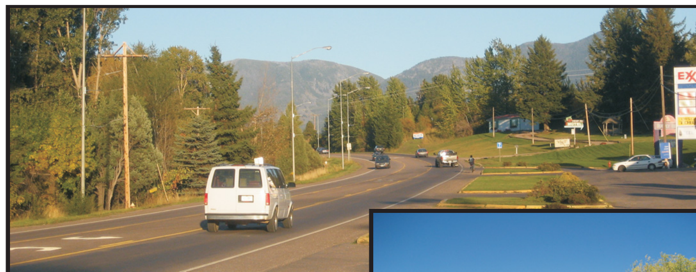
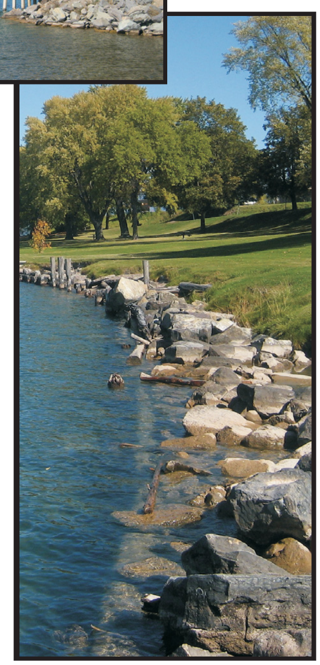
APPENDIX C
Corridor Study Documentation





US 93 Polson
Corridor Study

Polson Area Transportation Plan
US 93 Polson Corridor Study

PUBLIC PARTICIPATION PLAN

Prepared For:

Montana Department of Transportation

Confederated Salish & Kootenai Tribes

Lake County

City of Polson

Prepared By:

Camp Dresser & McKee Inc.

Helena, Montana

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1.0 Introduction

Lake County, City of Polson and the Confederated Salish and Kootenai Tribes (CSKT), in partnership with the Montana Department of Transportation (MDT), has initiated the development of the Polson Area Transportation Plan and US 93 Polson Corridor Study. These two area-wide interrelated transportation planning processes will assist state and local governments and the community at large in guiding transportation infrastructure and implementation over the next 20-year planning horizon. The comprehensive Polson Area Transportation Plan will provide an opportunity for local governments and residents to work together to develop innovative approaches necessary to plan and implement an integrated transportation system that will beneficially serve the community's citizens and visitors well into the future. The US 93 Polson Corridor Study will primarily focus on US 93, the principle arterial through the greater Polson area, and will assist MDT in determining cost-effective ways to address transportation needs including the feasibility of a truck bypass to US 93. The corridor planning process will provide information into any future NEPA/MEPA process, help identify viable improvement options, and provide opportunity for public involvement at all stages.

An initial step of the corridor study and transportation plan processes is to develop a Public Participation Plan that provides for and identifies public involvement activities on existing and future transportation system needs. The purpose of this plan is to ensure a proactive public involvement process that provides opportunities for the public to be involved in all phases of the corridor study and transportation plan process. This is accomplished by providing complete information, timely public notice, opportunities for making comments, and ensuring full access to key decisions.

1.1 Transportation Plan Purpose

The Polson area transportation plan is intended to help guide decisions about the future of the transportation system in the area. The development and implementation of a transportation plan is a tool for managing growth and accommodating development needs. Public participation is a key component in any successful transportation planning process. For this planning study, numerous public participation strategies are being proposed to reach as many people as possible and gather essential information to guide infrastructure improvements. The City of Polson has been one of the fastest growing areas in Montana and it is expected that the City will become a designated urban area based on the 2010 Census. The level of public involvement in transportation issues generally increases with the community's growth. In the Polson area, this population growth has manifested itself in new development and new employment with additional traffic and higher demands on the local transportation system. The transportation plan will provide public outreach opportunities that will:

- Educate the public on the important elements of planning and engineering the community's transportation system,
- Respond to the increasing interest of the general public to participate in planning of the community, and
- Increase the public's investment in the Transportation Plan.

1.2 Corridor Study Purpose

The purpose for a corridor study is to analyze existing data to determine current and future deficiencies and needs within the corridor and identify potential environmental issues and mitigation opportunities. The US 93 Corridor Study is a pre-NEPA/MEPA study that allows flexibility in examining improvement options for the roadway system should any project move forward. Additionally, this study will look at the feasibility of a truck bypass to US 93 as previously examined in the 1996 US 93 – Evaro to Polson Environmental Impact Statement. Public participation is an important component in any successful corridor planning study process. For this study, a number of public involvement strategies are proposed to reach the most people possible and elicit meaningful participation. These opportunities will:

- Educate the public on important element and the process of planning the US 93 corridor near Polson,
- Increase the public's ability to provide input and ask questions throughout the corridor planning study, and
- Present findings and recommendations.

1.3 Corridor Study and Transportation Plan Areas

The termini of the US 93 Corridor Study has been established by the MDT as being along US 93 from (RP) Reference Post 56.5 (US 93/Caffrey Road) to RP 63.0 (0.8 miles beyond the Rocky Point Road intersection). The study area for the Polson Area Transportation Plan includes the city limits of Polson, in addition to a 2-mile radius outside of the city limits. Physical features within the study area include Flathead Lake, Flathead River, and public, private, and tribal property. The study areas for the Polson Area Transportation Plan and the US 93 Polson Corridor Study are shown in Figures 1 and 2, respectively.

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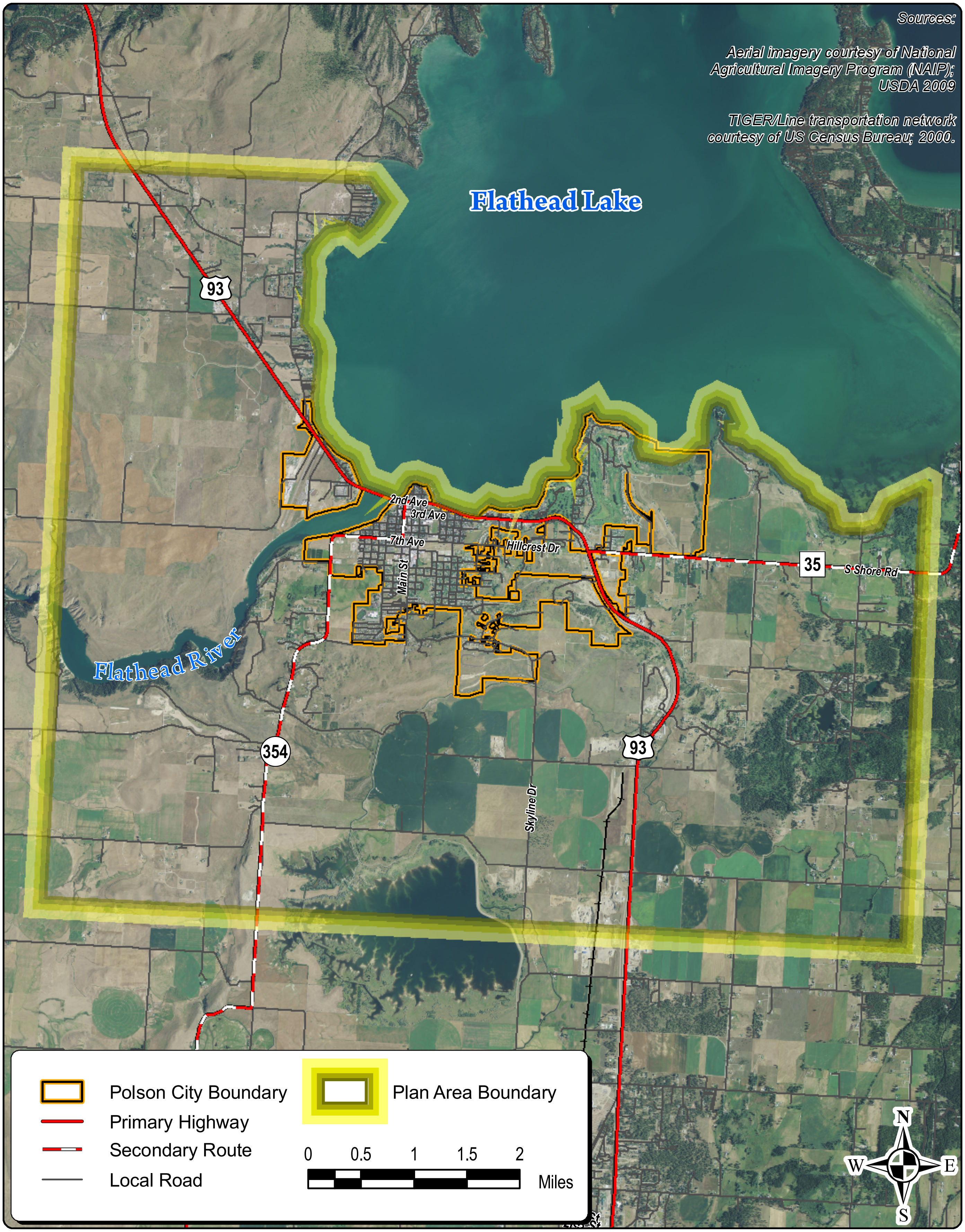

Figure 1

Plan Area Boundary

Polson Area Transportation Plan

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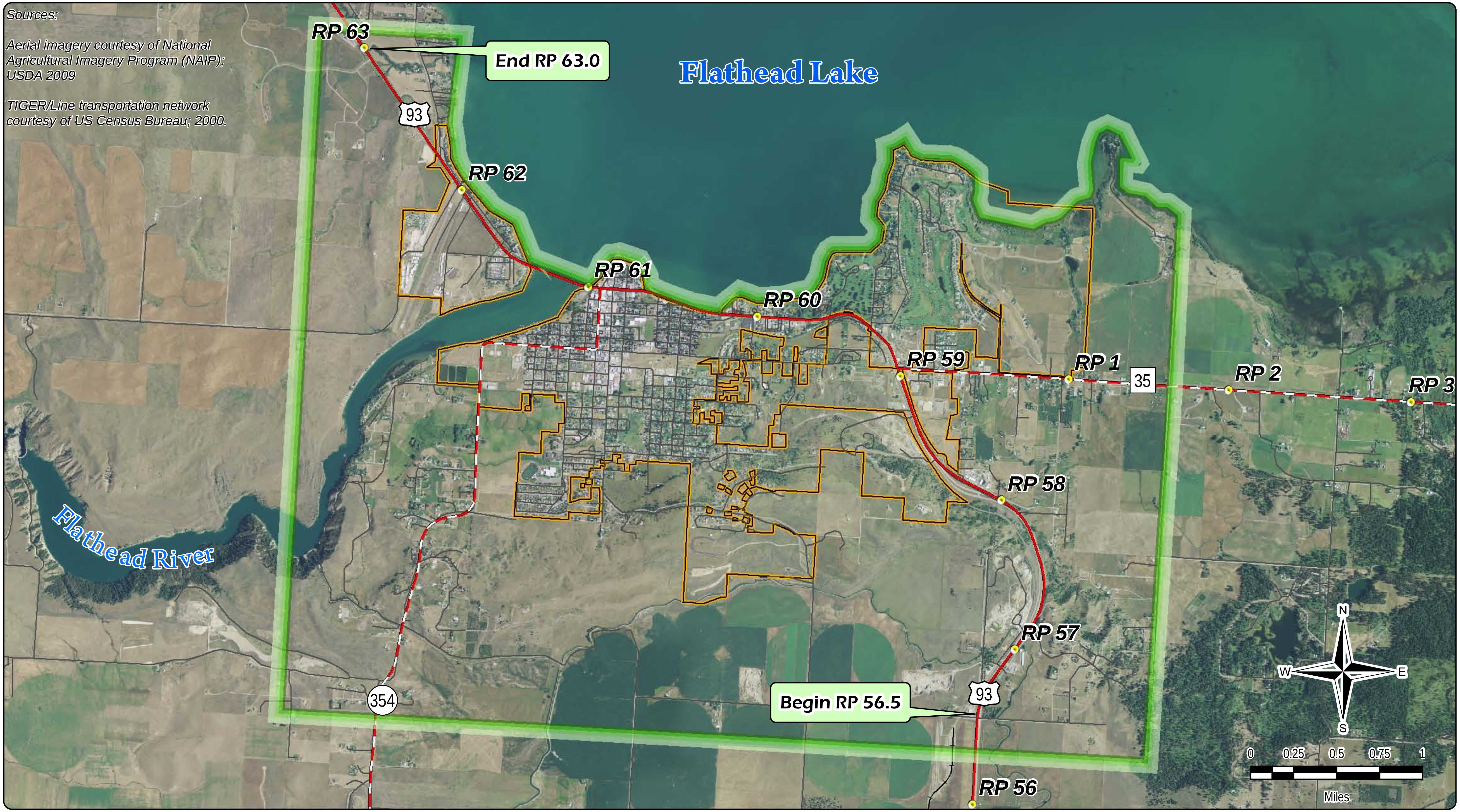


Figure 2

Study Area Boundary

US 93 Polson Corridor Study

Polson City Boundary

Primary Highway

Secondary Route

Local Road

Study Area Boundary

Reference Post

1.4 Goals of Public Involvement & Outreach Effort

The goal of the study partners and the consultant is to have ongoing public involvement for the corridor study and transportation plan processes. Education and public outreach are an essential part of fulfilling the local entities' responsibility to successfully inform the public about the corridor study and transportation plan processes. All four contracting entities (CSKT, Lake County, the City of Polson and MDT) seek to encourage public involvement and meaningful participation. These public outreach activities will be devoted to defining relevant issues and presenting preliminary findings of the analysis and studies of the existing transportation and socio-economic systems.

Education and public outreach are an essential part of fulfilling the local entities' responsibility to successfully inform the public about the corridor study and transportation planning processes.

2.0 Public Participation Procedures

The Public Participation Plan describes the public information and input opportunities that will be provided as part of the development of the Polson Area Transportation Plan and US 93 Polson Corridor Study. This plan encourages active participation in identifying and commenting on corridor and transportation issues at every stage of the planning process. Participants in this public participation process include:

- The general public – residents of the City of Polson, the Flathead Reservation, and adjacent unincorporated areas (Lake County) affected by the planning efforts;
- Landowners and business owners affected within the study area boundaries;
- The Technical Oversight Committee (TOC) – made up of 9 representatives of the study partners, including the Federal Highway Administration (FHWA); and
- Stakeholders and Outreach Groups.

Methods of notifying the public of the planning processes, upcoming meetings, and other information are detailed in this document. The general public will be kept informed of all aspects of the plan and study, and their input will be sought throughout the process. The public and interested parties shall provide input to the Consultant via the methods detailed herein.

2.1 Study Contacts

Contact information for CSKT, Lake County, City of Polson, MDT and the Consultant will be provided to the public. Telephone numbers and email addresses of plan and study contacts will be published in information that is released and is also included here.

City of Polson, 106 1st Street East, Polson, MT 59860; (406) 249-5637; Contact – Todd Crossett, polsonmanager@centurytel.net

Lake County, 106 Fourth Avenue East, Polson, MT 59860; (406) 883-7204; Contact – Bill Barron, lakecommissioners@lakemt.gov

CSKT, 36100 Second Street East (PO Box 278), Pablo, MT 59855; Contact – Joe Hovenkotter, jhovenkotter@cskt.org

Montana Department of Transportation (MDT), Statewide and Urban Planning, 2960 Prospect Avenue (PO Box 201001), Helena, MT 59620-1001; (406) 444-9193; Contact – Sheila Ludlow, sludlow@mt.gov

Montana Department of Transportation (MDT), Missoula District Office, 2100 W Broadway (PO Box 7039), Missoula, MT 59807-7039; (406) 523-5830; Contact – Shane Stack, sstack@mt.gov

Camp Dresser & McKee, Inc. (CDM), 50 West 14th Street, Suite 200, Helena, MT 59601
(406) 441-1400; CDM Project Manager – Jeff Key, P.E., KeyJA@cdm.com

2.2 Publications

Meeting announcements will be developed by CDM and advertised by MDT at least three weeks prior to meetings. The ads will announce the meeting location, time, and date, the format and purpose of the meeting, and the locations where documents may be reviewed (if applicable). The following print newspapers may carry the display ads.

Char-Koosta News – print and online http://www.charkoosta.com

Lake County Leader– print and online http://leaderadvertiser.com

The Valley Journal– print and online http://www.valleyjournal.net

The Missoulian– print and online http://missoulian.com

Daily Inter Lake– print and online http://www.dailyinterlake.com

Flathead Beacon– print and online http://www.flatheadbeacon.com

Also, three newsletters for each study will be made available one month prior to each formal public meeting. Newsletters will describe work in progress, results achieved, preliminary recommendations, and other related topics. Each newsletter will be saved as a PDF and delivered to CSKT, Lake County, the City of Polson, MDT and select stakeholders for their use in posting to their individual internet sites.

2.3 Radio and Television

Meetings may also be announced on local radio and television stations. Input from the TOC will identify the most popular radio and television stations on which announcements will be made.

Frequency	Call Sign	Format	Home Community	Licensee
600 AM	KGEZ		Kalispell, MT	Skyline Broadcasters, Inc.
750 AM	KERR		Polson, MT	Anderson Radio Broadcasting, Inc.
1180 AM	KOFI		Kalispell, MT	Kofi, Inc.
1240 AM	KSAM		Whitefish, MT	Bee Broadcasting, Inc.
88.7 FM	KLKM	Christian	Kalispell, MT	Educational Media Foundation
89.1 FM	KUFM	National Public Radio	Missoula, MT	The University Of Montana
91.5 FM	KPLG		Plains, MT	Hi-line Radio Fellowship, Inc.
92.3 FM	KQRK		Ronan, MT	Anderson Radio Broadcasting, Inc.
93.3 FM	KGGL		Missoula, MT	Fisher Radio Regional Group, Inc.
94.9 FM	KYSS-FM	Country	Missoula, MT	Capstar Tx Limited Partnership
95.9 FM	KHNK		Columbia Falls, MT	Bee Broadcasting, Inc.
96.3 FM	KBAZ	New Rock	Hamilton, MT	Capstar Tx Limited Partnership
97.1 FM	KALS		Kalispell, MT	Kalispell Christian Radio Fellowship, Inc.
98.5 FM	KBBZ		Kalispell, MT	Bee Broadcasting, Inc.
100.7 FM	KIBG		Wallace, ID	Anderson Radio Broadcasting, Inc.
103.9 FM	KZMN		Kalispell, MT	Kofi, Inc.
105.1 FM	KWOL-FM		Whitefish, MT	Cathleen R. Bee Dba Rose Communications
106.3 FM	KDBR		Kalispell, MT	Bee Broadcasting, Inc.
106.7 FM	KBQQ		Pinesdale, MT	Fisher Radio Regional Group Inc.

Source: The Center for Public Integrity - Radio stations that reach ZIP code 59860, Polson, MT.
http://projects.publicintegrity.org/telecom/search/default.aspx?zip=59860

Channel	Call Sign	License Type	Network	Home Community	Licensee
3	K03DJ	Translator (VHF)		Polson, MT	Blacktail Tv Tax District
6	K06EL	Translator (VHF)		Ferndale, Etc., MT	Swan Hill Tv, Inc.
8	KPAX-TV	Commercial (VHF)	CBS	Missoula, MT	Kpax Communications, Inc.
9	KCFW-TV	Commercial (VHF)	NBC	Kalispell, MT	Bluestone License Holdings Inc.
10	K10LP	Translator (VHF)		Polson, MT	Blacktail Tv Tax District
11	K11HO	Translator (VHF)		Polson, MT	Polson Tv Improvement Association
11	KUFM-TV	Educational (VHF)	PBS	Missoula, MT	The University Of Montana
13	KECI-TV	Commercial (VHF)	NBC	Missoula, MT	Bluestone License Holdings Inc.
14	K14LT	Translator (UHF)		Polson, MT	Blacktail Tv Tax District
15	K15GP	Translator (UHF)		Kalispell, MT	Blacktail Tv Tax District
16	K16GJ	Translator (UHF)		Polson, MT	Polson Tv Improvement Association
17	KMMF	Commercial (UHF)	FOX	Missoula, MT	Montana License Sub, Inc.
20	K20CP	Translator (UHF)		Elmo, MT	Salish Kootenai College
23	KTMF	Commercial (UHF)	ABC	Missoula, MT	Mmm License Llc
25	KSKC-CA	Class A (UHF)		Pablo/ronan, MT	Salish Kootenai College
26	K26DD	Translator (UHF)		Kalispell, MT	Trinity Broadcasting Network
30	K30II	Translator (UHF)		Polson, MT	Blacktail Tv Tax District
41	K41IW	Translator (UHF)		Polson, MT	Blacktail Tv Tax District
44	K44FR	Translator (UHF)		Blacktail, Etc., MT	Blacktail Tv Tax District
51	K51HT	Translator (UHF)		Kalispell, MT	Blacktail Tv Tax District

Source: The Center for Public Integrity - Television stations that reach ZIP code 59860, Polson, MT.
http://projects.publicintegrity.org/telecom/search/default.aspx?zip=59860

2.4 Stakeholder Contact List

A stakeholder contact list will be produced that will include individuals, businesses, or groups identified by the CSKT, Lake County, City of Polson, and MDT. The intent of developing the stakeholder list is to identify those individuals and groups to actively seek out and engage in all phases of the study and plan processes. Individuals who attend public meetings will also be added to the stakeholder list. The following groups or businesses (at a minimum) will be included in the initial list, providing that addresses and/or emails are obtainable from each respective group for these purposes:

- CSKT Tribal Council
- City of Polson
- Lake County Commissioners
- Lake County Planner
- Polson Chamber of Commerce
- Polson Airport
- Polson K-12 School District
- Downtown Business Owners Association
- US 93 User's Group
- Water User's Group (Flathead Lake and Flathead River)
- Office of Emergency Management
- Montana Fish, Wildlife, and Parks
- County Fire Departments and Emergency Medical Personnel
- County Sheriff and Montana State Highway Patrol
- Montana Truckers Association (MTA)
- Interested Landowners
- Employers:
    - KwaTaqNuk Resort
    - St. Joseph Medical Center
    - Businesses along US 93

2.5 Document Availability

All study deliverables and working draft technical memorandums will be available in hard copy format at the offices of the CSKT, Lake County, City of Polson, and the MDT. These are the "formal" locations at which materials will be available. In addition, when the Public Draft and Final Draft of the Polson Area Transportation Plan and US 93 Polson Corridor Study are made available in the Spring of 2011, hard copies will also be located at the Polson City Library.

Document Availability Locations:

- CSKT Land Use Planning Department, 42487 Complex Boulevard, Pablo, MT
- Lake County Planning Department, 106 4th Avenue East, Polson, MT
- Polson City Hall, 106 1st Street East, Polson, MT
- MDT District 1 Office, 2100 W Broadway, Missoula, MT
- MDT District Office, 85 5th Avenue East North, Kalispell, MT
- MDT Statewide and Urban Planning Section Office, 2960 Prospect Avenue, Helena, MT
- Polson City Library, 2 1st Avenue East, Polson, MT (Public Draft and Final Draft Reports Only)

Electronic copies of study deliverables will be posted on the study websites at the addresses shown below within 7 days of receiving approval to do so by the study partners.

http://www.mdt.mt.gov/pubinvolve/polsoncorridorstudy/

http://www.mdt.mt.gov/pubinvolve/polsontransplan/

The following Americans with Disabilities Act (ADA)-required statement will be included on all published materials:

The CSKT, Lake County, City of Polson, MDT, and CDM attempt to provide accommodations for any known disability that may interfere with a person participating in any service, program, or activity associated with this project. Alternative accessible formats of this information will be provided upon request. For further information, call (406) 441-1400 or TTY (800) 335-7592, or by calling Montana Relay at 711. Accommodation requests must be made at least 48 hours prior to the scheduled activity and/or meeting.

