian Improvement Strategies Cont'd

Refuge Median

Description	Benefits	Considerations	Estimated Cost
Medians and crossing islands (also known as refuge islands or center islands) are raised areas that are constructed in the center portion of a roadway that can serve as a place of refuge for pedestrians who cross the road mid-block or at an intersection. After crossing to the center island, pedestrians wait for motorists to stop or for an adequate gap in traffic before crossing the second half of the street.	1. Medians provide a simplified crossing maneuver by allowing pedestrians to concentrate on only one direction of traffic at a time, creating the equivalent of two narrower one-way streets instead of one wide two-way street. 2. Medians also provide space for landscaping that can be used to change the visual cues of the roadway and reduce driver speeds	1. Refuge median may not be appropriate or physically possible at all locations. They may need to be weighed against other roadway features such as wider sidewalks, bicycle lanes, landscaping buffers, or on-street parking. 2. Short sections of median at high-priority crossings, such as schools and parks, at both intersections and mid-block locations provide benefit to the pedestrians crossing the street. Pedestrian islands may be appropriate at unsignalized and signalized crossing locations. 3. Refuge medians must be fully accessible by ramps or cut through, and should provide tactile cues for pedestrians with visual impairments to indicate the border between the pedestrian refuge area and the motorized vehicle roadway. 4. Winter maintenance should be considered to keep the pedestrian route clear of snow.	The cost for adding a raised median can range from $15,000 to $30,000 per 100 feet, depending on the design, site conditions, and whether the median can be added as part of a larger reconstruction or utility project.

In-Lane Pedestrian Sign

Description	Benefits	Considerations	Estimated Cost
An advance warning sign and signs at the crossing are typically installed where it is determined that signing is needed to supplement the markings to better alert drivers of the crosswalk placement.	1. Pedestrian safety is maximized when drivers are aware of the crosswalk location and know when a pedestrian is attempting to cross. 2. An in lane pedestrian sign can be an effective tool to further enhance the crosswalk markings and denote the presence of expected pedestrian activity.	1. In-street pedestrian crossing signs should be placed at the crosswalk in the street or on a median, but should not obstruct the pedestrian path of travel. 2. In-street signs can be permanently installed in the roadway or mounted on a portable base to allow them to be taken in and out of the street as needed. 3. They can be easily damaged and need to be reset or replaced when damaged.	Typical costs for implementation of are generally in the range of $50 - $100.

Rectangular Rapid Flashing Beacon (RRFB)

Description	Benefits	Considerations	Estimated Cost
A rectangular rapid flashing beacon (RRFB) has two rapidly and alternatively flashing rectangular yellow indications attached to supplement the pedestrian warning sign (W11-2) or school crossing sign (S1-1) at a crosswalk. The beacon, when activated manually by a pedestrian or passively by a pedestrian detection system, uses an irregular flash pattern similar to emergency flashers on police vehicles, an alternating "wig-wag" flashing sequence (left light on, then right light on) with a rapid pulsing light source.	1. High rates of motorist "yield to pedestrians" compliance, up to between 80 percent has been documented. 2. The RRFB has been shown to be more effective than standard yellow flashing beacons. Drivers were yielding or slowing down further in advance of the crosswalk with RRFB than with standard round yellow flashing beacons. 3. Increases driver awareness of the presence of pedestrians. 4. Allows for normal traffic flow when not actuated.	1. The purpose of the RRFB is to increase driver awareness of crosswalks that are not across approaches controlled by YIELD signs, STOP signs, or traffic control signals. They can be used on crosswalks across the approach to and/or egress from a roundabout.	Costs for the installation of two units (one on either side of the street) rangefrom $10,000 to $15,000. This cost includes all the signs and lights plus the solar panels for powering the unit. The costs vary depending on the type of activation, either manually by the pedestrian or passive detection.

Pedestrian Acutated Flashing Beacon

Description	Benefits	Considerations	Estimated Cost
Overhead flashing beacons are pedestrian-activated flashing amber beacons installed on traffic signal poles and mast arms at uncontrolled crossing locations, typically along with regulatory/warning signage.	1. To increase driver awareness when approaching a marked crosswalk at an uncontrolled location, and to alert drivers to the presence of pedestrians and their intention to cross the roadway, so that drivers will stop for pedestrians 2. Increases driver compliance with laws to stop/yield for pedestrians in crosswalks. 3. Increases driver awareness of the presence of pedestrians. 4. Allows for normal traffic flow when not actuated.	1. Does not have a steady red signal indication requiring traffic to stop. 2. Relatively high installation cost and some maintenance costs. 3. Visually-impaired may not know to activate the beacon.	Costs for the installation of an overhead actuated flashing beacon system is approximately $45,000.

HAWK System

Description	Benefits	Considerations	Estimated Cost
A pedestrian hybrid beacon system, also known as a high-intensity activated crosswalk (HAWK), is a beacon installed at mid-block crosswalks. It consists of both a vehicle beacon with two side-by-side red lenses and a single yellow lens below the red, and also typical pedestrian signal heads with a WALK signal. The beacon remains dark until the pushbutton is activated by a pedestrian and the beacon flashes a sequence of amber warning beacons followed by a red STOP beacon, a message that tells motorists to stop for pedestrians at the crosswalk.	1. Pedestrian hybrid beacon system will provide gaps in roadway traffic at a crosswalk that allow pedestrians to cross safely. 2. The crosswalk treatment is a tried safety strategy with up to 97 percent vehicle compliance of stopping at the crosswalk during the steady red beacon phase. 3. A 69 percent reduction in vehicle pedestrian crashes was found in a Federal Highway Administration (FHWA) study, and it was also found to be associated with a statistically significant 29 percent decrease in all crashes	1. Pedestrian hybrid beacons should only be used in conjunction with a marked crosswalk and not at an intersection, because they are not intended to assist vehicles on a minor road with entering or crossing a major road. 2. Limitation of the pedestrian hybrid beacon to be used only at midblock locations is currently under discussion within the industry, and consideration is being given to its use at minor intersections. 3. The beacon is intended solely to assist pedestrians.	The costs for a typical beacon system can range from approximately $50,000 to $240,000, depending on site conditions and what equipment is already installed, and ADA pedestrian ramp improvements.

Source: MnDOT, Minnesota's Best Practices for Pedestrian/Bicycle Safety, September 2013

Table 3.3 Traffic Signal vs. Roundabout Comparison

Signal System

Description	Pros and Cons	Considerations
Traffic signals assign right-of-way to various traffic movements at intersections. Signal design has typically focused on the operating characteristics of motorized vehicles. Like the pedestrian hybrid beacons, signals are effective at creating gaps in the traffic allowing pedestrians to cross, however, unlike pedestrian hybrid beacons, signals have turning conflicts and long cycles. Traffic signals are a mobility treatment with benefits for pedestrians and bicyclists in some cases.	Pros 1. Generally Can Be Designed with Minor Impact to Street Width/Curbs 2. Improves Left Turn Access onto Bygland 3. Provides Pedestrian Crossing Signal 4. Provides Slightly Better AM Peak Capacity than Roundabout 5. Familiarity Cons 1. Traffic Signals That Do Not Meet MMUTCD Warrants – Ineligible for Federal Funding. City Cost or Wait Until Warranted. 2. Outside of AM Peak 30 Minutes, Higher Delay and Inefficient 3. Ongoing Operation, Maintenance, Electricity Costs 4. Increased Crashes, Particularly Rear-end, Right Angle	1. Locations with high volumes of pedestrian activity such as near transit stops or schools, are candidates for traffic signal improvements. MN MUTCD Warrants should be considered for installation of new signals.

Roundabout

Description	Pros and Cons	Considerations
Roundabouts are a design technique intended to control traffic and reduce conflicts between traffic movements on the major and minor legs approaching an intersection. Roundabouts, which provide an alternative to traffic signal control at an intersection, are usually built with a circular raised island and splitter medians on all approaches to help slow vehicles and direct traffic into the counterclockwise flow around the center island.	Pros 1. Greatly Improves Access to Bygland – Left turn has Priority 2. Provides Continuous Flow of Traffic. Reduced Delay and Most Efficient 24-hour Solution 3. Provides Traffic Calming – Designed for 15 mph Speed. 4. Improves Pedestrian Crossing – Reduced Exposure, Improved Sightline with Refuge Island 5. Greatly Reduces Crash Severity 6. Aesthetics Cons 1. Slightly Less AM Peak Capacity Than Traffic Signal 2. Slightly More Expensive than Signal, But May be Less in Long Run. 3. Requires More Space at Intersection, but Less Space along Road. 4. Special Attention Required in Design for Trucks/Buses 5. Familiarity	1. The primary use of roundabouts is to control traffic at intersections where traditional strategies involving STOP signs or traffic signals cannot adequately address operational or safety deficiencies. 2. Special consideration should be given for visually-impaired pedestrians during the design of roundabouts, particularly multi-lane roundabouts. Some possible treatments to assist visually-impaired pedestrians include raised crosswalks or pedestrian hybrid beacons at the splitter islands.

Source: MnDOT, Minnesota's Best Practices for Pedestrian/Bicycle Safety, September 2013

Table 3.4 Signal Warrant Analysis Results Summary

Bygland Road at 5th Avenue

Scenario	All Way Stop Control			Warrant 1 - Eight Hour Vehicle Volume				Warrant 2 - Four Hour Volume		Warrant 3 - Peak Hour Volume		Warrant 6 - School Crossing			Warrant 7 - Crash Experience
	Cond. C (Hours)	Cond. D (80%) (Hours)	Warrant Met / Not Met	1A (Hours)	1B (Hours)	1C (Hours)	Warrant Met / Not Met	Hours	Warrant Met / Not Met	3B (Hours)	Warrant Met / Not Met	No. School Children	Primary School Crossing	Warrant Met / Not Met	Warrant Met / Not Met
Year 2015 Existing	0 Hours	0 Hours	Not Met	0 Hours	2 Hours	1 Hour	Not Met	1 Hour	Not Met	1 Hour	Met	--	No	Not Met	Not Met
Year 2025 Forecast	0 Hours	0 Hours	Not Met	0 Hours	2 Hours	1 Hour	Not Met	1 Hour	Not Met	1 Hour	Met	--	No	Not Met	Not Met
Year 2040 Forecast	0 Hours	0 Hours	Not Met	0 Hours	2 Hours	1 Hour	Not Met	1 Hour	Not Met	1 Hour	Met	--	No	Not Met	Not Met
Year 2040 W/32nd Avenue Bridge	0 Hours	0 Hours	Not Met	0 Hours	2 Hours	1 Hour	Not Met	1 Hour	Not Met	1 Hour	Met	--	No	Not Met	Not Met

Source: 2011 Minnesota Manual on Uniform Traffic Control Devices

Bygland Road at Rhinehart Drive

Scenario	All Way Stop Control			Warrant 1 - Eight Hour Vehicle Volume				Warrant 2 - Four Hour Volume		Warrant 3 - Peak Hour Volume		Warrant 6 - School Crossing			Warrant 7 - Crash Experience
	Cond. C (Hours)	Cond. D (80%) (Hours)	Warrant Met / Not Met	1A (Hours)	1B (Hours)	1C (Hours)	Warrant Met / Not Met	Hours	Warrant Met / Not Met	3B (Hours)	Warrant Met / Not Met	No. School Children	Primary School Crossing	Warrant Met / Not Met	Warrant Met / Not Met
Year 2015 Existing	0 Hours	0 Hours	Not Met	0 Hours	1 Hour	1 Hour	Not Met	1 Hour	Not Met	0 Hours	Not Met	--	No	Not Met	Not Met
Year 2025 Forecast	0 Hours	0 Hours	Not Met	1 Hour	4 Hours	2 Hours	Not Met	2 Hours	Not Met	1 Hour	Met	--	No	Not Met	Not Met
Year 2040 Forecast	1 Hour	2 Hours	Not Met	10 Hours	6 Hours	7 Hours	Met (1A, B, C)	4 Hours	Met	2 Hours	Met	--	No	Not Met	Not Met
Year 2040 W/32nd Avenue Bridge	1 Hour	2 Hours	Not Met	7 Hours	2 Hours	6 Hours	Met (1A)	3 Hours	Not Met	2 Hours	Met	--	No	Not Met	Not Met

Source: 2011 Minnesota Manual on Uniform Traffic Control Devices

Bygland Road at 13th Street

Scenario	All Way Stop Control			Warrant 1 - Eight Hour Vehicle Volume				Warrant 2 - Four Hour Volume		Warrant 3 - Peak Hour Volume		Warrant 6 - School Crossing			Warrant 7 - Crash Experience
	Cond. C (Hours)	Cond. D (80%) (Hours)	Warrant Met / Not Met	1A (Hours)	1B (Hours)	1C (Hours)	Warrant Met / Not Met	Hours	Warrant Met / Not Met	3B (Hours)	Warrant Met / Not Met	No. School Children (1)	Primary School Crossing	Warrant Met / Not Met (2)	Warrant Met / Not Met
Year 2015 Existing	1 Hour	1 Hour	Not Met	1 Hour	0 Hours	1 Hour	Not Met	1 Hour	Not Met	0 Hours	Not Met	11	Yes	Not Met	Not Met
Year 2025 Forecast	1 Hour	1 Hour	Not Met	1 Hour	0 Hours	1 Hour	Not Met	1 Hour	Not Met	0 Hours	Not Met	11	Yes	Not Met	Not Met
Year 2040 Forecast	1 Hour	1 Hour	Not Met	1 Hour	0 Hours	1 Hour	Not Met	1 Hour	Not Met	0 Hours	Not Met	11	Yes	Not Met	Not Met
Year 2040 W/32nd Avenue Bridge	1 Hour	3 Hours	Not Met	1 Hour	0 Hours	0 Hours	Not Met	1 Hour	Not Met	0 Hours	Not Met	11	Yes	Not Met	Not Met

Source: 2011 Minnesota Manual on Uniform Traffic Control Devices

(1) Counted in April 2015

(2) MMUTCD Standard: A minimum of 20 school children crossing during the highest hour

3.2 Street Segment Alternatives

Bygland Road was divided into similar segments. Based on street widths and lane use characteristics, cross-section alternatives for each segment were developed to improve the multimodal and traffic mobility of the corridor.

- **1st Street to 5th Avenue –** the alternatives aim to improve the northbound left turn lane operation and safety, improve the travel lane delineation and illustrate how a bicycle lane could be integrated along Bygland Road. The concepts compare a raised median, suitable for landscaping, versus a painted median to separate the traffic flows.
- **5th Avenue to 13th Street** – the typical section diagrams provide ten alternative strategies to best utilize the existing infrastructure and street width through reallocation of the street

space and feasible strategies to integrate bicycle facility into the corridor, improve pedestrian access, and provide travel lane delineation.

- **13th Street to south city limits** – the concept alternatives aim to establish a connection to South Middle School. The two concepts compare either replacing the existing sidewalk with an off-street trail or providing on street bike lanes. If the off-street trail is pursued, the sidewalk over the creek would require reconstruction as the curb line needs to move into order to provide sufficient trial width. Under the on street bike lane option, establishing a safe connection into the middle school will be needed. One option may be to construct a refuge median (opposite the left turn lane) and a waiting area for bicyclists to pull off the bike lane. Once these features are established, future consideration could be given to warning beacon systems if warranted.

Table 3.5, Table 3.6 and Table 3.7 illustrate the potential street segment alternatives for the 1st Street to 5th Avenue, 5th Avenue to 13th Street and 13th Street to the south segments, respectively.

3.3 Intersection Control and Pedestrian Improvements

Multiple intersection improvement alternatives were identified to address access control and to enhance pedestrian crossings at key locations along Bygland Road. Each intersection location investigated was selected based on the existing and future issues raised and the expected benefit the improvements will provide to the community.

- **5th Avenue.** The alternatives for 5th Avenue include the future installation of a traffic signal system or a roundabout intersection. The initial geometrics for the intersection would include one travel lane each direction for a signalized intersection and a single lane entry for a roundabout along Bygland Road and 5th Avenue. Under the traffic signal control option, exclusive left turn and right turn lanes are recommended. The location of the intersection should also be considered. There is advantage to realigning the 5th Avenue approach opposite the fire station driveway. This consideration reduces access conflicts and brings the intersection at the top of the horizontal roadway curve, which improves the sight lines allowing the existing stop control to operate longer into the future. The realignment does require right of way acquisition. In addition, the realignment creates space, which may allow for the future expansion of the intersection to accommodate the second northbound travel lane if needed in the future. The intersection improvement alternatives for 5th Avenue are shown in Table 3.8.
- **Rhinehart Drive.** The alternatives for Rhinehart Drive include either the installation of a traffic signal or a roundabout. Similar to 5th Avenue, the initial intersection geometrics would provide for one travel lane on each approach with exclusive left or right turn lanes. The roundabout would consist of only one lane of approach. Future expandability to accommodate a second northbound travel lane must be considered in the future intersection design. The intersection improvement alternatives for Rhinehart Drive are shown in Table 3.9.
- **6th Street**. 6th Street is currently a signed and marked pedestrian crossing. The intersection skew results in a very wide and uncomfortable distance for pedestrians to cross. To improve this situation, two potential options include providing either a raised

pork chop island or reconstructing each corner to provide curb extensions. The intersection improvement alternatives for 6th Street are shown in Table 3.10.

- **James Avenue and 8th Street Intersections.** Other than the key intersection of 1st Street, 5th Avenue, Rhinehart Drive and 13th Street, the next two most beneficial locations along the corridor to improve motorist left turn operation or provide an improved pedestrian crossing are at James Avenue and 8th Street. A cost effective option may include the construction of a refuge island (with landscaping) that shadows an exclusive left turn lane. The refuge island improves the pedestrian crossing by reducing exposure and establishing a safe two stage crossing. This configuration is compatible with the existing street width and the provision of on street bicycle lanes. The intersection improvement alternatives for James Avenue and 8th Street are shown in Table 3.11
- **13th Street –** Five alternatives were considered at the 13th Street intersection: a single lane roundabout, installation of a traffic signal with existing lane geometrics, installation of a traffic signal with a center median, all way stop control or a high intensity activated crosswalk beacon (HAWK). The intersection improvement alternatives for 13th Street are shown in Table 3.12

Table 3.5 Corridor Roadway Segment Alternatives – 1st Street to 5th Avenue

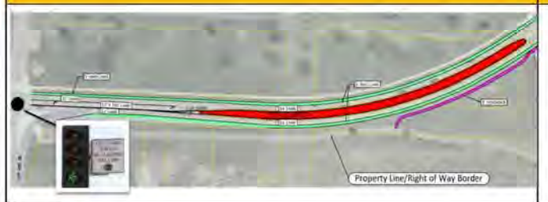
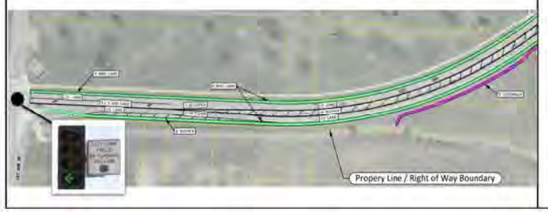
Intersection Design Alternatives	Typical	Description	Pros	Cons / Considerations	Estimated Cost
	1	- Extend northbound left turn lane - Add northbound protected/permissive left turn arrow - Construct raised median - Provide on street standard bike lanes - Establish permanent No Parking zone both sides of Bygland	- Narrows the feel of the roadway - Median provides opportunity for landscape and corridor aesthetic improvements - Improves operation of the 1st Street intersection - Improves safety with appropriate lane deflection entering the left turn lane - Street width allows the implementation of a bike facility compatible with the options identified for Segment B, - Median is not compatible with the addition of a second northbound travel lane at the 5th Avenue (if determined needed).	- Expensive - Drainage system impacts may occur - Bike lane connection to 1st Street requires further evaluation. Street widening may be required, or other design treatment is necessary	$400,000
	2	- Extend northbound left turn lane - Add northbound protected/permissive left turn arrow - Develop left turn lane deflection with pavement markings - Provide on street standard bike lane - Establish permanent No Parking zone on both sides of Bygland	- Inexpensive - Provisions for on street parking could be made on both sides of Bygland - Improves operation of the 1st Street intersection - Improves safety with appropriate lane deflection entering the left turn lane - Street width allows the implementation of a bike facility compatible with the options identified for Segment B	- Bike lane connection to 1st Street requires further evaluation. Street widening may be required, or other design treatment is necessary - Roadway will still feel too wide	$130,000

Table 3.6 Corridor Roadway Segment Alternatives –5th Avenue to 13th Street

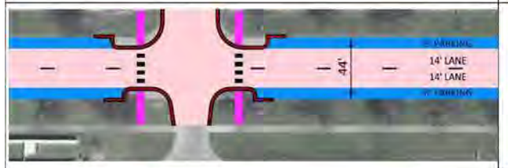
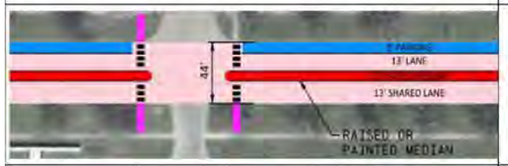
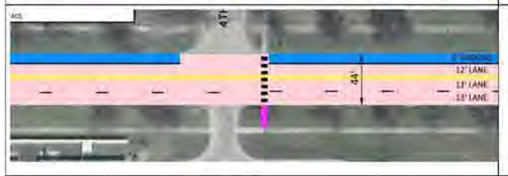
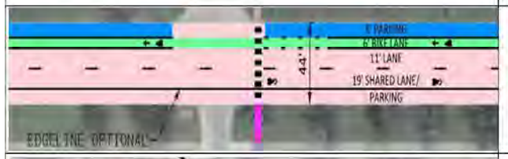
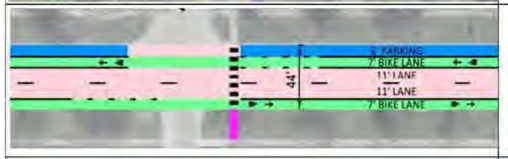
Cross-Section Design Alternatives	Typical	Description	Pros	Cons / Considerations	Estimated Cost
	1	- Stripe edgelines - Maintain parking - No bike facility	- Inexpensive - Better defines lane use and motor vehicle space in the roadway - Maintains parking on both sides of road	- Does not provide for dedicated bicycle space within the corridor - Maintains overall wide corridor feel	$70,000 (Depends on Material)
	2	- Stripe Edglines - Construct curb extension - Maintain parking - No bike facility	- Curb extensions narrow pedestrian crossing at all intersections - Traffic calming element. Corridor may feel more narrow - Maintains existing parking on both sides of road	- Does not provide for dedicated bicycle space within the corridor - Expensive. May not be most cost beneficial design for retrofit application. - Potential drainage system modifications may be required	$750,000 (Each Curb Extension is Approximately $20,000 to $30,000 Per Corner)
	3	- Stripe Edglines - Construct median - Maintain parking one side - No bike facility	- Median reduces pedestrian exposure and provides a refuge for crossing Bygland Road - Traffic calming element. Corridor may feel more narrow - Could accommodate a bicycle facility in segments wider than 48 feet. - Adds potential for landscaping	- Limits application for bicycle lanes in the 44' foot segment - Expensive. - Parking removal on one side required - Potential drainage system modifications will be required	$1,500,000
	4	- Stripe Edgline - Mark 2nd Northbound Through Lane (Rhinehart to 1st St) - Maintain parking one side - No bike facility	- Inexpensive - Defines lane use and motor vehicle space in the roadway - Improves mobility if a traffic control device were added at Rhinehart Drive or 5th Avenue	- Removes parking on one side of Bygland Road - Does not accommodate bicycle lane - Degrades pedestrian safety by introducing imbalanced lanes and double threat in one direction. - May increase speeds - 2nd lane not needed outside of AM peak half hour - 2nd lane is not needed if the 32nd Avenue Bridge Extension occurs or potentially if School Districting changes	$80,000 (Depends on Material)
	5	- Northbound bike lane - Southbound shared bike lane - Maintain parking both sides **(Does Not Apply to 48 Foot Cross Section. See Typical 6)**	- Inexpensive - Provides bike lane in one direction. Denotes expected location in roadway to expect cyclist - Maintains parking on both sides of road	- May not be most suitable for inexperienced or younger cyclists. - No physical separation between cars and bikes - Roadway centerline shifts and won't align with existing concrete panel joints	$125,000 (Depends on Material)
	6	- Standard bike lanes both directions - Remove parking on one side	- Inexpensive - Provides designates space in the road for bicyclists. - 48 foot segment could maintain parking in both directions - Discourages cyclists from riding on the sidewalk	- May not be most comfortable for inexperienced or younger cyclists adjacent to high volume traffic - No physical separation between cars and bikes - Roadway centerline shifts and won't align with existing concrete panel joints	$170,000 (Depends on Material)
	7	- Standard bike lanes both directions - Maintain on street parking both sides **(Not Compatible with Streetwidth Less than 48 feet)**	- Inexpensive - Provides designates space in the road for bicyclists. - Discourages cyclists from riding on the sidewalk - Maintains parking on both sides of road (>48' width segments)	- Narrow bike lane against parked cars and moving traffic. May not be most comfortable for inexperienced or younger cyclists adjacent to high volume traffic - No physical separation between cars and bikes - Roadway centerline shifts and won't align with existing concrete panel joints - Standard bike lanes in both directions requires one side parking removal on blocks less than 48 feet in width	$200,000 (Depends on Material)

Table 3.6 Corridor Roadway Segment Alternatives –5th Avenue to 13th Street Cont'd

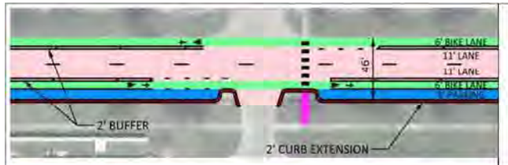
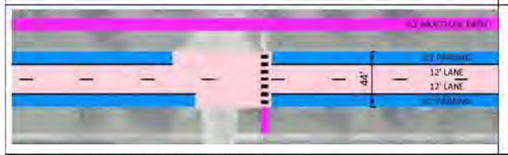
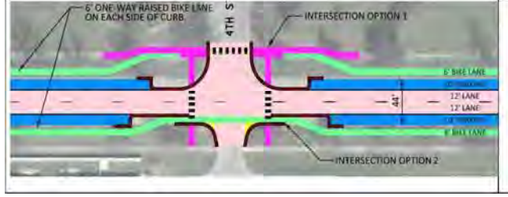
	8	- Buffered bike lane in both directions - curb extension on one side of Bygland to shadow parking - Remove parking on one side - 2 foot road widening **(2 Foot Widening Not Required on Blocks Wider than 46 feet)**	- Provides wider designated bicycle lane with buffer creates greater separation from vehicles - Curb extension narrows pedestrian crossing and improves visibility of pedestrians at intersections - Traffic calming. May make road feel narrowerer. - Boulevard space is available to accommodate widening	- Expensive - Potential drainage system impacts - May require relocation of street light poles if widening occurs on west side - One side parking removal - Roadway centerline shifts and won't align with existing concrete panel joints	$600,000
	9	- Maintain existing roadway lanes and stripe edgelines - Parking on both sides of Bygland - Replace existing sidewalk with 10 foot multi-use trail	- Provides the greatest level of protection for bicylists and is most suitable for younger or inexperienced users - Space is available and can accommodate the multi-use trail - Edglelines define motorist space in the roadway - Maintains two sided on street parking	- Combines pedestrians and bicyclists into the same space - Safety concern with right turn vehicle conflicts at intersection crossings - Expensive, and doesn't provide tangible change in feel of roadway	$750,000
	10	- Off street bike lanes - Parking on both sides of Bygland - Curb extensions at intersections to shadow parking	- Provides the greatest level of protection for bicylists and is most suitable for younger or inexperienced users - Curb extensions provide opportunity to provide design treatments to address right turn motorist conflict with off street bike lane - Curb extension shortens pedestrian crossing distance and provides traffic calming - Space is available and can accommodate the off street bike lanes - Edglelines define motorist space in the roadway - Maintains two sided on street parking - Separates pedestrians and bicyclists	- Expensive - Intersection option 1 results in pedestrian and bicycle conflicts - Drainage system impacts - Street lighting will need to be relocated along corridor - Duplicates both bike and pedestrian pavement areas on both sides of the roadway	$1,700,000

Table 3.7 Corridor Roadway Segment Alternatives – 13th Street to South City Limits

Cross-Section Design Alternatives	Typical	Description	Pros	Cons / Considerations	Estimated Cost
	1	- Replace existing sidewalk with 10 foot multiuse trail - Maintain existing travel lanes	- Provides the greatest level of protection for bicylists and is most suitable for younger or inexperienced users - Space is generallyl available and can accommodate the multi-use trail - Maintains existing travel lanes	- Requires narrowing of travel lanes over creek - Need to establish designated crossing at 13th Avenue (both sides of intersection) - Combines pedestrians and bicyclists into shared space - Serves primarily a school function. Separate on-street bike lanes south of 13th Avenue would be necessary to establish a bike facility connection	$250,000
	2	- Provide on-street standard bike lanes - Construct refuge island and pedestrian/bicycle waiting area on west side of Bygland	- Inexpensive - Connects directly to sholders south of Central Middle School to establish corridor bicycle facility - Maintains existing travel lanes	- Requires street widening south of 13th Avenue to establish bicycle lane - Bicycle lane connection to the Middle school is circuitous and requires crossing Bygland Road - Potential drainage system modifications may be required - Does not provide physical separation of bicyclists and motor vehicles. May not be most suitable design for younger or inexperienced users	$200,000 (Depends on Material)

Table 3.8. Intersection Improvement Alternatives – 5th Avenue

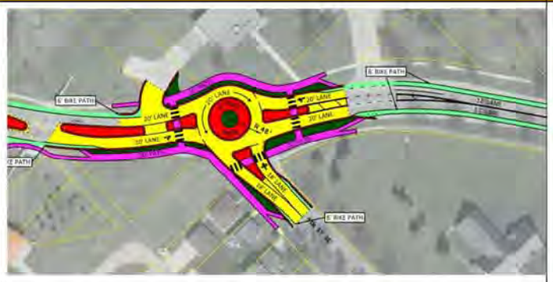
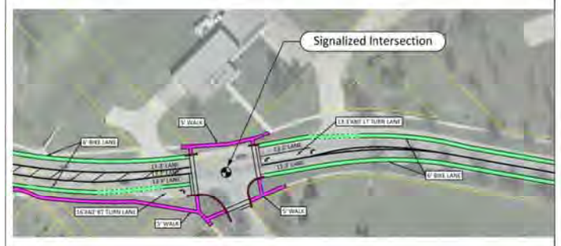
Intersection Design Alternatives	Typical	Description	Pros	Cons / Considerations	Estimated Cost
	1	- Construct Roundabout	- Greatly improves access to Bygland for motorists approaching from the west or southwest - Addresses sightline constraint - Improves pedestrian crossing of Bygland - Provides optimum 24 hour intersection operation and low delay - Provides traffic calming on Bygland - Provides opportunity for landscaping and corridor aesthetic improvements - Reduces right angle conflict and improves safety	- Expensive - Requires full reconstruction of the intersection - Potential right of way encroachment and easements required - Northbound approach is st capacity during the peak 30 minute period under 2040 forecast volumes. May require 2 northbound approach and exit lanes. - Providing improved access onto Bygland results in degraded flow along Bygland. Degraded flow on Bygland could impede upstream access during peak of AM rush - Close access spacing to the fire station - Requires on street parking removal on both sides of Bygland on both approaches to allow for roundabout entry	$750,000
	2	- Install Traffic Signal	- Inexpensive compared to a roundabout - Improves pedestrian crossing of Bygland - Greatly improves access to Bygland for motorists approaching from the west or southwest. Delay is greater than a roundabout - Installation could occur with existing intersection lane geometrics	- Signal warranted for only 1 hour of the day. Traffic control device increases motor vehicle delay during remaining daily hours - Expected to increase intersection crashes (typically rear end types) - Northbound approach is at capacity during the peak 30 minute period under 2040 forecast volumes - Providing improved access onto Bygland results in degraded flow along Bygland. Degraded flow on Bygland could impede upstream access during peak of AM rush - Incurs annual operation and maintenance cost (electricty, timing, equipment) - Close access spacing to the fire station. - Requires on street parking removal on both sides of Bygland on both approaches to allow for turn lanes and bike lanes	$500,000
	3	- Construct Second Northbound Through Lane	- Improves northbound traffic flow and operations during the AM peak period	- May require substantial right of way acquisition to accommodate additional travel lane plus a bike lane - Eliminates potential for a median in the segment north of 5th Ave to 1st Street - Increases roadway footprint and pedestrian crossing. This can be mitigated with refuge island in the rounabout design. - Requires parking removal along both sides of the street on the intersection approaches. Additional widening would be required to maintain parking.	NA

Table 3.9. Intersection Improvement Alternatives – Rhinehart Drive

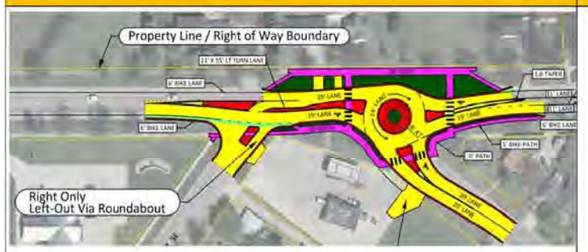
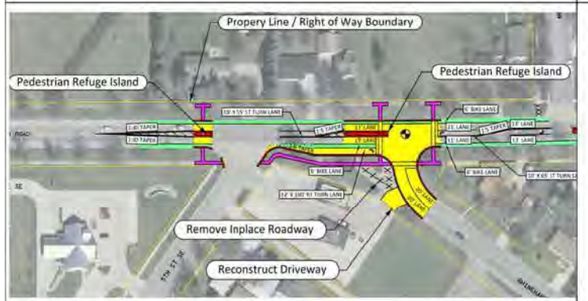
Intersection Design Alternatives	Typical	Description	Pros	Cons / Considerations	Estimated Cost
	1	- Construct Roundabout	- Greatly improves access to Bygland for motorists approaching from the west or southwest - Addresses sightline constraint - Improves pedestrian crossing of Bygland - Provides optimum 24 hour intersection operation and low delay - Provides traffic calming on Bygland - Provides opportunity for landscaping and corridor aesthetic improvements - Reduces right angle conflict and improves safety	- Expensive - Requires full reconstruction of the intersection - May require an easement with gas station property - At capacity during the peak 30 minute period under 2040 forecast volumes. May require 2 northbound approach and exit lanes - Providing improved access onto Bygland results in degraded flow along Bygland. Degraded flow on Bygland could impede upstream access during peak of AM rush - Close access spacing to the gas station. Gas station access to Rhinehard Dr should be relocated. - Requires on street parking removal on both sides of Bygland between 5th Street and 6th Street to fit bike lanes	$900,000
	2	- Install Traffic Signal	- Improves pedestrian crossing of Bygland - Greatly improves access to Bygland for motorists approaching from the west or southwest. Delay is greater than a roundabout - Bike lane would remain within the street through intersection	- Expensive. - Signal volume warrant not met until 2025 . Only the peak hour warrant expected to be at that time. Traffic control device increases motor vehicle delay during remaining daily hours. - Expected to increase intersection crashes (typically rear end types) - At capacity during the peak 30 minute period under 2040 forecast volumes - Providing improved access onto Bygland results in degraded flow along Bygland. Degraded flow on Bygland could impede upstream access during peak of AM rush - Incurs annual operation and maintenance cost (electricty, timing, equipment) - Close access spacing to the gas station. - Requires on street parking removal on both sides of Bygland between 5th Street and 6th Street to fit bike lanes	$800,000

Table 3.10. Intersection Improvement Alternatives – 6th Street

Intersection Design Alternatives	Typical	Description	Pros	Cons / Considerations	Estimated Cost
	1	- Construct curb extensions to narrow overall intersection	- Greatly reduces the pedestrian crossing distance on all approaches - Narrows the intersection and adds green space on the corners - Compatible with all cross-section alternatives - Compatible with a future pedestrian crossing beacon	- Expensive - Drainage infrastructure required.	$175,000
	2	- Construct pedestrian refuge island	- Inexpensive - Greatly reduces the pedestrian crossing distance on the north and west legs - Compatible with all cross-section alternatives - Compatible with a future pedestrian crossing beacon	- Channelized right turn islands result in a circuitous pedestrian crossing that can be difficult for the blind	$30,000

Table 3.11. Intersection Improvement Alternatives – James Avenue and 8th Street

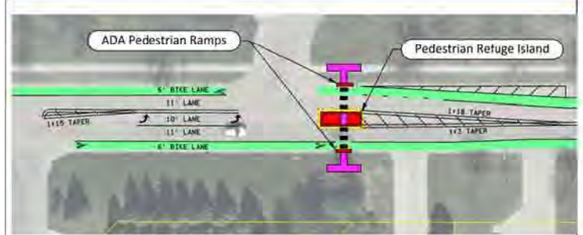
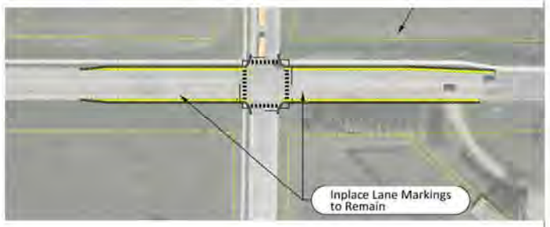
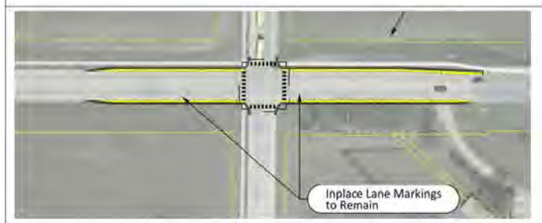
Intersection Design Alternatives	Typical	Description	Pros	Cons / Considerations	Estimated Cost
	1	- Construct left turn lane and pedestrian refuge median **(Could be Applied to Most Intersections Where a Left Turn Lane is Prioritized)**	- Provides dedicated space for left turn vehicles - Median shadowing the left turn lane provides a safe refuge for two stage pedestrian crossing. Shortens the pedestrian exposure time. - Median could provide opportunity for landscaping and corridor aestetics improvements - Compatible with most cross-section alternatives - Fairly inexpensive treatment. Less expensive than curb extension alternatives. - Provides the potential for additional pedestrian crossing locations along Bygland	- May be drainage infrastructure required. - Removal of parking is required on one side Bygland if no bike lanes are provided - Removal of parking is requrired on both sides of Bygland if bike lanes are provided on street	$50,000

Table 3.12. Intersection Improvement Alternatives – 13th Street

Intersection Design Alternatives	Typical	Description	Pros	Cons / Considerations	Estimated Cost
	1	- Construct Roundabout	- Greatly improves access to Bygland for motorists approaching from the west or southwest - Improves pedestrian crossing of Bygland - Installation of a RRFB brings greater awareness to the presence of pedestrians - Provides optimum 24 hour intersection operation and low delay - Provides traffic calming on Bygland - Provides opportunity for landscaping and corridor aesthetic improvements - Reduces right angle conflict and improves safety	- Expensive - Requires full reconstruction of the intersection - Alignment must be shifted to the west to avoid right of way impacts. Encroaches into city owned property on the west - Does not provide signalized pedestrian crossing. Could be improved with the installation of a RRFB crossing the north leg	$1,200,000
	2	- Install Traffic Signal	- Provides signalized pedestrian crossing of Bygland - Greatly improves access to Bygland for motorists approaching form the west or from the school. Delay is greater than a roundabout - Bike lane would remain within the street through intersection - Could be installed with existing lane geometrics. However, street widening is required if bike lanes are implemented.	- Inexpensive - Signal volume warrants are not met under any volume condition . The school crossing warrant may be satisfied in the future with more children expected to cross at Bygland - Overall increase in delay is expected with a traffic signal. Outside of the AM and PM school periods, the traffic signal is not needed. - Expected to increase intersection crashes (typically rear end types) - Incurs annual operation and maintenance cost (electricty, timing, equipment)	$250,000
	3	- Install Traffic Signal with raised medians	- Provides signalized pedestrian crossing of Bygland - Greatly improves access to Bygland for motorists approaching form the west or from the school. Delay is greater than a roundabout - Bike lane would remain within the street through intersection - Could be installed with existing lane geometrics. However, street widening is required if bike lanes are implemented. - Medians provide greater separation of vehicle flows and improves safety - Medians serve as a pedestrian refuge	- Expensive - Signal volume warrants are not met under any volume condition . The school crossing warrant may be satisfied in the future with more children expected to cross at Bygland - Overall increase in delay is expected with a traffic signal. Outside of the AM and PM school periods, the traffic signal is not needed. - Expected to increase intersection crashes (typically rear end types) - Incurs annual operation and maintenance cost (electricty, timing, equipment)	$1,000,000
	4	- Install all way stop	- Provides improved pedestrian crossing of Bygland - Greatly improves access to Bygland for motorists approaching form the west or from the school. Delay is greater than a roundabout - Bike lane would remain within the street through intersection - Could be installed with existing lane geometrics. However, street widening is required if bike lanes are implemented. - Compatible with future traffic signal installation	- Inexpensive - All way stop volume warrants are not met under any volume condition . The school crossing warrant may be satisfied in the future with more children expected to cross at Bygland - Overall increase in delay is expected with an allway stop control. Outside of the AM and PM school periods, the all way stop is not needed. - May experience off peak period violations and roll through operation - All way stops generally result in increased vehicle speeds and noise	$500
	5	- Install HAWK Signal	- Provides improved pedestrian crossing of Bygland - May improve access to Bygland for motorists downstream. When activated the HAWK will stop all traffic movements at this intersection. - Bike lane would remain within the street through intersection - Could be installed with existing lane geometrics. However, street widening may be required if bike lanes are implemented. - Compatible with future traffic signal installation	- Inexpensive - Replacement of the existing yellow flashing pedestrian signs may require paying back federal SRTS funds with the installation of a HAWK - May require replacement of pedestrian ramps	$225,000

3.4 Traffic Operation Analysis

Many of the alternatives previously presented maintain the existing mobility along the corridor and do not positively or negatively impact the quality of traffic flow. In this regard, a specific operation analysis of each alternative was not completed. The potential change in traffic control device, whether it is an installation of a traffic signal or a roundabout, will have an effect on the Bygland Road traffic flow. A traffic operation analysis was performed for the key traffic control/geometric alternatives using SimTraffic8 (traffic signal) and VISSIM (roundabout) to evaluate specific performance of the roundabout geometrics. Table 3.13 documents the overall intersection and worst stop (or yield controlled) approach delay, LOS and average and maximum queue lengths at the key intersections.

Table 3.13. Traffic Operation Analysis – Alternative Concepts

Intersection	MOE	Existing With Roundabout		2025 With Roundabout		2040 With Roundabout		2040 With Multi-Lane Roundabout		2040 Bridge Extension and Roundabouts	
		AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	[1] PM Peak Hour	AM Peak Hour	PM Peak Hour
Bygland Rd & 5th Av S	Worst Approach (Delay)	EB 5th Ave	EB 5th Ave	NB Bygland Rd	NB Bygland Rd	NB Bygland Rd	EB Bygland Rd	SB Bygland Rd		NB Bygland Rd	NB Bygland Rd
	Overall Delay / Worst Approach Delay	6.6 / 7.3	5.0 / 11.3	37.3 / 55.8	12.6 / 36.6	39.7 / 60.2	16.4 / 29.6	6.7 / 9.5		12.5 / 21.6	15.2 / 19.4
	LOS	A / C	A / B	**E** / **F**	B / **E**	**E** / **F**	C / D	A / A		B / C	C / C
	Worst Approach (Queue)	NB Bygland Rd	SB Bygland Rd	NB Bygland Rd	SB Bygland Rd	NB Bygland Rd	SB Bygland Rd	SB Bygland Rd		NB Bygland Rd	SB Bygland Rd
	Average Queue / Max Queue (ft)	88 / 1342	1 / 93	297 / 1540	18 / 598	318 / 1527	32 / 829	26 / 159		48 / 1027	60 / 1270
Bygland Rd & Rhinehart Dr SE	Worst Approach (Delay)	NB Bygland Rd	NB Bygland Rd	NB Bygland Rd	NB Bygland Rd	NB Bygland Rd	NB Bygland Rd	EB Rhinehart Dr		NB Bygland Rd	NB Bygland Rd
	Overall Delay / Worst Approach Delay	2.1 / 4.6	2.1 / 4.6	28.8 / 45.1	2.9 / 7.1	41.1 / 71.5	3.0 / 7.8	5.1 / 11.3		5.9 / 12.0	5.9 / 23.9
	LOS	C / D	A / A	D / **E**	A / A	**E** / **F**	A / A	A / B		A / B	A / C
	Worst Approach (Queue)	NB Bygland Rd	NB Bygland Rd	NB Bygland Rd	NB Bygland Rd	NB Bygland Rd	NB Bygland Rd	EB Rhinehart Dr		NB Bygland Rd	NB Bygland Rd
	Average Queue / Max Queue (ft)	57 / 1031	0 / 110	207 / 1418	1 / 170	545 / 1544	2 / 161	55 / 180		11 / 322	20 / 608
Bygland Rd & 13th St	Worst Approach (Delay)	EB Green Way Blvd	WB 13th Street	NB Bygland Rd	WB 13th Street	NB Bygland Rd	WB 13th Street	NB Bygland Rd		NB Bygland Rd	WB 13th Street
	Overall Delay / Worst Approach Delay	2.1 / 3.4	2.1 / 9.5	3.7 / 5.4	2.7 / 3.5	3.7 / 5.3	2.7 / 3.5	4.3 / 5.5		3.1 / 4.0	2.6 / 3.2
	LOS	A / B	A / A	A / A	A / A	A / A	A / A	A / A		A / A	A / A
	Worst Approach (Queue)	WB 13th Street	NB Bygland Rd	WB 13th Street	SB Bygland Rd	WB 13th Street	SB Bygland Rd	NB Bygland Rd		SB Bygland Rd	SB Bygland Rd
	Average Queue / Max Queue (ft)	1 / 122	0 / 60	2 / 163	0 / 69	2 / 163	0 / 68	24 / 88		1 / 116	0 / 93

[1] PM peak hour was not analyzed because the AM peak hour is the primary constraint

Table 3.13. Traffic Operation Analysis – Alternative Concepts Cont'd

Intersection	MOE	Existing With Traffic Signal		2025 With Traffic Signal		2040 With Traffic Signal		2040 Bridge Extension and Traffic Signals	
		AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Bygland Rd & 5th Av S	Overall Delay	4.5	5.3	14.7	10.3	25.8	11.4	9.0	10.2
	LOS	A	A	B	B	C	B	A	B
	Worst Approach (Queue)	EB 5th Ave	SB 5th Ave	NB Bygland Rd	SB Bygland Rd	NB Bygland Rd	SB Bygland Rd	NB Bygland Rd	SB Bygland Rd
	Average Queue / Max Queue (ft)	48 / 130	29 / 66	265 / 619	141 / 379	507 / 1048	173 / 340	138 / 320	134 / 360
Bygland Rd & Rhinehart Dr SE	Overall Delay	5.4	2.9	6.9	3.7	11.9	5.9	8.2	6.0
	LOS	A	A	A	A	B	A	A	A
	Worst Approach (Queue)	NB Bygland Rd	SB Bygland Rd	NB Bygland Rd	SB Bygland Rd	NB Bygland Rd	SB Bygland Rd	NB Bygland Rd	NB Bygland Rd
	Average Queue / Max Queue (ft)	115 / 242	53 / 135	141 / 249	72 / 174	182 / 252	97 / 182	97 / 199	100 / 203
Bygland Rd & 13th St	Overall Delay	3.5	2.1	8.2	6.1	8.3	5.7	7.9	7.8
	LOS	A	A	A	A	A	A	A	A
	Worst Approach (Queue)	WB 13th Street	WB 13th Street	SB Bygland Rd	NB Bygland Rd	SB Bygland Rd	NB Bygland Rd	WB 13th Street	WB 13th Street
	Average Queue / Max Queue (ft)	45 / 86	24 / 65	50 / 153	37 / 109	50 / 210	34 / 113	57 / 152	50 / 124

The traffic operation analysis finds that improving access and reducing delays for motorists entering onto Bygland Road during the a.m. peak period will reduce the quality of traffic flow for motorists already on Bygland Road. Currently traffic on Bygland does not have to stop or yield, and with any future traffic control device, the traffic flow will become impeded. This is due either to the traffic signal turning red or for the roundabout, the northbound motorists yielding right of way to motorists on their left. However, this may be an acceptable trade when balancing all users and system considerations. Key conclusions of the traffic control alternatives are as follows:

- A traffic signal system will have a higher a.m. peak hour capacity than a single lane roundabout. However, during the off peak period (remaining 23 hours of the day) the delay at the traffic signal will be higher than the roundabout.
- A roundabout will provide a greater degree of priority for motorists making the eastbound to northbound Bygland Road left turn. This is due to the fundamentals of how a roundabout works. In a roundabout, the motorist approaching from the left (i.e., already in the circulatory roadway) has right of way. Since the southbound volume on Bygland Road is low during the a.m. peak period, the eastbound approach will be first into the circulatory roadway. As such, the northbound Bygland Road approach will be yielding. A traffic signal will assign right of way to the cross-street, but the cross-street approaches will have a much higher delay, while Bygland Road approach delays will be lesser.
- During the a.m. peak period (on school days), a single lane roundabout at Rhinehart Drive or 5th Avenue is expected to provide acceptable approach delays, but could generate longer vehicle queue lengths under existing and forecast 2025 volumes. The

northbound queue length approaching Rhinehart Drive may at times extend beyond 6th Street.