2.6 Meetings

2.6.1 Technical Oversight Committee Meetings

Technical Oversight Committee (TOC) meetings will be scheduled every month for the duration of the twelve-month corridor study and transportation plan period. Individuals included in the meetings will be the Consultant, CSKT, Lake County, City of Polson, FHWA, MDT personnel, and others as needed. The meetings are intended to track progress and address study development issues and questions. The meetings are considered an important aspect for the exchange of information and ideas during the development of these studies. Throughout these meetings, issues, problems, and possible solutions will be identified and discussed.

There will be two study status meetings and one public hearing each with the CSKT Tribal Council, Lake County Commission, and the Polson City Council, as necessary, to ensure that goals, objectives, and decisions are acceptable to elected officials.

2.6.2 Resource Agency Meeting/Involvement

After the first formal public meeting has been held on the study, a meeting will be scheduled and held with the Resource Agencies. The meeting will be organized by MDT and facilitated by CDM with assistance from the study partners as necessary.

2.6.3 Public Meetings

Three formal public opportunities will be held throughout the duration of the Corridor Study and Transportation Plan. The first public meeting will be a combined transportation plan/corridor study meeting to discuss and identify the issues and visioning that will help define community perceptions and goals, as well as identifying issues that should be addressed as part of the transportation planning effort. This initial effort would consist of a 2- or 3-hour workshop that would be very interactive. The purpose would be for CDM to define the transportation plan and corridor study processes, and then engage the community appropriately.

The second public meeting will also be a combined transportation plan/corridor study meeting that will occur after initial field studies have been completed and the transportation-related problems are defined. The purpose of this gathering with regard to the Transportation Plan will be to review the identified problems with the public to assure that all of the major transportation problems have been included in the analysis. Potential Recommended Improvement Options relative to the Corridor Study will also be presented. An informal open house would be held where attendees could visit with study personnel at several displays, followed by a formal presentation by the Consultant with questions and answers.

The third set of public meetings will be different in that the Corridor Study and Transportation Plan will each have their own meeting. The third public meeting for the Corridor Study (expected to occur first) will be held in order to present the Draft Corridor Study Report and its findings. The third public meeting for the Transportation Plan will be held to present the preliminary recommendations and findings. Individual work stations will be set up for participants to move about to their areas of interest and review and comment on the preliminary findings. It is hoped that participants can become fully engaged through this mechanism and alleviate many of the "confrontational" situations that can occur in large, traditional public forums. The purpose of this venue will be to present the types of recommended improvements and receive initial feedback from the community.

2.6.4 Public Hearings

Three public hearings will be held after the draft Polson Area Transportation Plan and US 93 Polson Corridor Study documents have been published. These public hearings will be held separately with the CSKT Tribal Council, the Lake County Commission, and the Polson City Council. These hearings will be designed to obtain official comments from the public prior to final approval of the document(s) and production of the final report(s).

The comments made during the hearings will be transcribed by CDM staff and entered as part of the public record of the planning process. The comments will be reviewed and responses will be provided in the final documents as an appendix.

2.6.5 Other Meetings

Up to ten other meetings may be conducted over the 12-month schedule. While the Consultant is in the Polson community, meetings with neighborhood groups, special interest groups, additional Council meetings, interested landowners, and others may be needed or requested. Coordination and approval by the study partners will be obtained prior to the meetings.

Summary of Proposed Meetings:

CSKT Tribal Council -------------	Two Study Status Meetings & One Public Hearing
Lake County Commission ------	Two Study Status Meetings & One Public Hearing
Polson City Council --------------	Two Study Status Meetings & One Public Hearing
1st Public Meeting ---------------	One Open House with Formal Presentation (Visioning & Issues)
Resource Agency Meeting ----	Corridor Workshop (US 93 Polson Corridor Study only)
2nd Public Meeting --------------	One Open House with Formal Presentation
3rd Public Meeting --------------	Presentation of Corridor Study Report (US 93 Polson Corridor Study only)
3rd Public Meeting --------------	Preliminary Recommendations (Polson Area Transportation Plan only)

Other Meetings, up to ten total (as needed or requested)

2.6.6 Public Outreach Events

Community events will provide valuable public outreach opportunities. Presence at the Farmers' Market is anticipated as a possible opportunity to interact with and engage the public on the planning study processes.

- Farmers' Market; Fridays 9 AM – 1 PM, May to October; Contact – J.E. Donald Blais; (406) 883-3595.

2.6 Consideration for Traditionally Underserved Populations

The TOC and Consultant recognize that additional efforts must be made to involve traditionally underserved segments of the population in the public process for the study and plan, including the disabled, racial and ethnic minorities, and low-income residents. Including these groups leads to planning that reflects the needs of everyone. The following steps will help with these efforts:

<u>Plan Meeting Locations Carefully</u>

- Public meetings will be held in locations that are accessible and compliant with the Americans with Disabilities Act (ADA). If a targeted population is located in a certain geographic part of the City or County, then the meeting location should be in that area for convenience.

<u>Seek Help from Community Leaders and Organizations</u>

- To facilitate involvement of traditionally underserved populations, community leaders and organizations that represent these groups will be consulted about how to most effectively reach their members.

<u>Be Sensitive to Diverse Audiences</u>

- At public meetings, study partner staff and the Consultant will attempt to communicate as effectively as possible. Technical jargon will be avoided and appropriate dress and conduct will be adhered to.

2.7 Study and Plan Schedule

Adherence to the study and plan schedule is important to stay on track and keep all participating parties engaged. The study schedules for the Polson Area Transportation Plan and US 93 Polson Corridor Study are attached as Figures 2-1 and 2-2, respectively. It is CDM's intent to adhere to these schedules.

3.0 Overall Study and Plan Communication

3.1 Summary

The Polson Area Transportation Plan and US 93Polson Corridor Study Public Participation Plan establish guidelines and procedures for encouraging public participation. The following communication strategies and techniques may be used in their entirety (or partially) to distribute the information to the community at large and seek a higher level of engagement. The TOC and the Consultant will utilize as many of these techniques as possible that best suit the planning study processes.

- All relevant deliverables and associated materials will be posted on the study and plan websites at the following addresses:
  - http://www.mdt.mt.gov/pubinvolve/polsoncorridorstudy/
  - http://www.mdt.mt.gov/pubinvolve/polsontransplan/
- Public service announcements and interviews on radio and television may be conducted to explain the subject matter and promote participation.
- Articles and press releases for the newspaper or other widely circulated publications will be developed.
- Informal presentations will be made at regional sites, open houses, round tables, or other community forums to receive input from the affected community.
- Formal presentations will be made to various service clubs and civic and professional groups.
- Select mailings, as requested by interested parties, will be provided to individuals or groups that have expressed interest or made comments at meetings.
- Technical memorandums (working drafts) will be provided to the CSKT, Lake County, City of Polson, and the MDT for posting to their respective internet sites, and also distributed to the TOC, to provide a better understanding of proposed transportation issues and recommendations and, in return, to provide the four study partner with feedback and an opportunity for continual comment. Hard copies of all materials will be made available at the following locations:
  - CSKT Land Use Planning Department, 42487 Complex Boulevard, Pablo, MT
  - Polson City Hall, 106 1st Street East, Polson, MT
  - Lake County Planning Department, 106 4th Avenue East, Polson, MT
  - MDT District 1 Office, 2100 W Broadway, Missoula, MT

  - MDT District 1 Office, 85 5th Avenue East North, Kalispell, MT

  - MDT Statewide and Urban Planning Section Office, 2960 Prospect Avenue, Helena, MT

- Special presentations will be made, upon request, to community groups and organizations.

- Fact sheets may be used to explain transportation related issues.

- Special issues "technical memorandums" will be announced or reported at meetings and/or via email on relevant transportation issues.

Responses to questions and comments from the public concerning the public participation plan, working draft technical memorandums, the draft and public draft Polson Area Transportation Plan / US 93 Polson Corridor Study documents, and other work products will be made via written response in an Appendix to the actual documents. In some circumstances, the TOC and/or the Consultant will respond directly to an individual or group by letter or telephone call, or by way of a periodic newsletter.

Figure 2-1 (Polson Area Transportation Plan Schedule)

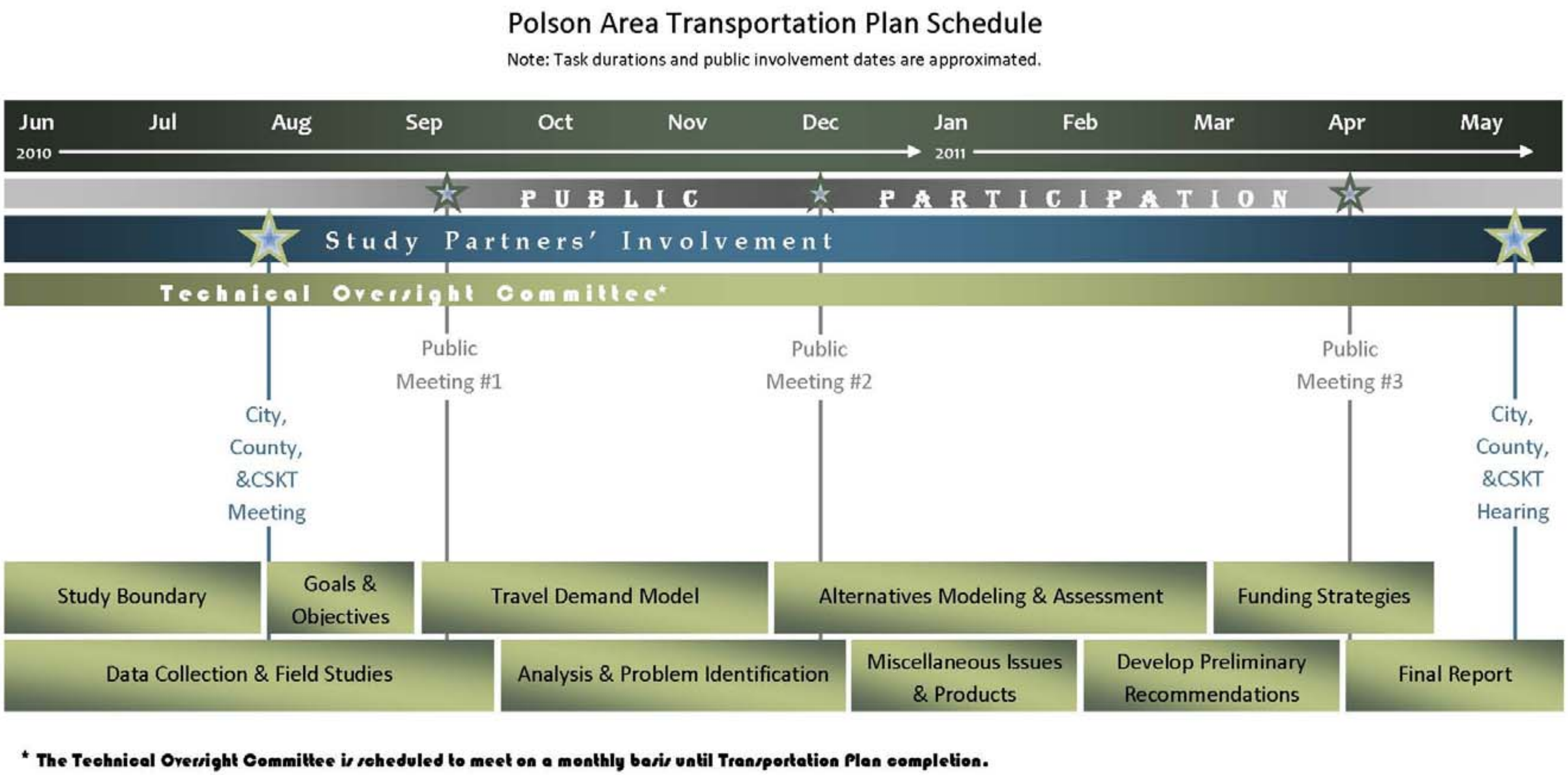
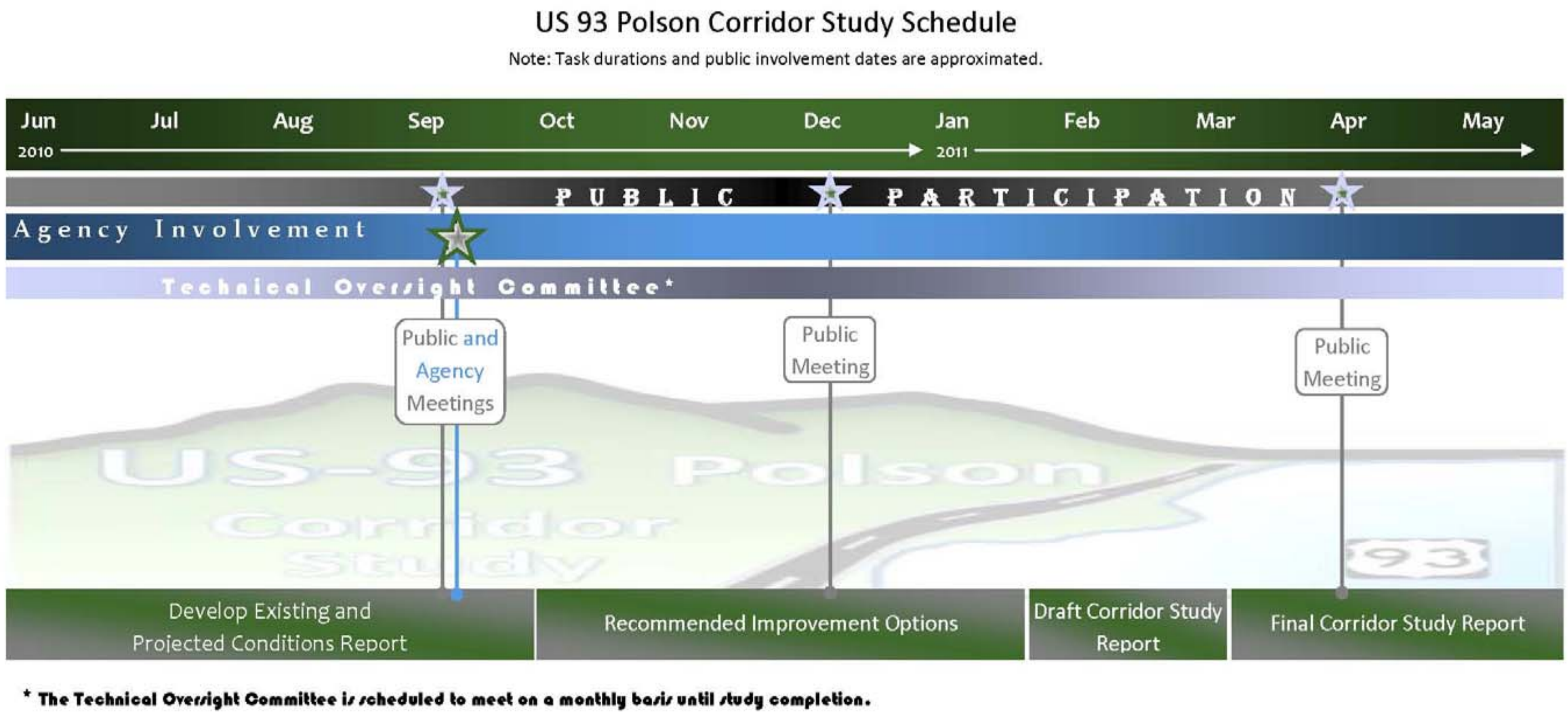


Figure 2-2 (US 93 Polson Corridor Study Schedule)



US 93 Polson Corridor Study

CORRIDOR SETTING DOCUMENT

Prepared For:

Montana Department of Transportation

Confederated Salish & Kootenai Tribes

Lake County

City of Polson

Prepared By:

Camp Dresser & McKee Inc.

Helena, Montana

Table of Contents

1.0 Overview of Corridor Setting Document

The US 93 Polson Corridor Study near Polson, Montana in Lake County begins around Reference Post (RP) 56.5 and extends approximately 6.5 miles north to around RP 63.0. The US 93 Polson Corridor Study area boundary has been developed to identify corridor concerns and assess the feasibility of an alternate route to US 93 through the Polson community. The option of an alternate route to US 93 was brought forward in the 1996 US 93-Evaro to Polson Environmental Impact Statement (EIS).

The Corridor Study will look at improvement options, in terms of both short-range and long-range improvements, that will address the needs of the corridor, while also considering cost, feasibility and environmental impacts within the corridor. A figure showing the corridor study area is included herein as Figure 1-1.

This corridor setting document describes the existing corridor in preparation for future detailed analysis of technical conditions and environmental resources. This document is intended to be the "blueprint" for further investigation that will be made via the Existing and Projected Conditions Report. The Existing and Projected Conditions Report will provide for greater detail for all the items listed in this Corridor Setting Document.

2.0 Description of Corridor

The description of the corridor as contained in this section focuses on the existing roadway aspects of the corridor study area.

2.1 Roadway Aspects

- **Functional Classification**

  US 93 is part of the National Highway System (NHS). US 93 is classified as (NHS) Rural Principal Arterial – Non-Interstate System. Arterials provide the highest level of mobility, at the highest speed, for long interrupted travel. The rural arterial network provides interstate and inter-county service. US 93 is a major north/south highway providing a vital regional link between Idaho and Canada. It also provides an important link between Missoula, Kalispell, and surrounding communities.

- **Right-of-Way and Jurisdictions**

  US 93 is located primarily along private property, with the State of Montana maintaining the right-of-way along each side of the existing highway. Montana Rail Link has land ownership of three small parcels interspersed within the corridor study area. The Confederated Salish and Kootenai Tribes (CSKT) has jurisdiction as authority of the

Flathead River. The Federal Aviation Administration (FAA) has jurisdiction of the Polson Airport.

- **Geometrics**

The existing physical and geometric design criteria for US 93 will be evaluated for the study area boundary to identify areas that do not meet current MDT design standards. The Existing and Projected Conditions Report will investigate as-built drawings and identify specifications on lane width, passing percentage, and guardrail sites and identify whether the current conditions meet current MDT design standards. Whether or not bridge structures meet the specific design criteria for spanning a major river will be further identified in the Existing and Projected Conditions Report.

- **Traffic Data**

The following table shows traffic data for US 93 through the study area corridor. As shown in the following table, the average annual daily traffic was at its highest in 2004 and has decreased from 2007 to 2009.

	Average Annual Daily Traffic										
Location	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
US 93, RP 58.5 (.5 mi S of MT 35)	9,080	9,510	9,280	9,910	10,210	10,780	10,780	10,760	10,230	9,740	9,600
US 93, RP 59.5 (.5 mi N of MT 35)	11,430	9,860	12,610	12,410	13,590	14,690	14,690	14,660	13,440	12,590	11,760
US 93, E of 8th St E in Polson	12,670	14,400	11,850	11,870	12,920	13,760	13,760	13,730	13,030	10,940	11,290
US 93, between 5th East & 2nd East in Polson	10,580	13,950	11,150	11,500	12,240	12,900	12,190	12,170	12,550	10,440	10,600
US 93 (2nd Avenue), between Main & 1st St East in Polson	10,150	10,970	10,570	10,890	11,570	12,190	8,010	7,990	11,120	8,790	8,140
US 93, either end of Flathead River Bridge in Polson	6,380	7,730	6,890	7,980	7,830	8,010	12,900	12,870	8,910	6,810	6,850
Weighted Average	*9,862*	*11,638*	*10,397*	*10,809*	*11,424*	*12,058*	*12,610*	*12,586*	*11,766*	*9,943*	*9,884*

Source: MDT Traffic Data and Collection Analysis

- **Safety**

  Comprehensive crash and safety data will be obtained from MDT State Highway Traffic Office and examined to evaluate Polson crash data compared to other incorporated cities in Montana. The data will determine safety issues, concerns, and locations within the study area boundary.

- **Roadway Considerations**

  The existing physical and geometric design criteria for US 93 will be evaluated within the study area boundary to identify areas that do not meet the current MDT design standards.

- **Horizontal Alignment**

  The horizontal alignment of US 93 will have a major influence on traffic flow and safety.

- **Vertical Alignment**

  The vertical alignment is a measure of elevation change of a roadway. The length and steepness of grades directly affects the operational characteristics of the roadway. The MDT Road Design Manual lists recommendations for maximum grades on principal arterials according to the type of terrain in the area.

- **Roadside Safety (Clear Zone)**

  Clear zone considerations will be evaluated.

- **Pavement Width**

  The existing pavement width and typical section will be evaluated.

- **Geotechnical**

  A geotechnical investigation report will not be developed for this corridor study. Existing as-built drawings indicate the study area has no substantial geotechnical issues.

- **Drainage**

  There are several irrigation ditches and canals located throughout the study area. There do not appear to be any hydraulics issues within the corridor study area.

- **Bridge Structures**

  Throughout the corridor there are four bridges. These are located as follows:

RP 57.1, Structure No. P00005057+00641 (Pablo Feeder Canal)

RP 57.8, Structure No. P00005057+07611 (Wildlife Underpass)

RP 57.8, Structure No. P00005057+07612 (Wildlife Underpass)

RP 61.2, Structure No. P00005061+01811 (Flathead River Bridge)

- **Railroad**

  The presence of Montana Rail Link within the corridor is a key factor in developing improvement options. Guidelines have been established in accordance with construction and development near railroad facilities. These will be evaluated as improvement options are evaluated.

- **Utilities**

  Utilities existing throughout the corridor will be addressed in developing improvement options.

Figure 1
Corridor Study Boundary
US 93 Polson Corridor Study

2.2 Environmental Setting

The study area environmental setting is an important aspect of this pre-NEPA/MEPA Corridor Study. The following items represent a preliminary list of potential environmental resources that will be further evaluated in the Existing and Projected Conditions Report.

- **Land Use and Ownership**

  The corridor study area boundary has a predominant land use of rangeland, agriculture, and urban land. Land ownership within the study area is predominately private with scattered tracts of tribal, state, and federal land.

- **Development**

  Future development is important to the corridor and improvement options that may be proposed. The zoning districts for the Polson City/County Planning Area were just updated in 2009. Zoning for lands located outside the Polson City Limits vary from rural residential to productive lands to highway commercial. Within the unincorporated areas of the Study Area Boundary, there are likely to be planned and or undeveloped, platted subdivisions to consider.

- **Surface Waters**

  Polson is situated along the southern shore of Flathead Lake, the largest natural, freshwater lake in the western United States. Along the west side of the Mission Valley, the Flathead River flows from the south end of Flathead Lake to the confluence with the Clark Fork River. Approximately two miles south of Polson is the Pablo Reservoir/Pablo National Wildlife Refuge, a lake with wetlands providing habitat for birds and other wildlife. In addition, several irrigation canals are present within, and south of Polson.

- **Recreation**

  An abundance of recreational activities exist within the study area, predominantly due to the presence of the Flathead Lake.

- **Tribal Concerns**

  There are tribal concerns and resource issues (cultural, historical, economic and environmental) known within the study area. Archeological sites might be present along the Flathead River and elsewhere within the Study Area Boundary.

- **General Vegetation**

  The study area is largely comprised of a short grassland prairie ecosystem with inclusions of willow, cottonwood, ponderosa pine, and mountain mahogany. The grasslands support livestock grazing, and have been tilled for small grain and hay production.

- **Wildlife**

  The Pablo Reservoir / Pablo National Wildlife Refuge is located approximately two miles south of Polson. A lake and wetlands within this wildlife refuge provide habitat for birds and other wildlife. If an improvement option is forwarded during the project development process, a complete biological survey of the study area will be conducted in accordance with accepted.

- **Sensitive Species**

  Species of Special Concern

  A search of the Montana Natural Heritage Program species of special concern database revealed two mammal species (gray wolf and Townsend's big eared bat), five bird species (common loon, bald eagle, long-billed curlew, grasshopper sparrow, and bobolink), one fish species (bull trout), and three plant species (sweet flag, lake bank sedge, and scribner's panic grass) within or overlapping the study area.

  Threatened and Endangered Species

  The federal list of endangered and threatened species is maintained by the USFWS. According to the USFWS, Lake County has been documented to possess two threatened animal species (Grizzly Bear and Canada Lynx) and two threatened plant species (spalding's campion and water howellia).

- **Aquatic Resources**

  Fish species abundantly/commonly occurring in the Flathead River and within the study area are the largescale sucker, northern pike, northern pike minnow, peamouth, redside shiner, and westslope cutthroat trout. Species occurring rarely within this river stretch are the brown trout, largemouth bass, rainbow trout, slimy sculpin, and yellow perch (MFISH, 2010).

- **Wetlands**

  The study area crosses the Flathead River, sits adjacent to Flathead Lake, and contains several other drainages and irrigation ditches. Scattered locations of freshwater emergent wetlands exist throughout the study area.

- **Air Quality**

  The Study area is located within a designated non-attainment area for particulate matter with an aerodynamic diameter of 10 microns or less (PM10). Any improvement options forwarded from corridor study into project development will need to be evaluated to determine if the project is regionally significant according to the Federal Highway Administration letter of July 17, 2008.

- **Historic Properties**

  Historic properties are properties included in the National Register of Historic Places (NRHP). There are seven registered historic places in Lake County; at least one of those is located within the study area. The Montana State Historic Preservation Office (SHPO) revealed 62 previously recorded historic properties within the Study area. Most of these historic properties are residences located within the City of Polson.

- **Noise**

  If an improvement option is forwarded into project development, a noise study would be required to determine where noise-sensitive land uses are located, what existing noise levels those areas are experiencing, and to estimate what future noise levels will be as a result of the project. If the project was expected to change traffic volumes on other routes, then off-project routes should also be studied for noise impacts. In areas of residential development, noise impacts (existing or predicted) may need to be mitigated.

- **Farmlands**

  Prime farmland, as well as farmland of statewide and local importance, exists within the Study area. Due to the large capacity of prime farmland within the corridor, there is potential for farmlands to be impacted as improvement options further develop.

- **Irrigation**

  The study area contains a portion of the Flathead Irrigation District. There is an estimated 1,300 miles of canals and lateral ditches in the entire distribution system.

- **Section 4(f) and 6(f)**

  There are twenty-two potential Section 4(f) sites. It should be noted there may be additional Section 4(f) sites located within the study area after a cultural resource survey has been completed. According to Montana Department of Fish, Wildlife, and Parks Land and Water Conservation Fund list, there are eight Section 6(f) properties within the study area.

- **Floodplain**

  Based on a review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps for Lake County, a delineated 100-year floodplain (Zone A) is located along the Flathead River and Flathead Lake throughout the study area.

- **Hazardous Waste**

  The NRIS database has layers for tank sites and leaking tank sites which probably would be the most likely issue to come up regarding contamination within the study area.

- **Geology and Soils**

  According to NRIS, the soil conditions within the study area boundary are consistent with the primary land use of grassland, crop, and pasture lands.

- **Noxious Weeds**

  The following noxious weeds have been identified as present in Lake County: Leafy Spurge, Spotted Knapweed, Russian Knapweed, Dalmatian Toadflax, and Sulphur Cinqueful. Spotted Knapweed is known to be present within the Study area. The Study area will need to be surveyed for noxious weeds during the project development process.

3.0 Conclusion

Preliminary review of the existing conditions and corridor settings lead to a number of factors and issues that will be further identified and addressed in the Existing and Projected Conditions Report. The highway geometrics will be analyzed and confirmed whether current MDT design standards are met or if standards need to be updated with future improvement options. Safety issues and concerns will be addressed in future improvement options in order to increase traffic safety. Environmental concerns and issues will be explained in greater detail in the Existing and Projected Conditions Report in order to minimize environmental impacts with projected improvement options.

4.0 References

Code of Federal Regulations (CFR). 23 CFR Section 450.

Montana Department of Transportation. Draft Environmental Scan *Polson Corridor Planning Study*. Montana, 2010.

Montana Department of Transportation. 2000 Montana State Rail Plan Update. Montana, 2000.

Montana Fisheries Information System. 2010 http://fwp.mt.gov/fishing/mFish/

National Register of Historic Places. 2010 http://www.nationalregisterofhistoricplaces.com/

US 93 Polson Corridor Study

Existing Conditions of US 93

Prepared For:

Montana Department of Transportation

Confederated Salish & Kootenai Tribes

Lake County

City of Polson

Prepared By:

Camp Dresser & McKee Inc.

Helena, Montana

US-93 Polson Corridor Study

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Chapter 2 Existing and Projected Conditions

This chapter documents the existing technical and environmental features along the existing US 93 corridor. The Technical Oversight Committee established the existing 6.5 mile study corridor along US 93. In addition to the existing US 93 corridor, the Committee determined the corridor study area which encompasses a full representation of the environment and physical surroundings of the study area. Even though several routes and alignments exist outside the existing US 93 corridor, there is a lack of detail and as-built drawings available for such alignments. The focus of this chapter consists of the existing technical features along the US 93 corridor.

2.1 Existing Roadway Users and Traffic Volumes

Montana Highway 35 (MT 35) intersects US 93 near RP 59.0 at South Shore Road and is primarily used by local traffic, commercial trucks, and recreational vehicles. Secondary Route 354 (S 354) intersects US 93 east of the Flathead River Bridge and is primarily used by local traffic, commuters, and commercial trucks. During the non-winter months, an increase in roadway users and traffic volumes is primarily due to recreation and tourism in the area.

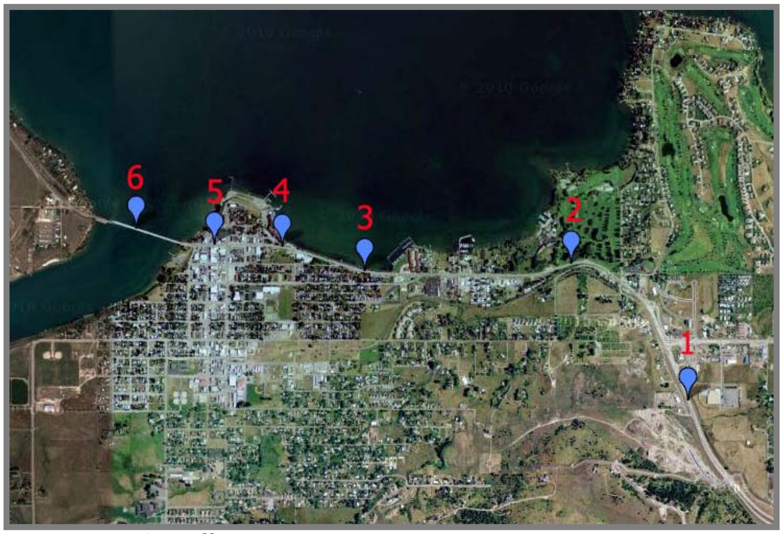
The "weighted" Average Annual Daily Traffic (AADT) for US 93 through the study area for 2009 was 9,884, which has decreased since a peak of 12,610 in 2005. In 2009, the percentage of truck traffic through the corridor reached 10.9%. Table 2.1 shows the most recent 10-year traffic volumes for the corridor study area.

Table 2.1 Average Annual Daily Traffic

No.	Length (miles)	Location	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1	0.332	US 93, RP 58.5 (.5 mile S of MT 35)	9,080	9,510	9,280	9,910	10,210	10,780	10,780	10,760	10,230	9,740	9,600
2	0.953	US 93, RP 59.5 (.5 mile N of MT 35)	11,430	9,860	12,610	12,410	13,590	14,690	14,690	14,660	13,440	12,590	11,760
3	0.400	US 93, East of 8th Street East in Polson	12,670	14,400	11,850	11,870	12,920	13,760	13,760	13,730	13,030	10,940	11,290
4	2.766	US 93, between 5th East and 2nd East in Polson	10,580	13,950	11,150	11,500	12,240	12,900	12,190	12,170	12,550	10,440	10,600
5	0.226	US 93 (2nd Avenue), between Main & 1st Street East in Polson	10,150	10,970	10,570	10,890	11,570	12,190	8,010	7,990	11,120	8,790	8,140
6	1.266	US 93, either end of Flathead River Bridge in Polson	6,380	7,730	6,890	7,980	7,830	8,010	12,900	12,870	8,910	6,810	6,850
		Weighted Average	*9,862*	*11,638*	*10,397*	*10,809*	*11,424*	*12,058*	*12,610*	*12,586*	*11,766*	*9,943*	*9,884*

Source: MDT Traffic and Data Collection Analysis

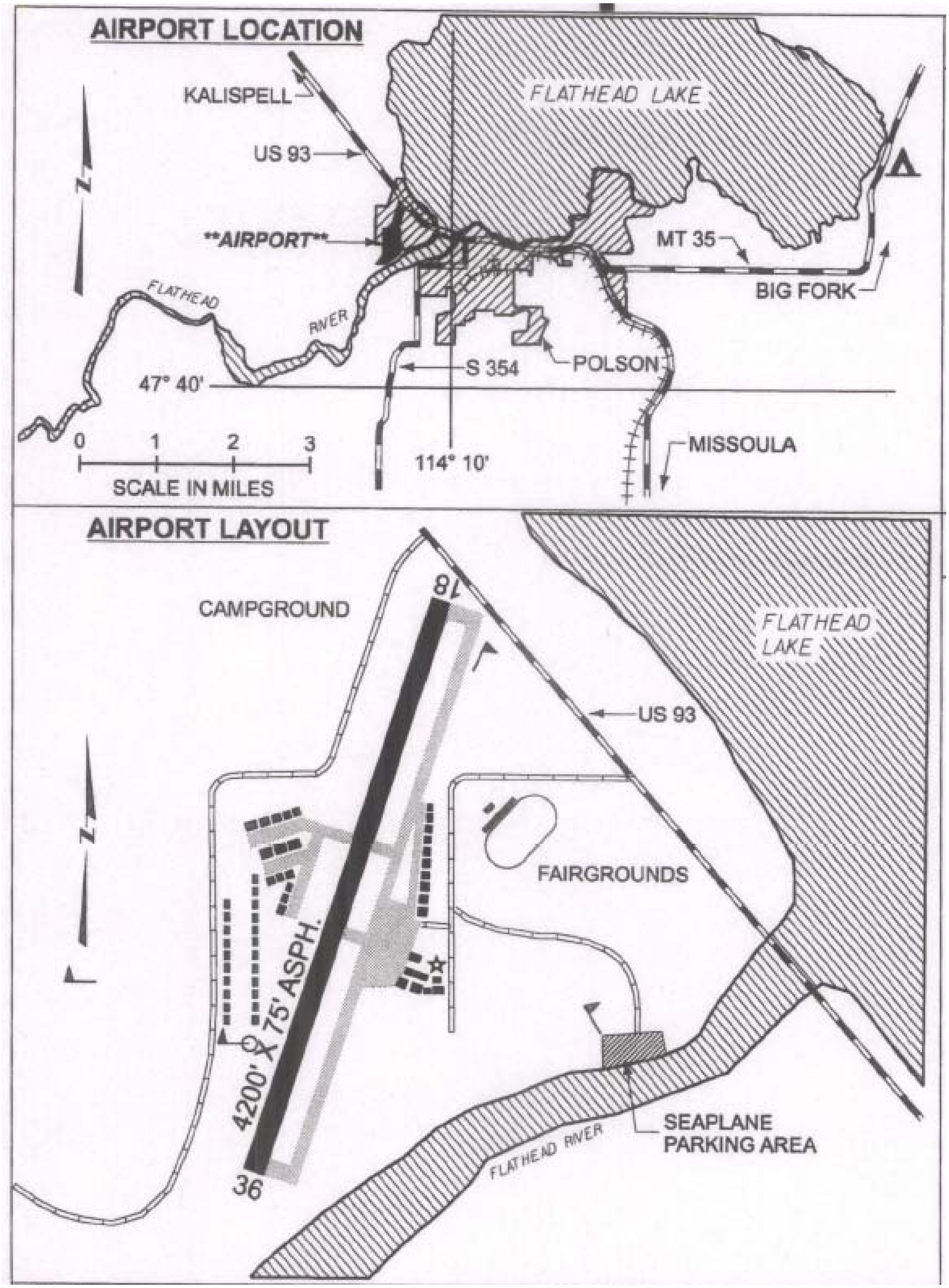
The following graphic shows the locations of the MDT Traffic Count stations shown in the table above.



MDT Statewide Traffic Count Site Location Map

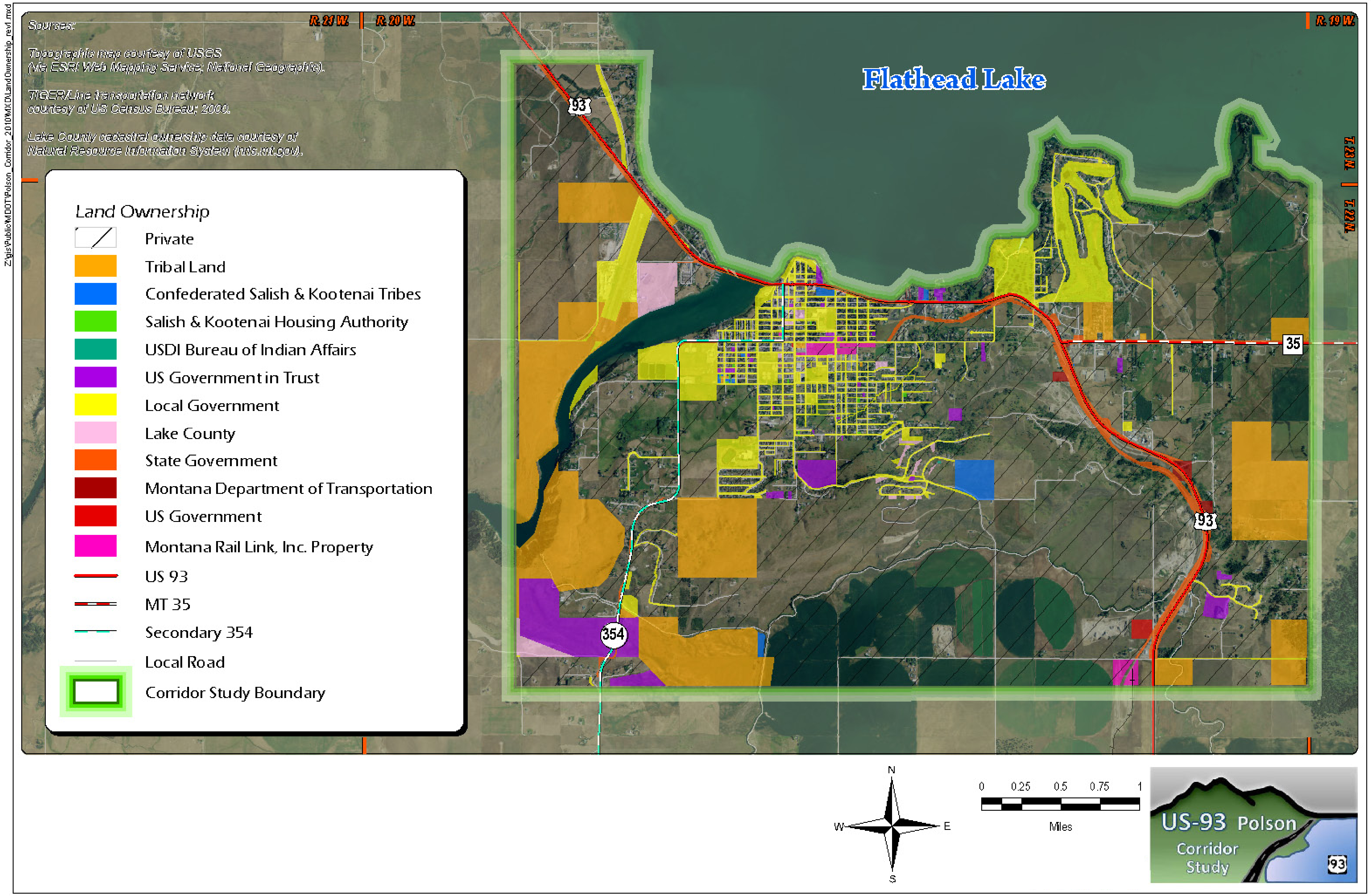
2.2 Right-of-Way and Jurisdictions

The existing US 93 corridor is located primarily along private property. The State of Montana maintains the right-of-way on each side of the highway. Three small sections of MDT land are within the study area boundary, and the level of impact is undetermined at this point. Montana Rail Link (MRL) infrastructure and right-of-way is located within the corridor study area. Montana Rail Link also has land ownership interspersed throughout the study area, primarily along 7th Avenue. If any improvement options are identified along 7th Avenue this will need to be addressed. The Flathead River flows along the west side of the study area and passes under US 93 at MP 61. CSKT has jurisdiction as authority of the Flathead River. The Polson Airport is located inside the study area boundary and west of the Flathead River and includes a seaplane landing area. The Federal Aviation Administration (FAA) has jurisdiction of the Polson Airport. The graphic below shows the location and layout of the Polson Airport. If improvement options are considered near the Polson Airport, appropriate coordination will be determined.


AIRPORT LOCATION
FLATHEAD LAKE
KALISPELL
US 93
AIRPORT
MT 35
BIG FORK
FLATHEAD
RIVER
S 354
POLSON
47° 40'
0
1
2
3
SCALE IN MILES
114° 10'
MISSOULA
AIRPORT LAYOUT
18
CAMPGROUND
FLATHEAD LAKE
US 93
FAIRGROUNDS
4200' X 75' ASPH.
36
SEAPLANE PARKING AREA
FLATHEAD RIVER

Resource agency coordination with the US Army Corps of Engineers (USACE), US Environmental Protection Agency (EPA), Montana Fish, Wildlife, and Parks (FWP), Montana Department of Environmental Quality (DEQ), Tribal Preservation Office, CSKT, Lake County, City of Polson, MDT, and FHWA was conducted on September 30, 2010. The proactive coordination with the resource agencies is essential to ensure agency guidelines and requirements are considered as improvement options develop. Regulatory areas that will be considered and further addressed include wildlife habitat, permitting, wetlands, and mapping considerations. Figure 2-1 shows the land ownership within the study area.

Figure 2-1 Land Ownership



2.3 Physical Characteristics

US 93 is a major north/south highway providing a vital regional link between Idaho and Canada, and is functionally classified as a Rural Principal Arterial on the NHS Non-Interstate System. This corridor also provides an important link between Missoula, Kalispell, and surrounding communities. At the south end of the corridor (RP 58.5), US 93 functions as a four-lane divided highway which transitions to a four-lane undivided highway with interspersed turning lanes. Just north of the junction of US 93 and MT 35, the four-lane segment of US 93 transitions to a two-lane roadway with interspersed turning lanes. The posted speed limit along the US 93 corridor varies from 25 mph to 70 mph. The graphic below shows the posted speed limits through the US 93 corridor.

Posted speed limits

The US 93 facility enters the corridor study area at the southeastern section at RP 56.5 and traverses northward on primarily level terrain comprised of farm and agricultural lands. Continuing northward, US 93 curves slightly eastward crossing the Pablo Feeder Canal and around a bluff before continuing to the northwest to the southern bank of the Flathead Lake, where it continues westward through the City of Polson. Once across the Flathead River, the facility curves to the northwest exiting the corridor study area boundary at RP 63.0.

Work was recently completed on US 93 from Minesinger Trail to MT 35. The following reconstruction activities were completed:

- Construction of a 4-lane roadway
- Construction of an overlook of Flathead Lake form the top of Polson Hill
- One wildlife crossing structure
- Two bike and pedestrian paths
    - US 93/MT 35 junction east to Turtle Lake Road
    - Top of Polson Hill to ½ mile north of Caffrey Road
- Installations of sidewalks along Haack Road and Anchor Way Frontage Road
- Installation of traffic signal at the junction of US 93 and MT 35
- Two southbound, left-turn lanes and one northbound, right-turn lane
- Turn bays at Walmart intersection, Frontage Road, and Ford/Caffrey Road intersection

2.4 Design Standards

Table 2.2 lists the design standards for rural and urban principal arterials according to MDT design criteria. The design speed for this corridor ranges from 45 mph to 70 mph. Although the segment of US 93 through the city of Polson is not classified as an urban principal arterial, MDT design standards will apply if improvement options are further developed from the study.

Table 2.2 Design Standards for US 93

Design Element			Design Criteria			
Design Controls	Functional Classificiation		Rural Principal Arterial		Urban Principal Arterial	
					2-Lane, Curbed	2-Lane, Uncurbed
	Design Forecast year		2030		2030	
	*Design Speed	Level	70 mph		40 - 45 mph	40 - 50 mph
		Rolling	60 mph			
	Level of Service		B		Desirable: B Minimum: C	
Roadway Elements	*Travel Lane Width		12'		12'	
	*Shoulder Width	Outside	Varies		Varies	
		Inside			N/A	
	Cross Slope	*Travel Lane	2%		2% Typical	2%
		Shoulder	2%		2% Typical	2%
	Median Width		Varies		N/A	
	TWLTL Width		N/A		16'	
Earth Cut Sections	Ditch	Inslope	6:1 (Width: 10')		N/A	Desirable: 6:1 Minimum: 4:1
		Width	10' Minimum		N/A	10' Minimum
		Slope	20:1 towards back slope		N/A	20:1 towards back slope
	Back Slope; Cut Depth at Slope Stake	0' - 5'	5:1		5:1	
		5' - 10'	4:1		Level/Rolling: 4:1 Mountainous: 3:1	
		10' - 15'	3:1		Level/Rolling: 3:1 Mountainous: 2:1	
		15' - 20'	2:1		Level/Rolling: 2:1 Mountainous: 1.5:1	
		> 20'	1.5:1		1.5:1	
Earth Fill Slope	Fill Height at Slope Stake	0' - 10'	6:1		6:1	6:1
		10' - 20'	4:1		4:1	4:1
		20' - 30'	3:1		3:1	3:1
		> 30'	2:1		2:1	2:1
Alignment Elements	DESIGN SPEED		60 mph	70 mph	40 mph	45 mph
	*Stopping Sight Distance		570'	730'	305'	360'
	Passing Sight Distance		2135'	2480'	N/A	N/A
	*Minimum Radius		1200'	1810'	533'	711'
	*Superelevation Rate		e_{max} = 8.0%		e_{max} = 4.0%	
	*Vertical Curvature (K-value)	Crest	151	247	44	61
		Sag	136	181	64	79
	*Maximum Grade	Level	3%		6%	6%
		Rolling	4%		7%	7%
	Minimum Vertical Clearance		17.0'		17.0'	

Source: Montana Department of Transportation Road Design Manual Chapter 12, Figure 12-3 "Geometric Design Criteria for Rural and Urban Principal Arterials"

*Controlling design criteria (see Section 8.8 of the MDT Road Design Manual)

2.5 Roadway Geometrics

The MDT Road Design Manual specifies general design principles and controls which determine the overall operational characteristics of the roadway and enhance the aesthetic appearance of the highway. The physical and geometric design elements of the US 93 facility were evaluated to identify areas that do not meet current MDT design standards as shown in Table 2.2. The analysis was necessary to identify areas with substandard geometric design that may contribute to safety concerns.