- A second northbound approach lane may be required at Rhinehart Drive and 5th Avenue to accommodate the forecast year 2040 traffic volumes (a.m. peak period only).
- The future 32nd Avenue bridge extension is expected to eliminate the need for an additional lane on Bygland Road. A single lane roundabout or one northbound through lane with a traffic signal system is expected to perform sufficiently under this scenario.
- A single lane roundabout or traffic signal system at 13th Street is expected to provide sufficient capacity under all traffic volume forecast scenarios.

4.0 Recommended Transportation Plan

Recommendations were developed based on input from the SRC, public participation process and the results of the technical analysis completed herein. Environmental Justice impacts are not expected as the result of any of the recommended improvements; however, further investigation may be warranted during the design development phase. The following sections provide the GF-EGF MPO the necessary guidance and serve as a planning tool to develop a prioritization for future roadway and multimodal transportation improvements within the corridor.

4.1 Alternatives

The previous chapter details feasible alternatives to address the study goals and issues raised through the technical and public participation process. The following provides a brief summary of the key recommended improvements for the Bygland Road corridor.

- **Goal 1: Evaluate feasibility and design options to integrate an on street bike facility along Bygland Road.**
  - The feasibility analysis identified ten cross-section alternatives to integrate bicycling or improve the street characteristics of Bygland Road. The implementation of standard on street bicycle lanes, and removal of on street parking along the east side of Bygland Road is recommended.
  - The recommended on street bicycle lanes provide the most economical use of existing infrastructure and efficient reallocation of street space. This alternative provides dedicated space to pedestrians (existing sidewalks), bicycles (separated lane) and motorists with no change in motor vehicle operation. The bike lanes at 7 feet in width provide a comfortable and separated space within the street.
  - The segment of Bygland Road between 6th Street and 13th Street is 48 feet in width and could be marked to provide buffered lanes (by narrowing the parking and travel lanes to the minimum width allowed by Minnesota State Aid Rules). The implementation of buffered lanes will carry a higher cost than denoted in the estimates provided in the next section.
  - The provision of dedicated bicycle lanes also brings motor vehicle lane definition to Bygland Road, which is expected to provide more orderly traffic flow.
  - The establishment of a designated bicycle route that connects the elementary school with the regional trail system (west and east of Bygland Road) should be made.

- **Goal 2: Examine traffic operations at key intersections, specifically 5th Avenue, Rhinehart Drive and 13th Street and potential options to improve vehicle mobility, left turn access and safety.**
  - The alternatives analysis evaluated traffic signals and roundabout intersection designs to improve access to Bygland Road. Based on the evaluation, roundabout intersection control is recommended.
  - A roundabout provides the most efficient traffic control device, with the least overall delay when considering a 24-hour day, weekends and non-school days.
  - Roundabouts are expected to prioritize left turn access onto Bygland Road, which addresses a key issue raised by the community.

- Federal funding and other funding opportunities can be sought to provide assistance with implementation sooner than could be accomplished with the traffic signal.
- The intersections can be designed for continuous flow at a low operating speed, which may result in traffic calming along the corridor.
- Improved pedestrian access and safety is accomplished by providing wide median refuge islands and marked crosswalks.

- **Goal 3: Improve pedestrian crossing opportunities and safety at key locations along the corridor.**
  - Refuge median islands are recommended at the James Avenue, 8th Street and Middle School driveway intersections to provide reduced exposure and two stage crossing of Bygland Road.
  - Installation of curb extensions at the 6th Street intersection will significantly reduce the crossing distance for pedestrians and increase visibility of pedestrians waiting at the intersection corners.
  - To address students crossing at the 13th Street intersection, prior to the future installation of a roundabout, a HAWK signal is recommended. The HAWK is expected to provide the greatest protection (similar to a traffic signal); however, is far more efficient since it will be deactivated when no pedestrians present and the intersection can continue to operate as a two way stop control.
  - A sidewalk should be established on the west side of Bygland Road that connects 5th Avenue with the regional trail system.
  - Narrow segments of sidewalk (e.g., Metro Court to 4th Street) should be widened to a minimum of 5 feet.
  - The above improvement measures coupled with the future intersection control improvements at 5th Avenue and Rhinehart Drive results in improved pedestrian access at frequent locations along the Bygland Road, and should greatly improve the pedestrian environment of the corridor.

- **Goal 4: Examine Cities Area Transit (CAT) and school bus stops and routes within the study area and potential to improve the modal connections.**
  - With the construction of the roundabout at Rhinehart Drive, it is recommended that Route 11 be realigned to access Bygland Road via Rhinehart Drive instead of 6th Street.
  - Further study is necessary to explore the demand for extending transit service further south into the “point” neighborhood. Public feedback indicated a low desire for additional transit service along the corridor.
  - The GF-EGF MPO should consider replacing Route 11 bus transit with an on-demand transit service within the “point” area.
  - School bus stops should continue to be provided on the cross-street stopped approaches.

4.2 Design Considerations

As the GF-EGF and the City of East Grand Forks begins to implement components of the recommended transportation plan, several design considerations need to be made:

- **Mobility:**
  - The traffic characteristics on Bygland Road are unique in that for 45 minutes a day, there is an existing accessibility concern and anticipated future congestion issue on the corridor. This situation exists only on school days between 7:30 a.m. and 8:15 a.m. A key consideration is whether or not Bygland Road should be designed to accommodate a condition that encompasses only 2 percent of the year. If so, then a second northbound travel lane between 6th Street and 1st Street may be required in the future. The trade off with this design provision may include:
    - A wider roadway cross-section (55 feet instead of 44 or 48 feet) to accommodate on street parking and bike lanes; or
    - Removal of on street parking along both sides of Bygland Road; or
    - Moving the on street bike lanes to an off-street trail, which will require additional infrastructure investment.
    - Consequences of a second northbound travel lane may include increased vehicle speeds and degraded pedestrian crossing safety.
  - Alternatively, Bygland Road could be designed for the non-a.m. peak time period (remaining 23 hours of the day), weekends and non-school days, which represent 98 percent of the year. The trade off with this consideration is that congestion along northbound Bygland Road is expected at Rhinehart Drive and 5th Avenue (7:30 a.m. to 8:15 a.m.) with the construction of single lane roundabouts at these locations.

- **Planning:**
  - The 32nd Avenue extension from Grand Forks via new bridge over the Red River is currently identified as a long range improvement within the 2040 LRTP. This important regional connection is expected to eliminate the need for a future second northbound travel lane on Bygland Road. It is recommended the GF-EGF MPO accelerate the construction of this project.
  - Other considerations that may reduce the need for a second northbound lane include; staggering the start time of the elementary and middle school, increasing acceptance of flexible work schedules throughout the metropolitan area or the potential to go to neighborhood schools instead of city schools.

- **Design:**
  - It is recommended the roundabouts at Rhinehart Drive and 5th Avenue intersections be designed for single travel lanes, but provide expandability for a potential second northbound travel lane. This will require the need for right of way acquisition at both locations.
  - Preliminary engineering is required to fully vet other design, utility and environmental issues that cannot be fully identified at a concept planning level.

This also includes right sizing the intersection footprints to accommodate all vehicle and truck types expected to use the intersections.

- The implementation of roundabouts in any community requires a public outreach and education plan. Until more roundabouts are installed, familiarity and motorist comfort will take time.

4.3 Implementation Plan

The implementation plan has identified improvement strategies at key locations along Bygland Road. In most cases, implementations of the improvement strategies are mutually exclusive of one another and could be constructed at any time. All improvements identified should be further evaluated during the design development phase and are subject to further environmental analysis and design requirements. To address the critical needs of the corridor, the implementation plan has been developed to prioritize the recommendations over near term (within 5 years), mid-term (2020 to 2025) and long term (2026-2040) horizons. Figure 4.1 and the included concept design indices illustrate the recommended components of the near term implementation plan. Figure 4.2 and the included concept design indices illustrate the recommended components of the mid-term and long term implementation plan. It is noted, the implementation plan could be subject change based on unforeseen traffic changes that may occur in the future.

4.4 Funding

To support the implementation of the recommended alternatives, the City of East Grand Forks and the GF-EGF MPO will seek support from available funding sources. Key funding sources may include:

- **NWATP City Sub-target Federal Funds.** This fund is awarded every 4 years (2018, 2022, etc.). An estimated $750,000 may be available to help support the construction of the roundabout at Rhinehart Drive under the 2018 allocated funding.
- **City Maintenance and Operation Funds**. The city currently expends resources to provide regular signing, pavement marking and other infrastructure maintenance along the city streets. Components of the recommended transportation plan, such as the bicycle lanes, route connection or sidewalk widening could be funded through this resource.
- **Transportation Alternatives Program**. This program provides funding for non-traditional transportation improvement projects. For Bygland Road, this could include the construction of the High-Intensity Activated crossWalk beacon (HAWK) system, pedestrian refuge islands or curb extensions.
- **MnDOT Municipal State Aid (MSA) Funds**. The City of East Grand Forks is allocated state aid funding to help maintain and improve roadways on the state system. Bygland Road is an MSA roadway and MSA funds could be applied to most components of the transportation plan. A specific improvement eligible for MSA funding could be the traffic signal left turn arrow installation or bike lanes.
- **Minnesota and Federal Safe Route to School (SRTS) Funds**. The city can submit eligible projects to compete for available SRTS funds. Specific improvements may

include the HAWK signal, the pedestrian refuge island at the South Middle school, establishment of the bicycle route connection to the regional trail system and sidewalk installations.

- **Highway Safety Improvement Program (HSIP).** This program provides funding for safety improvement projects. Projects that may qualify for this funding include the pedestrian improvement treatments such as the refuge islands or curb extensions.
- **Other Minnesota and Federal Competitive Grant Programs**. Transportation improvement, bicycle, pedestrian and other multimodal grants can become available through MnDOT and Federal grant programs. Depending on the grants available at the time, any of the recommended project components could be eligible for funding.

4.5 Implementation Cost

Table 4.1 documents the estimated construction and project design and administration costs for each recommended improvement. The costs have been estimated for the average year of expenditure and include a 5 percent per year inflation factor.

Table 4.1 Implementation Cost Summary

Near Term Improvements (Year 2016 to 2020)

Element	Intersecton or Roadway Segment	Improvement Description	Construction Cost [1]	Engineering, Admin, Utilities and Inspection [2]	Total Cost
1	Bygland Road - 1st Street to South City Limits	On Street Bike Lane	Paint - $172,000 Epoxy - $210,000 GR IN Poly - $500,000	$43,000	Paint - $215,000 Epoxy - $253,000 GR IN Poly - $543,000
2	19th Avenue S, Greenway Boulevard and 13th Street	Establish Bike Route Connection Between Elementary School and Regional Trails	$20,000	$5,000	$25,000
3	Bygland Road at 1st Street N	Install Green Left Turn Arrow (with Flashing Yellow Arrow Indications)	$50,000	$12,500	$62,500
4	CAT Route 11	Re-route CAT Route 11 to Bygland Road/Rhinehart Drive Intersection.	$0	$0	$0
5	Bygland Road at Rhinehart Drive	Construct Roundabout [3]	$1,100,000	$275,000	$1,375,000
6	Bygland Road - Regional Trail (South of 1st Street) to 5th Avenue	Construct Sidewalk	$57,000	$14,250	$71,250
7	Bygland Road at 13th Street	Install HAWK Signal System	$225,000	$56,250	$281,250
Total			**$1,624,000 to $1,952,000**	**$406,000**	**$2,030,000 to $2,358,000**

Mid Term Improvements (Year 2021 to 2025)

Element	Intersecton or Roadway Segment	Improvement Description	Construction Cost [1]	Engineering, Admin, Utilities and Inspection [2]	Total Cost
8	Bygland Road at Middle School Access	Construct Refuge Median	$115,000	$28,750	$143,750
9	Bygland Road at 5th Avenue	Persue 5th Avenue Realignment [4] (Maintain Stop Control)	$655,000	$163,750	$818,750
10	Bygland Road - 4th Street to Metro Court (East Side)	Widen Existing 4 foot Sidewalk to 5 foot Sidewalk	$50,000	$12,500	$62,500
Total			**$820,000**	**$205,000**	**$1,025,000**

Long Term Improvements (Year 2026 to 2040)

Element	Intersecton or Roadway Segment	Improvement Description	Construction Cost [1]	Engineering, Admin, Utilities and Inspection [2]	Total Cost
11	Bygland Road at 13th Street	Construct Roundabout	$2,800,000	$700,000	$3,500,000
12	13th Street - Bygland Road to Elementary School	Construct Sidewalk on South Side of Street	$325,000	$81,250	$406,250
13	Bygland Road at 6th Street	Construct Curb Extensions	$420,000	$105,000	$525,000
14	Bygland Road at James Street and 8th Street	Construct Refuge Medians	$195,000	$48,750	$243,750
15	Bygland Road at 5th Avenue	Construct Roundabout	$1,500,000	$375,000	$1,875,000
Total			**$3,740,000**	**$935,000**	**$4,675,000**

(1) Construction costs are estimated year of expenditure (YOE) with an assumed 5% per year inflation rate

(2) Engineering, Administration, Utilities and Inspection are assumed to be 25% of the YOE construction cost.

(3) Rhinehart Roundabout requires an estimated 1,500 SF easement for relocation of the gas station driveway and an estimated 1,600 SF of right of way acquisition (2 parcels) to accommodate potential future expansion

(4) The future realignment of 5th Avenue requires an estimated 20,500 SF of right of way acquisition (1 parcel).

Bygland Road Study: Prioritized Improvement Plan

Near Term Improvements (Within 5 Years) High Priority

Location 1
Stripe Bike Lanes on Bygland Road (1st Street to South City Limits). Establish No Parking Zone on East Side.

Location 2
Designate bike route between Elementary School and Regional Trail (Shared Lane Markings and Signing) and bike route along Greenway between Regional Trail access and Bygland (Shared Lane Markings and Signing)

Near Term Improvements (Within 5 Years)

Location 3
Install Green Left Turn Arrow (with Flashing Yellow Arrow Indications) at 1st Street N

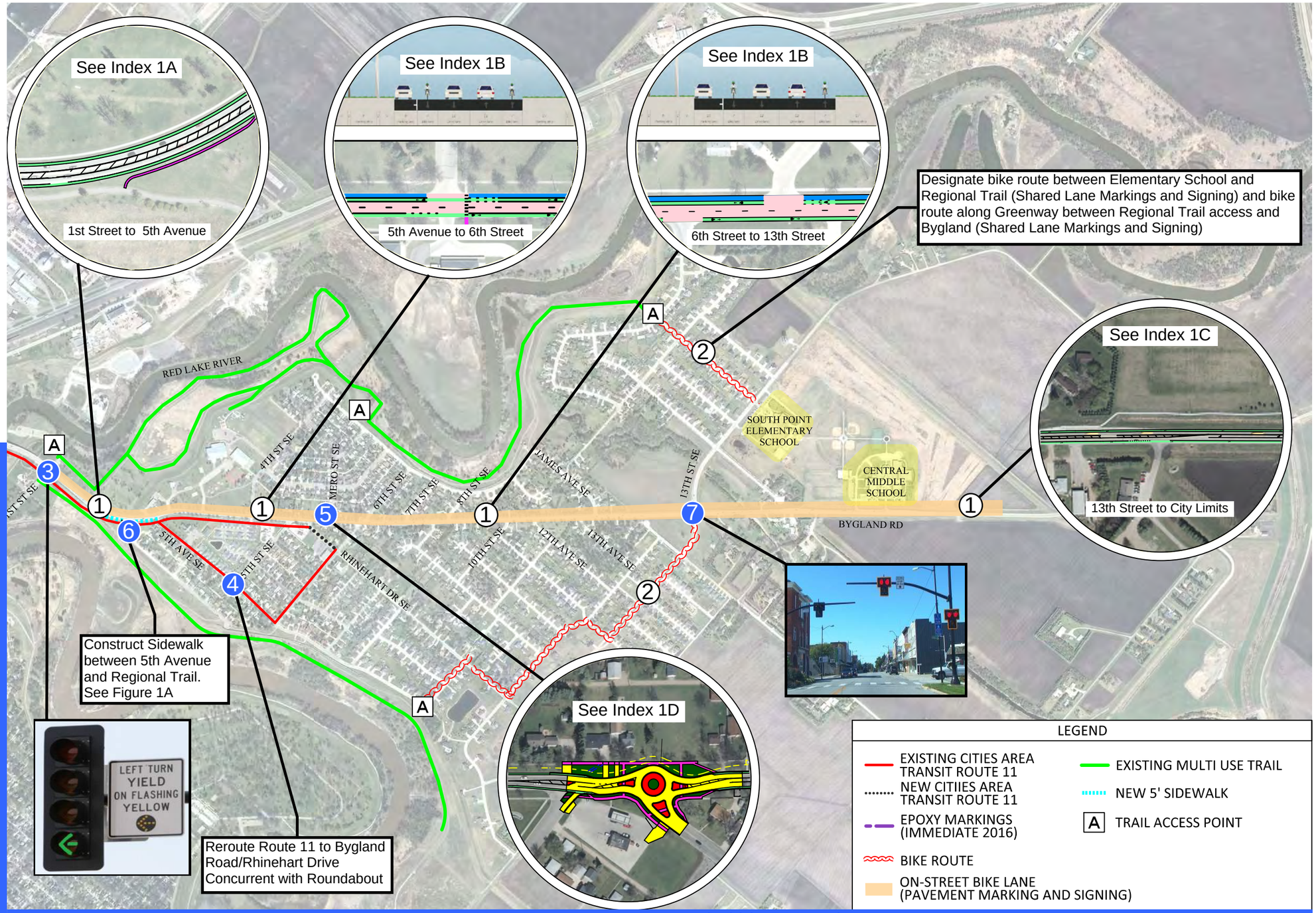
Location 4
Reroute Route 11 to Bygland Road/Rhinehart Drive Concurrent with Roundabout

Location 5
Preliminary Design and Construction of Roundabout at Rhinehart Drive

Location 6
Construct Sidewalk between 5th Avenue and Regional Trail

Location 7
Install HAWK signal at 13th Street

Near Term Improvements (Within 5 Years) - High Priority



Near Term Improvements (Within 5 Years)

ALLIANT ENGINEERING

FIGURE 4.1
NEAR TERM IMPLEMENTATION PLAN
(1 OF 5)

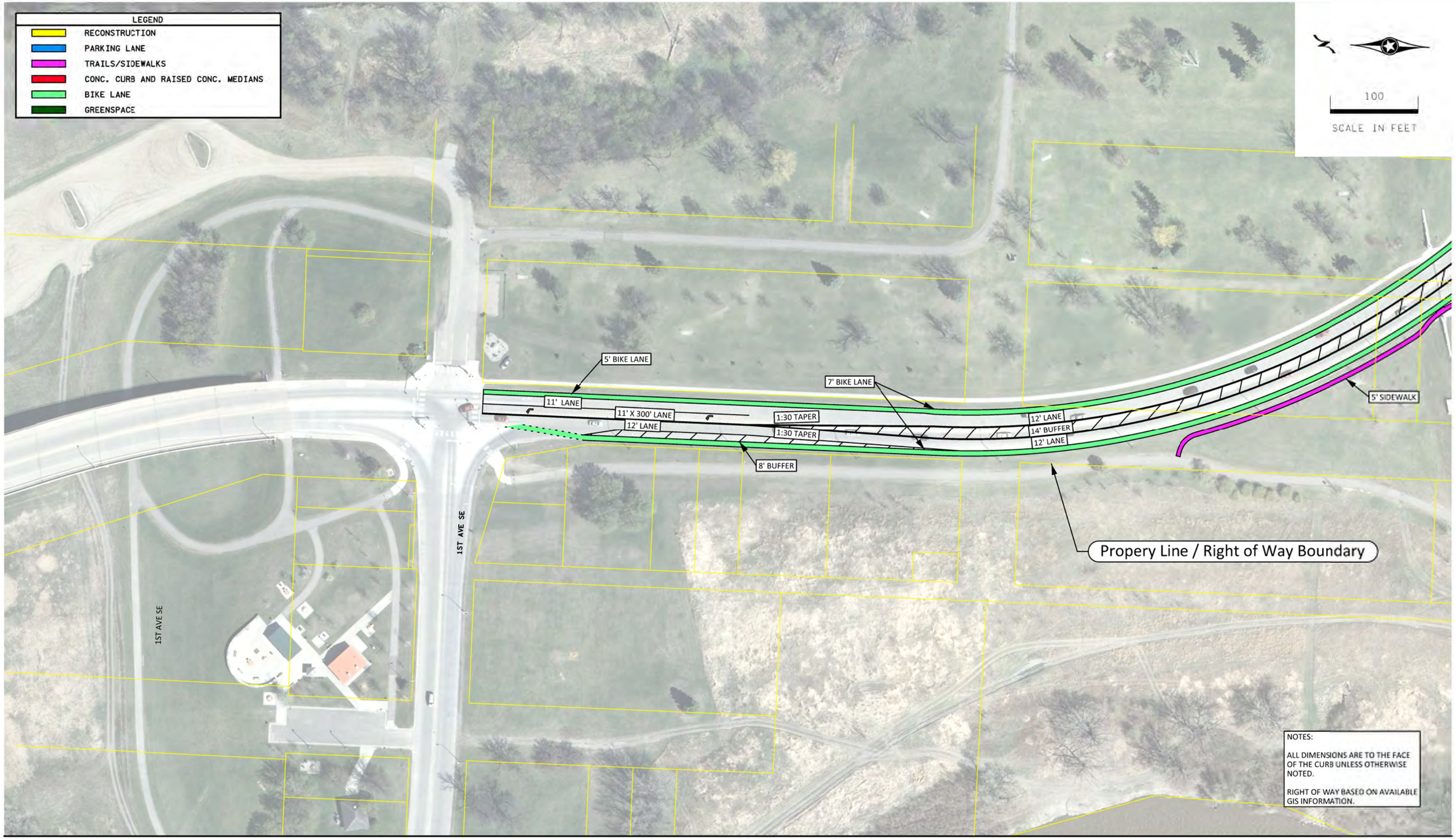
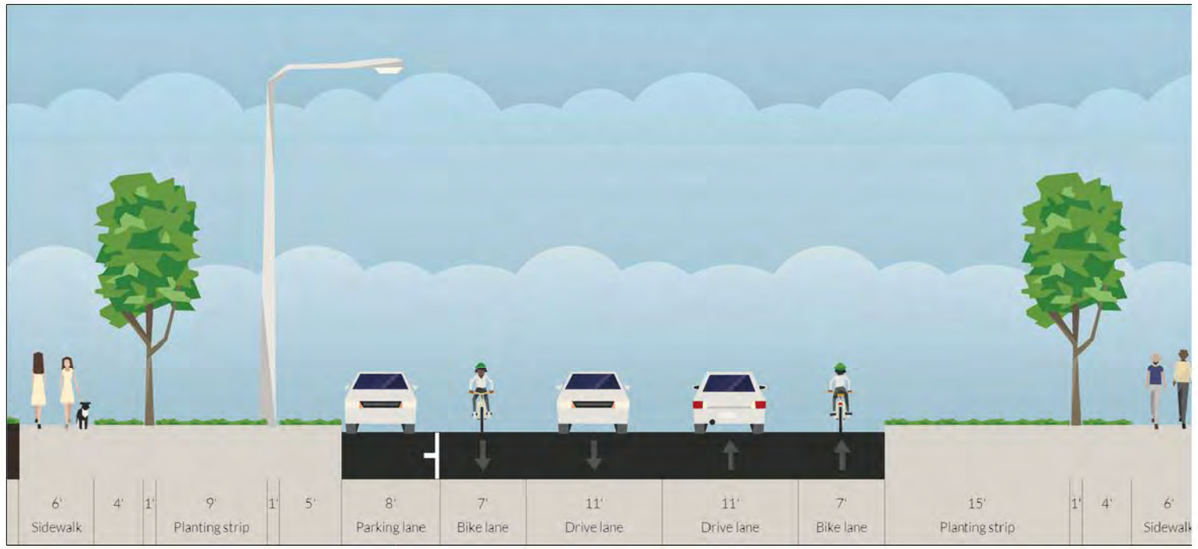