Available information including as-built construction drawings and the 2009 Montana Road Log were utilized to conduct this analysis. Table 2.3 summarizes the findings of the roadway geometrics of US 93 through the study area and is further discussed in the sections below.

Table 2.3 Summary of US 93 Roadway Geometrics

Design Characteristic	Summary
Horizontal Alignment	Meets current design standards for design speeds of 45 mph and 60 mph
Vertical Alignment	Grades of 5.5% to 5.9% exceed 4% maximum
	Sag k-values of 128.81 and 130.15 are less 136 minimum
Roadside Clear Zone	Improvement options should be designed to current design standards
Surface Width	Surface widths of 28' and 38' are less than 40' recommended width*

** A formal capacity analysis may indicate a four-lane or wider facility is needed to provide LOS B in the design year, indicating a potential surface width of 68' or more.*

2.5.1 Horizontal Alignment

The horizontal alignment of US 93 has a major influence on traffic operation and safety and is comprised of elements that include curvature, superelevation, and sight distance. These parameters are directly related to the design speed. The horizontal alignment along US 93 meets current MDT design standards for design speeds ranging from 45 mph to 70 mph. The graphic below shows the range of design speeds through the existing US 93 corridor.

Design speeds

2.5.2 Vertical Alignment

The vertical alignment is a measure of elevation change of a roadway. The length and steepness of grades directly affects the operational characteristics of the roadway. The MDT Road Design Manual lists recommendations for maximum grades on rural and urban principal arterials according to the type of terrain in the area. Table 2.4 shows the maximum grade recommendations according to terrain.

Table 2.4 Maximum Grade

Terrain	Maximum
Level - Rural	3%
Rolling - Rural	4%
Level - Urban	6%
Rolling - Urban	7%

The grade and terrain throughout the corridor study area varies from level to rolling and from rural to urban. The vertical alignment of US 93 does not meet current design standards at five locations. These include:

1. From RP 57.2 to 57.8, the northbound grade goes from 5.9% to 5.7%, respectively. The nearly 6% grade exceeds the maximum allowable grade of 4% for a 60 mph rural design speed in rolling terrain. **A design exception was approved for this grade in April 2004.**

2. From RP 57.2 to 57.7, the southbound grade is 5.5% which exceeds the maximum grade of 4% recommended for a 60 mph rural design speed in rolling terrain. **A design exception was approved for this grade in April 2004.**

3. At RP 57.7, the vertical sag curve k-value of 130.15 does not meet the minimum k-value of 136. **A design exception was approved for this grade in April 2004.**

4. At RP 62.5, the grade of 4.8% exceeds the maximum grade of 4% recommended for a 60 mph rural design speed in rolling terrain.

5. At RP 62.5, the vertical sag curve k-value of 128.81 does not meet the minimum k-value of 136.

2.5.3 Roadside Safety (Clear Zone)

The roadside clear zone, starting at the edge of the traveled way, is the total roadside border area available for safe use by errant vehicles. The area may consist of a shoulder, a recoverable slope, a non-recoverable slope, and/or a recovery area. The desired width varies depending on traffic volumes, speeds, and roadside geometry. Clear zones are evaluated individually and based on the roadside cross section. In an urban section, the clear zone is not reduced due to the presence of curb and gutter. The urban section through Polson has substantial development such as landscaping features, signs, mailboxes, signals, utilities, and luminaries, and it may be impractical to protect or remove the obstacles within the clear zone. Current MDT standards establish clear zone guidelines in rural and urban sections.

As improvement options develop, roadside clear zones should be designed, to the extent practicable, to meet current MDT urban and rural design standards.

2.6 Surface Width

The 2009 Montana Road Log prepared by MDT contains the most current highway statistics. According to MDT NHS Route Segment Plan Map, the recommended surface width of US 93 is 40 feet or greater. However, the Route Segment Plan no longer defines a standard roadway width. The MDT Road Width Committee would determine the appropriate width during future project development. Table 2.5 below shows the existing roadway surface width and surface thickness through the corridor study area. Due to the presence of turning lanes, which are not included in the Road Log, the total surface width may be greater than the sum of lane widths and shoulder widths.

Table 2.5 Existing Roadway Surface Width

Location Reference Post (RP)	Width (feet)			Thickness (inches)		Travel Lanes
	Surface	Lane	Shoulder	Surface	Base	
RP 56.500 - 57.362	71	12	8	8.9	12.0	4
RP 57.362 - 57.865	71	12	8	10.7	12.0	4
RP 57.865 - 57.917	71	12	8	8.9	12.0	4
RP 57.917 - 58.361	71	12	8	5.9	6.9	4
RP 58.361 - 58.504	71	12	8	8.9	12.0	4
RP 58.504 - 58.912	71	12	8	10.7	12.0	4
RP 58.912 - 59.174	55	12	3	9.1	16.7	4
RP 59.174 - 59.511	39	12	7	4.8	24.0	2
RP 59.511 - 60.114	40	12	8	4.8	24.0	2
RP 60.114 - 60.724	39	12	7	4.8	24.0	2
RP 60.724 - 60.839	59	12	8	5.8	24.0	2
RP 60.839 - 61.113	38	12	7	5.8	24.0	2
RP 61.113 - 63.000	28	12	2	6.0	26.0	2

Source: 2009 Montana Road Log (page 42)

The Route Segment Plan does not extend into urban areas, due to certain constraints. Therefore, the section from RP 60.839 to 63.000 does not meet the current recommended surface width of 40 feet or greater. Along with the range of surface widths, the US 93 corridor has varying traffic flows, which can be seen in the posted speed limit graphic on page 6.

2.7 Geotechnical

A detailed geotechnical investigation report will not be developed for this corridor study. The US 93 Minesinger Trail – MT 35 project covers RP 55.5 to approximately 58.7. As-built drawings show the study area has no substantial geotechnical issues.

The Polson-East Geotechnical report noted subgrade materials generally consisting of glacial moraine sand and gravel with intermittent zones of low-plasticity fine-grained material. Frost susceptibility is a major concern during intermittent periods of moisture infiltration and freezing temperatures; particularly in cut areas with concentrated runoff.

Neither the drilling logs for the US 93 Minesinger Trail-MT 35 project nor the drilling logs for the Polson-East project indicate that bedrock was encountered. The study area is located in a moderate seismic risk area. Seismicity will need to be considered for any bridge foundation design. Polson is located within the Intermountain Seismic Belt, which appears to be predominately classified as a zone 3 on the Uniform Building Code seismic risk scale of 0 (low risk) to 4(high risk). Seismic zones reflect the variation in seismic risk across the country and are used to permit different requirements for methods of analysis, minimum support lengths, column design details, and foundation and abutment design procedures.

2.8 Drainage

The corridor study area is located within the Lower Flathead sub basin. Flathead Lake is the major body of water, with the Flathead River providing as a tributary to the Clark Fork River. The drainage has several unnamed streams contribute to the Lower Flathead and Flathead Lake. Storm water drainage is in place for the city of Polson. Several irrigation ditches and canals exist within the corridor, and consideration will be given to drainage as a improvement options develop.

2.9 Hydraulic Structures

Table 2.6 shows the hydraulic structures throughout the corridor. A full hydraulic analysis would be recommended if an improvement option is implemented within the study area. Based on a lack of historical flooding occurrences, it is presumed irrigation ditches, culverts, and bridges are hydraulically adequately sized.

Table 2.6 Hydraulic Structures

Approximate Location Reference Post (RP)	Size	Length	Remarks	As-Built Project
RP 56.68	24"	190'	Drain	US 93 - Minesinger Trail to MT 35 (2005)
RP 56.88	18"	110'	Approach LT	
RP 56.88	18"	118'	Approach RT	
RP 57.1	22' x 5' Box	140'	Pablo Feeder Canal	
RP 57.28	18"	50'	Approach RT	
RP 57.76 - 57.82	36"	360'	Irrigation Right	
RP 56.48	18"	103'	Storm Drain	
RP 56.56	18"	87'	Storm Drain	
RP 56.72	18"	105'	Storm Drain	
RP 56.78	18"	103'	Storm Drain	
RP 56.90	18"	79'	Storm Drain	
RP 57.51	18"	87'	Storm Drain	
RP 57.51 - 57.60	18"	487'	Storm Drain	
RP 57.60	18"	89'	Storm Drain	
RP 57.60 - 57.70	24"	490'	Storm Drain	
RP 57.68 - 57.70	18"	121'	Storm Drain	
RP 57.70 - 57.74	24"	235'	Storm Drain	
RP 57.74	12"	7'	Storm Drain	
RP 57.74 - 57.74	24"	113'	Storm Drain	
RP 57.74 - 57.74	24"	39'	Storm Drain	
RP 57.79	12"	7'	Storm Drain	
RP 57.79 - 57.83	18"	228'	Storm Drain	
RP 57.81	18"	295'	Storm Drain	
RP 57.83	12"	7'	Storm Drain	
RP 57.83	18"	115'	Storm Drain	
RP 57.83 - 57.89	18"	292'	Storm Drain	
RP 57.89	12"	7'	Storm Drain	
RP 57.89 - 57.94	18"	292'	Storm Drain	
RP 57.94	12"	7'	Storm Drain	
RP 57.94 - 58.03	18"	446'	Storm Drain	

Table 2.6 Hydraulic Structures

Approximate Location Reference Post (RP)	Size	Length	Remarks	As-Built Project
RP 58.08 - 58.08	18"	118'	Storm Drain	Polson-East (2004)
RP 58.08 - 58.11	24"	157'	Storm Drain	
RP 58.11	30"	149'	Storm Drain	
RP 58.11 - 58.14	24"	138'	Storm Drain	
RP 58.14	24"	113'	Storm Drain	
RP 58.22 - 58.27	18"	351'	Storm Drain	
RP 58.27 - 58.33	18"	330'	Storm Drain	
RP 58.33 - 58.37	18"	208'	Storm Drain	
RP 58.37	18"	46'	Storm Drain	
RP 58.37 - 58.45	18"	428'	Storm Drain	
RP 58.39	18"	103'	Storm Drain	
RP 58.45 - 58.46	18"	49'	Storm Drain	
RP 58.57	18"	80'	Storm Drain	
RP 58.69	18"	64'	Storm Drain	
RP 58.71 - 58.72	24"	34'	Storm Drain	
RP 58.71 - 58.74	24"	166'	Storm Drain	
RP 58.72 - 58.74	24"	133'	Storm Drain	
RP 58.74	24"	69'	Storm Drain	
RP 58.74	30"	41'	Storm Drain	
RP 58.74 - 58.82	24"	379'	Storm Drain	
RP 58.82	12"	67'	Storm Drain	
RP 58.82	18"	28'	Storm Drain	
RP 58.82 - 58.87	24"	302'	Storm Drain	
RP 58.87	12"	67'	Storm Drain	
RP 58.87	24"	94'	Storm Drain	
RP 58.87 - 58.94	24"	351'	Storm Drain	
RP 58.94	12"	107'	Storm Drain	
RP 58.94	18"	31'	Storm Drain	
RP 58.94 - 58.98	24"	185'	Storm Drain	
RP 58.97 - 58.98	24"	97'	Storm Drain	
RP 58.98	24"	33'	Storm Drain	
RP 58.98 - 59.02	30"	223'	Storm Drain	
RP 59.02	30"	92'	Storm Drain	
RP 59.02 - 59.04	24"	107'	Storm Drain	
RP 59.10	18"	105'	Storm Drain	
RP 59.10 - 59.14	18"	172'	Storm Drain	
RP 59.18	18"	72'	Storm Drain	
RP 59.18 - 59.22	18"	220'	Storm Drain	
RP 59.22	12"	71'	Storm Drain	

Table 2.6 Hydraulic Structures

Approximate Location Reference Post (RP)	Size	Length	Remarks	As-Built Project
RP 59.11	24"	76'	Drain	Pablo-Kalispell (1958 & 1966)
RP 59.26	18"	108'	Irrigation	
RP 59.28	15"	28'	Irrigation Approach RT	
RP 59.33	15"	60'	Approach RT	
RP 59.38	24"	80'	Drain	
RP 59.40	3-36"	110', 676', 430'	Irrigation	
RP 59.57	15"	30'	Irrigation	
RP 59.66	24"	76'	Drain	
RP 59.67	18"	130'	Drain	
RP 59.73 - 60.06	15"	1,750'	Drain	
RP 59.84	18"	40'	Approach LT	
RP 59.90	18"	40'	Approach LT	
RP 59.97	30"	94'	Drain	
RP 59.99	18"	40'	Approach LT	
RP 60.05	18"	50'	Approach LT	
RP 60.09	15"	40'	Irrigation Approach LT	
RP 60.10	18"	56'	Irrigation	
RP 60.11	24"	96'	Irrigation	
RP 60.20 - 60.23	15"	178'	Drain	
RP 60.23	18"	40'	Approach LT	
RP 60.23 - 60.24	15"	42'	Drain	
RP 60.24	24"	86'	Drain	
RP 60.26	24"	86'	Drain	
RP 60.47	24"	88'	Drain	
RP 60.50	24"	86'	Drain	
RP 60.52	24"	72'	Drain	
RP 60.61	12"	100'	Drain	
RP 60.62	24"	70'	Drain	
RP 61.07	15"	18'	Drain thru Embankment RT	
RP 61.50	18"	50'	Approach LT	
RP 61.53	24"	56'	Approach RT	

Table 2.6 Hydraulic Structures

Approximate Location Reference Post (RP)	Size	Length	Remarks	As-Built Project
RP 61.39	18"	40'	Approach LT	Polson-North (1955)
RP 61.39	15"	26'	Approach RT	
RP 61.43	15"	110'	Approach RT	
RP 61.50	24"	76'	Drain	
RP 61.60	24"	126'	Drain	
RP 61.81	15"	32'	Farm Entrance RT	
RP 61.82	15"	40'	Farm Entrance RT	
RP 61.83	24"	58'	Drain	
RP 61.89	15"	34'	Approach RT	
RP 62.13	15"	38'	Approach RT	
RP 62.15		74'	Stockpass	
RP 62.35	15"	40'	Farm Entrance LT	
RP 62.36	12"	84'	Irrigation	
RP 62.58	15"	64'	Farm Entrance LT & RT	
RP 62.74	15"	30'	Farm Entrance RT	
RP 62.78	36"	68'	Drain	
RP 62.88	15"	36'	Approach LT	

2.10 Bridge Crossings

Four bridge crossings are located along the corridor. They include the Flathead River Bridge, the Pablo Feeder Canal Bridge, and two Wildlife Underpass Bridges. The Pablo Feeder Canal Bridge and two Wildlife Underpass Bridges were assessed in 2009, and the Flathead River Bridge was assessed in 2010. The assessments determined the Sufficiency Rating (SR) for each structure.

The Sufficiency Rating formula is a method of evaluating highway bridge data to obtain a numeric value indicating the sufficiency of the bridge to remain in service. The result of this method is the percentage in which 100 is an entirely sufficient bridge and 0 is an entirely deficient bridge. In order to receive funding through the Highway Bridge Replacement and Rehabilitation Program (HBRRP), structures must be *Structurally Deficient* or *Functionally Obsolete* and have an SR of 80% or below. Structures with an SR of 0 to 49.9% are eligible for replacement, and structures 50 to 80 are eligible for rehabilitation unless otherwise approved by the FHWA. The following criteria determine whether or not a structure is structurally deficient or functionally obsolete:

1. Structurally Deficient. A condition of **4 or less** for any of the following:

   Deck Rating

   Superstructure Rating

   Substructure Rating

   Or, an appraisal of 2 or less for the following:

Structure Rating

Waterway Adequacy

2. Functionally Obsolete. An appraisal of **3 or less** for the following:

Deck Geometry

Under Clearance

Approach Roadway Alignment

Or, an appraisal of 3 for the following:

Structure Rating

Waterway Adequacy

All four structures are not structurally deficient and not functionally obsolete at the present time. Table 2.7 shows the sufficiency ratings of the four bridge crossings.

Table 2.7 Bridge Sufficiency Rating (SR)

Structurally Deficiency SR Criteria		Flathead River	Pablo Feeder Canal	Wildlife Underpass	Wildlife Underpass
Deck Rating	≤4	7	-	-	-
Superstructure Rating	≤4	7	-	-	-
Substructure Rating	≤4	7	-	-	-
Structure Rating	≤2	7	8	7	7
Waterway Adequacy	≤2	8	9	-	-
Functionally Obsolete SR Criteria					
Structure Rating	≠3	7	8	7	7
Deck Geometry	≤3	4	9	5	5
Under Clearance	≤3	-	-	-	-
Waterway Adequacy	≠3	8	9	-	-
Approach Roadway Alignment	≤3	8	8	8	8
Design Loading		5 MS 18 (HS 20)	5 MS 18 (HS 20)	5 MS 18 (HS 20)	5 MS 18 (HS 20)
Sufficiency Rating		66.9	84.9	83.2	83.2
Structure Status		Not Deficient	Not Deficient	Not Deficient	Not Deficient

2.10.1 Flathead River Bridge

The Flathead River Bridge is a two lane structure located at RP 61.2. Constructed in 1966 on a horizontal tangent, the bridge is 1,562 feet long and 30 feet wide with a concrete cast-in-place deck and 25 spans.

Based on the above ratings, the Flathead River Bridge is categorized as ***not structurally deficient*** and ***not functionally obsolete***. In 2009, the Flathead River Bridge underwent a bridge deck rehabilitation project.

2.10.2 Pablo Feeder Canal Bridge

The Pablo Feeder Canal Bridge is a concrete box culvert located at RP 57.1. Constructed in 2006 on a horizontal tangent, the culvert spans the four-lane divided roadway of US 93 in addition to the two-lane frontage roads on both the east and west sides of US 93 for a total of 8 lanes of traffic. This culvert is 140 feet long and is 22 feet wide situated at a 33-degree skew. To address the moderate potential of strong ground motion in Seismic 3 areas, the appropriate National Earthquake Hazards Reduction Program seismic design parameters were included for a soil profile Type II.

Based on the above ratings, the Pablo Feeder Canal Bridge is categorized as ***not structurally deficient*** and ***not functionally obsolete***.

2.10.3 Wildlife Underpass Bridge

The Wildlife Underpass Bridge (Structure No. P00005057+07611) is a two lane structure located at RP 57.8. Constructed in 2006 on a horizontal curve, the steel culvert bridge is 25 feet long and 36 feet wide. The Wildlife Underpass Bridge is ***not structurally deficient*** and ***not functionally obsolete***.

2.11 Crash Analysis

Safety issues are a concern along US 93 through the study area. In 2010, the MDT Traffic and Safety Bureau conducted a crash analysis along US 93 from RP 55.0 to RP 65.0 through the Polson area. Due to the recent reconstruction of the segment south of Polson, the latest three-year crash data was provided from July 1, 2007 to June 30, 2010. The segments of US south of MT 35 and north of Irvine Flats Road exhibit more rural than the urban section through town; therefore the study area was divided into three segments. The analysis compared the study area with the average crash rates on Non-Interstate National Highway System (NINHS) routes statewide. The results are shown in Table 2.8.

Table 2.8 US 93 Crash Statistics (RP 55.0 - 65.0)
(from July 1, 2000 - June 30, 2010)

Statewide Average	Study Area			NINHS Rural Routes[1]	NINHS Urban Routes[2]
	South of MT 35	MT 35 to Irvine Flats Road	North of Irvine Flats Road		
All Vehicles Crash Rate	1.58	2.33	1.32	1.07	5.06
All Vehicles Severity Index	1.95	1.57	1.86	2.14	1.67
All Vehicles Severity Rate	3.08	3.66	2.46	2.29	8.48
Commercial Vehicles Crash Rate	2.63	4.44	1.05	0.90	
Commercial Vehicles Severity Index	1.88	1.22	1.00	2.34	
Commercial Vehicles Severity Rate	4.94	5.42	1.05	2.11	
Commercial Vehicle Crashes	8	18	4		
All Vehicle Crashes	73	256	79		

**Segment reconstructed, completed in 2006. Data from 3-Year Time Period July 1, 2007 - June 30, 2010*

Denotes segment of "urban" character of US 93.

1. NINHS Route averages outside the city limits from 2005 through 2009.

2. NINHS Route averages within city limits from 2004 through 2008.

Source: MDT Traffic and Safety Bureau, 2010.

The crash rate within the US 93 Polson Corridor is higher than the average comparable rural routes throughout the state of Montana. The "urban" section from MT 35 to Irvine Flats Road is higher than the NINHS rural routes, but less than the NINHS urban routes. Currently, the section from MT 35 to Irvine Flats Road is not functionally classified as an urban section. It is possible the 2010 Census may determine an urban classification for Polson. In the case of a rural to urban reclassification, the crash rate for the urban section would be less than the statewide average.

Table 2.9 shows the total number of crashes, with a breakdown of crashes by severity, for every quarter mile through the existing corridor study area boundary.

Table 2.9 Crash Data per Quarter-Mile

Reference Post Location	# Crashes	No Injury	Injury	Fatal Injury
56.50 - 56.74	31	13	16	2
56.75 - 56.99	12	10	2	
57.00 - 57.24	11	7	4	
57.25 - 57.49	7	6	1	
57.50 - 57.74	14	10	4	
57.75 - 57.99	9	6	3	
58.00 - 58.24	11	9	2	
58.25 - 58.49	5	5		
58.50 - 58.74	14	11	3	
58.75 - 58.99	20	12	8	
59.00 - 59.24	81	56	25	
59.25 - 59.49	16	11	5	

59.50 - 59.74	14	10	4	
59.75 - 59.99	11	9	2	
60.00 - 60.24	31	24	7	
60.25 - 60.49	32	26	6	
60.50 - 60.74	27	18	9	
60.75 - 60.99	95	77	18	
61.00 - 61.24	11	10	1	
61.25 - 61.49	3	1	2	
61.50 - 61.74	7	6	1	
61.75 - 61.99	8	5	3	
62.00 - 62.24	17	12	5	
62.25 - 62.49	10	7	3	
62.50 - 62.74	6	4	2	
62.75 - 62.99	2	1	1	
Corridor Total	505	366	137	2

2.12 Railroad

Montana Rail Link (MRL), which ends just within the southern boundary of the corridor study area, is a factor in developing improvement options. Guidelines have been established defining construction requirements and development standards near railroad facilities. MRL also has land ownership interspersed throughout the study area, primarily along 7th Avenue. If any improvement options are identified along 7th Avenue this will need to be addressed. As improvement options develop, consideration will be made to comply with specified railroad requirements.

2.13 Utilities

Several utilities exist throughout the corridor, primarily along US 93 corridor. Utilities include power (overhead and underground), telephone, water, sewer, gas, and fiber optics. As improvement options develop, it will be important to recognize the impact options may or may not have on the utilities within the corridor. Utility adjustments and/or relocations may delay projects if they are not identified in the project development process. Consideration will be given to utilities as improvement options develop.

2.14 Access Points

There are 115 access points along US 93 (58 north/east and 73 south/west) from RP 56.5 (Caffrey/Ford Road) to RP 63.0. Access control is implemented along existing US 93 from the study area boundary north to MT 35. All approaches and access points will be considered as the study develops. Table 2.10 contains a listing of approaches by approximate half-mile increments.

Table 2.10 Access Points along US 93

Reference Post (RP)	North/East of US 93		South/West of US 93		Total	
	No. Accesses	Density (access/mi)	No. Accesses	Density (access/mi)	No. Accesses	Density (access/mi)
56.5 to 57.0	2	4	2	4	4	8
57.0 to 57.5	1	2	0	0	1	2
57.5 to 58.0	0	0	1	2	1	2
58.0 to 58.5	1	2	1	2	2	4
58.5 to 59.0	1	2	1	2	2	4
59.0 to 59.5	8	16	4	8	12	24
59.5 to 60.0	16	32	11	22	27	54
60.0 to 60.5	8	16	20	40	28	56
60.5 to 61.0	13	26	23	46	36	72
61.0 to 61.5	2	4	3	6	5	10
61.5 to 62.0	3	6	4	8	7	14
62.0 to 62.5	2	4	1	2	3	6
62.5 to 63.0	1	2	2	4	3	6

Over the 3 mile section, the average density is 20 accesses per mile.

US 93 Polson Corridor Study

Needs and Objectives

Prepared For:

City of Polson

Lake County

Confederated Salish & Kootenai Tribes

Montana Department of Transportation

Prepared By:

Camp Dresser & McKee Inc.

Helena, Montana

March 22, 2011

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Chapter 4 Needs and Objectives

US 93 is a major north/south highway providing a vital regional link between Idaho and Canada, and is functionally classified as a Rural Principal Arterial on the NHS Non-Interstate System. This corridor also provides an important link between Missoula, Kalispell, and surrounding communities. In the corridor study area, US 93 sees a diverse mix of traffic - including trucks, recreational vehicles, passenger vehicles and non-motorized uses. During the peak summer tourism season traffic volumes elevate in numbers causing congestion and poor levels of service on the roadway and adjacent intersections. The needs and objectives listed below addresses both MDT's concerns to enhance traffic flow and the local government's desire to enhance livability and connectivity within their community.

Note the needs or objectives followed by an asterisk implies a variation on the needs or objectives contained in the 1995 FEIS fully referenced in Section 4.2 References at the end of this chapter.

4.1 Needs and Objectives:

4.1.1 Need Number 1: System Linkage and Function

Preserve functionality of US 93 as a principal arterial.

Objectives

- Maintain connections of Polson with other Montana communities.
- Maintain connections to other major highways in the corridor.

4.1.2 Need Number 2: Transportation Demand and Operations

Accommodate existing and future transportation demand on US 93 through the planning horizon of the year 2030.

Objectives

- Maintain a level of service (LOS) B or better for roadway segments along US 93 (rural principal arterial), to the extent practicable. *
- Maintain a level of service (LOS) C or better for roadway segments along US 93 (urban principal arterial), to the extent practicable. *
- Acknowledge the increase in non-motorized transportation uses and provide for appropriate infrastructure, to the extent practicable.

4.1.3 Need Number 3: Roadway Geometrics

Provide a facility that accommodates the diversity of vehicle types.

Objectives

- Provide appropriate lane configuration(s) to accommodate the vehicle demand expected under existing and future conditions, to the extent practicable.
- Provide for unique turning movements and grade requirements for specialized vehicles such as semi-trucks and recreational vehicles, to the extent practicable.
- Improve the road and bridge surfacing widths to meet current MDT design criteria, to the extent practicable.
- Provide modifications to the roadway horizontal alignment and vertical alignment to meet current MDT design criteria, to the extent practicable.

4.1.4 Need Number 4: Safety

Improve the safety of US 93. *

Objectives

- Provide adequate clear zones along US 93 by identifying and removing obstacles, upgrading shoulder widths, and providing urban roadway features in accordance with MDT design criteria, to the extent practicable.
- Manage public access points and private approaches by providing appropriate features commensurate with the types and volumes of traffic encountered at each approach, and/or by consolidating or closing approaches, to the extent practicable.

4.1.5 Need Number 5: Livability and Connectivity

Reduce conflicts by enhancing connectivity and minimizing impacts within the US 93 corridor.

Objectives

- Minimize impacts to existing neighborhoods. *
- Minimize impacts to environmental, sensitive and recreational resources, including trails. *
- Be responsive to land use plans and future transportation needs. *

4.1.6 Need Number 6: Truck Traffic

Minimize the impacts of US 93 thru truck traffic.

Objectives

- Provide appropriate signage to direct thru truck traffic.
- Minimize the number of vertical grade changes for thru truck traffic.
- Provide acceptable travel times with minimal delay for thru truck traffic.

4.1.7 Other

The following are potential objectives that do not correlate to any of the five needs described above.

- Be responsive to long-term maintenance requirements. *
- Limit construction disruption as much as possible. *
- Community preference.

4.2 References

Carter Burgess/WGM Group Inc., *F 5-1(9)6, U.S. Highway 93 Evaro – Polson Final Environmental Impact Statement and Section 4(f) Evaluation*, June, 1996

Carter Burgess/WGM Group Inc., *US Highway 93 – Polson, Traffic Operations and Environmental Study*, March, 1995

Northwest Environmental Training Center, *Writing the Perfect EA/FONSI or EIS Training Course Publication*, September 3-4, 2008

US 93 Polson Corridor Study

Alignment Identification

Prepared For:

City of Polson

Lake County

Confederated Salish & Kootenai Tribes

Montana Department of Transportation

Prepared By:

Camp Dresser & McKee Inc.

Helena, Montana

US-93 Polson Corridor Study

May 17, 2011

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Alignment Identification

1.1 Introduction

This Technical Memorandum presents the process used to develop potential alternate alignments to US Highway 93 for potential forwarding into the screening analysis. The identification of potential alternate alignments was based on analysis results of the Quantm Alignment Planning System (i.e. Quantm) route optimization software, as well as the assessment of potential alignments contained in the 1995 US 93-Evaro to Polson Environmental Impact Statement (EIS). General corridors were identified based on input from local government, the community, and resource agencies (e.g., U.S. Army Corps of Engineers, Montana Fish Wildlife and Parks, etc.). The general corridors identified within this Technical Memorandum will be included in the Corridor Study Report document, and were forwarded to the first level screening process.

The identification of alternate alignments is necessary to determine what alignments are most relevant to carry forward into the screening process and determine whether a single, feasible alternate alignment is possible. Since an EIS was previously prepared for US Highway 93 in the Polson area with no conclusion on this section of US 93, it was necessary to evaluate the EIS alignments in this identification process. Additionally, because the Quantm route optimization software was available to the study team, it was decided that any new routes generated by Quantm should also be explored.

1.2 Design Criteria

In order to generate new alignments, minimum geometric design criteria for the roadway must be known. Since the corridor study area incorporates both urban and rural land, MDT's Road Design Manual criteria for rural principal arterials and urban principal arterials were utilized. Table 1 lists the minimum geometric design criteria used for alignment identification. Note that within the study area, portions of the roadway (whether existing or proposed) falling within the Polson city limits were categorized as "urban", while portions outside of the Polson city limits were categorized as "rural".

Table 1 Rural Principal and Urban Principal Arterial Design Criteria

Design Element			Design Criteria			
Design Controls	Functional Classification		Rural Principal Arterial		Urban Principal Arterial	
					2-Lane, Curbed	2-Lane, Uncurbed
	Design Forecast year		2030		2030	
	*Design Speed	Level	70 mph		40 - 45 mph	40 - 50 mph
		Rolling	60 mph			
	Level of Service		B		Desirable: B Minimum: C	
Roadway Elements	*Travel Lane Width		12'		12'	
	*Shoulder Width	Outside	Varies		Varies	
		Inside			N/A	
	Cross Slope	*Travel Lane	2%		2% Typical	2%
		Shoulder	2%		2% Typical	2%
	Median Width		Varies		N/A	
	TWLTL Width		N/A		16'	
Earth Cut Sections	Ditch	Inslope	6:1 (Width: 10')		N/A	Desirable: 6:1 Minimum: 4:1
		Width	10' Minimum		N/A	10' Minimum
		Slope	20:1 towards back slope		N/A	20:1 towards back slope
	Back Slope; Cut Depth at Slope Stake	0' - 5'	5:1		5:1	
		5' - 10'	4:1		Level/Rolling: 4:1	Mountainous: 3:1
		10' - 15'	3:1		Level/Rolling: 3:1	Mountainous: 2:1
		15' - 20'	2:1		Level/Rolling: 2:1	Mountainous: 1.5:1
		> 20'	1.5:1		1.5:1	
Earth Fill Slopes	Fill Height at Slope Stake	0' - 10'	6:1		6:1	6:1
		10' - 20'	4:1		4:1	4:1
		20' - 30'	3:1		3:1	3:1
		> 30'	2:1		2:1	2:1
Alignment Elements	DESIGN SPEED		60 mph	70 mph	40 mph	45 mph
	*Stopping Sight Distance		570'	730'	305'	360'
	Passing Sight Distance		2135'	2480'	N/A	N/A
	*Minimum Radius		1200'	1810'	533'	711'
	*Superelevation Rate		e_{max} = 8.0%		e_{max} = 4.0%	
	*Vertical Curvature (K-value)	Crest	151	247	44	61
		Sag	136	181	64	79
	*Maximum Grade	Level	3%		6%	6%
		Rolling	4%		7%	7%
	Minimum Vertical Clearance		17.0'		17.0'	

Source: Montana Department of Transportation Road Design Manual Chapter 12, Figure 12-3 "Geometric Design Criteria for Rural and Urban Principal Arterials"

*Controlling design criteria (see Section 8.8 of the MDT Road Design Manual)

In some cases, minimum design criteria cannot be achieved. In these circumstances, design exceptions need to be sought and accepted by MDT's roadway design staff. For alignment identification purposes, the need for design exceptions is not explicitly addressed in this Technical Memorandum. Of particular note is that the existing US Highway 93 does have vertical roadway grade design exceptions on Polson Hill, as the vertical grades in both directions are over the MDT design criteria of 4 percent for a rural principal arterial. It is noted that the potential for design criteria exceptions, related to vertical roadway grades, may need to be explored in the first level screening process.

1.3 Data Gathering

The primary objective in gathering data was to identify potential constraints within the study area that could inhibit the development of an alignment. If information was not available within MDT's internal repositories, other GIS data repositories such as Natural Resource Information System (NRIS) were searched. Additional information was gathered from public sources, interviews with local governments, and staff input. Specific tribal sensitive area data was provided by the Confederated Salish and Kootenai Tribes. Information contained within the Environmental Scan for the study area was also included.

In order to determine the preliminary alignments for the project, the Technical Oversight Committee (TOC) reviewed the identified constraints and prioritized the information. The TOC determined which features should be avoided, which data should be considered sensitive, which should be considered an additional cost to the project, and which should be shown on the mapping for reference only. The TOC's conclusions are listed in Table 2.

Table 2 Feature Identification and Prioritization

Linear Features		Roads, railroad, irrigation canals, streams, drainages
Special Zones	**Avoid Areas**	4(f) / 6(f) resources (schools, parks, etc.), cemeteries, public water supply, abandoned mines, landfills, sewage lagoons
	Sensitive Areas	Wildlife habitat & crossings, Fairgrounds, native grasslands, specific lands of tribal importance
	Additional Costs	Hazardous areas (underground storage tanks), wetlands
Additional Data		Study area boundary, Polson city limits, topography, land ownership, vegetation

The identification of "avoid" areas and "sensitive" areas was important in the process because Quantm recognizes the importance of certain features based on these two definitions and attempts to route alignments that stay clear of these areas whenever possible. Accordingly, very few of the Quantm generated alignments were found to traverse through an "avoid" area. This recognizes the importance of certain features within the community, and results in efforts to stay clear of these areas with a potential alternate alignment.

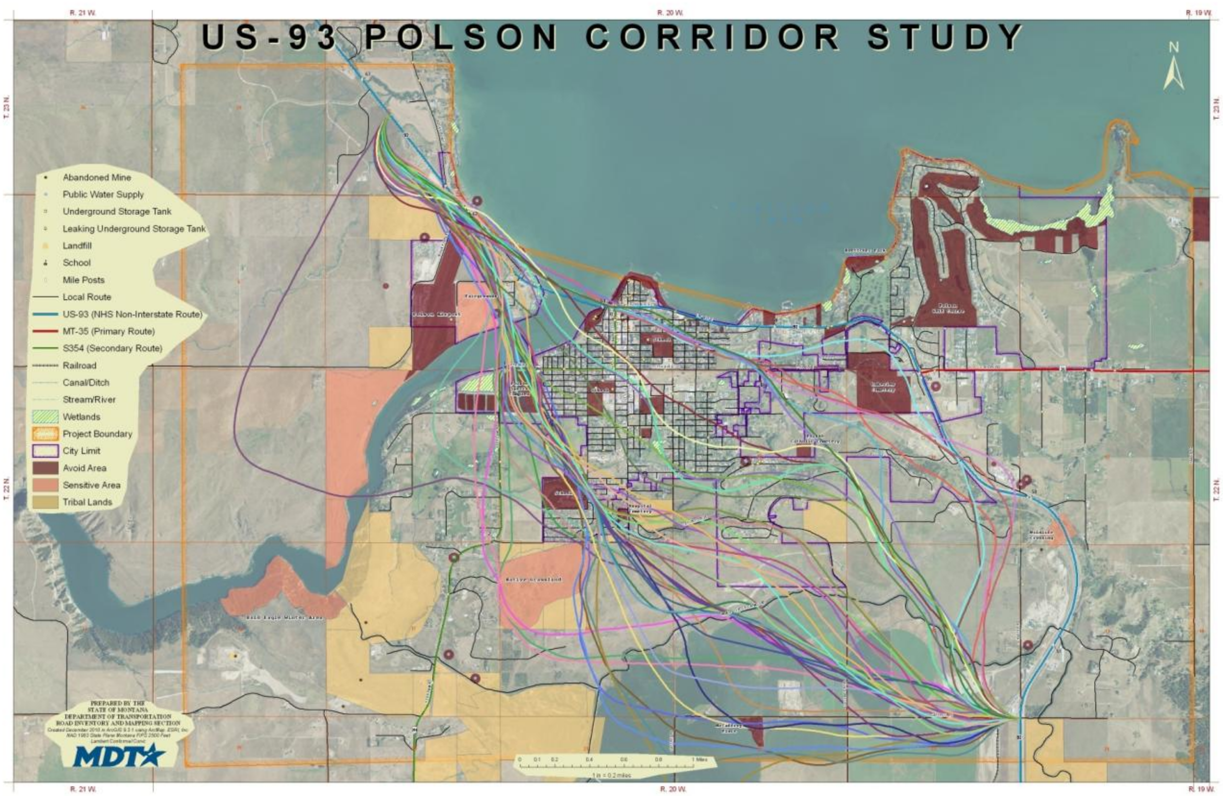
1.4 Quantm Background

The Trimble Quantm Alignment Planning System (i.e. Quantm) is a planning tool that uses route optimization software to generate multiple cost-based alignments that balance social, environmental, and terrain constraints and scenarios. This unique software generated hundreds of potential alignments for review by local stakeholders. As the study progressed, different scenarios were created and revised alignments were produced for further consideration and refinement. This approach to alignment identification allowed for multiple iterations to fulfill local stakeholders' needs (Trimble 2009).

To begin the Quantm process, all data including linear features, special zones, geometric standards, structure sizes, and Digital Terrain Model (DTM) was synthesized into a GIS format. Once start and end points were determined, the Quantm system generated multiple potential alignments as presented in the discussion herein.

Figure 1 is reflective of a totally "unconstrained" model run in that Quantm alignments generated primarily cut through the existing city proper, without sensitivity to established routes and/or land uses. The purpose of this first model run was to identify what Quantm would generate in an unconstrained condition. The type of information shown in Figure 1 is commonly referred to as a "spaghetti" map, in that it portrays a series of fine lines representing potential alignments within the study area.

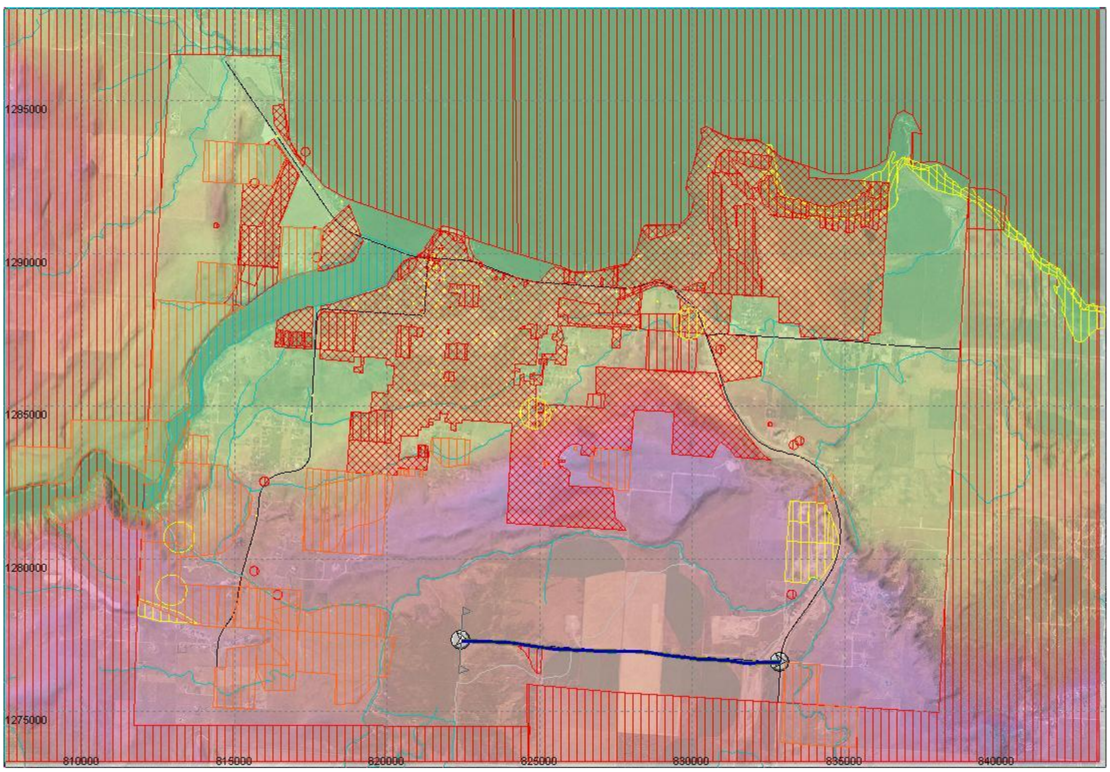
Figure 1 First Run of Potential Alignments



1.5 Quantm Alignment Trends

A starting point was determined to be the intersection of Caffrey Road and US 93. The end point was determined to be near RP 63, approximately 0.75 miles northwest of the intersection of Irvine Flats Road with US Highway 93. All of the Quantm alignments use the existing two-mile segment of Caffrey Road from the westerly termini of Caffrey Road back to the US 93/Caffrey Road intersection. Figure 2 shows a screen shot of the Quantm alignment for the Caffrey Road segment. The estimated range of costs for the Caffrey Road segment is $4.3 to $5.1 million dollars. These costs are generated by the Quantm route optimization tool and are reflective of construction costs (i.e. do not include detailed right-of-way cost, project development costs, utility relocation costs, inflation, etc.) This planning level cost does not include preliminary engineering, construction engineering, and/or IDC costs. Note that this is the case for all planning level costs presented in this Technical Memorandum.

Figure 2 Quantm Screen Shot (Caffrey Road)



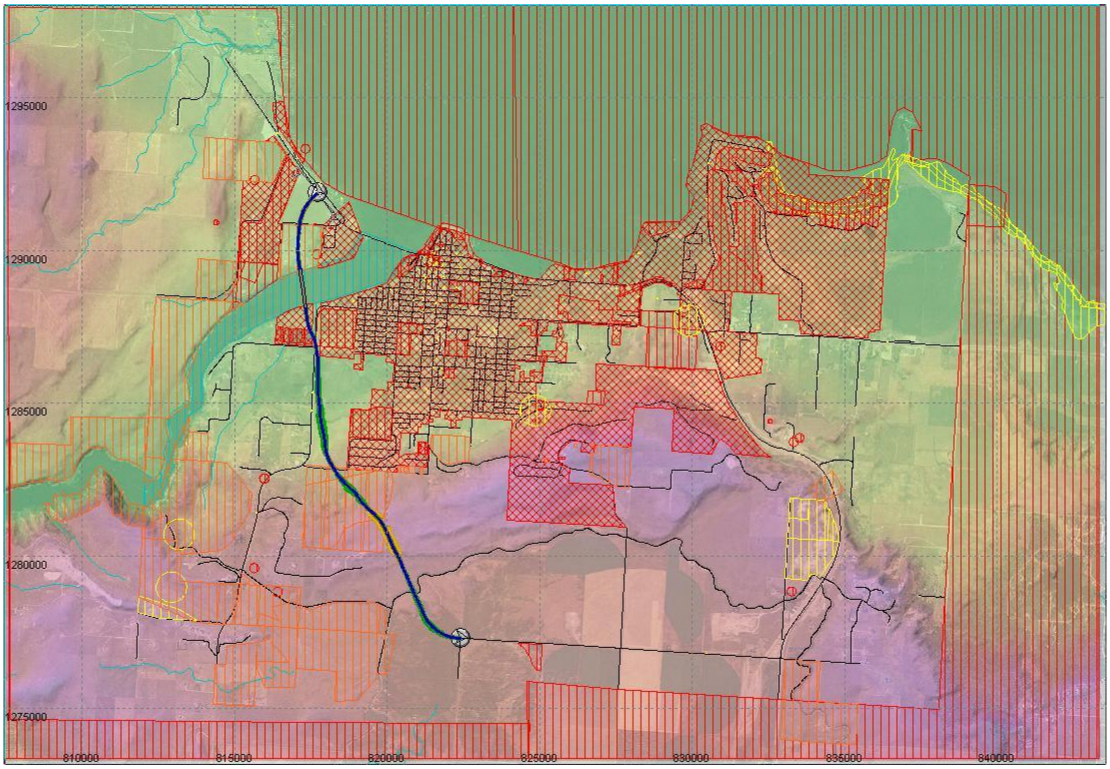
The five alignment trends produced by Quantm are described below, and are shown graphically on Figure 10.

<u>Northern Bridge – 1</u>

This alignment follows Caffrey Road to the westerly termini as described above, traverses in a northwest direction, clips the tribal native grassland sensitive area, follows Kerr Dam Road to the north, and cuts through the Fairgrounds property. It then intersects US 93 between the airport and the west end of the

Flathead River Bridge. Figure 3 shows a screen shot of the Quantm alignment for the Northern Bridge – 1 route. The bridge length crossing the Flathead River as computed by Quantm is 1,350 feet. The total length of this alignment, including the Caffrey Road segment, is 5.14 miles. The estimated range of costs for this alignment, which includes the Caffrey Road segment, is $31.0 to $37.0 million dollars.