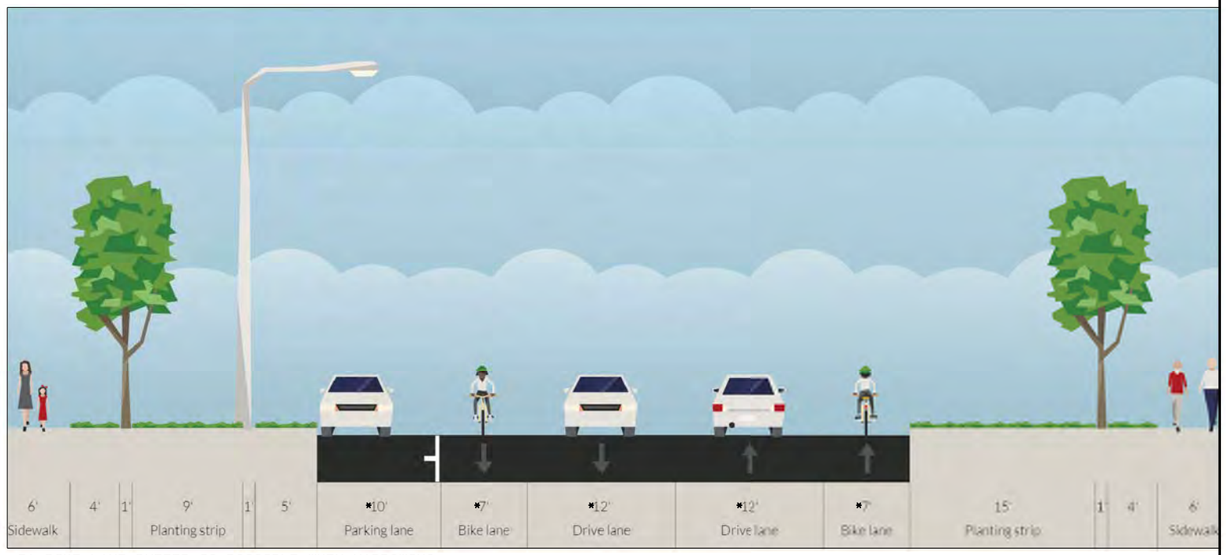
FIGURE 4.1
NEAR TERM IMPLEMENTATION PLAN
INDEX 1A
(2 OF 5)

ALLIANT ENGINEERING

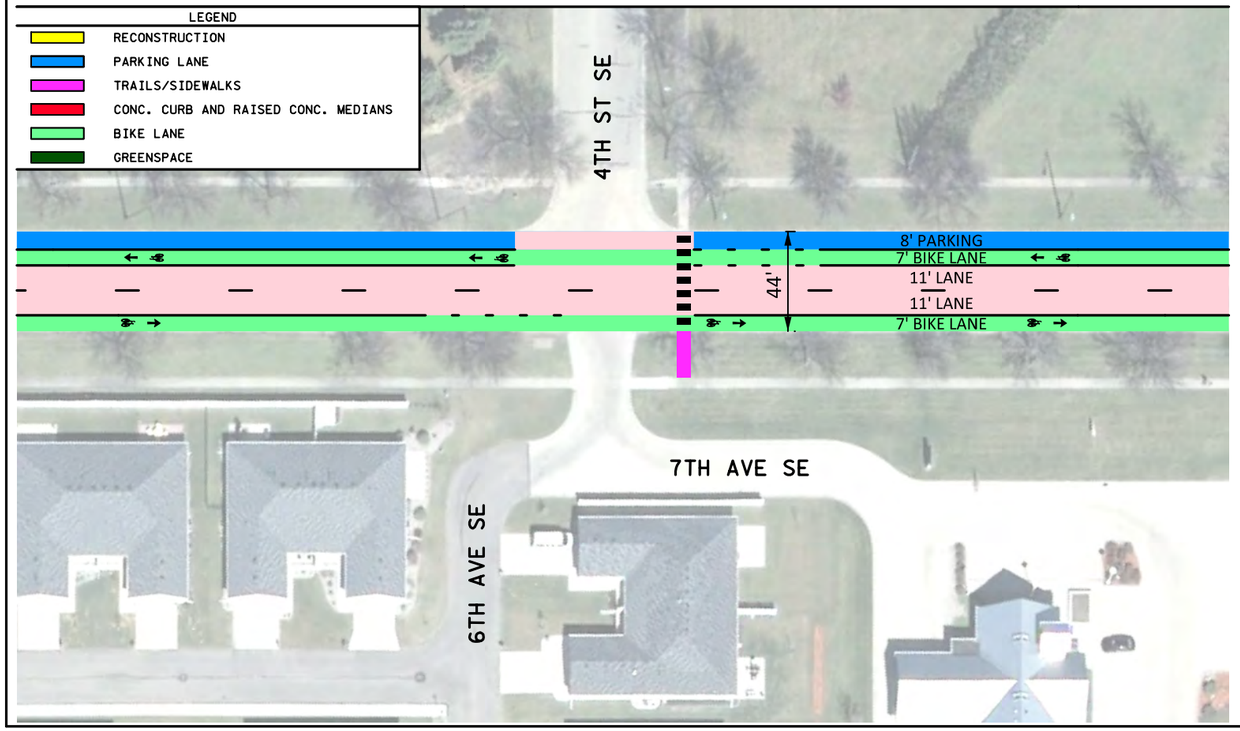
44' LANE CONFIGURATION



48' LANE CONFIGURATION



*3' BIKE LANE BUFFER IS POSSIBLE WHEN NARROWING TO 11' DRIVE LANE, 6' BIKE LANE, AND 8' PARKING



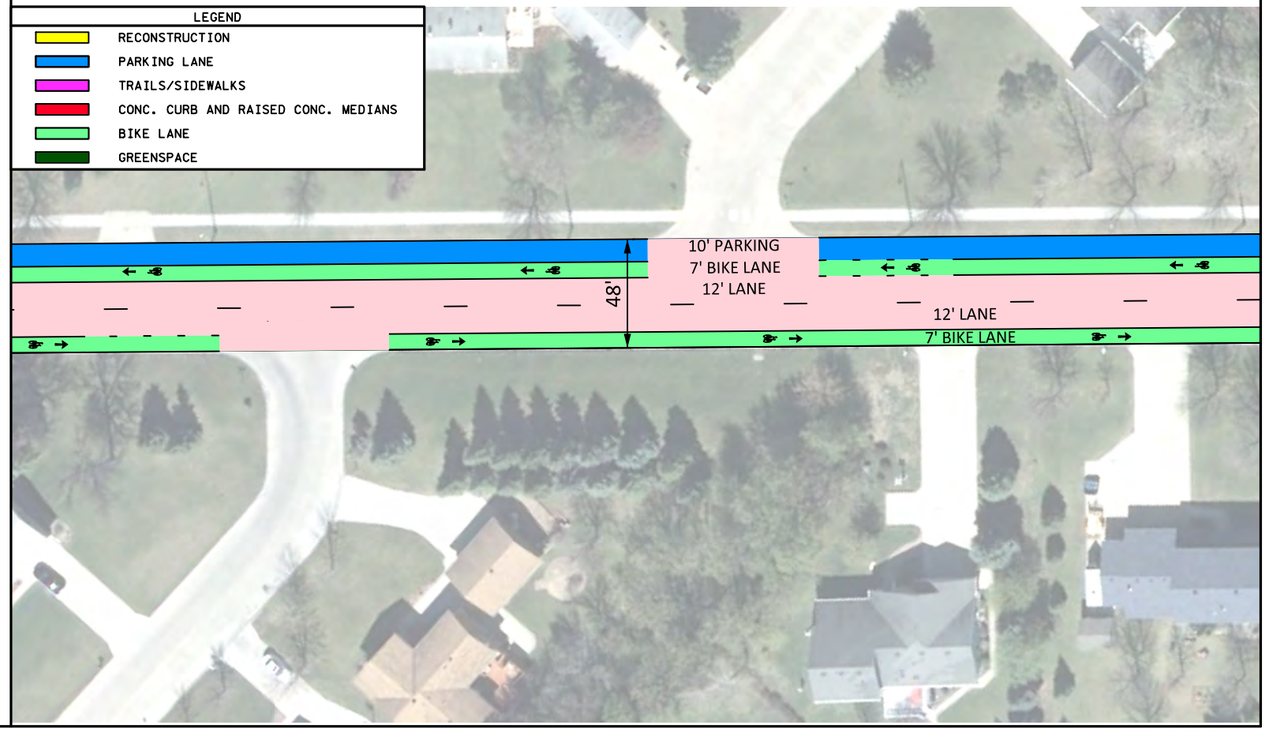
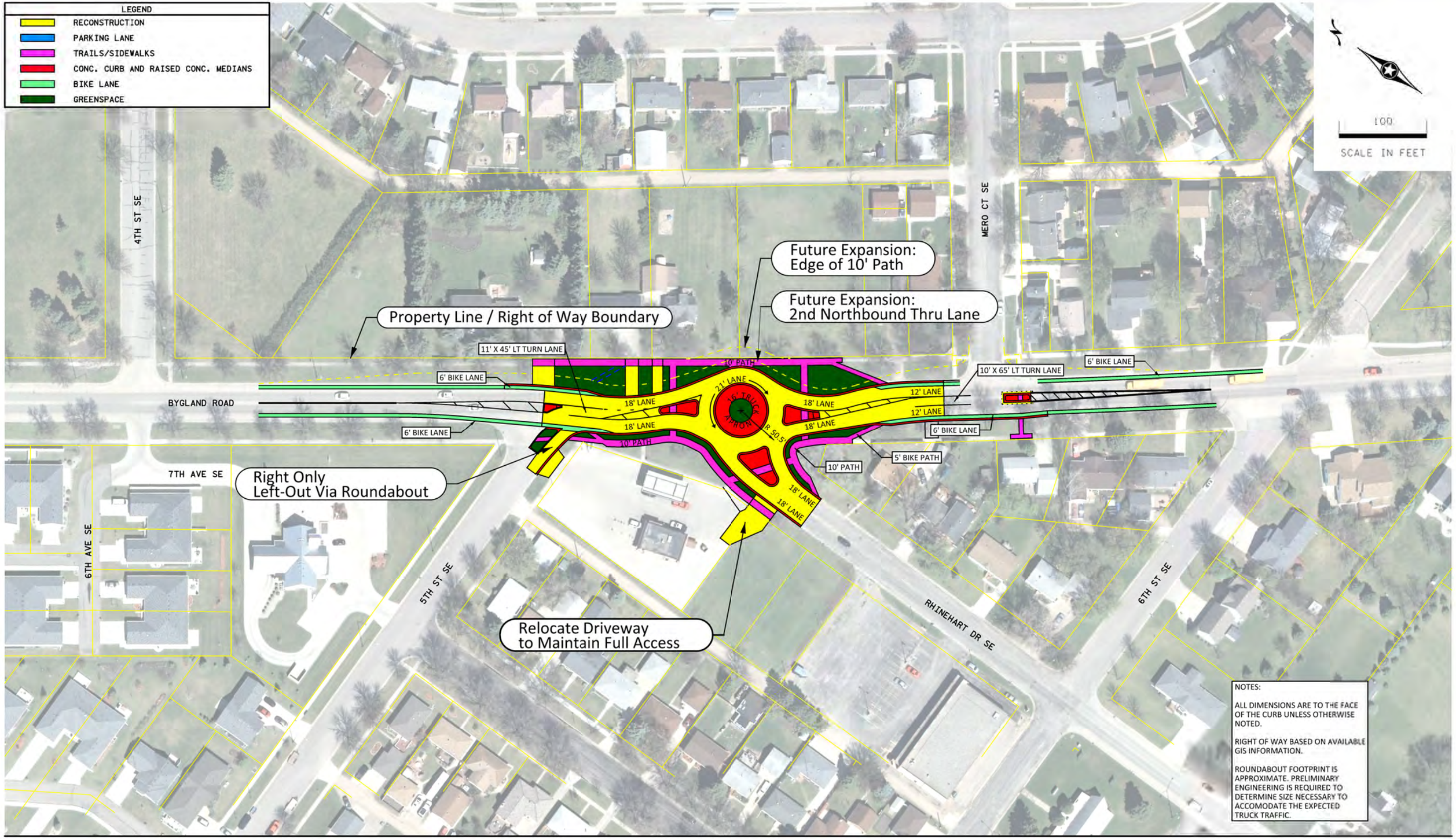


FIGURE 4.1
NEAR TERM IMPLEMENTATION PLAN
INDEX 1B
(3 OF 5)

ALLIANT ENGINEERING

FIGURE 4.1
NEAR TERM IMPLEMENTATION PLAN
INDEX 1C
(4 OF 5)



ALLIANT ENGINEERING

FIGURE 4.1
NEAR TERM IMPLEMENTATION PLAN
INDEX 1D
(5 OF 5)

Bygland Road Study: Prioritized Improvement Plan

Mid Term Improvements (2021-2025)

Location 8
Construct refuge median to provide bike access to Middle School

Location 9
Pursue 5th Avenue realignment (ROW Acquisition Required), maintain stop control

Location 10
Widen existing 4’ Sidewalk to 5’ sidewalk between 4th Street and Metro Court

Long Term Improvements (2026-2040)

Location 11
Construct Roundabout at 13th Avenue

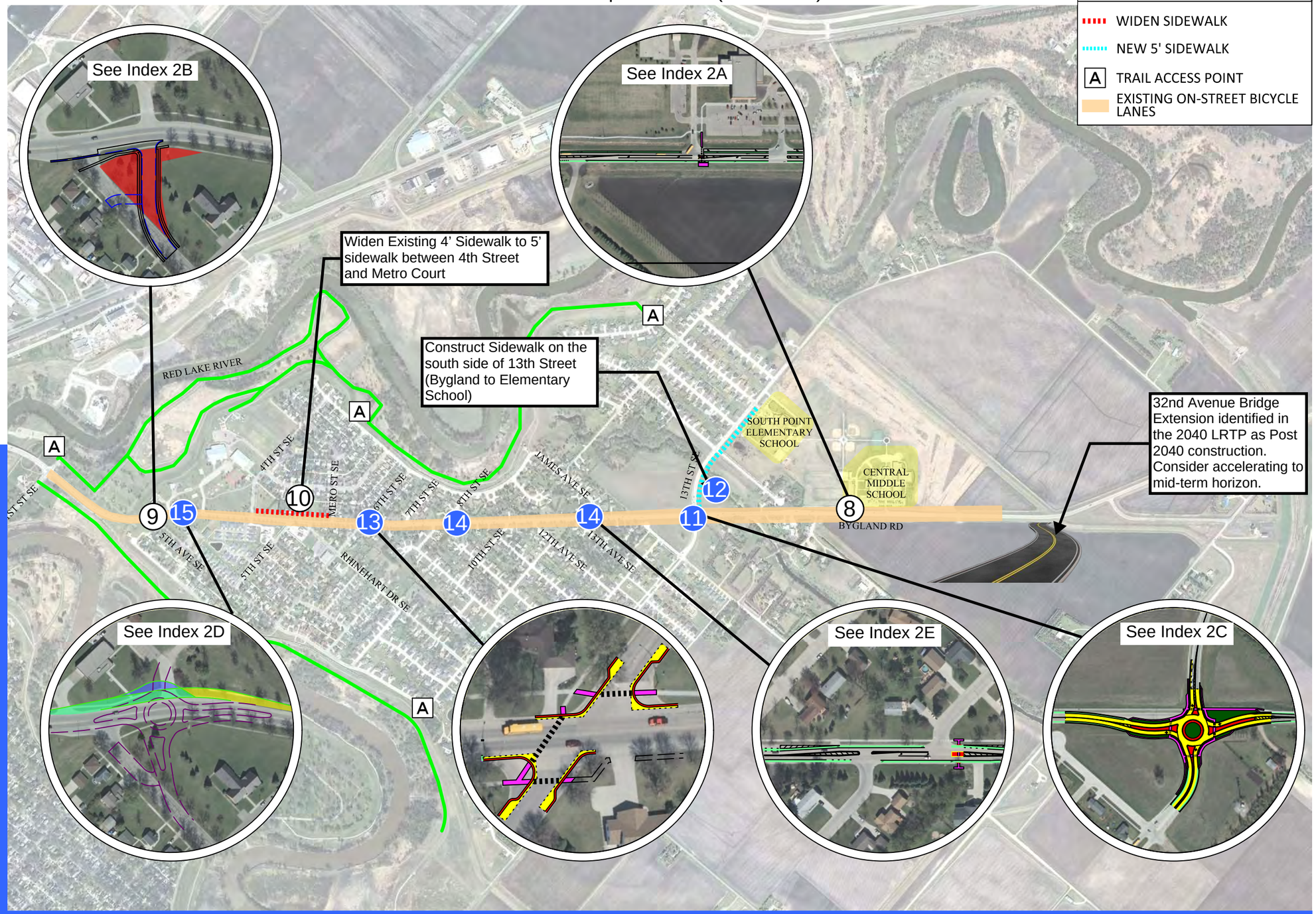
Location 12
Construct Sidewalk on the south side of 13th Street (Bygland to Elementary School)

Location 13
Construct Curb Extensions at 6th Street

Location 14
Add Median/Left Turn Lanes at James and 8th Street

Location 15
Construct Roundabout at 5th Avenue

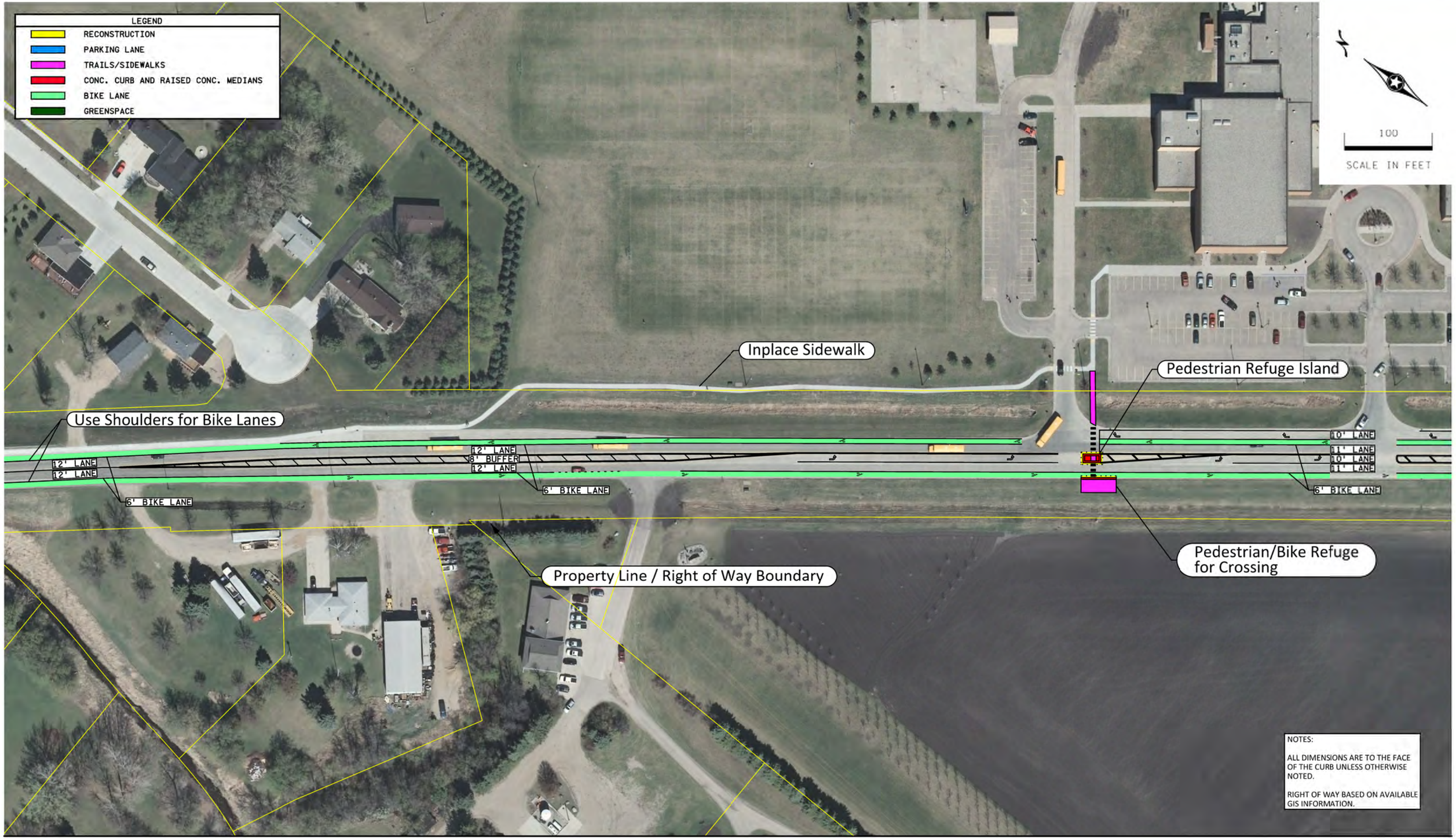
Mid Term Improvements (2021-2025)



Long Term Improvements (2026-2040)

FIGURE 4.2
MID TERM AND LONG TERM IMPLEMENTATION PLAN
(1 OF 6)

ALLIANT ENGINEERING



ALLIANT ENGINEERING

FIGURE 4.2
MID TERM AND LONG TERM IMPLEMENTATION PLAN
INDEX 2A
(2 OF 6)

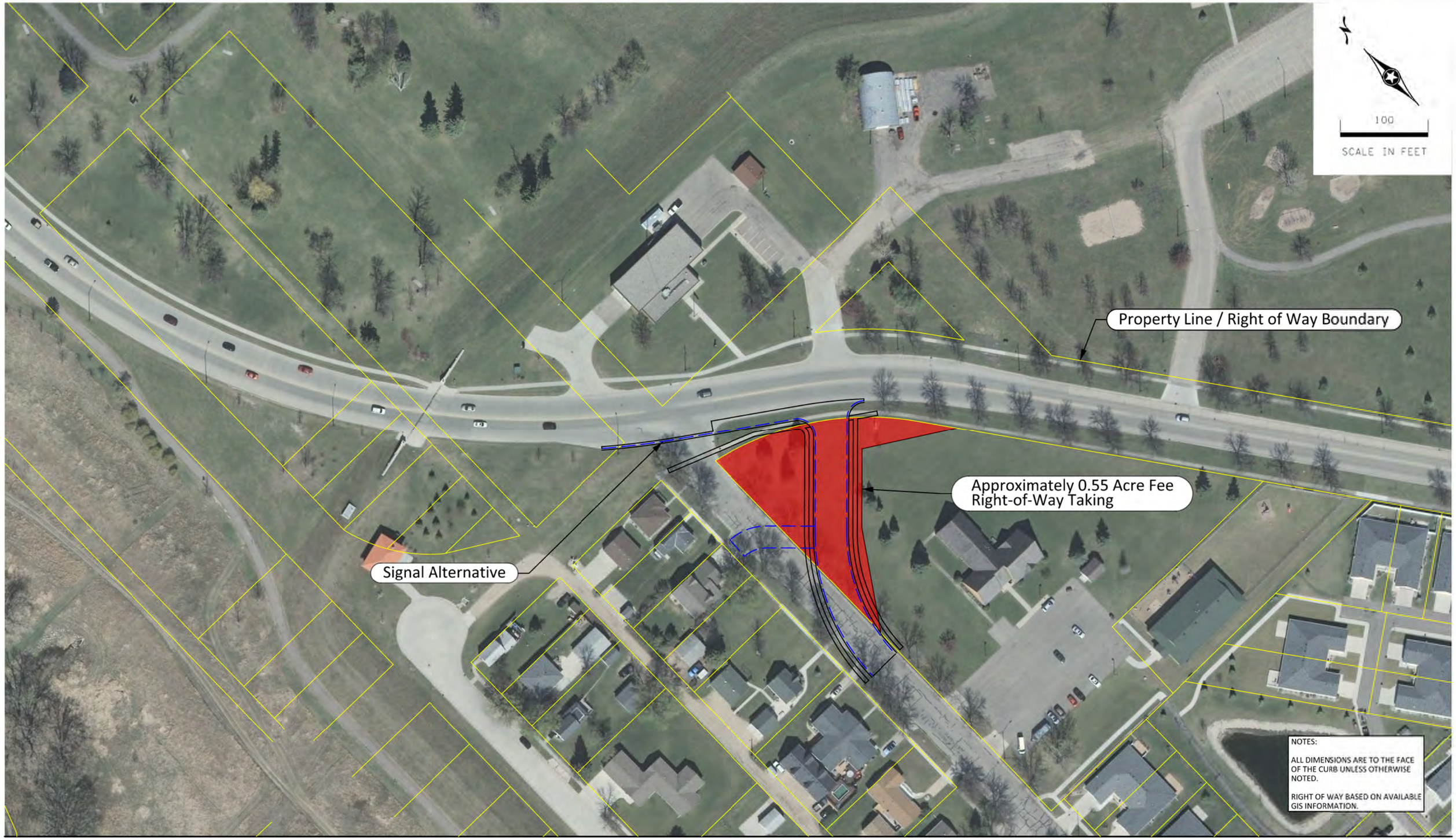


FIGURE 4.2
MID TERM AND LONG TERM IMPLEMENTATION PLAN
INDEX 2B
(3 OF 6)

ALLIANT ENGINEERING

LEGEND

- RECONSTRUCTION
- PARKING LANE
- TRAILS/SIDEWALKS
- CONC. CURB AND RAISED CONC. MEDIANS
- BIKE LANE
- GREENSPACE

100

SCALE IN FEET

13th STREET SE

Property Line / Right of Way Boundary

Bygland Road Alignment Shifted South to Avoid Right of Way Aquisition

Large Pedestrian Refuge Islands

8' BIKE LANE

24' LANE

24' LANE

5' BIKE PATH

10' PATH

20' LANE

20' LANE

8' BIKE LANE

5' BIKE PATH

16' LANE

18' LANE

5' BIKE PATH

10' PATH

10' PATH

25' LANE

10' TRUCK APRON

10' TRUCK APRON

R 68'

20' LANE

20' LANE

10' PATH

10' PATH

16' LANE

16' LANE

6' BIKE LANE

6' BIKE LANE

BYGLAND ROAD

5' BIKE PATH

City Owned Parcel

City Owned Parcel

GREEN WAY BLVD. SE

NOTES:

ALL DIMENSIONS ARE TO THE FACE OF THE CURB UNLESS OTHERWISE NOTED.