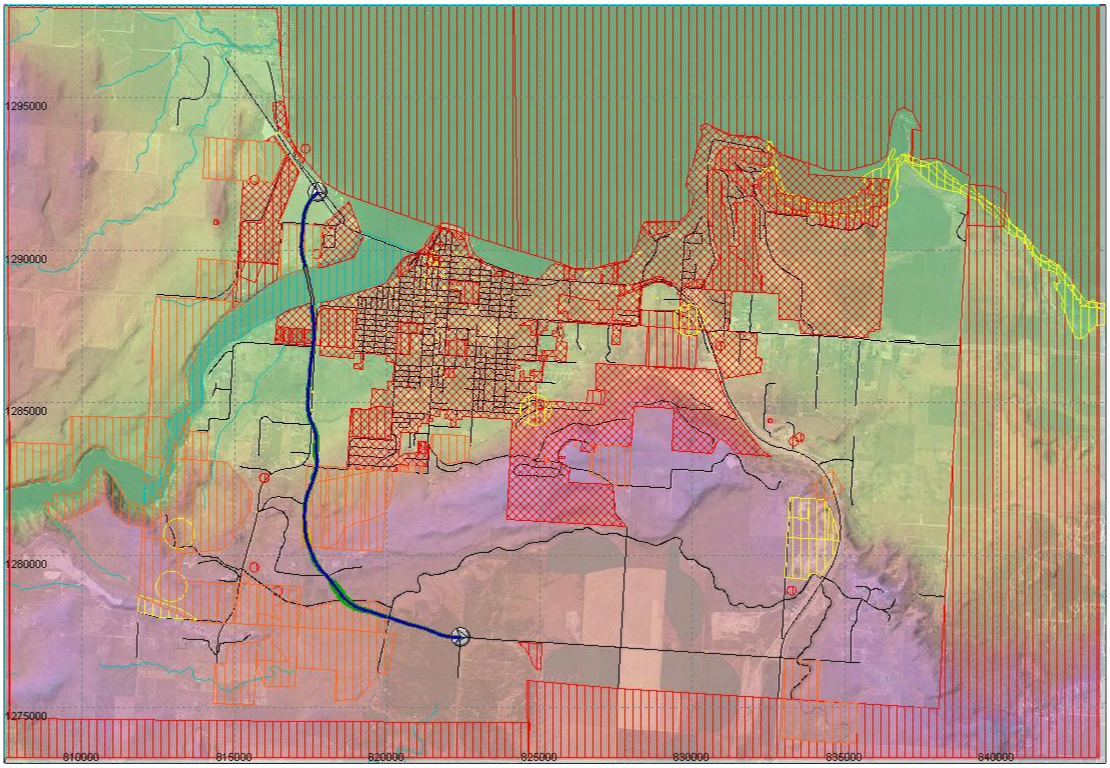
Figure 3 Quantm Screen Shot (Northern Bridge – 1)



Northern Bridge – 2

This alternative follows Caffrey Road, similar to Northern Bridge – 1 described above, and then traverses in a northwest direction. The alignment skirts around the southwest corner of the tribal native grassland sensitive area. As with Northern Bridge – 1, this alignment follows Kerr Dam Road, bisecting the Fairgrounds property prior to intersecting with US 93 between the airport and the west end of the Flathead River Bridge. Figure 4 shows a screen shot of the Quantm alignment for the Northern Bridge – 2 route. The bridge length crossing the Flathead River as computed by Quantm is 1,450 feet. The total length of this alignment, including the Caffrey Road segment, is 5.43 miles. The estimated range of costs for this alignment, which includes the Caffrey Road segment, is $33.0 to $39.1 million dollars.

Figure 4 Quantm Screen Shot (Northern Bridge – 2)

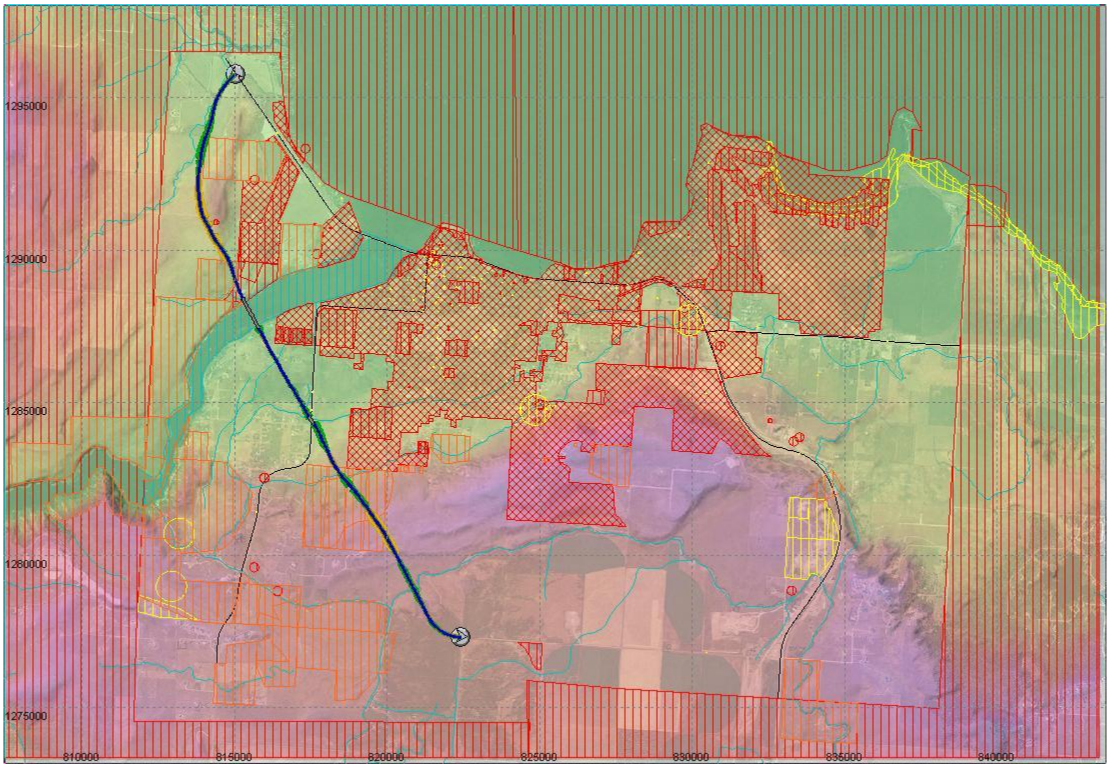


Central Bridge

The Central Bridge alignment follows Caffrey Road, skirts around the tribal native grassland sensitive area, travels north/northwest and crosses the Flathead River at the southern edge of the airport property. Then, the alignment skirts the western edge of a tribal land parcel (southwest of the existing US 93) and connects with US 93 north of the airport and south of Stone Horse Drive.

Figure 5 shows a screen shot of the Quantm alignment for the Central Bridge route. The bridge length crossing the Flathead River as computed by Quantm is 1,100 feet. The total length of this alignment, including the Caffrey Road segment, is 6.06 miles. The estimated range of costs for this alignment, which includes the Caffrey Road segment, is $36.0 to $43.5 million dollars.

Figure 5 Quantm Screen Shot (Central Bridge)

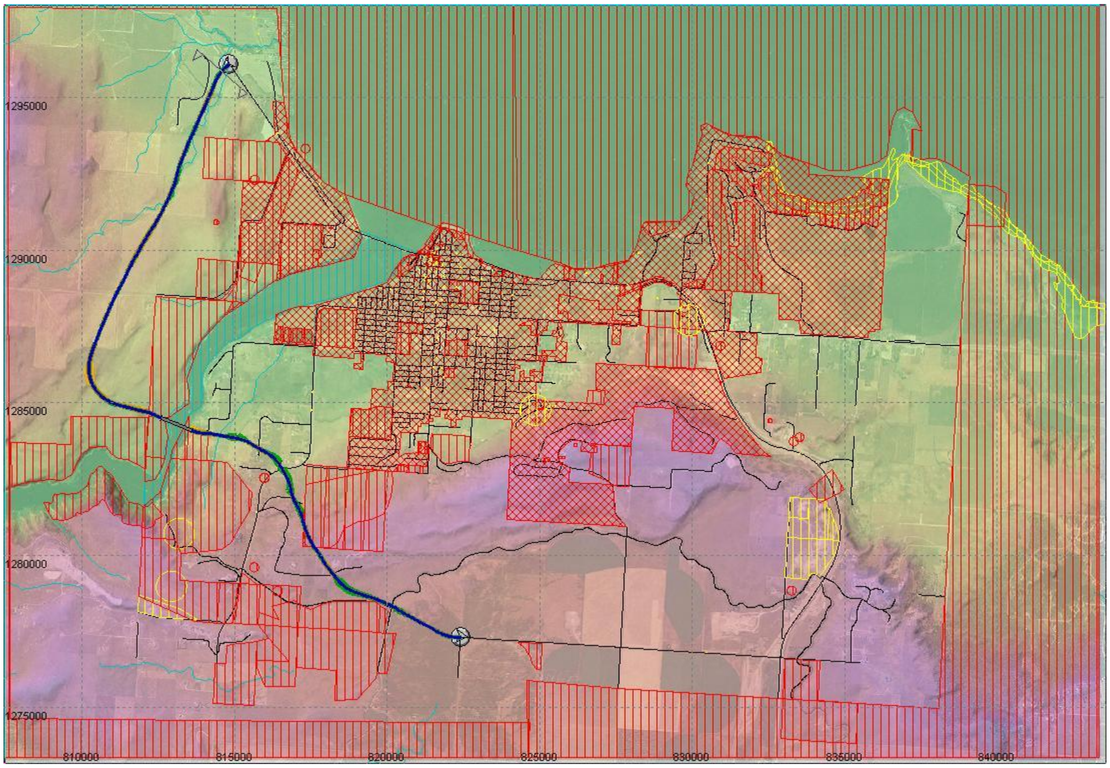


<u>Southern Bridge – 1</u>

The South Bridge – 1 alignment follows Caffrey Road, clips the tribal native grassland sensitive area, and travels just north of the Bald Eagle winter area where it crosses the Flathead River. This alternative connects with US 93 near RP 63.

Figure 6 shows a screen shot of the Quantm alignment for the Southern Bridge – 1 route. The bridge length crossing the Flathead River as computed by Quantm is 1,150 feet. This bridge crossing is almost 100 feet above the river surface (at its highest point). The total length of this alignment, including the Caffrey Road segment, is 7.16 miles. This results in the longest alignment of the five generated by Quantm. The estimated range of costs for this alignment, which includes the Caffrey Road segment, is $34.0 to $44.0 million dollars.

Figure 6 Quantm Screen Shot (Southern Bridge – 1)

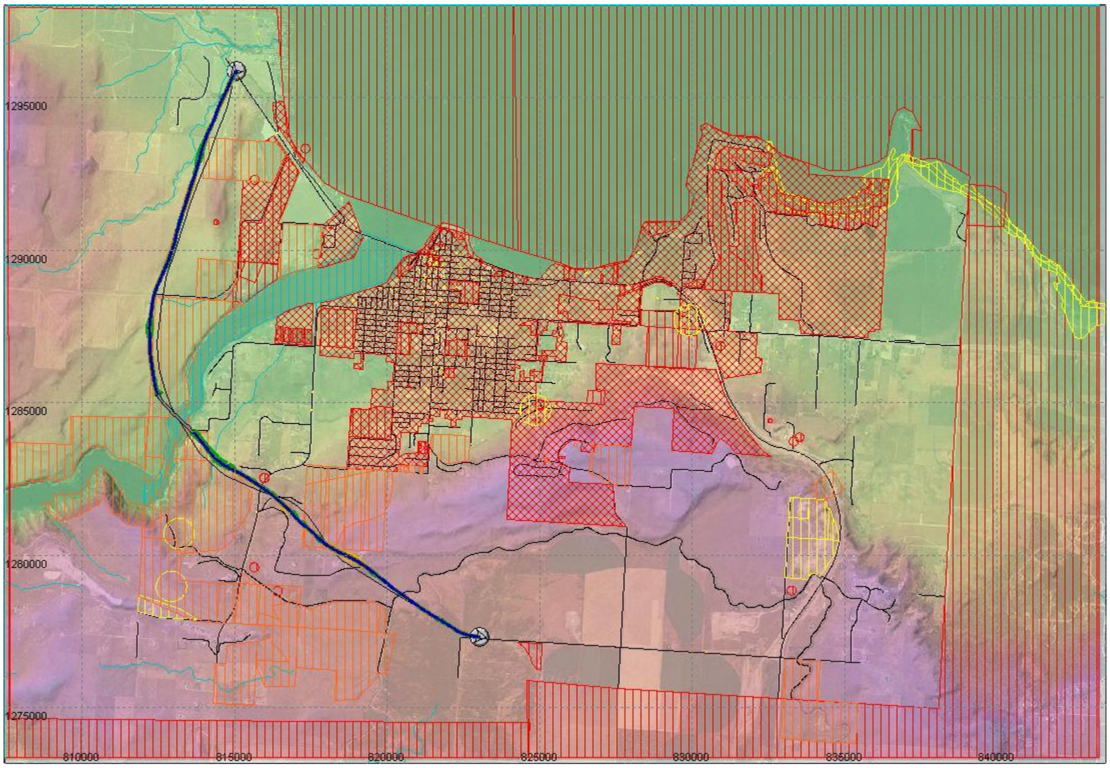


South Bridge – 2

This alignment follows Caffrey Road, cuts through the tribal native grassland sensitive area, clips the Bald Eagle winter area, travels along the western side of the study area boundary, and connects to US 93 near RP 63.

Figure 7 shows a screen shot of the Quantm alignment for the Southern Bridge – 2 route. The bridge length crossing the Flathead River as computed by Quantm is 1,800 feet. This bridge crossing is the longest bridge crossing length of the five Quantm alignments, and is due to the alignment skew and crossing at a wide spot of the river. Additionally, the elevation of the bridge is the highest and is almost 160 feet above the river surface (at its highest point). The total length of this alignment, including the Caffrey Road segment, is 6.65 miles. The estimated range of costs for this alignment, which includes the Caffrey Road segment, is $37.0 to $47.2 million dollars.

Figure 7 Quantm Screen Shot (Southern Bridge – 2)



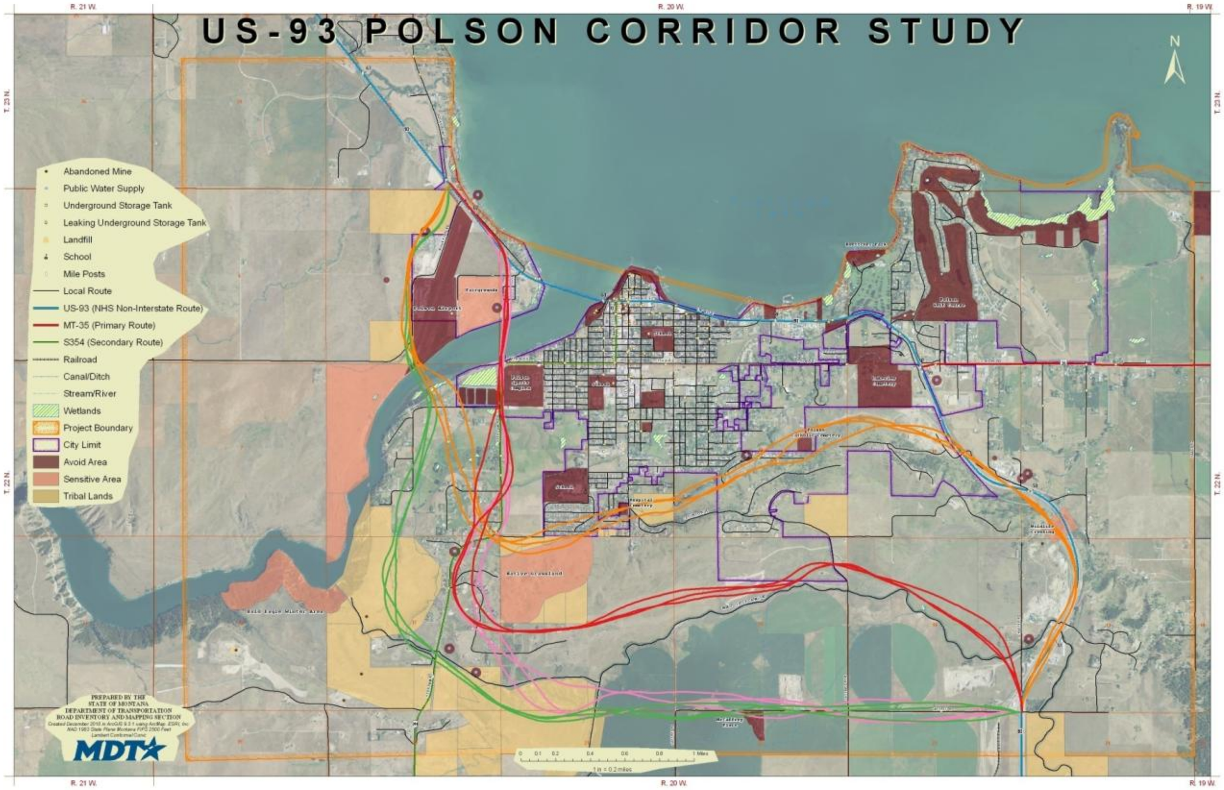
1.6 EIS Alignments

The TOC reviewed and analyzed the eight alternative alignments developed during the preparation of the US 93-Evaro to Polson EIS (see Figure 9). Quantm was used to analyze four of the EIS alignments (EIS 2, 3, 5, and 6) which were manually entered into the software (see Figure 8). Because the remaining four alignments (EIS 1, 4, 7, and 8) traverse through the city of Polson proper and are more "urban", the decision was made by CDM and MDT staff that Quantm would not be the appropriate tool for analysis of these alignments. Each of the alignments is defined below and shown on Figure 9. Costs generated for each alignment are reflective of construction costs (i.e. do not include detailed right-of-way cost, project development costs, utility relocation costs, inflation, etc.). Planning level costs do not include preliminary engineering, construction engineering, and/or IDC costs. Note that this is the case for all planning level costs presented in this Technical Memorandum.

1.6.1 EIS Alignments Modeled in Quantm

Figure 8 shows the EIS alignments that were modeled in Quantm. Each alignment is described in the text that follows.

Figure 8 EIS Alignments Modeled in Quantm



EIS Alignment 2

The Quantm alignments generated for EIS Alignment 2 are shown as pink lines in Figure 8. This alignment follows Caffrey Road, then curves northwest with no impacts to the tribal native grasslands, before proceeding north along Kerr Dam Road and crossing the river just east of the Fairgrounds property. A new bridge across the Flathead River would be constructed to continue the general Kerr Dam Road alignment straight north over the river.

The bridge length crossing the Flathead River as computed by Quantm is 1,520 feet. The total length of this alignment is 5.74 miles. The estimated range of costs for this alignment is $34.7 to $41.6 million dollars.

EIS Alignment 3

The Quantm alignments generated for EIS Alignment 3 are shown as green lines in Figure 8. This alignment follows Caffrey Road and extends approximately one mile west of the end of the road (at the 90 degree bend) before curving to the northwest. The alignment travels north through tribal lands, and then crosses the river just south of the airport. The alignment continues northbound, west of the airport, and ties into US 93 at Rocky Point Road. A new bridge across the Flathead River would be constructed.

The bridge length crossing the Flathead River as computed by Quantm is 1,100 feet. The total length of this alignment is 6.48 miles. The estimated range of costs for this alignment is $30.4 to $36.4 million dollars.

EIS Alignment 5

The Quantm alignments generated for EIS Alignment 5 are shown as orange lines in Figure 8.This alignment begins near Saw Mill Road, heads west, then southwest, where it bisects the tribal land located east of the Hospital Cemetery and the tribal native grasslands before heading north toward the southwest corner of the airport. EIS Alignment 5 then continues northbound, west of the airport property, until it connects to US 93.

The bridge length crossing the Flathead River as computed by Quantm is 1,200 feet. The total length of this alignment is 5.17 miles. The estimated range of costs for this alignment is $41.0 to $44.1 million dollars.

EIS Alignment 6

The Quantm alignments generated for EIS Alignment 6 are shown as red lines in Figure 8. EIS Alignment 6 starts just north of the intersection of US 93 and Caffrey Road and crosses the Pablo Feeder Canal. This alignment continues to travel west in the general vicinity of the Pablo Feeder Canal, then curves northward (with no impacts to the tribal native grasslands and tribal lands). This alignment proceeds along Kerr Dam Road and crosses the river just east of the Fairgrounds property. A new bridge across the Flathead River would be constructed to continue the general Kerr Dam Road alignment straight north over the river.

The bridge length crossing the Flathead River as computed by Quantm is 1,650 feet. The total length of this alignment is 6.64 miles. The estimated range of costs for this alignment is $45.0 to $48.8 million dollars.

1.6.2 Additional EIS Alignments

As discussed previously, due to the urban nature of the remaining four alignments from the US 93-Evaro to Polson EIS (EIS 1, 4, 7, and 8), the decision was made by CDM and MDT staff that Quantm would not be the appropriate tool for analysis of these alignments. These four alignments are shown in Figure 9 and described below.

EIS Alignment 1

This alignment follows the current US 93 alignment and consisted of reconstructing the roadway in its existing corridor with adjustments to allow for widening, improving horizontal curves, reconstructing substandard intersections, improving vertical alignment (includes removing the road surface from the floodplain), and avoiding any important feature adjacent to the roadway. The bridge over the Flathead River would be replaced. The bridge length crossing the Flathead River is 1,560 feet. The total length of this alignment is 5.65 miles, however the segment from the intersection of Caffrey Road to MT-35 has already been improved. Accordingly, the true length of the alignment that would be in need of reconstruction is 3.11 miles. The estimated range of costs for this alignment is $23.7 to $28.4 million dollars.

EIS Alignment 4

Alignment 4 starts near Saw Mill Road and travels west/northwest until it intersects 7th Street East. At this point EIS Alignment 4 continues due west until it reaches 1st Street East, there it turns south and follows 1st Street East until it reaches 10th Avenue East. At this intersection it travels due west until it reaches the Sports Complex. EIS Alignment 4 then traverses north, crossing the Flathead River and joining US 93 just west of the current bridge. A new bridge crossing the Flathead River would be constructed. The bridge length crossing the Flathead River is 1,400 feet. The total length of this alignment is 3.25 miles. The estimated range of costs for this alignment is $27.8 to $33.4 million dollars.

EIS Alignment 7

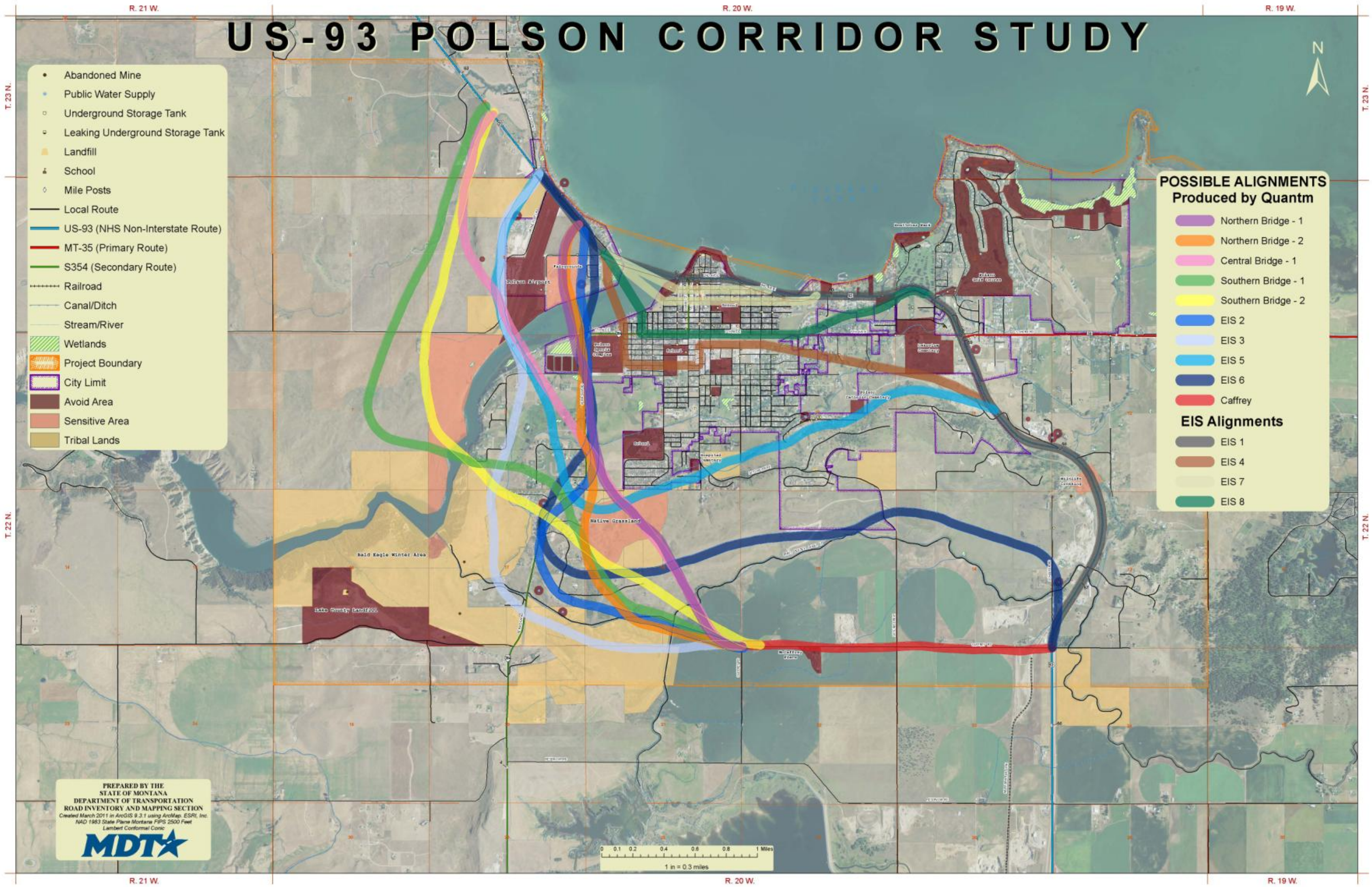
This alignment consists of a couplet utilizing the existing US Highway 93 for the westbound direction, and 3rd Avenue and 4th Avenue, in their entirety, for the eastbound direction (i.e., this alignment start where 3rd Avenue and 4th Avenue connect to US 93 and follow each street until the street ends). As a couplet, this alternative would require a total of three bridge crossings. Two of these bridge crossings would be new (e.g. for the eastbound direction). The couplet alignments would tie into US 93 east of Regatta Road. The total length of this alignment is 2.60 miles. The estimated range of costs for this alignment is $22.1 to $26.5 million dollars.

EIS Alignment 8

This alignment starts at the intersection of 7th Avenue East / Hillcrest Road and US 93. This alignment follows 7th Avenue for approximately the first ¼ mile, then veers off 7th Avenue to form a relatively tangent alignment to the intersection of 11th Street East. This alignment then follows 7th Avenue until the intersection of 4th Street West, at which point it follows 4th Street West northward, crosses the river and unites US 93 just west of the current bridge. A new bridge crossing the Flathead River would be constructed. The bridge length crossing the Flathead River is 1,750 feet. The total length of this alignment is 2.49 miles. The estimated range of costs for this alignment is $26.9 to $32.3 million dollars.

Figure 9 shows the alignments produced by Quantm as well as the EIS alignments previously identified in the 1995 EIS. These alignments will be further analyzed in the screening criteria process.

Figure 9 Potential EIS Alignments and Alignments Produced by Quantm



1.7 Overall Trends

The Quantm analysis identified five trend areas resulting in three distinct bridge crossing locations over the Flathead River. These three bridge crossing locations are shown on Figure 10 and are as follows:

- Northern Bridge Crossing - Two northern bridge trends (near the Fairgrounds) were found within the Quantm analysis. A detailed review of these two trends led to the creation of a single alignment "swath" to carry forward onto the screening process. The Northern Bridge Crossing alignment resulted in a total length of 5.43 miles, and a planning level cost range of $33.0 to $39.1 million dollars

- Central Bridge Crossing - One central bridge trend (just southwest of the airport runway) was observed in the Quantm analysis. The Central Bridge Crossing alignment resulted in a total length of 6.06 miles, and a planning level cost of $36.0 to $43.5 million dollars. Note that there are two possible variations to the "Central Bridge Crossing" alignment – one traversing west of the ridge near the Polson airport, and one going east of the ridge near the Polson airport.

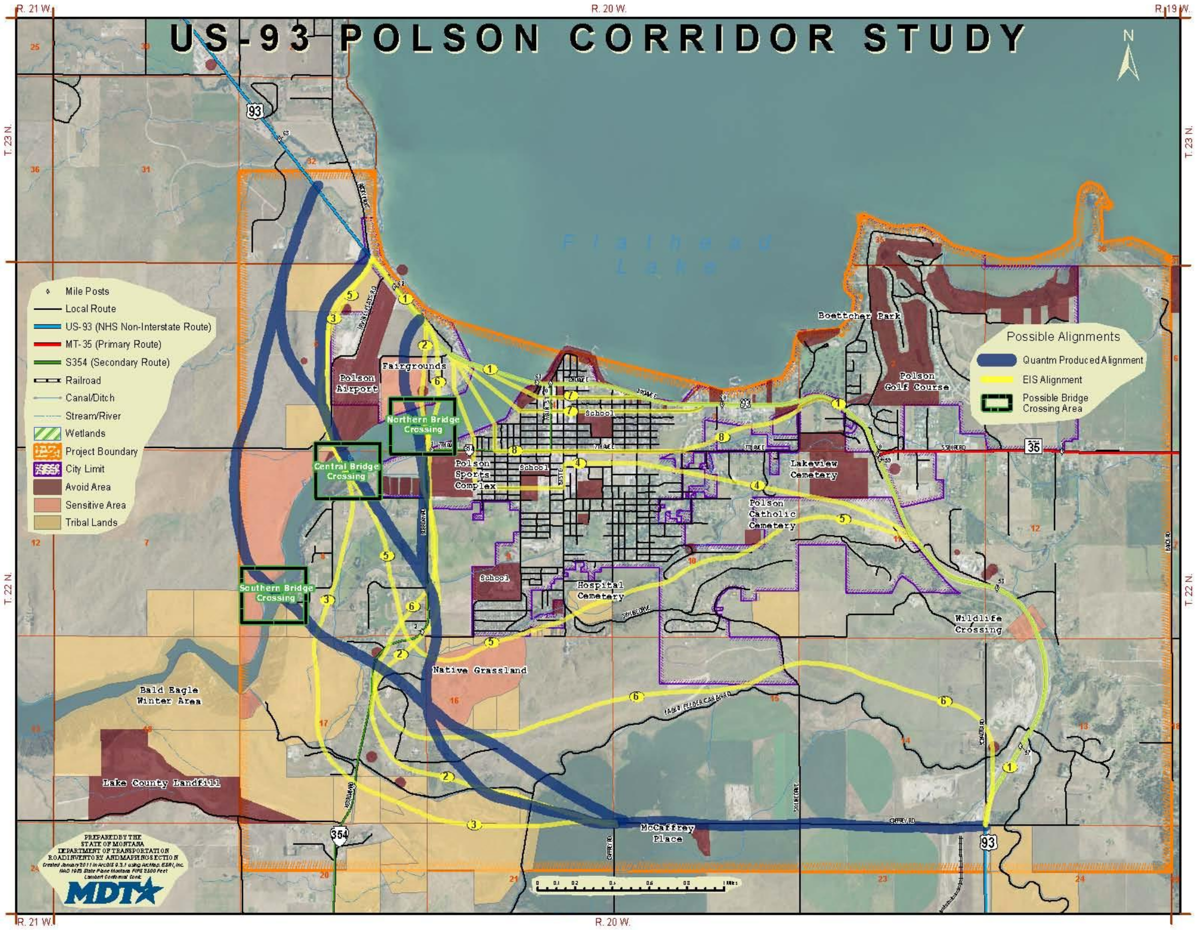
- Southern Bridge Crossing - Two southern bridge trends were observed in Quantm. The two observed trends were combined into a single Southern Bridge Crossing alignment "swath" with a total length of 6.65 miles and a planning level cost range of $37.0 to $47.2 million dollars.

The Quantm generated alignment "swaths" described above are shown in blue on Figure 10. It is recommended that these three general alignments be carried forward into the screening process. In addition, the EIS alignments described herein, and shown in yellow on Figure 10, should be carried forward into screening. This results in eleven alignments to be screened in the first level screening. Table 3 shows the eleven alignments and their respective total length, bridge length and planning level cost range.

Table 3 Alignment Length and Planning Cost Comparison

Criteria	Northern Bridge*	Central Bridge*	Southern Bridge	EIS 1	EIS 2	EIS 3	EIS 4	EIS 5	EIS 6	EIS 7	EIS 8
Total Length	5.43 miles	6.06 miles	6.65 miles	5.65 miles (3.11)	5.74 miles	6.48 miles	3.25 miles	5.17 miles	6.64 miles	2.60 miles	2.49 miles
Bridge Length	1,450 feet	1,100 feet	1,800 feet	1,560 feet	1,520 feet	1,100 feet	1,400 feet	1,200 feet	1,650 feet	1,650 feet	1,750 feet
Planning Level Range of Costs	$33.0 – 39.1M	$36.0 – 43.5M	$37.0 - 47.2M	$23.7 – 28.4M	$34.7 – 41.6M	$30.4 – 36.4M	$27.8 – 33.4M	$41.0 – 44.1M	$45.0 – 48.8M	$22.1 – 26.5M	$26.9 – 32.3M

Figure 10 Overall Trends



1.8 References

HKM Engineering inc., Sidney Truck Route Study, August 2003.

Carter Burgess/WGM Group Inc., US Highway 93 – Polson, Traffic Operations and Environmental Study, March 1995

Trimble, Quantm System Brochure, 2009-2010, http://www.trimble.com/alignment/

US 93 Polson Corridor Study

First Level Screening Criteria

Prepared For:

City of Polson

Lake County

Confederated Salish & Kootenai Tribes

Montana Department of Transportation

Prepared By:

Camp Dresser & McKee Inc.

Helena, Montana

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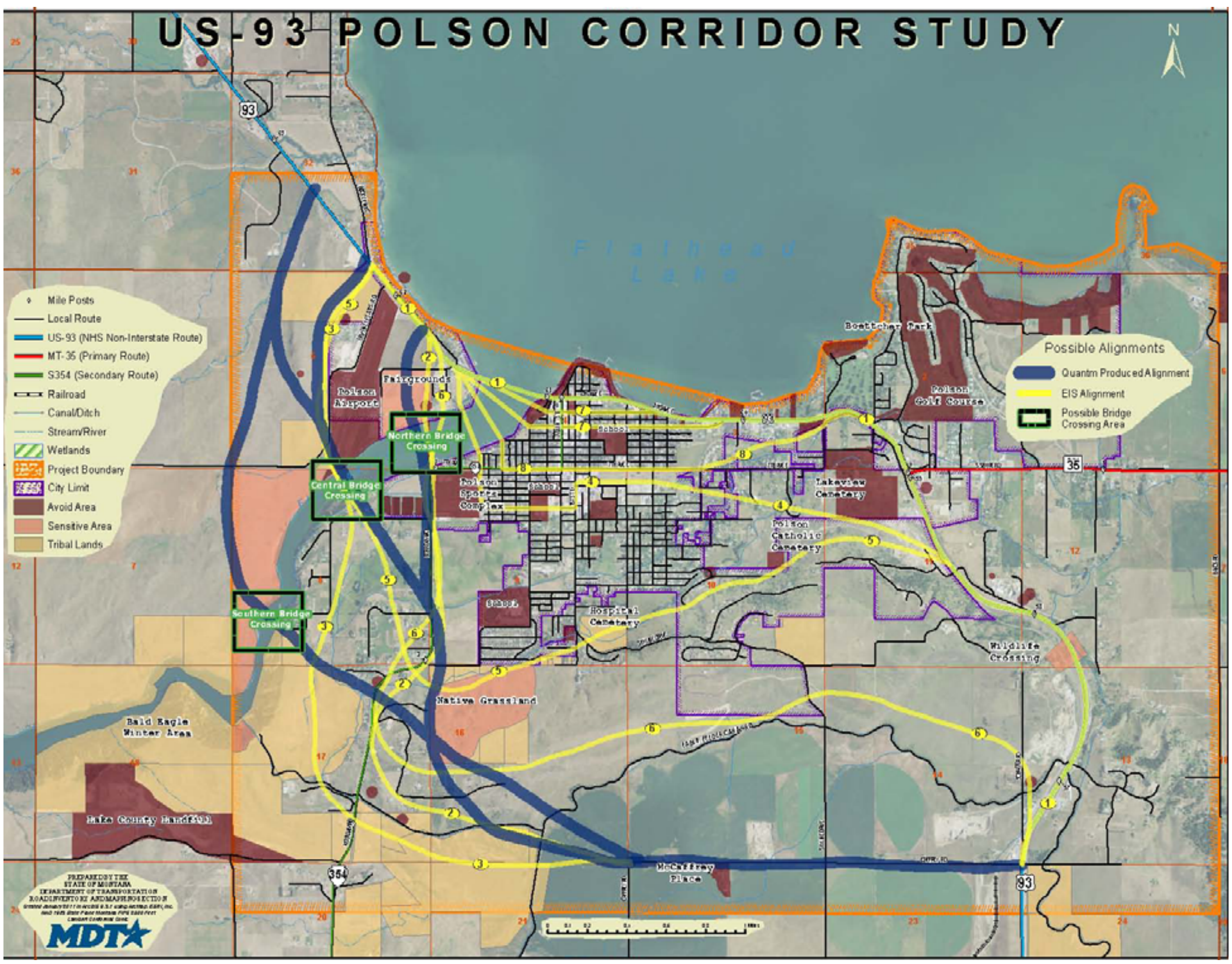
Section 6.3 Improvement Option Screening Process

Screening criteria were developed to assist in the evaluation of the eleven (11) potential alignments of US 93 between RP 56.5 and RP 63.0. Screening criteria provide a means of reducing the range of potential alignments for consideration by comparing them both quantitatively and qualitatively with a set of specific measures. The screening process consisted of two screening steps. The "first level" screening was a high level screen that was utilized to identify alignment options that satisfied the needs and objectives laid forth previously, and subsequently could be carried forward for consideration in the second level of screening. The second level of screening will be more detailed and will evaluate shifts in traffic volumes, intersection operations, and potential impacts to safety.

The screening process described in this section illustrates each alignment's ability to meet the screening criteria and each alignment's respective scoring. Figure 6-1 depicts the eleven (11) alignments.

Figure 6-1 US 93 Polson Original Alignment Options



6.1 Rating Factors

In order to rate each screening criterion, rating factors were developed. Low, medium and high rating factors were assigned to each screening criterion for each alignment. The factors represented the likelihood of a screening criterion to meet the needs and objectives established for the corridor. Table 6.1 describes the impact rating factors.

Table 6.1 Initial Screening Criteria Rating Factors

○	◐	●
Low Impact Best Able to Meet Need & Objectives	Medium Impact Moderately Able to Meet Need & Objectives	High Impact Least Able to Meet Need & Objectives

A qualitative and quantitative comparison of each alignment against the needs identified for the US 93 corridor is described below. A matrix summary of the results of the first screening is shown in Table 6.22.

6.2 First Level Screening Criteria

The needs and objectives previously defined for the US 93 corridor through Polson informed the development of 18 screening criteria. The screening criteria were developed based on input by the Technical Oversight Committee (TOC) and general public. The first level of screening evaluates 11 alignment options against the six (6) needs and objectives.

The primary concerns for the US 93 corridor are as follows:

- system linkage and function,
- transportation demand and operation,
- roadway geometrics,
- safety,
- livability and connectivity, and
- truck traffic.

6.2.1 System Linkage and Function

System linkage and function of an alignment relates to the ability to implement access control, and to maintain principal arterial speed. Two screening criteria were developed based on this need.

Access Control

Access control is the condition in which the right of owners or occupants of land abutting a highway is fully or partially controlled by public authority. Access control limits the conflicts with through traffic by limiting the location and number of private and public approaches. (Pizzini 2007) Access control is more difficult to implement in a developed corridor because of the multiple existing private and public approaches that exist. From an access control perspective, the rating factors take into consideration the general distance which an alignment travels through types of land as follows:

Range of Access Control	Rating Factor
Less Developed Land	○
Some Developed Land	◐
Mostly Developed Land	●

Table 6.2 Access Control Rating Factor

	EIS Alignments								QUANTM Alignments		
	1	2	3	4	5	6	7	8	South Bridge	Central Bridge	North Bridge
Rating Factor	●	○	○	●	◐	○	●	●	○	○	○

Principal Arterial Speeds

The second criterion under System Linkage and Function is the principal arterial speed of the alignments. The concept of traffic channelization provides for a hierarchy of highway systems that allows for functional specialization in meeting both access and mobility requirements. Principal arterials are designed to provide a high level of mobility for through movement. Alignments that cross through developed areas, such as the city, are considered urban and would therefore be subject to speed reduction. Conversely, alignments that stay within rural land would be able to maintain the higher speeds assigned to rural principal arterials. From a principal arterial speed perspective, the rating factors are measured against the distance which an alignment travels within city limits as follows:

Range for Principal Arterial Speeds	Rating Factor
Does not enter City Limits	○
Some Distance within City Limits	◐
Mostly within City Limits	●

Table 6.3 Rating for Principal Arterial Speed

	EIS Alignments								QUANTM Alignments		
	1	2	3	4	5	6	7	8	South Bridge	Central Bridge	North Bridge
Rating Factor	●	◐	○	●	◐	◐	●	●	○	○	◐

6.2.2 Transportation Demand and Operation

To accommodate existing and future transportation demand on US 93 through the planning horizon of the year 2030 and fulfill the needs and objectives, an alignment must maintain roadway traffic flow at a Level B or better for rural principal arterials and Level C or better for urban principal arterials. Additionally, an alignment would need to have ROW available to provide for non-motorized users. There are three screening criteria under this need.

Rural Arterials

Arterials provide the highest level of mobility, at the highest speed, for long uninterrupted travel. The roadway operational performance standard for a rural principal arterial is a level of service of B or better. To quantify the operational performance of those segments of the various alignments that are likely to perform as a rural principal arterial, the TransCad travel demand model was utilized. The TransCad model was used to evaluate each of the 11 alignments, and the volume-to-capacity (v/c) ratios were examined along both the existing US 93 corridor and the proposed alignment. For the screening, v/c ratios that were less than 0.59 were identified for all of the alignments under existing year conditions (2010) as well as future year conditions (year 2030). V/c ratios less than 0.59 correspond to a level of service of B or better. Accordingly, all proposed alignments were found to operate at a level of service B or better under 2010 and 2030 traffic conditions, and are therefore not explicitly included in Table 6.4. However, the ability of each alignment to pull traffic off US 93 caused a variance in the v/c ratios on the existing US 93. Table 6.4 describes the percentage of the existing US 93, outside of city limits, that operates at a level of service C or worse once traffic is diverted to the respective proposed alignments. The range developed for the rating factors were initially based on third points between 0 and 100 percent, however in reviewing the actual data it was determined to use a range of less than 20 percent, and greater than 60 percent, to realize rating factors that correlated better to the data observed.

Range for Rural LOS B	Rating Factor
Less than 20 percent	○
20 to 60 percent	◐
Greater than 60 percent	●

Table 6.4 Future (2030) Rural Arterials' Rating

Existing US 93 Rating Factor	EIS Alignments								QUANTM Alignments		
	1	2	3	4	5	6	7	8	South Bridge	Central Bridge	North Bridge
Percent of US 93 (Rural) >0.59	100%	23%	23%	11%	23%	23%	11%	11%	23%	11-16%	23%
2030 Rating Factor	●	◐	◐	○	◐	◐	○	○	◐	◐	◐

Urban Arterials

The urban principal arterial system serves major metropolitan centers, corridors with the highest traffic volumes, and those with the longest trip lengths. It carries most trips entering and leaving urban areas, and it provides continuity for all rural arterials that intercept urban boundaries. (State of Montana Department of Transportation 2008)

The roadway operational performance standard for an urban principal arterial is a level of service of C or better. To quantify the operational performance of those segments of the various alignments that are likely to perform as an urban principal arterial, the TransCad travel demand model was utilized. The TransCad model was used to evaluate each of the 11 alignments, and the v/c ratios were examined along the existing US 93 corridor and the proposed alignment. For the screening, v/c ratios that were less than 0.79 were identified for all of the alignments under existing year conditions (2010), as well as future year conditions (year 2030). Accordingly, all proposed alignments were found to operate at a level of service C or better under 2010 and 2030 traffic conditions, and are therefore not explicitly included in Table 6.5. However, Table 6.5 does include ratings for the existing US 93 performance under future conditions (year 2030), as noted. The range developed for the rating factors were based on third points between 0 and 100 percent.

Range for Urban LOS C	Rating Factor
Less than 33 percent	○
33 to 67 percent	◐
Greater than 67 percent	●

Table 6.5 Future (2030) Urban Arterials' Rating

Existing US 93 Rating Factor	EIS Alignments								QUANTM Alignments		
	1	2	3	4	5	6	7	8	South Bridge	Central Bridge	North Bridge
Percent of US 93 (Urban) >0.79	28%	29%	41%	29%	29%	27%	25%	29%	42%	29-41%	29%
2030 Rating Factor	○	○	◐	○	○	○	○	○	◐	◐	○

Right-of-Way for Non-motorized Users

The availability of right-of-way needed to provide for non-motorized users depends on the current land use of the area through which an alignment crosses. In an urban/developed area, there are multiple buildings and other constraints that could impede the acquisition of land needed for a smaller facility such as a sidewalk or shared bicycle/pedestrian path to accommodate non-motorized users. In areas where there are numerous existing buildings and/or other constraints, the area was considered to be "highly constrained". If the area an alignment crosses is primarily vacant pasture or agricultural land with few existing buildings and/or other constraints, the area was considered to be "minimally constrained". Rating factors were assigned based on field observations regarding the built-up nature along the alignment paths, as well as a review of aerial photographs. Rating factors for this screening criterion are as follows:

Range for ROW Available	Rating Factor
Minimally Constrained Area	○
Moderately Constrained Area	◐
Highly Constrained Area	●

Table 6.6 Right-of-Way Available for Non-motorized Users Rating

	EIS Alignments								QUANTM Alignments		
	1	2	3	4	5	6	7	8	South Bridge	Central Bridge	North Bridge
Rating Factor	●	○	○	●	◐	○	●	●	○	○	○

6.2.3 Roadway Geometrics

To provide a facility that accommodates the diversity of vehicle types and fulfills the objectives for the US 93 corridor, potential screening criteria were developed that would meet the roadway geometric need and objectives. In order to meet these objectives and needs, an alignment would need to meet horizontal curve, and road and bridge width, design standards. There are two screening criteria under this need.