RIGHT OF WAY BASED ON AVAILABLE GIS INFORMATION.

LOCATION IS APPROXIMATE. FURTHER EVALUATION OF ROW AND CENTER LOCATION IS NECESSARY

FIGURE 4.2
MID TERM AND LONG TERM IMPLEMENTATION PLAN
INDEX 2C
(4 OF 6)

ALLIANT ENGINEERING

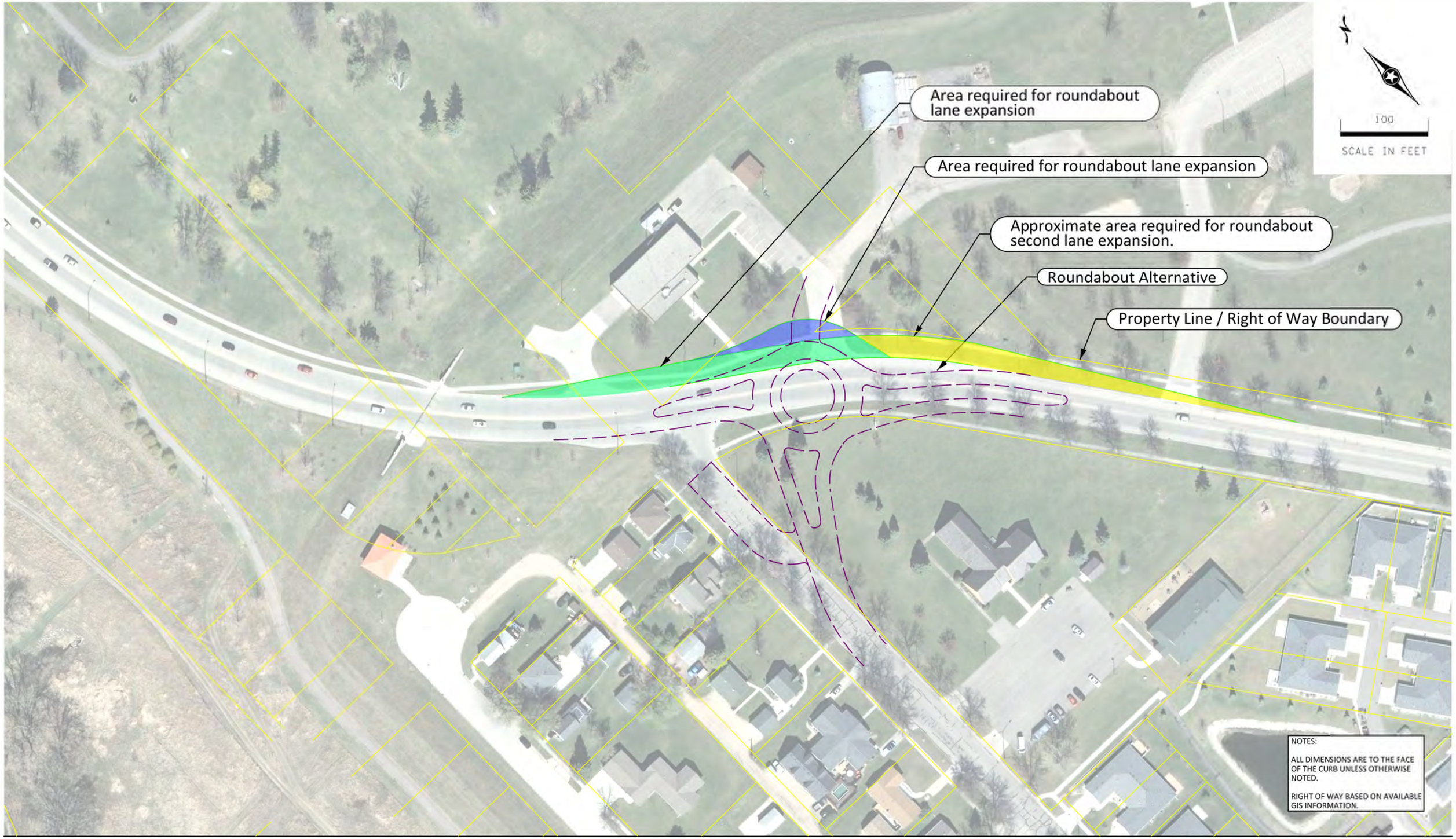
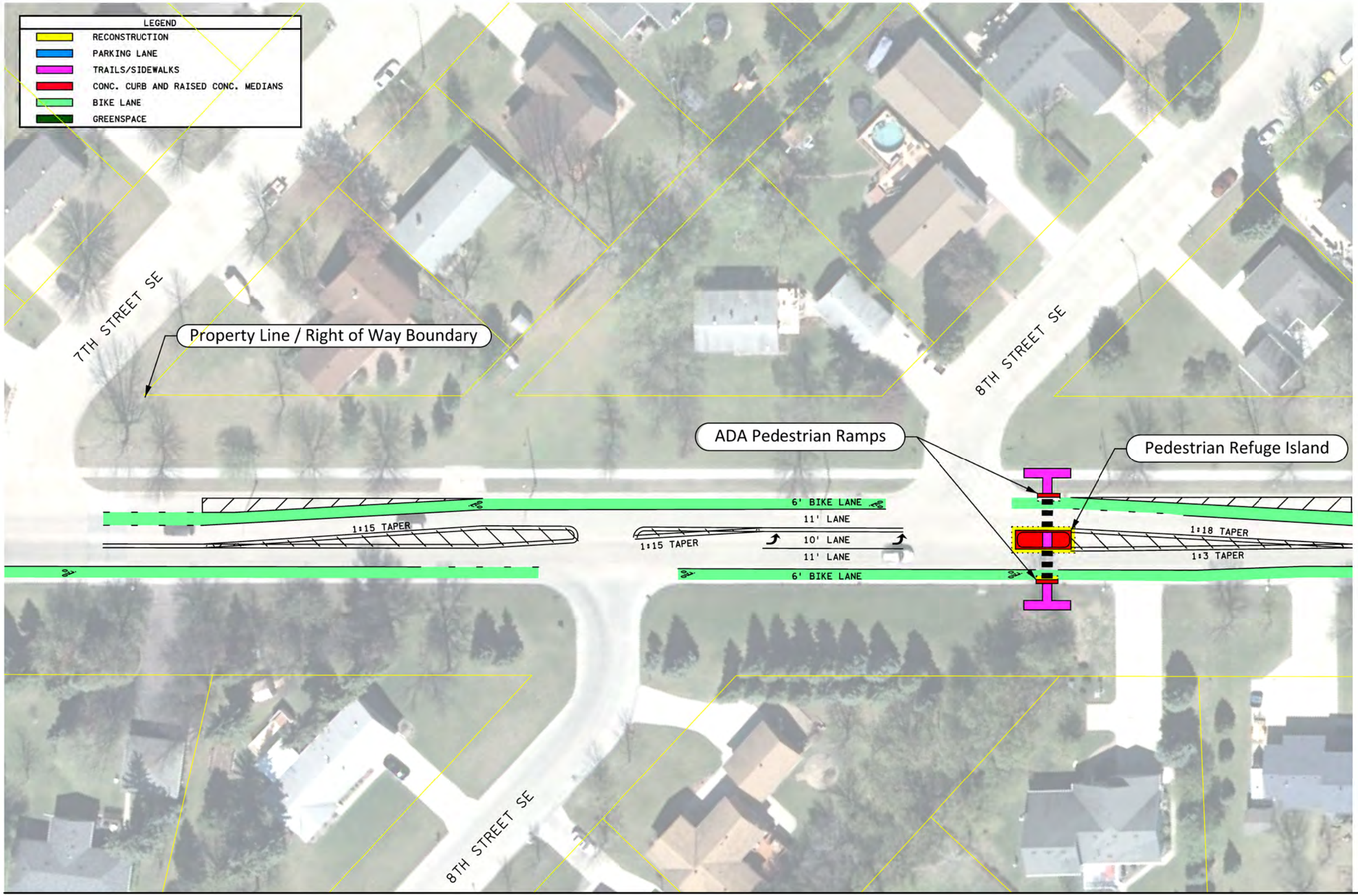


FIGURE 4.2
MID TERM AND LONG TERM IMPLEMENTATION PLAN
INDEX 2D
(5 OF 6)

ALLIANT ENGINEERING



NOTES:

ALL DIMENSIONS ARE TO THE FACE OF THE CURB UNLESS OTHERWISE NOTED.

RIGHT OF WAY BASED ON AVAILABLE GIS INFORMATION.

FIGURE 4.2
MID TERM AND LONG TERM IMPLEMENTATION PLAN
INDEX 2E
(6 OF 6)

ALLIANT ENGINEERING

Appendix A:

Public Open House and Public Comments

ALLIANT
ENGINEERING

ALLIANT PROJ. NO. 115-0031.0

Bygland Road Study Meeting Minutes

DATE/TIME: Tuesday, May 12, 2015; 6:30 PM

LOCATION: East Grand Forks
Senior Citizens Center

PROJECT: Bygland Road Study

PURPOSE: **Public Open House #1 –** Review Existing and Define Corridor Vision

MINUTES BY: Stephen Smith, Alliant Engineering

The following provides a summary of the public meeting open house and comments and issues heard. A presentation was given and an opportunity for feedback, comments and input on the Bygland Corridor was made.

Attendees:
A total of 21 participants signed in as they entered the open house; however, general observations determined approximately 25-30 individuals were present. The sign in sheet is attached. Furthermore, 5 individuals chose to fill out a North Dakota Department of Transportation (NDDOT) Title VI Public Participation Survey. A summary of the Title VI survey responses are listed in Table 1.

Overview:

1) **Welcome:** Teri Kouba – Planner/ GF-EGF MPO called the meeting to order at 6:30 p.m. She welcomed everyone in attendance and introduced the presenter, Mike Anderson, Alliant Engineering Project Manager.

2) **Survey**
https://www.surveymonkey.com/s/byglandroadstudy

3) **Website**
http://www.alliant-inc.com/GrandForks/index.html

Table 1. NDDOT Title VI Public Participation Survey Results

								Total Number of Responses
Sex								
Male:	3			Female:	2			5
Age								
18-35:		36-55:	2			Over 55:	3	5
Disability								
Yes:				No:	5			5
Race								
White:	5			Black:				5
Language								
English:	5			Other:				5
Do you receive public assistance?								
Yes:				No:	4			4
Indicate how you heard about the meeting:								
						Advertisement:		
						Advocacy Group - Greenway & Trail Users:		
						Mailing:		1
						Other - Email:		
						Other - Friend:		
						Other - MPO:		1
						Other - City Website:		
						Other - Newspaper, TV, Radio, Internet:		3
Total Number of Responses:								**5**

4) **Presentation (Located on Project Website)**
   - Agenda
   - Study Overview and Goals
   - Study Process & Schedule
   - Study Area and Existing Characteristics
   - Safety Analysis
   - Land Use and Traffic Volumes
   - Issues and Constraints
   - Corridor Vision
     - Facility Needs
     - Bicycle Accommodations
     - Pedestrian Accommodations
     - Transit
   - Next Steps – Alternative Analysis
   - Open Discussion

5) **Open House #2 –** Anticipated for July to discuss concept alternatives

6) **Comments Expressed During Presentation:**

   - **Land Use and Traffic Volumes**
     - Is there some way to control traffic flow because of merging into traffic?

- What about a three way stop? In the winter it's very dangerous. The sand in the winter doesn't last and some days it's very dangerous.
- Could you meter traffic coming out of the school?
- Can you talk more about the bridge constraints?
- The number of homes that are being added each year and 2 cars for each home will create more traffic in the future.
- Must be a lot of out of town traffic during the morning peak. Because it can't be that many people dropping their kids off at school. It would make more sense to divert traffic for them.
- I think the school causes the traffic because you can see a big difference in the summer.
- I'm stuck in traffic and take a risk of merging into traffic. I am always late for work. I have to wait 5-7 minutes to merge.
- I got a ticket right in front of Rhinehart Road across the street from the gas station. Is there no parking along the road?
- Any plans to modify the access from Rhinehart Road? You are able to make high speed right turns at 30 miles per hour.
- Is Bygland Road wide enough for 4 lanes?
- I think a roundabout is a terrible solution.
- Add more visibility at 1st street northbound.
- I like the idea of a roundabouts and I am starting to understand how to drive them.
- A couple stop lights through the corridor would be nice at 7:30am to 8:00am.

- **Bike Facilities**
  - I don't like bike lanes and they restrict traffic. How many people actually use them?
  - I don't think anyone will use a bike lane for recreation because the greenway is heavily used.
  - Make sidewalks more usable. I wouldn't let my kid bike Bygland Road. On-street bike lanes would increase the opportunity for your kid to get hurt.
  - School is only open for 9 months out of the year and the kids won't bike during the winter months.
  - The buses run half empty because parents take their kids to school.
  - In the summer we see kids on the sidewalks.
  - Long term, I would like to see the bike paths in the street. Because biking on a path and biking on the street requires two different skill sets.
  - I see kids ride all over the road and they don't have respect for the cars.
  - I think when riding a bikes you don't have blind spots but cars do and kids need to be taught that.
  - Only thing that make sense to me is shared use path.
- **Pedestrian Facilities**
  - Where do you cross Bygland Road?
    - 6th street crosswalk
    - Cross near the fire hall
  - Near the school there could be some improvements.

  - Many years ago there use to be an overhead pedestrian light on Rhinehart Road. People got numb to it and stopped slowing down for pedestrians.
  - What about having a cop police the crossings?
- **Transit**
  - The bus passes me at 65 miles per hour.
  - The school bus passes me at less than 65 mile per hour.
  - No one in attendance used transit and didn't see the need for additional transit.
  - No other comments related to transit.

ALLIANT
ENGINEERING

ALLIANT PROJ. NO. 115-0031.0

Bygland Road Study Meeting Minutes

DATE/TIME: Thursday July 23, 2015; 5:30 PM

LOCATION: East Grand Forks
Senior Citizens Center

PROJECT: Bygland Road Study

PURPOSE: **Public Open House #2 –** Present Concept Improvement Alternatives

MINUTES BY: Stephen Smith, Alliant Engineering

The following provides a summary of the public meeting open house and comments and issues heard. A presentation was given and an opportunity for feedback, comments and input on the Bygland Corridor was made.

Attendees:
A total of 10 participants signed in as they entered the open house. The sign in sheet is attached. Furthermore, 6 individuals chose to fill out a North Dakota Department of Transportation (NDDOT) Title VI Public Participation Survey. A summary of the Title VI survey responses are listed in Table 1.

Overview:

1) **Welcome:** Teri Kouba – Planner/ GF-EGF MPO called the meeting to order at 5:30 p.m. She welcomed everyone in attendance and introduced the presenter, Mike Anderson, Alliant Engineering Project Manager.

Table 1. NDDOT Title VI Public Participation Survey Results

						Total Number of Responses
Sex						
Male:	4		Female:	2		6
Age						
18-35:		36-55:	2	Over 55:	4	6
Disability						
Yes:	2		No:	4		6
Race						
White:	6		Black:			6
Language						
English:	6		Other:			6
Do you receive public assistance?						
Yes:			No:	6		6
Indicate how you heard about the meeting:						
					Advertisement:	
					Advocacy Group - Greenway & Trail Users:	
					Mailing:	2
					Other - Email:	
					Other -Work:	1
					Other - MPO:	
					Other - City Council:	1
					Other - Newspaper, TV, Radio, Internet:	3
					Total Number of Responses:	**7**

Presentation (Located on Project Website)
A public open house meeting was held on Thursday, July 23, 2015, from 5:30 p.m. to 7:00 p.m. at the EGF Senior Center. The purpose of the meeting was to provide preliminary information to the public on the proposed project and to get public input on concept improvements.

The public open house was arranged with several informational display boards in a central location for the public to view.

Mike Anderson welcomed the attendees and thanked the East Grand Forks MPO for hosting the meeting. He explained the purpose of both the Bygland Road Study and the public meeting.

Using a PowerPoint Presentation as a visual aid, Mike explained that the Bygland Road Study would (1) help the EGF MPO to decide if an improvement is needed and (2) identify and evaluate possible improvements alternatives. Mike said that this is a planning study and will identify future improvements for the corridor that improve mobility, and encourage multi modal transportation. The presentation focused on the improvement alternatives for key intersections and the corridor segments. Mike walked through each improvement concept highlighting pros/cons and estimated construction costs.

- **Exhibit Boards**

  The following maps were present on exhibit boards:

- Improvements Roll Plot
- Segment A -Corridor Roadway Segment Alternatives
- Segment B – Corridor Roadway Segment Alternatives
- Intersection #1 – 1st Street Improvement Alternatives
- Intersection #2 – 5th Avenue Improvement Alternatives
- Intersection #3 – Rhinehart Drive Improvement Alternatives
- Intersection #4 - 6th Street Improvement Alternatives
- Intersection #5 – Left Turn Lanes/Refuge Median Improvement Alternatives
- Intersection #6 -13th Avenue Improvement Alternatives

Attendees were invited to view the project exhibits and discuss any questions or concerns.

- **Comment/Response Made During Presentation**

  Following is a summary of comment/responses to citizen questions made at the public meeting:
  - Could the cul-de-sac at 13th Ave become open to through traffic? – The cul-de-sac was constructed to consolidate access along Bygland Road.
  - Could you design a signal just for the peak hour? – Traffic signals must be in operation at all times. When turned off they are an all way stop. Yellow-red flash is not used due to safety issues.
  - The City tried an All Way Stop at 6th St and it lasted for 2 days because of citizen complaints made regarding congestion and delays.
  - A raised median between 1ST and 5th would cost a lot of money to maintain.
  - Do you have any examples where a roundabout is installed near a school? – East Grand Forks personnel in attendance pointed out existing roundabouts in Grand Forks.
  - Is there federal funding for roundabouts? – Roundabouts qualify for federal funding.

Summary Tables and Surveys were available for attendees to fill out there survey form. One survey response was returned (attached).

The meeting was adjourned at 7:00 p.m.

Open House #3 – Anticipated for late September

ALLIANT PROJ. NO. 115-0031.0

Bygland Road Study Meeting Minutes

DATE/TIME: Wednesday September 23, 2015; 5:30 PM

LOCATION: East Grand Forks
Senior Citizens Center

PROJECT: Bygland Road Study

PURPOSE: **Public Open House #3 –** Present Project Recommendations

MINUTES BY: Stephen Smith, Alliant Engineering

The following provides a summary of the public meeting open house and comments and issues heard. A presentation was given and an opportunity for feedback, comments and input on the Bygland Corridor was made.

Attendees:
A total of 5 citizens attended the public session in addition to City Reporter, News Press, MPO and City staff. Furthermore, 4 individuals chose to fill out a North Dakota Department of Transportation (NDDOT) Title VI Public Participation Survey. A summary of the Title VI survey responses are listed in Table 1.

Table 1. NDDOT Title VI Public Participation Survey Results

								Total Number of Responses
Sex								
Male:	2		Female:	2				4
Age								
18-35:		36-55:		Over 55:	4			4
Disability								
Yes:	1		No:	3				4
Race								
White:	4		Black:					4
Language								
English:	4		Other:					4
Do you receive public assistance?								
Yes:			No:	4				4
Indicate how you heard about the meeting:								
							Advertisement:	
							Advocacy Group - Greenway & Trail Users:	
							Mailing:	
							Other - Email:	
							Other - Friend:	
							Other - MPO:	
							Other - City Website:	
							Other - Newspaper, TV, Radio, Internet:	4
Total Number of Responses:								**4**

Overview:

1) **Welcome:** Teri Kouba – Planner/ GF-EGF MPO called the meeting to order at 5:45 p.m. She welcomed everyone in attendance and introduced the presenter, Mike Anderson, Alliant Engineering Project Manager.

Presentation (Located on Project Website)

The purpose of the meeting was to discuss the Bygland Road study recommendations and implementation plan with the public and to get public input.

The public open house was arranged with several informational display boards in a central location for the public to view.

Mike Anderson welcomed the attendees and thanked the East Grand Forks MPO for hosting the meeting. He explained the purpose of both the Bygland Road Study and the public meeting.

Using a PowerPoint Presentation as a visual aid, Mike explained that this is the final open house and presented is the implementation plan for Bygland Road Study. The implementation plan addresses future improvements for the corridor that improve mobility, and encourage multi modal transportation. The presentation focused on the improvements for key intersections and the corridor segments. Mike walked through each improvement concept and estimated construction costs.

- **Exhibit Boards**
  - Near Term Implementation Plan
  - Figure 1A – 1st Street to 5th Avenue Striping
  - Figure 1B – 5th Avenue Striping to 13th Street
  - Figure 1C – 13th Street to City Limits
  - Figure 1D – Rhinehart Drive Roundabout
  - Mid Term and Long Term Implementation Plan
  - Figure 2A – Middle School Refuge Median
  - Figure 2B – 5th Avenue Realignment
  - Figure 2C – 13th Street Roundabout
  - Figure 2D – 5TH Avenue Roundabout
  - Figure 2E – 8th and Janes Avenue Left Turn Lanes

Attendees were invited to view the project exhibits and discuss any questions or concerns.

- **Comment/Response Made During Presentation**

  Following is a summary of comment/responses to citizen questions made at the public meeting:
  - Will trucks be able to make through the roundabout that is being proposed? Mike Anderson commented that during preliminary engineering the roundabout will be sized for the appropriate design vehicle and truck traffic expected to use the intersection.
  - Will the 32nd Avenue extension be built? Teri Kouba commented that he plan has always been to eventually construct the 32nd Avenue extension.

The meeting was adjourned at 7:00 p.m.

Public Email Comments and Questions

TO: Grand Fork-East Grand Forks Metropolitan Planning Organization

SUBJECT: Bygland Road Study – Public Email Comments and Questions

---

Comments and Questions Submitted by the Public

The following is a summary of comments/questions submit by the public via email to the GF-EGF MPO.

- I would suggest a stop light at 13th St SE and Byland Road. After morning rush, Stop Light could default north and south. Also, I think the city/school could do more to promote and reward school related car-pooling. So many cars in the morning are single occupant. I highly dislike roundabouts.
- The various studies regarding bicycle facilities would not support your perception; further a five foot sidewalk cannot be designated as a multi-use facility, partly because it is unsafe for all users. While do nothing is an option, it doesn't address the issues we have been requested to further investigate and present recommendations. Addressing speed on the roadway is just one that merits consideration of on road bike facilities.
- There was discussion at the recent Bygland Road information meeting with consultants a couple weeks ago suggesting that a bike traffic lane be made a part of the roadway. Simply put, I believe that this would be a major mistake from a safety issue. There is just too much higher speed traffic on the roadway along with a younger population that doesn't have the focus needed for a joint use of the route with automobiles. There are currently sidewalks on both sides of the roadway from the Murray Bridge all the way south to 13th Street SE. From there, there are separate routes to the South Point Elementary School and Central Middle School locations. A joint pedestrian-bicycle use of these sidewalks is a much better plan than the creation of bike lanes. With good sidewalks already in place (which aren't getting a lot of use), this is a much better use of facilities, especially when you could likely count the number of walkers/bike riders in a day on one hand and we have other highway and street needs everywhere you look. I tried on a few occasions to access the survey monkey link, but wouldn't let me access, so am sending this email for my input. We live on 5th Ave. SE and feel a stop light needs to be put up somewhere along that road, when we try to take a left hand turn off of 5th Ave. SE, it takes quite a while and isn't a safe corner to turn fast on, due to the curve and constant line of traffic at certain times of the day. I have seen many close accidents on this road, due to not being able to get onto the road safely without taking a chance at times.
- I tried on a few occasions to access the survey monkey link, but wouldn't let me access, so am sending this email for my input. We live on 5th Ave. SE and feel a stop light needs to be put up somewhere along that road, when we try to take a left hand turn off of 5th Ave. SE, it takes quite a while and isn't a safe corner to turn fast on, due to the curve and constant line of traffic

at certain times of the day. I have seen many close accidents on this road, due to not being able to get onto the road safely without taking a chance at times.

- One concern I would have is that during harvest season there seems to be a lot of farm equipment that goes down Bygland Road. If the roundabouts were in place they would have to take a different route, they probably should be doing this anyway, but right now they don't. Regular tandem farm trucks are starting to be a thing of the past and during sugar beet season a lot of farmers are now running semi-trucks, and I am not sure if a semi can make it thru the roundabout or not. I don't think the city has ever designated a truck route. I have not look at city ord. for a while, but in the past we did have a sign or two around town that said no trucks. These signs were really not enforceable since the city ord. had wording in it that said trucks had to use a designated truck route, but the city had NEVER designated a truck route.
- Where is a copy of Bygland Road Study available?
- If Water and Light has to relocate electric facilities, who pays? I ask because single lane seems predicated on people yielding and taking turns to access the roundabout lane. If that were to actually happen it would be unique in my AM driving commute experiences from the Point in recent years. People don’t even stop when the signal goes red if they are close to the intersection. They just go faster and zoom through on RED. Worse since the work on the Sorlie is going on

Appendix B:

Public Input Survey Results

ALLIANT
ENGINEERING

Memorandum

TO: Bygland Road Steering Review Committee

FROM: Mike Anderson, P.E., PTOE

DATE: 6/26/2015

SUBJECT: Bygland Road Study Survey Response Summary

Summary of Survey Respondents

Beginning on April 16th an online survey was available for the public to provide feedback on the Bygland Road Traffic Study in East Grand Forks. 44 people initiated the survey. Approximately 45.5% of respondents were female with 86% of respondents living within the "Point" area. Of the 86% of respondents that lived in the area roughly 29% live along Bygland Road. The Age breakdown of respondents can be seen in Figure 1.

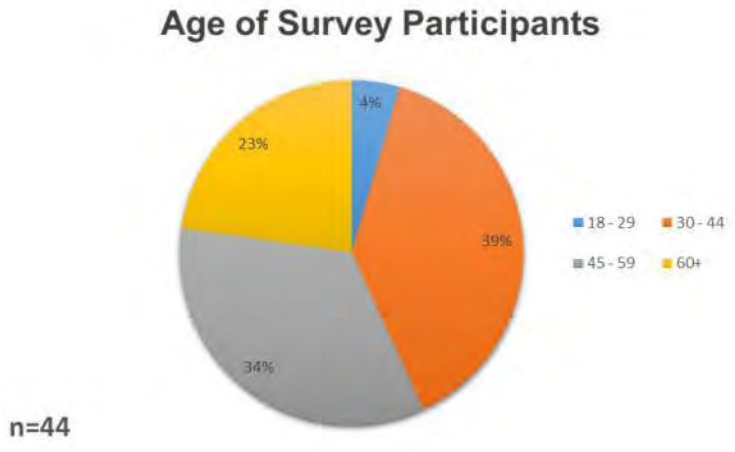


Figure 1: Age of Survey Participants

Summary of Survey Results

The 44 respondents who completed the survey were asked to respond to 28 questions with many relating to the current issues and preferred improvements along the project corridor. The results were then compiled into three figures. The first figure, Figure 2, breaks down the percent of respondents that categorize upgrades to pedestrian, bicycle, vehicular, parking, and bus and heavy truck improvements as Important or very important.

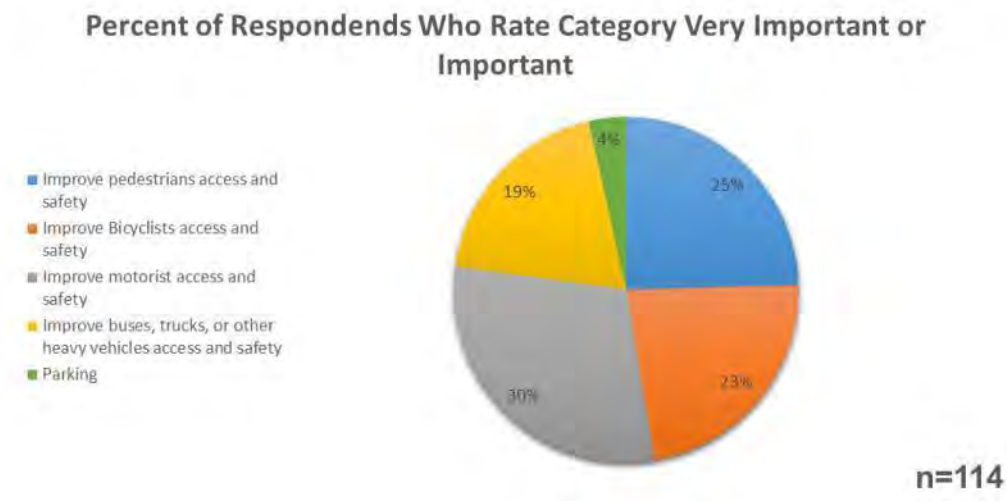


Figure 2: Preferred Improvements by Mode of Transportation

This figure shows that vehicular upgrades are of the highest concern to the surveyed population with 30% of respondents viewing motorist access and safety upgrades as very important or important. Parking along the corridor was deemed the least important with 4% of respondents rating parking along Bygland Road as very important to important. With the different modes of transportation rated a more specific breakdown of concerns was compiled into Figure 3.

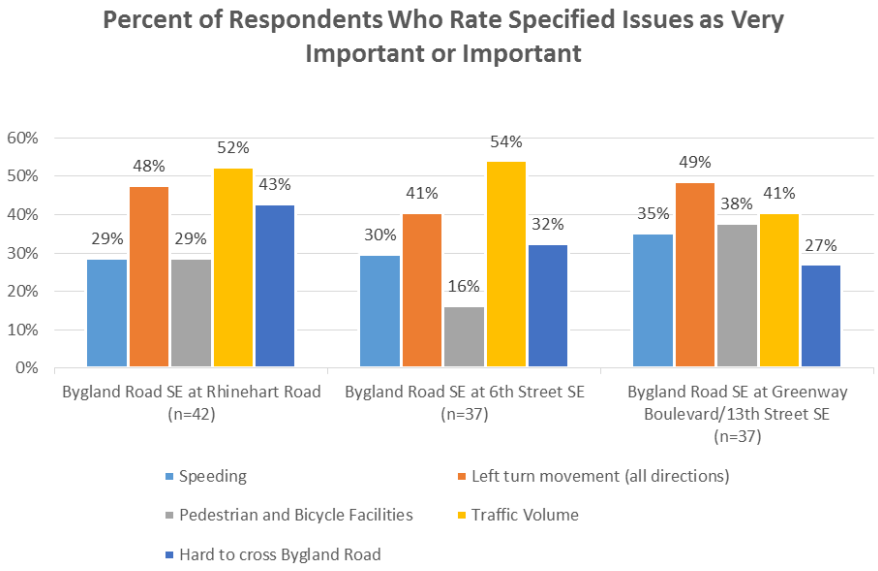


Figure 3: Specific Concerns by Intersection

The biggest concern of the surveyed respondent was traffic volume, with 41% - 52% of surveyors rating this as very important or important to fix. Left turn movements were second with a 41% - 49% rating as very important to important. The least important upgrades to the surveyed group were bicycle and pedestrian upgrades with a 16% - 38% rating. The trend of Figure 3 shows that vehicular upgrades and better access onto Bygland Road are of a higher concern than pedestrian and bicycle upgrades.

The final compiled figure, Figure 4, examines the preferred and recommended improvements at the three intersections of interest and the overall project corridor.

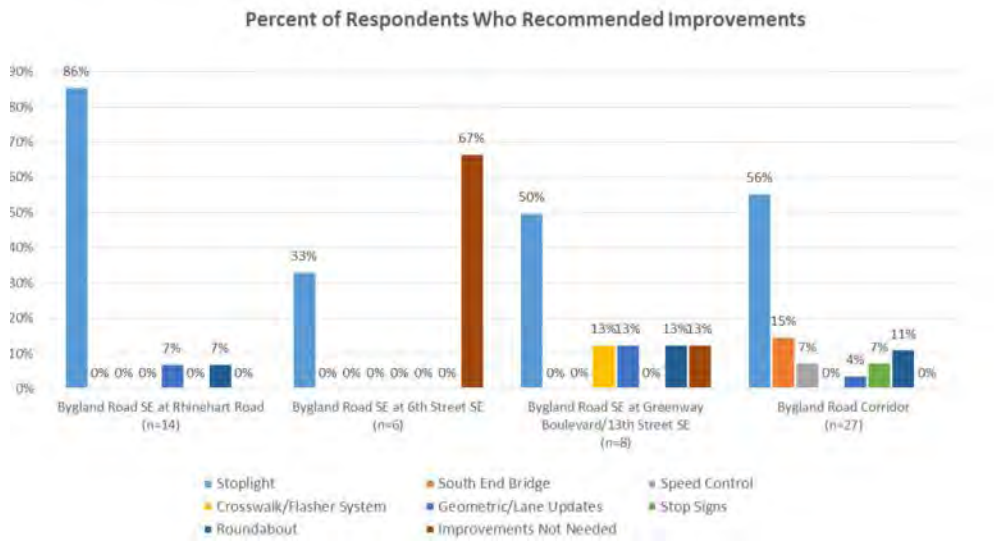
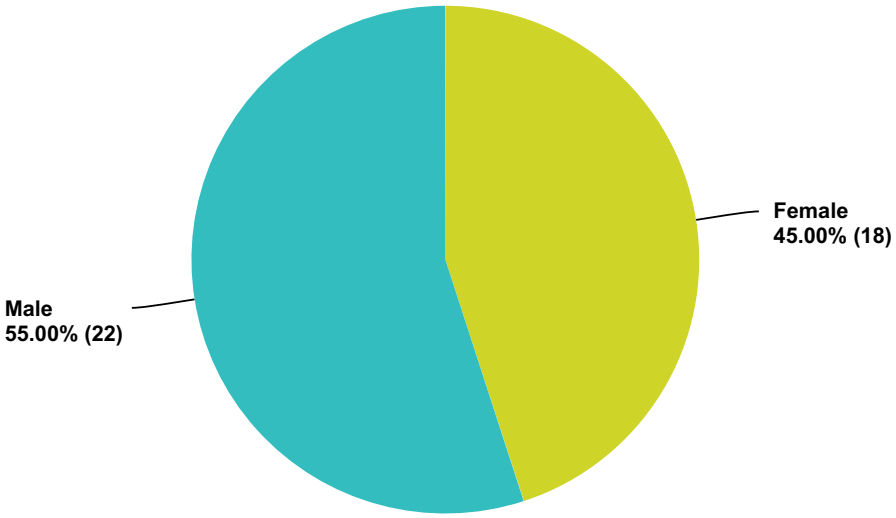


Figure 4: Specific Improvements by Intersection and Corridor

Figure 4 shows that a majority of surveyed participants prefer traffic signals and believe they are necessary upgrades at Bygland Rd SE at Rhinehart Dr SE/5th St and Bygland Rd SE at Greenway Blvd to help slow down drivers, allow more gaps for cross street traffic to enter the intersection and help facilitate safer bicycle and pedestrian crossings. A majority of the respondents that commented on Bygland Rd SE at 6th St SE believed that the intersection is sufficient with the existing design and that the operational issues would be fixed with the addition of stop control systems at Rhinehart Dr SE/5th St SE and Greenway Blvd. The complete survey and responses can be found in the attached document.

Q1 What is your gender?

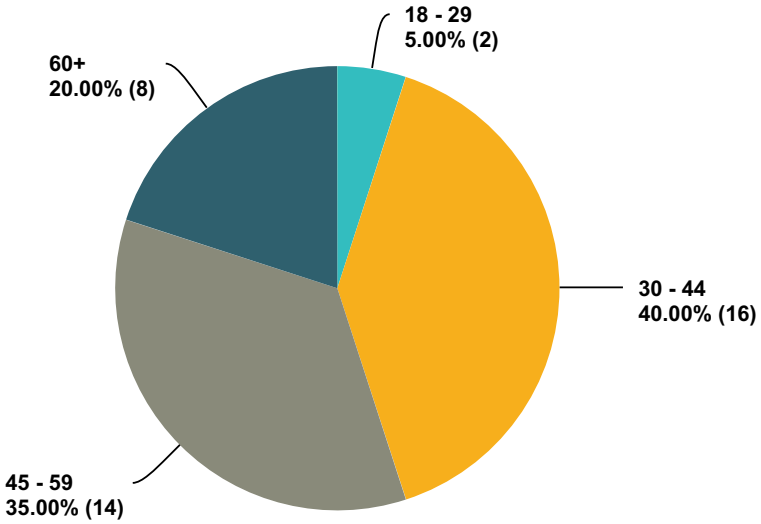
Answered: 40 Skipped: 0



Answer Choices	Responses	
Female	45.00%	18
Male	55.00%	22
Total		40

Q2 Age

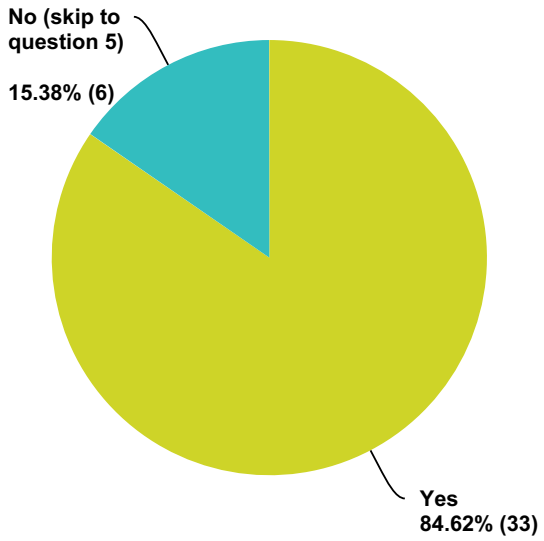
Answered: 40 Skipped: 0



Answer Choices	Responses	
<18	0.00%	0
18 - 29	5.00%	2
30 - 44	40.00%	16
45 - 59	35.00%	14
60+	20.00%	8
Total		40

Q3 Do you live in the "Point"

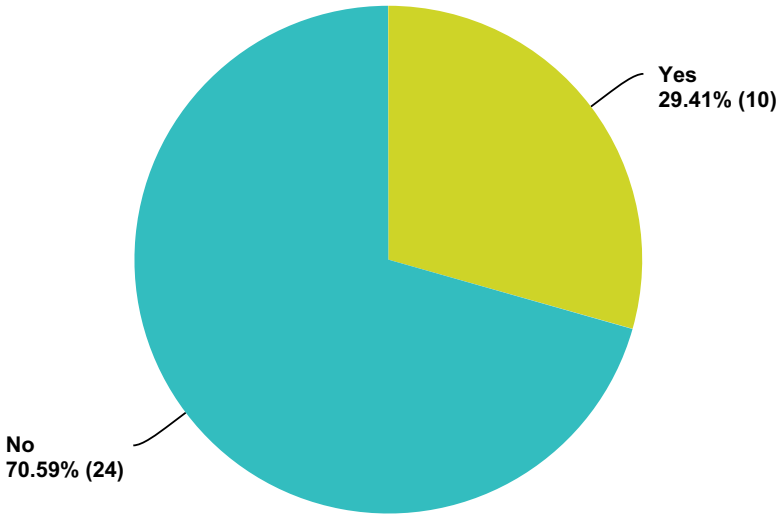
Answered: 39 Skipped: 1



Answer Choices	Responses	
Yes	84.62%	33
No (skip to question 5)	15.38%	6
Total		39

Q4 If so, do you live along Bygland Road?

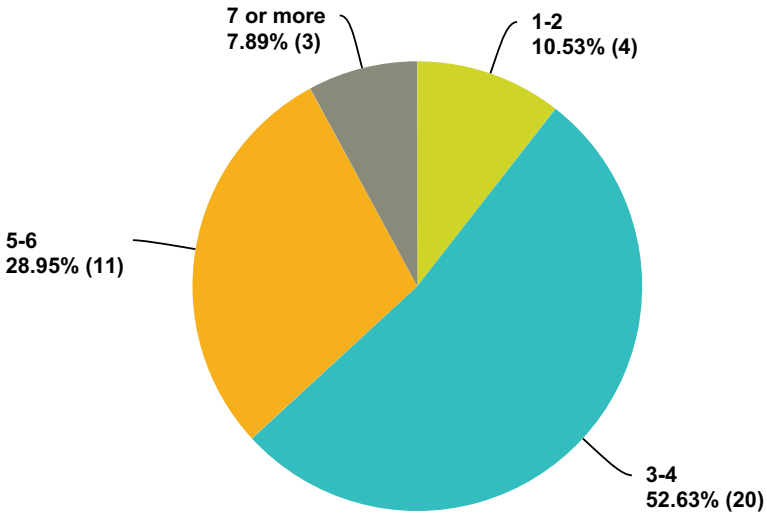
Answered: 34 Skipped: 6



Answer Choices	Responses	
Yes	29.41%	10
No	70.59%	24
Total		34

Q5 How many times per day do you travel along Bygland Road?

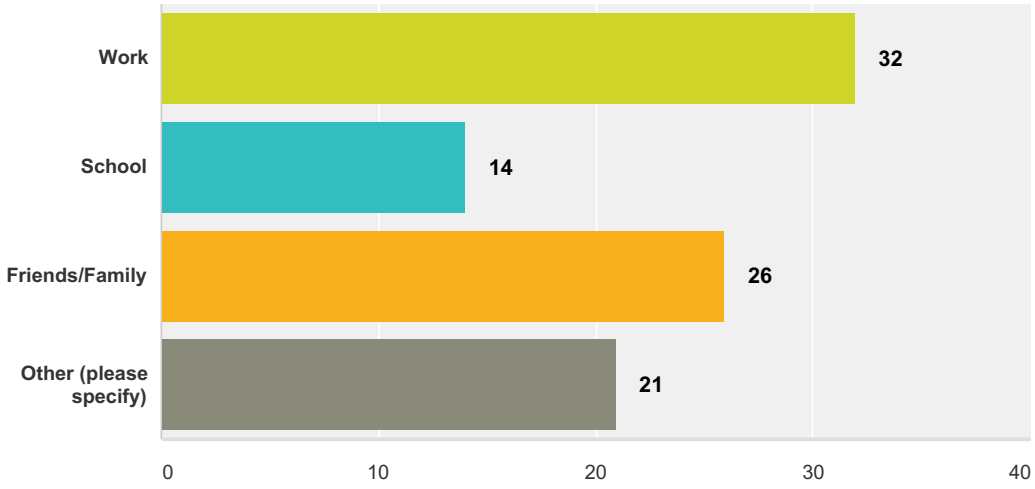
Answered: 38 Skipped: 2



	1-2	3-4	5-6	7 or more	Total	Weighted Average
(no label)	**10.53%** 4	**52.63%** 20	**28.95%** 11	**7.89%** 3	38	2.34

Q6 Why do you travel along Bygland Road? (select all that apply)

Answered: 40 Skipped: 0



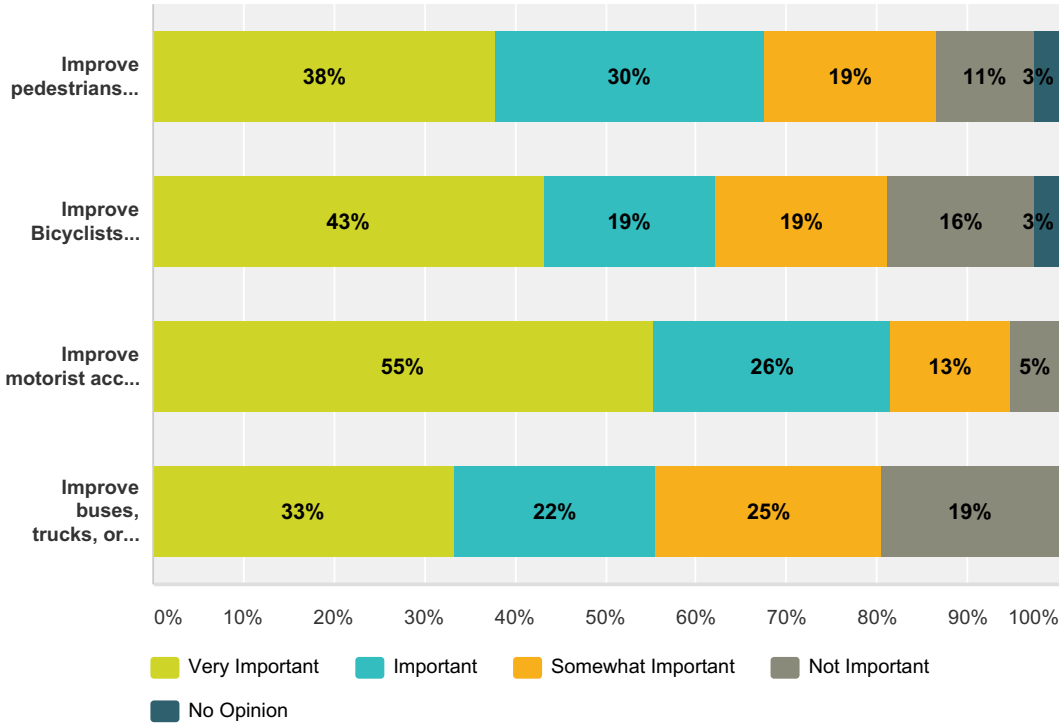
Answer Choices	Responses	
Work	**80.00%**	32
School	**35.00%**	14
Friends/Family	**65.00%**	26
Other (please specify)	**52.50%**	21
Total Respondents: 40		

#	Other (please specify)	Date
1	heading south	5/28/2015 9:59 PM
2	various reasons	5/28/2015 11:42 AM
3	To go anywhere basically.	5/26/2015 1:57 PM
4	errands, movie, restaurants, meetings, library	5/22/2015 5:40 AM
5	doctor-emergency room	5/21/2015 8:09 AM
6	To get anywhere	5/19/2015 2:33 PM
7	travel to go shopping, events, restaurants etc	5/18/2015 7:55 PM
8	It's the only way out of the point area	5/18/2015 6:25 PM
9	Errands	5/18/2015 1:47 PM
10	Shopping	5/18/2015 12:02 PM
11	shopping, entertainment	5/17/2015 5:13 PM
12	To get to and from to my home	5/17/2015 4:43 PM
13	go shopping or other personal business	5/17/2015 2:37 PM
14	Shopping, church, etc	5/16/2015 10:48 PM

15	shopping	5/16/2015 9:22 PM
16	shopping	5/16/2015 6:48 PM
17	to get to everywhere	5/16/2015 4:36 PM
18	travel to other parts of city for errands, shopping, church, volunteering	5/15/2015 1:31 PM
19	to go anywhere, shopping	5/6/2015 9:22 PM
20	Every errand I need to run requires me to turn left on to Bygland	5/6/2015 6:43 PM
21	to get to businesses in GF/north EGF	5/5/2015 6:50 AM

Q7 Please rate the priority of each of the following needs within the study area.

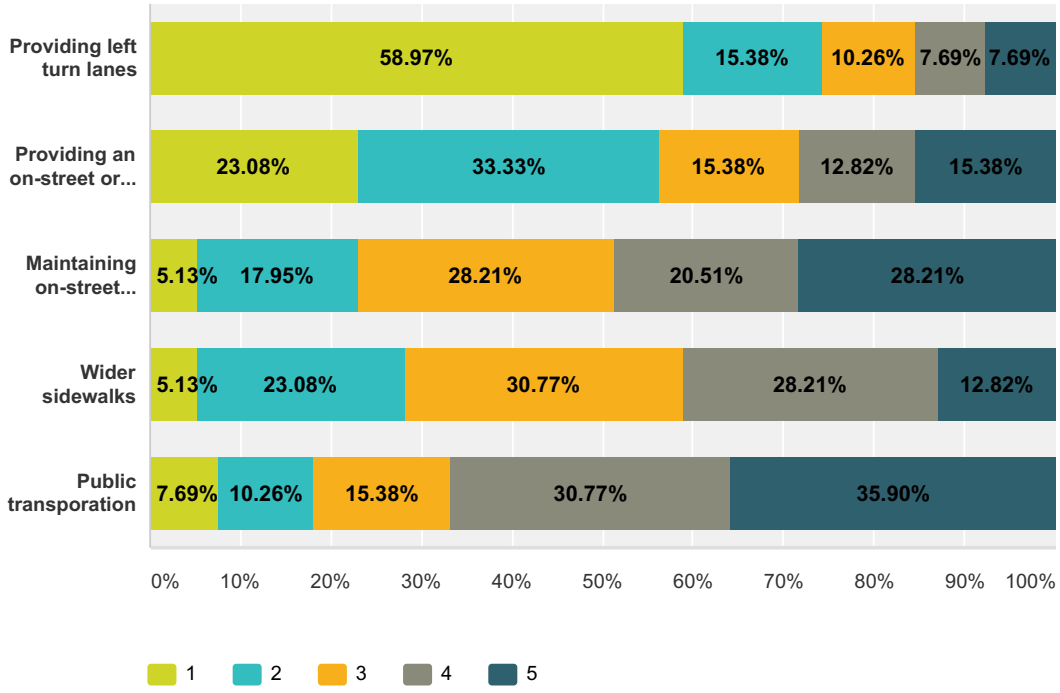
Answered: 38 Skipped: 2



	Very Important	Important	Somewhat Important	Not Important	No Opinion	Total
Improve pedestrians access and safety	**38%** 14	**30%** 11	**19%** 7	**11%** 4	**3%** 1	37
Improve Bicyclists access and safety	**43%** 16	**19%** 7	**19%** 7	**16%** 6	**3%** 1	37
Improve motorist access and safety	**55%** 21	**26%** 10	**13%** 5	**5%** 2	**0%** 0	38
Improve buses, trucks, or other heavy vehicles access and safety	**33%** 12	**22%** 8	**25%** 9	**19%** 7	**0%** 0	36

Q8 If you had control over street improvements made to Bygland Road, how would you rank the following in importance (1 being most important, 5 being least important)?

Answered: 39 Skipped: 1



	1	2	3	4	5	Total	Score
Providing left turn lanes	**58.97%** 23.0	**15.38%** 6.0	**10.26%** 4.0	**7.69%** 3.0	**7.69%** 3.0	39	4.10
Providing an on-street or off-street bicycle lane	**23.08%** 9.0	**33.33%** 13.0	**15.38%** 6.0	**12.82%** 5.0	**15.38%** 6.0	39	3.36
Maintaining on-street parking	**5.13%** 2.0	**17.95%** 7.0	**28.21%** 11.0	**20.51%** 8.0	**28.21%** 11.0	39	2.51
Wider sidewalks	**5.13%** 2.0	**23.08%** 9.0	**30.77%** 12.0	**28.21%** 11.0	**12.82%** 5.0	39	2.79
Public transporation	**7.69%** 3.0	**10.26%** 4.0	**15.38%** 6.0	**30.77%** 12.0	**35.90%** 14.0	39	2.23

Q9 What are your specific concerns regarding access, safety, circulation or other issues relating to:

Answered: 33 Skipped: 7

Answer Choices	Responses	
Pedestrians:	**72.73%**	24
Bicyclists:	**54.55%**	18
Motorists:	**60.61%**	20
Intersections: (Provide cross street)	**81.82%**	27

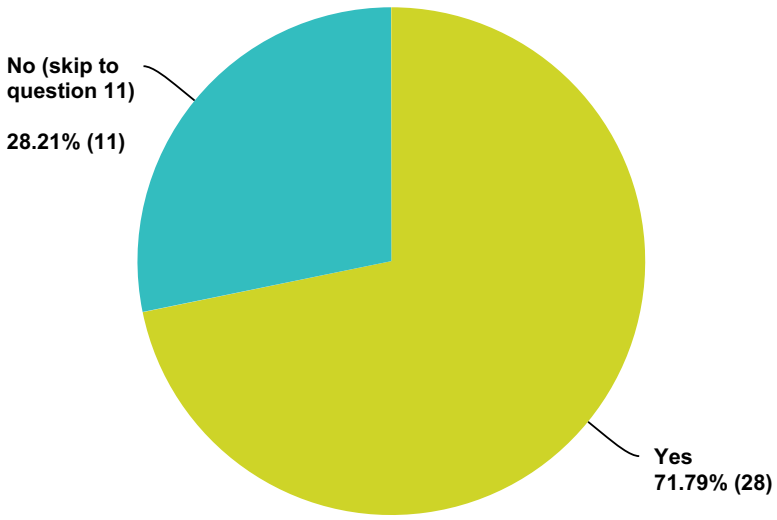
#	Pedestrians:	Date
1	cross walks by schools	5/28/2015 10:02 PM
2	Safer way for kids to cross street. Cars don't stop. Need a stoplight.	5/28/2015 6:06 PM
3	more crosswalk areas	5/28/2015 11:53 AM
4	The daycare facility on Bygland (Great Expectations) should have a sidewalk and crosswalk to bring the kids across the street to the park.	5/26/2015 2:01 PM
5	Put a school crossing light near South Point on Bygland and near school. Get rid off those on street signs. Put a stop light and crossing near Orton's and fix that intersection.	5/26/2015 10:42 AM
6	There should be stoplights on the road you turn left off to go to Southpoint school. It is a crazy intersection in the mornings.	5/23/2015 3:24 PM
7	need a stop light on the point	5/19/2015 9:17 PM
8	There are new sidewalks	5/19/2015 3:11 PM
9	sidewalks work well	5/18/2015 8:01 PM
10	None	5/18/2015 6:26 PM
11	None	5/18/2015 12:07 PM
12	Need a stop light or 4 way stop at 13th	5/17/2015 8:35 PM
13	need stoplights	5/17/2015 5:14 PM
14	Poor visibility for vehicles to see pedestrians/bikes where Mero meet bygland	5/17/2015 4:14 PM
15	safer way to cross bygland rd.	5/17/2015 2:42 PM
16	Traffic or Pedestrian lights at cross walks on Bygland	5/16/2015 11:00 PM
17	Bicyclists often pass too close to pedestrians for safety.	5/16/2015 9:26 PM
18	Crossing Safety	5/16/2015 6:32 PM
19	the crossings are dangerous	5/16/2015 4:39 PM
20	Crossing Bygland Road	5/14/2015 8:27 AM
21	There is no place to cross safely	5/7/2015 10:45 AM
22	There is usually adequate signs/street paint at crosswalks, but flashing lights would be a huge benefit to pedestians crossing Bygland.	5/5/2015 7:04 AM
23	speed of traffic at 13th and Bygland and students having trouble crossing.	5/4/2015 3:31 PM

24	Crossing Byland Road at marked crosswalks. Traffic does not routinely stop for pedestrians. This limits the number of children walking to South Point and Central Schools	5/2/2015 11:42 AM
#	**Bicyclists:**	**Date**
1	bicycle lanes	5/28/2015 10:02 PM
2	Same as pedestrians. Safe place to cross that cars will stop.	5/28/2015 6:06 PM
3	bike lanes	5/28/2015 11:53 AM
4	need a stop light on the point	5/19/2015 9:17 PM
5	There are parking lanes	5/19/2015 3:11 PM
6	a designated on street bike lane may work well as long as it docent affect peoples ability to park.	5/18/2015 8:01 PM
7	None	5/18/2015 6:26 PM
8	Should be improved sidewalks so that bicycles stay off the street	5/18/2015 12:07 PM
9	Crossing bygland	5/17/2015 8:35 PM
10	need stoplights	5/17/2015 5:14 PM
11	needs to be easier to cross bygland rd.	5/17/2015 2:42 PM
12	People riding on the wrong side of road, left lane into traffic	5/16/2015 9:26 PM
13	Crossing Safety/Visibility	5/16/2015 6:32 PM
14	Figuring out where they should be	5/14/2015 8:27 AM
15	Children are riding their bikes on the street during the busiest hours of the day	5/7/2015 10:45 AM
16	There are a lot of bicyclists w/o the protection of their own lane.	5/5/2015 7:04 AM
17	Traffic at 13th and Bygland not stopping for cyclists and bicyclists	5/4/2015 3:31 PM
18	Designated bike lanes or sharrows would provide safer environments.	5/2/2015 11:42 AM
#	**Motorists:**	**Date**
1	road width is more than adequate	5/28/2015 10:02 PM
2	Unable to get unto Bygland Rd safely with so much traffic. Especially trying to cross or turn left onto road in the morning.	5/28/2015 6:06 PM
3	Increase the speed limit. Paint some lines on the road, turning lanes, bicycle lanes, etc.. The road seems plenty wide (four lanes) and half the drivers don't know how or if they can utilize it.	5/26/2015 10:42 AM
4	have to wait sometimes 10 minutes to make left hand turn	5/21/2015 8:11 AM
5	need a stop light on the point	5/19/2015 9:17 PM
6	They are good	5/19/2015 3:11 PM
7	Traffic coming from the school makes it very hard to get onto Bygland Road	5/18/2015 8:37 PM
8	none.	5/18/2015 8:01 PM
9	None	5/18/2015 6:26 PM
10	mark/stripe/paint the intended lanes of traffic. Right now it is one huge lane in each direction and some idiots think they can pass on the right. I see near accidents everyday because its like a demo derby out there, especially north of the dyke to the stop light.	5/18/2015 12:07 PM
11	Turning left on bygland during busy times	5/17/2015 8:35 PM
12	need stop lights	5/17/2015 5:14 PM
13	easier access to bygland rd.	5/17/2015 2:42 PM
14	very difficult to make a left onto Bygland around 8:00 in morning	5/16/2015 9:26 PM

15	it's hard to even turn on bygland every morning at 8am. need roundabouts or lights down here.	5/16/2015 6:51 PM
16	Very heavy traffic flow before school after work...can't even get out of our street!	5/16/2015 6:32 PM
17	Safe access on to Bygland Road during busy periods	5/15/2015 1:32 PM
18	Morning Peak	5/14/2015 8:27 AM
19	Risking your life trying to access--especially in the winter on icy roads	5/7/2015 10:45 AM
20	Turn lanes would improve traffic flow tremendously, also give some room to larger veh/machinery passing through town.	5/5/2015 7:04 AM
#	**Intersections: (Provide cross street)**	**Date**
1	Greenway Blvd and Bygland Road, 10th st SE and Bygland road	5/28/2015 6:06 PM
2	more left turn lanes	5/28/2015 11:53 AM
3	Put a stop light and crossing near Orton's and fix that intersection.	5/26/2015 10:42 AM
4	Rhinehart/Bygland is a nightmare during "rush" hour. It is dangerous trying to get off Rhinehart to go west on Bygland.	5/23/2015 3:24 PM
5	need a stop light on the point	5/19/2015 9:17 PM
6	They are good	5/19/2015 3:11 PM
7	Its difficult to turn left onto by gland from 5th ave near the fire station. A round about may be a good idea.	5/18/2015 8:01 PM
8	None	5/18/2015 6:26 PM
9	5th Avenue SE & Bygland Road	5/18/2015 2:02 PM
10	none	5/18/2015 12:07 PM
11	Rhinehart and Bygland can't get out in mornings with long steady lines of traffic and then icy roads	5/18/2015 9:00 AM
12	Bygland and 13th st se	5/17/2015 8:35 PM
13	need stop lights	5/17/2015 5:14 PM
14	Mero	5/17/2015 4:14 PM
15	round about would make intersections easier	5/17/2015 2:42 PM
16	Rhinehart & Greenway Blvd	5/16/2015 11:00 PM
17	See above at 5th Ave and Bygland	5/16/2015 9:26 PM
18	13th street is a bad one in the mornings. lots of kids on foot and lots of cars. bad combo	5/16/2015 6:51 PM
19	Would love to see a light at Rhinehart to meter traffic	5/16/2015 6:32 PM
20	should make it 2 lanes each way because so many drive slow	5/16/2015 4:39 PM
21	Rhinehart & Bygland; Bygland & Minnesota Ave	5/15/2015 1:32 PM
22	We need one or more 4 way stops or traffic light intersections for safe access	5/7/2015 10:45 AM
23	Need a stop lights by Ortons to gain access to Bygland. Also need a set of lights at Bygland and 13th Street SE.....very hazardous trying to enter these areas at busy traffic times.	5/7/2015 10:06 AM
24	13th St SE	5/6/2015 9:26 PM
25	Any left turn from 6th Street SE to 5th Ave at flood wall	5/6/2015 6:46 PM
26	Bygland Rd SE/Rhinehart Dr SE/5th St SE- This intersection gets to be a flow problem, especially with (children) pedestrian/bicyclists traffic.	5/5/2015 7:04 AM
27	13th and Bygland - Traffic speeds and not stopping for pedestrians	5/4/2015 3:31 PM

Q10 Do you or family members walk along or cross Bygland Road as a pedestrian?

Answered: 39 Skipped: 1



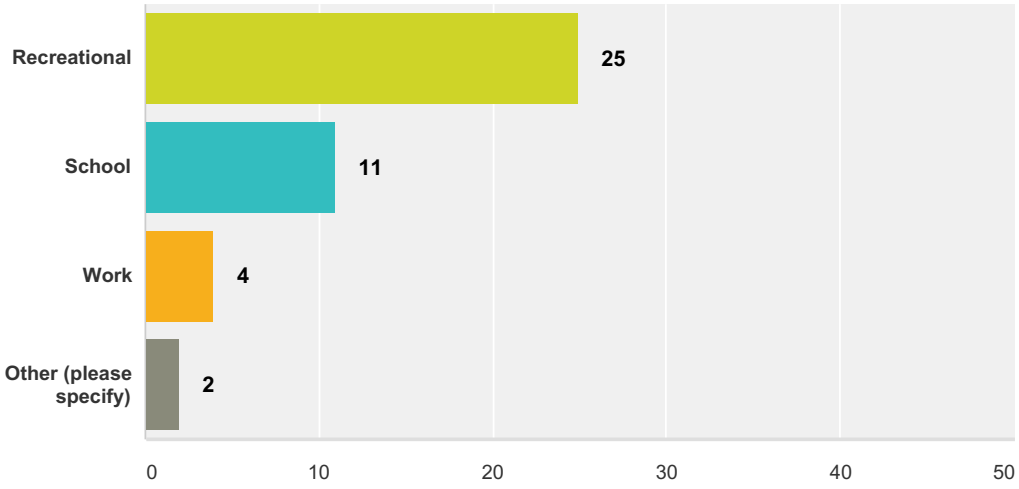
Answer Choices	Responses	
Yes	71.79%	28
No (skip to question 11)	28.21%	11
Total		39

#	If yes, where do you cross Bygland Road? (please specify)	Date
1	10th St SE, Greenway Blvd	5/28/2015 6:06 PM
2	various	5/28/2015 11:54 AM
3	Greenway	5/26/2015 2:03 PM
4	Rhinehart usually	5/23/2015 3:24 PM
5	5th street se	5/21/2015 8:13 AM
6	We walk along	5/19/2015 3:12 PM
7	At the crosswalk on 6th Street SE	5/18/2015 8:46 PM
8	13st se	5/17/2015 8:36 PM
9	bygland and greenway blvd	5/17/2015 5:15 PM
10	Greenway Blvd	5/16/2015 11:02 PM
11	At 5th avenue most frequently.	5/16/2015 9:27 PM
12	13th street	5/16/2015 6:52 PM
13	By 5th Ave SE and Across from the VFW	5/16/2015 6:33 PM
14	Bygland and 13th and/or Bygland and Rhinehart	5/7/2015 10:07 AM
15	13th St SE	5/6/2015 9:28 PM

16	6th Street	5/6/2015 6:48 PM
17	13th St SE, Rinehart Dr, 5th St, 5th Ave SE	5/5/2015 7:07 AM

Q11 If so, what is your trip purpose? (select all that apply)

Answered: 30 Skipped: 10

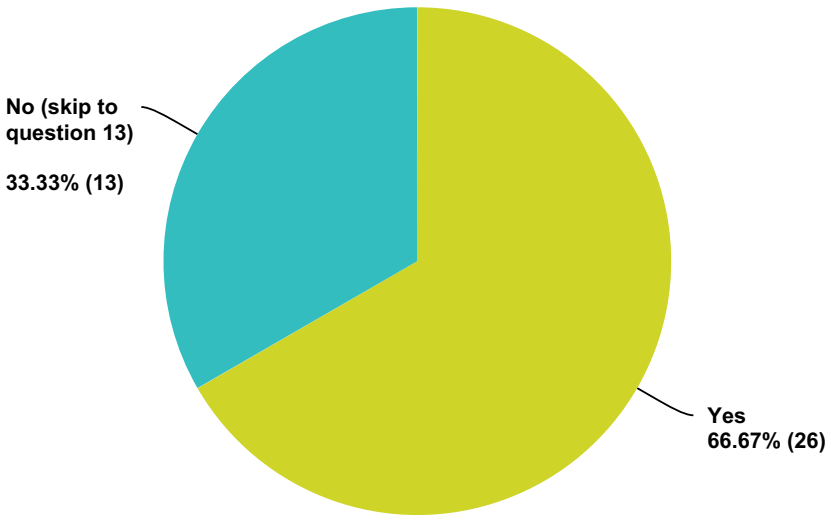


Answer Choices	Responses	
Recreational	83.33%	25
School	36.67%	11
Work	13.33%	4
Other (please specify)	6.67%	2
Total Respondents: 30		

#	Other (please specify)	Date
1	doctor	5/21/2015 8:13 AM
2	Visit Friends	5/16/2015 11:02 PM

Q12 Do you or family members bike along Bygland Road?

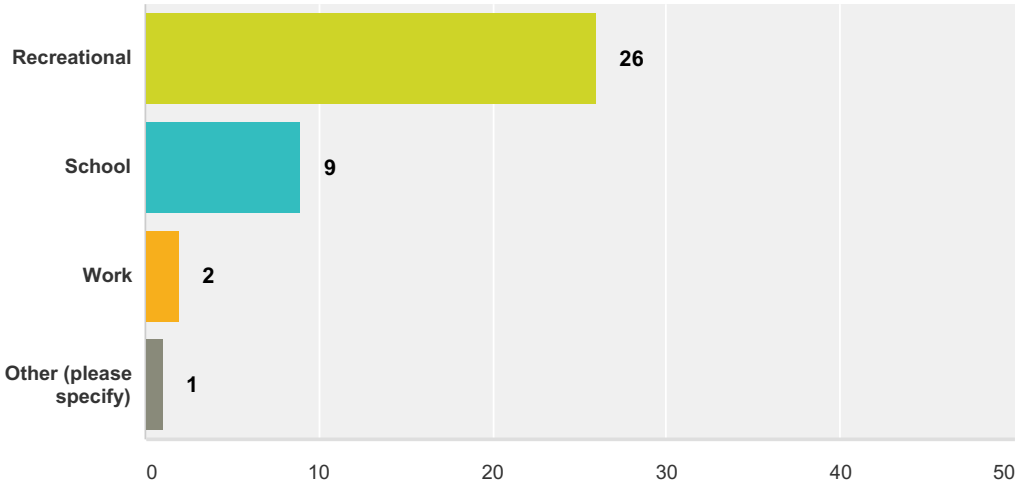
Answered: 39 Skipped: 1



Answer Choices	Responses	
Yes	66.67%	26
No (skip to question 13)	33.33%	13
Total		39

Q13 If so, what is your trip purpose? (select all that apply)

Answered: 27 Skipped: 13

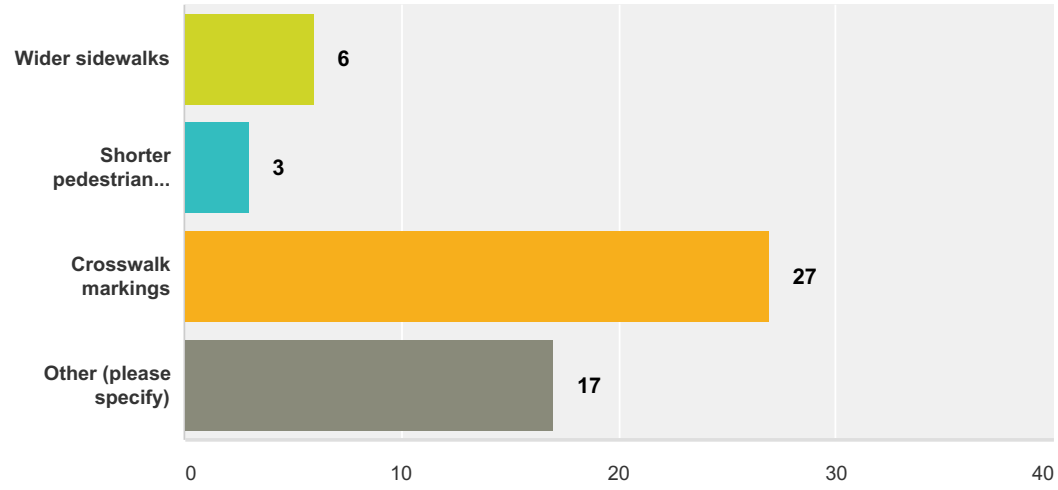


Answer Choices	Responses	
Recreational	96.30%	26
School	33.33%	9
Work	7.41%	2
Other (please specify)	3.70%	1
Total Respondents: 27		

#	Other (please specify)	Date
1	Convenient Store & Friends	5/16/2015 11:02 PM

Q14 What do you suggest to improve pedestrian safety along Bygland Road? (select all that apply)

Answered: 36 Skipped: 4



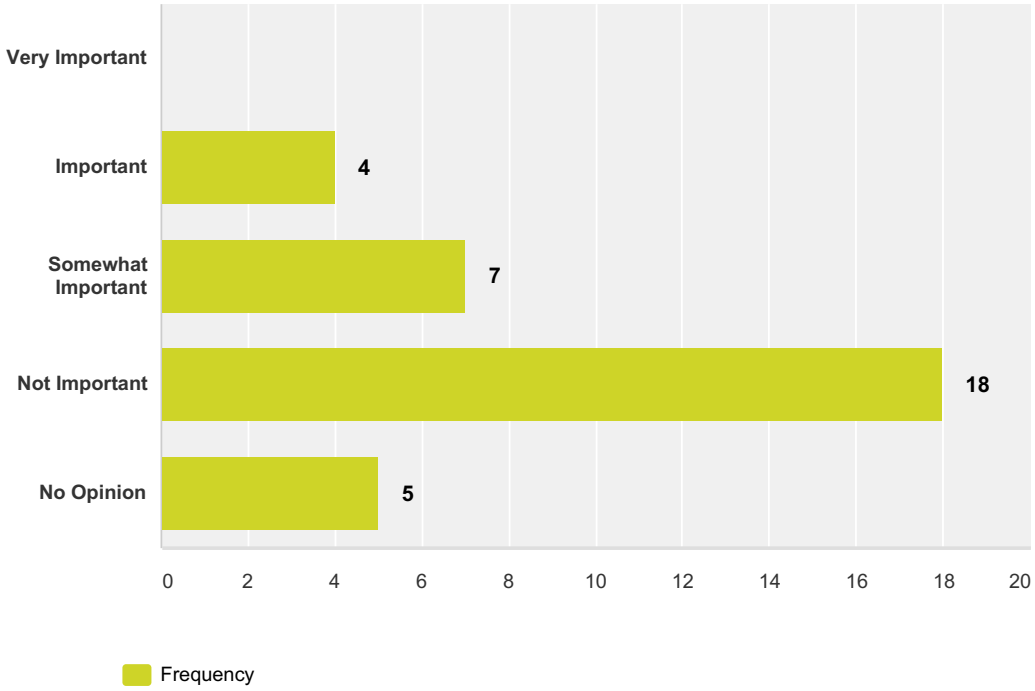
Answer Choices	Responses	
Wider sidewalks	**16.67%**	6
Shorter pedestrian crossings (i.e, narrow road)	**8.33%**	3
Crosswalk markings	**75.00%**	27
Other (please specify)	**47.22%**	17
Total Respondents: 36		

#	Other (please specify)	Date
1	Stoplight at Greenway Blvd so that cars stop and we can cross safely.	5/28/2015 6:06 PM
2	Install Stop light near Orton's and put a school crossing light near South Point.	5/26/2015 10:44 AM
3	stop signs or stop lights	5/21/2015 8:13 AM
4	stop light	5/19/2015 9:18 PM
5	I see no problem.	5/18/2015 8:02 PM
6	Tell peds to watch out for cars! Can't expect a 2 ton vehicle tostop on a dime if some idiot walks in front of them.	5/18/2015 12:08 PM
7	Stop signs or light	5/17/2015 8:36 PM
8	stoplight	5/17/2015 5:15 PM
9	Remove visibility obstructions; bushes, fences	5/17/2015 4:15 PM
10	control speeding.	5/17/2015 2:44 PM
11	Flashing peditrian lights or trafic lights with pedestrian signals	5/16/2015 11:02 PM
12	we need a roundabout or lights at 13th street and bygland	5/16/2015 6:52 PM
13	Flashing Lights For Pedestrian Crossings	5/16/2015 6:33 PM

14	lights, better signs, cameras for speeding and to catch those who do not yield	5/16/2015 4:40 PM
15	13th Ave SE needs ped crossing lights	5/6/2015 9:28 PM
16	flashing beacons at 13th and Bygland. Radar signs on Bygland	5/4/2015 3:32 PM
17	Possible HAWK signs at Bygland and 13th St. SE	5/2/2015 11:43 AM

Q15 How important is parking on Bygland Road?

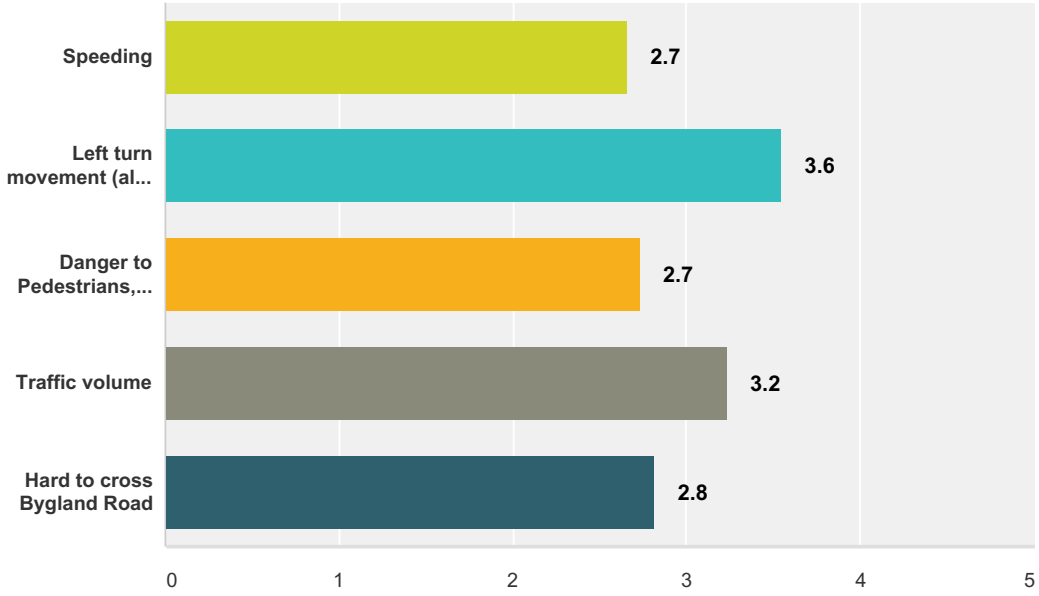
Answered: 34 Skipped: 6



	Frequency	Total	Weighted Average
Very Important	**0.00%** 0	0	1.00
Important	**100.00%** 4	4	2.00
Somewhat Important	**100.00%** 7	7	3.00
Not Important	**100.00%** 18	18	4.00
No Opinion	**100.00%** 5	5	5.00

Q16 Rank Bygland Rd SE and 5TH St SE/Rhinehart Rd intersection traffic problems.

Answered: 38 Skipped: 2



	1	2	3	4	5	N/A	Total	Score
Speeding	**13.16%** 5.0	**15.79%** 6.0	**23.68%** 9.0	**18.42%** 7.0	**28.95%** 11.0	**0.00%** 0.0	38	2.66
Left turn movement (all directions)	**36.84%** 14.0	**13.16%** 5.0	**26.32%** 10.0	**15.79%** 6.0	**7.89%** 3.0	**0.00%** 0.0	38	3.55
Danger to Pedestrians, bicyclist, etc. using street or sidewalk	**13.16%** 5.0	**15.79%** 6.0	**18.42%** 7.0	**36.84%** 14.0	**15.79%** 6.0	**0.00%** 0.0	38	2.74
Traffic volume	**21.05%** 8.0	**31.58%** 12.0	**13.16%** 5.0	**18.42%** 7.0	**15.79%** 6.0	**0.00%** 0.0	38	3.24
Hard to cross Bygland Road	**15.79%** 6.0	**23.68%** 9.0	**18.42%** 7.0	**10.53%** 4.0	**31.58%** 12.0	**0.00%** 0.0	38	2.82

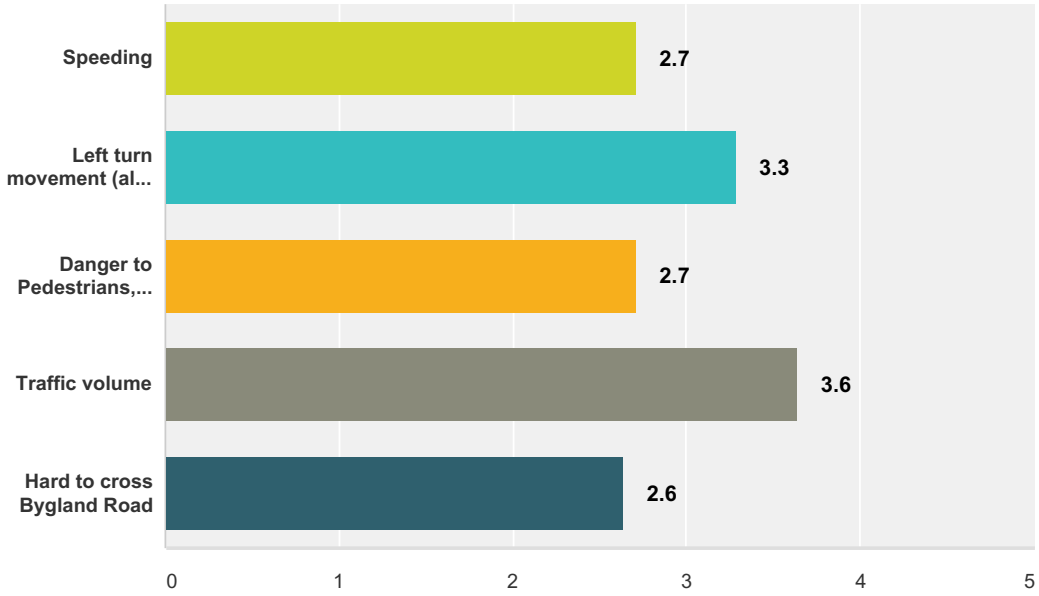
Q17 Optional: If N/A, Please provide a brief description of your concern at the above intersection.

Answered: 16 Skipped: 24

#	Responses	Date
1	Stupid drivers.	5/26/2015 2:06 PM
2	That intersection is just a mess in general. Hard to enter Bygland from Rhinehart at peak times. Bad first left turn heading north. Rhinehart traffic does not allow space to exit Bygland. Stop sign at same location seems useless.	5/26/2015 11:01 AM
3	the volume of cars during the morning rush hour makes it very difficult to turn left off Rhinehart to get on Bygland.	5/23/2015 3:28 PM
4	If I'm waiting for someone to turn left, I don't like how other drivers rush by me on the right side.	5/22/2015 5:56 AM
5	Need fast access to geton Bygland Road for medical reasons	5/21/2015 8:22 AM
6	This intersection needs a stop light to break up the flow of traffic and help all other intersections access bygland	5/19/2015 9:22 PM
7	Seems like it is hard for cars to pull out at peak traffic times	5/19/2015 3:25 PM
8	I live directly across from the gas station and I find it very difficult to get out of my driveway in the mornings between 730 and 830 weekday mornings, I believe it is related to speeding traffic and also a high volume of traffic during those hours.	5/18/2015 5:38 PM
9	Should be brought farther south so northbound cars on Rhinehart can "square up" to Bygland more and not have to strain to look south. DO NOT PUT A STOP LIGHT IN! That will only slow traffic flow.	5/18/2015 12:15 PM
10	needs stoplight	5/17/2015 5:17 PM
11	Have a trafic light at that intersection only at rush hour time then a caution during the remainder of the day.	5/17/2015 2:53 PM
12	Hard to cross safely	5/16/2015 6:57 PM
13	Needs a stop light to meter the traffic flow to allow for access onto Bygland and for bike and pedestrian crossing.	5/16/2015 6:38 PM
14	Should have a bridge to connect to GF at 32nd ave...should have done MANY years ago	5/16/2015 4:45 PM
15	Very hard to turn left at busy traffic times.	5/7/2015 10:09 AM
16	Turning left on to Bygland road is nearly impossible during morning rush hour and any event a the VFW arena.	5/6/2015 7:02 PM

Q18 Rank Bygland Rd SE and 6TH St SE intersection traffic problems.

Answered: 33 Skipped: 7



	1	2	3	4	5	N/A	Total	Score
Speeding	**18.18%** 6.0	**12.12%** 4.0	**12.12%** 4.0	**12.12%** 4.0	**30.30%** 10.0	**15.15%** 5.0	33	2.71
Left turn movement (all directions)	**21.21%** 7.0	**18.18%** 6.0	**18.18%** 6.0	**18.18%** 6.0	**9.09%** 3.0	**15.15%** 5.0	33	3.29
Danger to Pedestrians, bicyclist, etc. using street or sidewalk	**9.09%** 3.0	**9.09%** 3.0	**24.24%** 8.0	**33.33%** 11.0	**9.09%** 3.0	**15.15%** 5.0	33	2.71
Traffic volume	**21.21%** 7.0	**33.33%** 11.0	**18.18%** 6.0	**3.03%** 1.0	**9.09%** 3.0	**15.15%** 5.0	33	3.64
Hard to cross Bygland Road	**15.15%** 5.0	**12.12%** 4.0	**12.12%** 4.0	**18.18%** 6.0	**27.27%** 9.0	**15.15%** 5.0	33	2.64

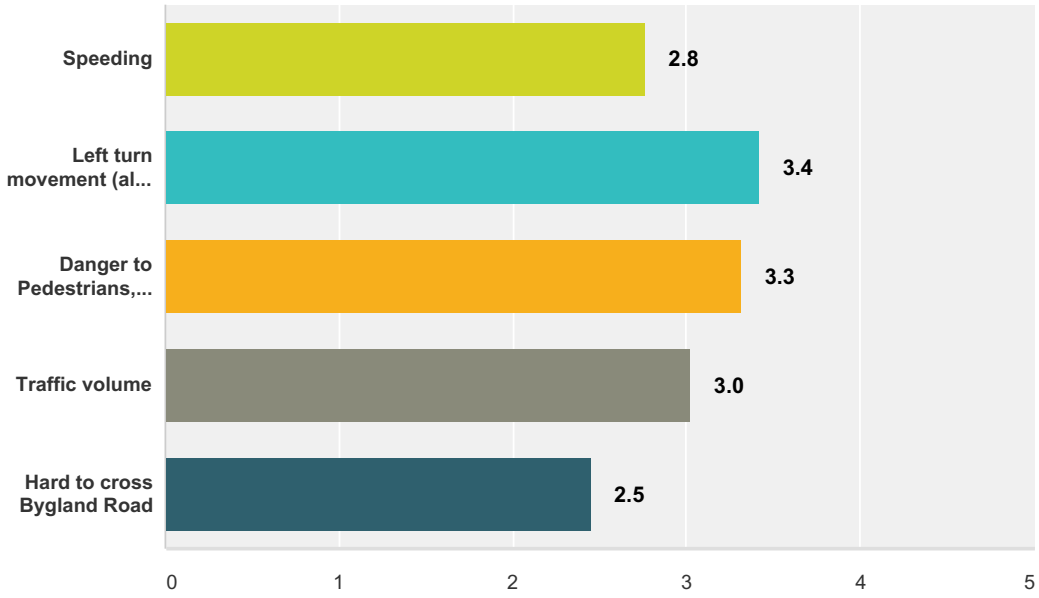
Q19 Optional: If N/A, Please provide a brief description of your concern at the above intersection.

Answered: 7 Skipped: 33

#	Responses	Date
1	This intersection seems to be an afterthought. Only traffic issue is those trying to beat traffic at 5TH intersection.	5/26/2015 11:01 AM
2	Need fast access to get to medical facilities	5/21/2015 8:22 AM
3	Same as above - but I think traffic could be routed to one area or another to cross	5/19/2015 3:25 PM
4	I'm not concerned with this intersection.	5/18/2015 8:07 PM
5	controling 5th st intersection would help this intersection.	5/17/2015 2:53 PM
6	I do not usually use 6th St SE	5/6/2015 9:34 PM
7	Turning left on to Bygland road is nearly impossible during morning rush hour and any event a the VFW arena.	5/6/2015 7:02 PM

Q20 Rank Bygland Rd SE and Greenway Blvd/13rd St SE intersection traffic problems.

Answered: 33 Skipped: 7



	1	2	3	4	5	N/A	Total	Score
Speeding	**24.24%** 8.0	**12.12%** 4.0	**12.12%** 4.0	**9.09%** 3.0	**36.36%** 12.0	**6.06%** 2.0	33	2.77
Left turn movement (all directions)	**21.21%** 7.0	**27.27%** 9.0	**21.21%** 7.0	**18.18%** 6.0	**6.06%** 2.0	**6.06%** 2.0	33	3.42
Danger to Pedestrians, bicyclist, etc. using street or sidewalk	**24.24%** 8.0	**15.15%** 5.0	**21.21%** 7.0	**33.33%** 11.0	**0.00%** 0.0	**6.06%** 2.0	33	3.32
Traffic volume	**9.09%** 3.0	**30.30%** 10.0	**21.21%** 7.0	**21.21%** 7.0	**12.12%** 4.0	**6.06%** 2.0	33	3.03
Hard to cross Bygland Road	**15.15%** 5.0	**9.09%** 3.0	**18.18%** 6.0	**12.12%** 4.0	**39.39%** 13.0	**6.06%** 2.0	33	2.45

Q21 Optional: If N/A, Please provide a brief description of your concern at the above intersection.

Answered: 5 Skipped: 35

#	Responses	Date
1	Cars don't stop even with improved crosswalk. There is too much traffic in all directions and cars have a hard time watching other cars and children. A stop light would help both cars and children safely cross the street.	5/28/2015 6:14 PM
2	Road is very busy during school rush.	5/26/2015 2:06 PM
3	Put a nice school crossing light here. Get those signs off the road. The intersection should be widened. The school can't even make legal turns without hogging all lanes and interfering with traffic.	5/26/2015 11:01 AM
4	This one is not too bad.	5/19/2015 3:25 PM
5	I hate this intersection with a passion! It's damn near impossible to cross it safely at 8am without getting into an accident or running over a kid. Seriously, it needs a roundabout already.	5/16/2015 6:57 PM

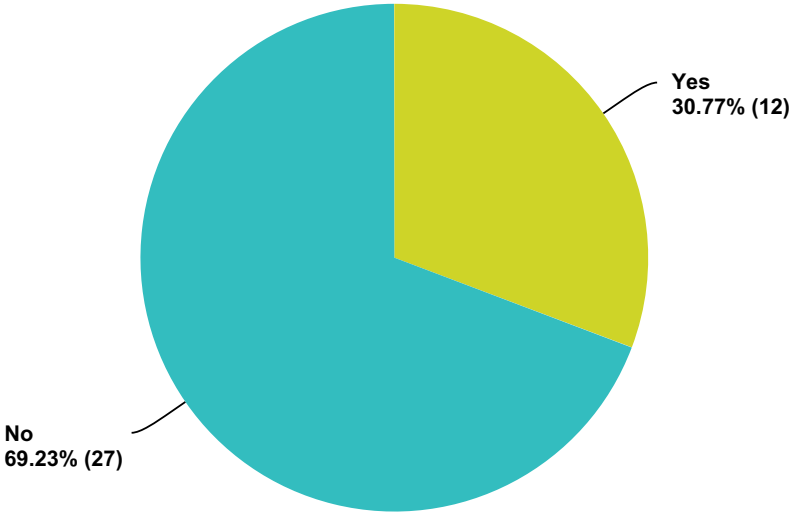
Q22 What improvements would you suggest for Questions 16, 18, and 20?

Answered: 21 Skipped: 19

#	Responses	Date
1	Stoplight at Greenway Blvd. Cars coming off Rhinehart Dr would also be able to use that intersection with a stop light rather than try attempt to get on Bygland road from Rhinehart Dr.	5/28/2015 6:14 PM
2	Stop Light at Greenway crossing.	5/26/2015 2:06 PM
3	16. Redo intersection and put a stop light and pedestrian crossing in. 18. Nothing. 20. Widen side street lanes and put turning lanes in. Put school crossing in that is timed in mornings and afternoons.	5/26/2015 11:01 AM
4	Stoplights? Something needs to be done to make it safer for access to Bygland for cars, bikes, and walkers.	5/23/2015 3:28 PM
5	Have another bridge south of us into ND so more traffic goes that way.	5/22/2015 5:56 AM
6	Traffic lights or stop signs	5/21/2015 8:22 AM
7	Stop lights!!!!!	5/19/2015 9:22 PM
8	Maybe put a light at just one of the above 5th or 6th so the cars could route that way for easier crossing	5/19/2015 3:25 PM
9	I guess I notice the most traffic during the hours of 730 and 830 in the mornings during the week seems to be the busiest, and also during the school year it seems worse, possibly a stop light/sign somewhere closer to the school to slow traffic and allow others onto the road.	5/18/2015 5:38 PM
10	Traffic lighting that would work together in timing to control the flow to be more efficient.	5/18/2015 2:10 PM
11	Two lanes of traffic in each direction.	5/18/2015 12:15 PM
12	Stop sign at bygland and 13 st se	5/17/2015 8:42 PM
13	stoplight	5/17/2015 5:17 PM
14	Traffic Lights	5/16/2015 11:05 PM
15	Lights or roundabouts	5/16/2015 6:57 PM
16	Please place a traffic light or 4 way stop either at the corner of 5th SE or the Rhinehart drive corner before someone gets killed. There is no place to access from the west safely. It's not just all the commuters coming from out of town or the local "point" people commuting to work; so many vehicles/buses are carrying children. It seems like safety should be the highest priority,	5/7/2015 11:00 AM
17	STOP LIGHTS	5/7/2015 10:09 AM
18	16 & 20: Stop lights for busier parts of the day	5/6/2015 9:34 PM
19	If there was a light at 1-2 of these intersections it would make it much easier for those trying to get to work by 8am.	5/6/2015 7:02 PM
20	Your Speed Radar signs on Bygland, flashing pedestrian crossing and hand controlled pedestrian crossing signs.	5/4/2015 3:34 PM
21	Speed radar signs, possible HAWK signals, crossing guards.	5/2/2015 11:45 AM

Q23 Do you have a family member that takes the school bus to Central Middle School or South Point Elementary School?

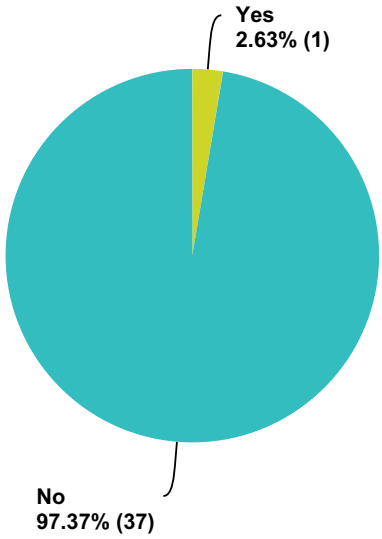
Answered: 39 Skipped: 1



Answer Choices	Responses	
Yes	30.77%	12
No	69.23%	27
Total		39

Q24 Do you use Cities Area Transit?

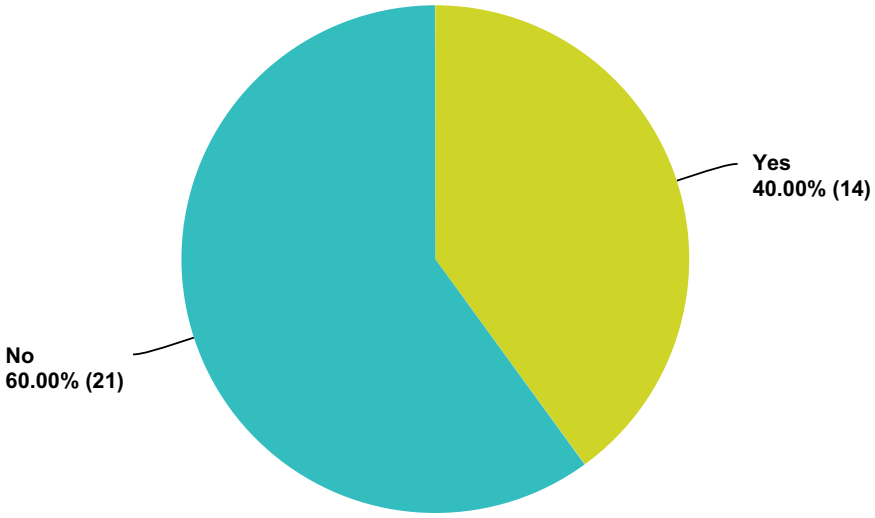
Answered: 38 Skipped: 2



Answer Choices	Responses	
Yes	2.63%	1
No	97.37%	37
Total		38

Q25 Would you support additional bus service along Bygland Road?

Answered: 35 Skipped: 5



Answer Choices	Responses	
Yes	40.00%	14
No	60.00%	21
Total		35

#	If yes, what suggestions do you have? (please specify)	Date
1	Not yet, since I still drive but the time will come.	5/22/2015 5:56 AM
2	Keep bus stops off on Bygland. Make them on intersecting streets to avoid someone rear-ending a bus.	5/18/2015 12:15 PM
3	extend further south	5/14/2015 8:29 AM
4	Add a route to south GF and a route to downtown EGF/GF area. Have at least two bus route stops along Bygland	5/5/2015 8:41 AM

Q26 What other concerns do you have for the study area?

Answered: 11 Skipped: 29

#	Responses	Date
1	safety	5/21/2015 8:22 AM
2	Lack of traffic lights	5/19/2015 9:22 PM
3	That you do more work than wahat is necessary and that not everyone in the city will have to pay for it when they all use it.	5/19/2015 3:25 PM
4	Stripe the existing lanes. Fix the potholes in the concrete by cutting out the section and replacing rather than patching that just crumbles away.	5/18/2015 12:15 PM
5	We could really use some bicycle safety training. Apparently lots of ignorance among both youth and adults about safe bicycling riding.	5/16/2015 9:30 PM
6	I don't see a need to improve pedestrian	5/16/2015 7:05 PM
7	Safety for children on bikes and trying to cross the road	5/16/2015 6:38 PM
8	The road over the coulee is EXTREMELY DANGEROUS, needs to be wider	5/16/2015 4:45 PM
9	Don not make a roundabout	5/14/2015 8:17 AM
10	It would be better if the sand would be spread BEFORE 7:40 AM in the winter.	5/7/2015 11:00 AM
11	I am very worried that there is going to be a crash involving a school bus in the morning because of those trying to get to work cutting off the bus making a left hand turn from the area on the west side of Bygland. I have seen many close calls and winter is the worst.	5/6/2015 7:02 PM

Q27 What improvements would you suggest for the study area?

Answered: 14 Skipped: 26

#	Responses	Date
1	Stop signs every 2 to 3 blocks	5/28/2015 10:07 PM
2	The road seems large even that speeds could be increased.	5/26/2015 11:01 AM
3	Again, another bridge south of us so people going to Grand Forks have another way to get there.	5/22/2015 5:56 AM
4	need traffic lights or stop signs	5/21/2015 8:22 AM
5	Traffic lights	5/19/2015 9:22 PM
6	None	5/19/2015 3:25 PM
7	Make it 2 lanes in each direction.	5/18/2015 12:15 PM
8	stop signs or lights to break up traffic in mornings.	5/18/2015 9:03 AM
9	I think somewhere down the road we need to install a large round about so people can go there to get out in the morning safely without fear of running into another vehicle or a pedestrian.	5/16/2015 6:57 PM
10	Need to meter the traffic to allow breaks in the heavy flow of vehicles at certain times of the day. Even if you just had lights that ran from 7-9am and 4-6 pm, etc during work week. The rest of the time could flash yellow both directions.	5/16/2015 6:38 PM
11	Traffic light at Rhinehart	5/14/2015 8:17 AM
12	If there are studies, please monitor the area during the school year and winter months. These are the busiest times and the most dangerous.	5/7/2015 11:00 AM
13	17th Ave SE Cul de sac needs a sidewalk that connects to Bygland sidewalk for students walking & biking to school. And there should be a sidewalk on both sides of 13th Ave SE near South point. That is a busy street for elementary students to cross.	5/6/2015 9:34 PM
14	Concerning the overwhelming traffic flow from both Central Middle and South Point schools: A North/South road connecting 13th St SE to Bygland on the East side of both of the schools may help spread out more of the traffic trying to turn at 13th/Bygland. It may be more efficient to have more right hand turns further East on Bygland than blocking up traffic at the (only) current 13th/Bygland intersection. Lights at the current 13/Bygland would also help with pedestrian crossing and the heavy traffic.	5/5/2015 8:41 AM

Q28 Please indicate any other comments or concerns?

Answered: 9 Skipped: 31

#	Responses	Date
1	The road is like a freeway for many people	5/28/2015 10:07 PM
2	It's hard to drive 30 miles an hour when cars are in a hurry behind you.	5/22/2015 5:56 AM
3	medical reasons to cross bygland road fast	5/21/2015 8:22 AM
4	None	5/19/2015 3:25 PM
5	I am glad to see this is being looked at. It's dangerous along Bygland Road for cars and pedestrians.	5/18/2015 2:10 PM
6	bygland needs stop lights	5/17/2015 5:17 PM
7	The ranking questions did not work correctly. They were automatically filled in as I tried to answer them.	5/16/2015 9:30 PM
8	I think we need a stop light somewhere on bygland road	5/16/2015 7:05 PM
9	I grew up in the house I now live in and love the neighborhood. If I would have known how hard it is to get off the point in the morning Mon- Fri I may have decided not to buy this house. I know several people who said realtors have told them not to discuss the issue of getting off the point during morning rush hour and a couple of people who passed on houses because of the traffic on Bygland.	5/6/2015 7:02 PM