Horizontal Curves

Each alignment was reviewed to see if it would meet horizontal curve design standards for the design speed of 65 mph for rural roadways and 45 mph for urban roadways. Although alignment EIS 1 currently passes horizontal curve design standards for the posted speed, it was not designed to meet the design standard for 45 mph through the city limits. Additionally, EIS alignments 4, 7, and 8 are not designed to meet urban design standards of 45 mph at intersections where curves are incorporated. Conversely, all new alignments would be designed to meet the MDT's geometric design standards.

Range for Horizontal Curves Design Criteria	Rating Factor
Meet Design Criteria at 65 mph rural/ 45 mph urban	○
Not Able to Meet Design Criteria at 65 mph rural/ 45 mph urban	●

Table 6.7 Horizontal Curve Design Criteria Rating

	EIS Alignments								QUANTM Alignments		
	1	2	3	4	5	6	7	8	South Bridge	Central Bridge	North Bridge
Rating Factor	○	○	○	●	○	○	●	●	○	○	○

Bridge and Road Width

The existing Flathead River Bridge does not meet width requirements. Since all alignments would require the construction of a new bridge structure, all new bridge structures would be designed to meet bridge width standards, and therefore pass the bridge width screening criterion. In terms of roadway width, any new roadway would be designed to meet the MDT's road width standards. Conversely, existing roadways would be more difficult to facilitate such a request. Rating factors for design width criteria are as follows:

Range for Width Design Criteria	Rating Factor
Meet Road and Bridge Design Width	○
Not Able to Meet Road and Bridge Design Width	●

Table 6.8 Road and Bridge Design Criteria Rating

	EIS Alignments								QUANTM Alignments		
	1	2	3	4	5	6	7	8	South Bridge	Central Bridge	North Bridge
Rating Factor	●	○	○	●	○	○	●	●	○	○	○

6.2.4 Safety

As stated previously, there is a need to select an alignment that can maintain travel speeds for a principal arterial. In order to maintain the safest roadway environment possible with the desired travel speeds, the selected alignment must manage public access points and private approaches. One way to measure the ability to meet this need is by investigating access density per mile. This is the only screening criterion under this need.

Access Density

In this analysis the total number of access points along each alignment was counted. Access points included each business entrance, private driveway, and street connection. To make this comparison relative to a common unit, the final number of accesses was divided by the total alignment length, in miles, to obtain a density of accesses per mile. Table 6.9 shows the results of this analysis, along with the assigned rating factor.

Range for Access Densities per Mile	Rating Factor
Less than or equal to 5	○
6 less than or equal to 14	◐
Greater than or equal to 15	●

Table 6.9 Access Density per Mile Rating

	EIS Alignments								QUANTM Alignments		
	1	2	3	4	5	6	7	8	South Bridge	Central Bridge	North Bridge
Access Density per Mile	20	4	4	15	3	3	20	18	4	4	5
Rating Factor	●	○	○	●	○	○	●	●	○	○	○

6.2.5 Livability and Connectivity

To minimize impacts to neighborhoods and to environmental, sensitive, and recreational resources, each alignment was compared with regard to the number of 4(f) / 6(f) resources, residential parcels, sensitive areas, and wetlands impacted, as well as the connectivity to public parks and recreation. There are five screening criteria under this need.

4(f) / 6(f) Resources

The number of 4(f) / 6(f) resources potentially impacted by an alignment ranges from 0 to 4. Potential 4(f) / 6(f) resources impacts, along with their respective rating factors for each alignment, are described in Table 6.10. A potential impact to a 4(f) / 6(f) resource was noted if any portion of an alignment "swath", as shown on Figure 6-1, appeared to touch or cross a defined resource. This was assessed in this manner as a "worst case" scenario. The accounting of potential 4(f) / 6(f) resource impacts does not include potential impacts to eligible historic homes and/or other structures.

Range for 4(f) / 6(f) Resources	Rating Factor
No resource impacted	○
1 or 2 resources impacted	◐
3 or 4 resources impacted	●

Table 6.10 4(f) / 6(f) Resources Rating

Alignment ID		4(f) / 6(f) Resource(s) Potentially Impacted *	Number of 4(f) / 6(f) Resources	Rating Factor
EIS Alignments	1	Ducharme Park, Waterfront Facilities, Riverside Park, Polson 5-6	4	●
	2	Sports Complex	1	◐
	3	--	0	○
	4	Cherry Valley School, Sports Complex	2	◐
	5	--	0	○
	6	Sports Complex	1	◐
	7	Linderman Elementary School, Riverside Park	2	◐
	8	Polson 5-6	1	◐
QUANTM Alignments	Southern Bridge	--	0	○
	Central Bridge	--	0	○
	North Bridge	Sports Complex	1	◐

- Does not include potential impacts to eligible historic homes and/or other structures.

Wetlands

Wetlands were identified throughout the study area and are documented in the Environmental Scan. The number of wetlands potentially impacted by an alignment ranges from zero to four. Comparative results of this analysis are shown in Table 6.11.

Range for Wetlands	Rating Factor
No wetlands impacted	○
1 or 2 wetlands impacted	◐
3 or 4 impacted wetlands	●

Table 6.11 Wetlands Rating

	EIS Alignments								QUANTM Alignments		
	1	2	3	4	5	6	7	8	South Bridge	Central Bridge	North Bridge
Wetlands Impacted	1	0	1	1	1	2	1	2	0	2	4
Rating Factor	◐	○	◐	◐	◐	◐	◐	◐	○	◐	●

Residential Parcels

The number of residential parcels impacted by an alignment ranges from 4 to 132. To determine the rating factor for this category, the range of residential parcels potentially impacted was divided evenly into three groups: low, medium and high impact. Table 6.12 shows the number of potentially impacted parcels, and rating factor, for each of the alignments.

Range for Residential Parcels	Rating Factor
low impact: 0 to 46 parcels impacted	○
medium impact: 47 to 89 parcels impacted	◐
high impact: > 90 parcels impacted	●

Table 6.12 Residential Parcels Impacted

	EIS Alignments								QUANTM Alignments		
	1	2	3	4	5	6	7	8	South Bridge	Central Bridge	North Bridge
Impacted Parcels	71	29	19	68	61	68	<46*	132	26-27	17	4-18
Rating Factor	◐	○	○	◐	◐	◐	○	●	○	○	○

*Note: This assumes the existing roadway for EIS Alignment 7 (one-way couplet) would be reconfigured within the existing right-of-way prism which would therefore only result in impacts where right-of-way for construction would be needed.

Sensitive Areas

Many sensitive areas were identified throughout the study area as documented in the Environmental Scan. The number of sensitive areas potentially impacted by an alignment ranges from 0 to two. Comparative results of this analysis are shown in Table 6.13.

Range for Sensitive Areas	Rating Factor
No sensitive area impacted	○
1 sensitive area impacted	◐
2 sensitive areas impacted	●

Table 6.13 Sensitive Areas Rating

	EIS Alignments								QUANTM Alignments		
	1	2	3	4	5	6	7	8	South Bridge	Central Bridge	North Bridge
Areas Impacted	1	1	0	0	1	0	0	0	2	1	2
Rating Factor	◐	◐	○	○	◐	○	○	○	●	◐	●

Connectivity to public parks and recreation

Based on local input, an element of the screening process needed to be responsive to land use plans such as connectivity to public parks and recreation wherever practicable. Rating factors were assigned based on the relative distance through which the alignments traversed the grid system within the city limits. Alignments that were far away from the grid system, or only entered the system for a few blocks, would not provide this desired connectivity. Conversely, alignments that were within the grid of the city had more potential to connect public parks and recreational areas, and were therefore given a more desirable rating. This analysis is shown below.

Range for Connectivity	Rating Factor
Mostly Within City Grid System	○
Within Grid and Remote Locations	◐
Mostly Remote Location	●

Table 6.14 Parks and Recreation Connectivity Rating

	EIS Alignments								QUANTM Alignments		
	1	2	3	4	5	6	7	8	South Bridge	Central Bridge	North Bridge
Rating Factor	○	◐	●	○	◐	◐	○	○	●	●	◐

6.2.6 Truck Traffic

In the corridor study area, US 93 realizes a diverse mix of traffic, including trucks, recreational vehicles, and tourism related traffic and passenger vehicles. To minimize the impacts of truck traffic to the existing US 93, and fulfill the needs and objectives previously discussed, the TOC found it important to screen alignments based on the length of grades greater than 4 percent. This is the only screening criterion under this need.

Length of Grades

Vertical grades greater than four percent require a design exception. Not only do these steeper grades require a design exception, but they are undesirable for truck drivers. Alignments with steep grades may not draw the desired truck traffic away from the existing US 93 facility, especially in the downtown area. Therefore, the longer lengths of grade, greater than the current MDT design standard of four percent, receive a less desirable rating. To determine the rating factor for this category, the range of lengths was divided into three groups as listed below. Table 6.15 shows the rating factor for each of the alignments.

Range for Length of Grades	Rating Factor
Less than 5000 feet	○
5000 to 7500 feet	◐
Greater than 7500 feet	●

Table 6.15 Rating by Length of Grade Greater than Four Percent

	EIS Alignments								QUANTM Alignments		
	1	2	3	4	5	6	7	8	South Bridge	Central Bridge	North Bridge
Length (ft)	8600	6790	6740	>7500	7770	7040	>7500	>7500	4050	6300-8840	8540
Rating Factor	●	◐	◐	●	●	◐	●	●	○	●	●

6.2.7 Other

The TOC identified four other criteria in which to screen the alignments. These include the overall planning level cost, the ability of utilities to be incorporated into bridge location and design, community preference, and maintenance cost. Each of these final screening criteria is described herein.

Planning Level Cost

High level planning cost estimates were prepared for each of the eleven potential alignments that were considered. The planning level cost estimates were primarily for construction costs (i.e. did not include detailed right-of-way costs, project development costs, utility relocation costs, inflation, etc.). To develop the planning level cost estimates, line item costs for cut, fill, borrow, demolition, paving, mass haul, retaining walls, culverts, bridges, footprint areas, and road costs were generated for the alignments. The results of the planning level cost estimates are shown in Table 6.16. The rating factors were measured against the highest range of costs for each alignment, with ranges calculated for the three possible ratings:

Range of Planning Level Costs	Rating Factor
Less than $30,000,000	○
Between $30,000,000 and $40,000,000	◐
Greater than $40,000,000	●

Table 6.16 Planning Level Cost Rating

	EIS Alignments								QUANTM Alignments		
	1	2	3	4	5	6	7	8	South Bridge	Central Bridge	North Bridge
Planning Level Cost	$23.7 to 28.4M	$34.7 to 41.6M	$30.4 to 36.4M	$27.8 to 33.4M	$41.0 to 44.1M	$45.0 to 48.8M	$22.1 to 26.5M	$26.9 to 32.3M	$37.0 to 47.2M	$36.0 to 43.5M	$33.0 to 39.1M
Rating Factor	○	●	◐	◐	●	●	○	◐	●	●	◐

Incorporation of Utilities into Bridge Location and Design

Based on TOC input, it was agreed that any alignment should attempt to be responsive to local sewer and water planning documents. To uphold the goals set forth in these planning documents, rating factors were assigned based on the ability of utility lines (i.e. water and sewer) to be incorporated into the alignment, coupled with the alignment's ability to perpetuate long-term utility needs in accordance with overall infrastructure requirements. As such, alignments closest to the current bridge were rated higher than alignments with bridge locations that would be constructed further away.

Range of Utilities	Rating Factor
North Bridge Location	○
Central Bridge Location	◐
South Bridge Location	●

Table 6.17 Utilities Incorporation Rating

	EIS Alignments								QUANTM Alignments		
	1	2	3	4	5	6	7	8	South Bridge	Central Bridge	North Bridge
Rating Factor	○	○	◐	○	◐	○	○	○	●	◐	○

Community Preference

An additional criterion considered in the first level screening process was whether the alignment had the support of the community. Community preference is an important screening criterion because if the community does not support an alignment early in the planning process there is likelihood that the alignment will not be supported as a project moves forward. Community preference was solicited on general corridor areas via written and verbal feedback at the informational meetings, solicitation of comments via the study website, and personal conversations with members of the community. Input from the TOC was offered throughout the process to help refine the community's preferences. EIS Alignments 3, 4, 5, 6 and the Central Bridge Crossing received low support due to various factors, including potential impacts to residential housing areas. EIS Alignments 1, 2, and 7 received a relatively equal amount of support and opposition. EIS Alignment 8, and the South and North Bridge Crossing alignments, received the highest support from the community. Table 6.18 shows the results of the community preference assessment.

Range of Community Preference	Rating Factor
High Community Preference	○
Medium Community Preference	◐
Low Community Preference	●

Table 6.18 Rating for Community Preference

	EIS Alignments								QUANTM Alignments		
	1	2	3	4	5	6	7	8	South Bridge	Central Bridge	North Bridge
Rating Factor	◐	◐	●	●	●	●	◐	○	○	●	○

Maintenance Cost

A query of the statewide average maintenance cost resulted in an average maintenance cost of $4300 per lane mile. All new alignments include the maintenance cost of not only the new alignment, but also of the current US 93 alignment. Since all alignments are two-lane facilities, this factor is primarily dependent upon the length of the alignment.

Range of Maintenance Costs	Rating Factor
Less than $100,000	○
Between $100,000 and $125,000	◐
Greater than $125,000	●

Table 6.19 Maintenance Cost Rating

	EIS Alignments								QUANTM Alignments		
	1	2	3	4	5	6	7	8	South Bridge	Central Bridge	North Bridge
Length (mi)	6.5	5.74	6.48	3.25	5.17	6.64	2.6	2.49	6.65	6.06	5.53
Maintenance. Cost ($1000)	95	127*	133*	105*	122*	135*	100*	99*	135*	130*	125*
Rating Factor	○	●	●	◐	◐	●	◐	○	●	●	◐

*Note: The cost of maintenance to this alignment includes both the current US 93 facility (approximately $77,000) and the new alignment.

6.2.8 Weighted Average Scoring

Part of the screening process included querying the TOC to identify which criteria was of most importance and least importance to the constituents they represent. Accordingly, each TOC member was asked to rate the screening criteria into thirds by assigning the top third of the eighteen screening criteria a numerical value of 1, the middle third of the eighteen screening criteria a numerical value of 2, and the bottom third of the screening criteria a numerical value of 3. TOC member scores for each of the criteria were totaled. The results of this exercise are shown in Table 6.20. These totals were divided into four categories of importance. Weighting for the highest importance was given a “1”, high importance a “5”, medium importance an “8” and lowest importance a “10”. Each empty circle was given zero points, each half circle was given half of the category points, and circles that were filled in received the full number of possible points for that screening criterion. Scoring of the objectives is described in Table 6.21.

Table 6.20 Importance of Objectives – Weighted Average Exercise for TOC Entities

Corridor Need & Objectives Screening Criteria	Weighting Exercise – Average of Each Entity					
	CSKT	Lake Co.	City	MDT*	FHWA*	**Total Value**
System linkage and function						
Ability to implement access control	1	1	3	1	2	**8**
Ability to maintain principal arterial speeds	3	3	3	1	2	**12**
Transportation demand and operation						
Maintain roadway traffic flow at LOS B or better (rural principal arterial)	2	2	2	2	2	**10**
Maintain roadway traffic flow at LOS C or better (urban principal arterial)	1	1	2	2	2	**8**
ROW available to provide for non-motorized users	2	2	1	2	2	**9**
Roadway geometrics						
Meet horizontal curve design criteria	2	3	3	3	2	**13**
Meet road and bridge width design criteria	2	2	2	2	2	**10**
Safety						
Access density per mile	1	2	1	3	3	**10**
Livability and connectivity						
Number of 4(f) / 6(f) resources potentially impacted	1	1	1	1	1	**5**
Number of wetlands potentially impacted	2	1	1	2	2	**8**
Number of residential parcels potentially impacted	1	1	1	1	1	**5**
Number of sensitive areas potentially impacted	1	1	1	1	1	**5**
Connectivity to public parks and recreation	2	2	1	3	3	**11**

Corridor Need & Objectives Screening Criteria	Weighting Exercise – Average of Each Entity					
	CSKT	Lake Co.	City	MDT*	FHWA*	**Total Value**
Truck traffic						
Length of grades greater than 4 percent	3	2	3	2	1	**11**
Other						
Overall planning level cost	2	3	3	2	3	**13**
Ability of utilities to be incorporated into bridge location and design	3	2	2	3	3	**13**
Community preference	1	1	2	1	1	**6**
Maintenance cost	3	3	2	3	2	**13**

*Note: The weighting exercise for these stakeholders resulted in an average of multiple individuals involved. Rounding of average results led to final values contained in this table.

Table 6.21 Weight Point System Assigned to Screening Criteria

Total Points from Table 6.20	Corresponding Level of Importance	Highest Possible Points given to Objectives	Corresponding Points for each of the Rating Factors		
			○	◐	●
5 to 7	Highest Importance	1.0	0.0	0.5	1.0
8 or 9	High Importance	5.0	0.0	2.5	5.0
10 or 11	Moderate Importance	8.0	0.0	4.0	8.0
12 to 14	Low Importance	10.0	0.0	5.0	10.0

6.2.9 First Level Screening Results

This scoring system helped identify which alignments could be dropped from further consideration and which alignments should be carried forward to the second level of screening. Options with the lowest overall numerical value were kept for further consideration and are detailed in Table 6.22. The remaining alignments, which were dropped from further consideration, are also presented in Table 6.22 for completeness.

Table 6.22 Summary of Corridor Need & Objectives Screening Criteria (First Level)

Corridor Need & Objectives Screening Criteria (highest possible rating value)	EIS Alignments								QUANTM Alignments		
	1	2	3	4	5	6	7	8	South Bridge	Central Bridge	North Bridge
System linkage and function											
Ability to implement access control (5)	● 5.0	○ 0.0	○ 0.0	● 5.0	◐ 2.5	○ 0.0	● 5.0	● 5.0	○ 0.0	○ 0.0	○ 0.0
Ability to maintain principal arterial speeds (10)	● 10.0	◐ 5.0	○ 0.0	● 10.0	◐ 5.0	◐ 5.0	● 10.0	● 10.0	○ 0.0	○ 0.0	◐ 5.0
Transportation demand and operation											
Maintain 2030 roadway traffic flow at LOS B or better (rural principal arterial) (8)	● 8.0	◐ 4.0	◐ 4.0	○ 0.0	◐ 4.0	◐ 4.0	○ 0.0	○ 0.0	◐ 4.0	◐ 4.0	◐ 4.0
Maintain 2030 roadway traffic flow at LOS C or better (urban principal arterial) (5)	○ 0.0	○ 0.0	◐ 2.5	○ 0.0	○ 0.0	○ 0.0	○ 0.0	○ 0.0	◐ 2.5	◐ 2.5	○ 0.0
ROW available to provide for non-motorized users (5)	● 5.0	○ 0.0	○ 0.0	● 5.0	◐ 2.5	○ 0.0	● 5.0	● 5.0	○ 0.0	○ 0.0	○ 0.0
Roadway geometrics											
Meet horizontal curve design criteria (10)	○ 0.0	○ 0.0	○ 0.0	● 10.0	○ 0.0	○ 0.0	● 10.0	● 10.0	○ 0.0	○ 0.0	○ 0.0
Meet road and bridge width design criteria (8)	● 8.0	○ 0.0	○ 0.0	● 8.0	○ 0.0	○ 0.0	● 8.0	● 8.0	○ 0.0	○ 0.0	○ 0.0
Safety											
Access density per mile (8)	● 8.0	○ 0.0	○ 0.0	● 8.0	○ 0.0	○ 0.0	● 8.0	● 8.0	○ 0.0	○ 0.0	○ 0.0
Livability and connectivity											
Number of 4(f) / 6(f) resources potentially impacted (1)	● 1.0	◐ 0.5	○ 0.0	◐ 0.5	○ 0.0	◐ 0.5	◐ 0.5	◐ 0.5	○ 0.0	○ 0.0	◐ 0.5
Number of wetlands potentially impacted (5)	◐ 2.5	○ 0.0	◐ 2.5	◐ 2.5	◐ 2.5	◐ 2.5	◐ 2.5	◐ 2.5	○ 0.0	◐ 2.5	● 5.0
Number of residential parcels potentially impacted (1)	◐ 0.5	○ 0.0	○ 0.0	◐ 0.5	◐ 0.5	◐ 0.5	○ 0.0	● 1.0	○ 0.0	○ 0.0	○ 0.0
Number of sensitive areas potentially impacted (1)	◐ 0.5	◐ 0.5	○ 0.0	○ 0.0	◐ 0.5	○ 0.0	○ 0.0	○ 0.0	● 1.0	◐ 0.5	● 1.0

Corridor Need & Objectives Screening Criteria (highest possible rating value)	EIS Alignments								QUANTM Alignments		
	1	2	3	4	5	6	7	8	South Bridge	Central Bridge	North Bridge
Connectivity to public parks and recreation (8)	○ 0.0	◐ 4.0	● 8.0	○ 0.0	◐ 4.0	◐ 4.0	○ 0.0	○ 0.0	● 8.0	● 8.0	◐ 4.0
Truck traffic											
Length of grades greater than 4 percent (8)	● 8.0	◐ 4.0	◐ 4.0	● 8.0	● 8.0	◐ 4.0	● 8.0	● 8.0	○ 0.0	● 8.0	● 8.0
Other											
Overall planning level cost (10)	○ 0.0	● 10.0	◐ 5.0	◐ 5.0	● 10.0	● 10.0	○ 0.0	◐ 5.0	● 10.0	● 10.0	◐ 5.0
Ability of utilities to be incorporated into bridge location and design (10)	○ 0.0	○ 0.0	◐ 5.0	○ 0.0	◐ 5.0	○ 0.0	○ 0.0	○ 0.0	● 10.0	◐ 5.0	○ 0.0
Community preference (1)	◐ 0.5	◐ 0.5	● 1.0	● 1.0	● 1.0	● 1.0	◐ 0.5	○ 0.0	○ 0.0	● 1.0	○ 0.0
Maintenance cost (10)	○ 0.0	● 10.0	● 10.0	◐ 5.0	◐ 5.0	● 10.0	◐ 5.0	○ 0.0	● 10.0	● 10.0	◐ 5.0
Screen Result	**57**	**38.5**	**42**	**68.5**	**50.5**	**41.5**	**62.5**	**63**	**45.5**	**51.5**	**37.5**

Based on results of the first level of screening, it can be seen that five (5) alignment options score lowest out of the eleven total alignments considered. These five (5) alignments were selected based on their point ratings as measured against all 11 alignments. The point ratings for each alignment that were within a range of 10 points or less were identified and selected for consideration. These include the following:

- North bridge crossing (score of 37.5)
- EIS alignment 2 (score 38.5)
- EIS alignment 6 (score 41.5)
- EIS alignment 3 (score 42)
- South bridge crossing (score 45.5)

The remaining six (6) alignments that scored outside the point margin were dropped from further consideration. Reasons for exclusion of each of the alternatives are detailed below.

EIS Alignment 1

Alignment 1 was unable to accommodate eight of the 18 screening criteria and was moderately able to accommodate 4 other screening criteria. Because this alignment traverses the heart of Polson's business district, there is a high access density. It would be difficult to implement access control throughout the urban sections of this alignment. It would also be difficult to receive the public's and businesses' support for widening the roadway footprint to accompany non-motorized users, or to bring the roadway up to current MDT design standards. Although this alignment is being dropped from further consideration, there will be improvements required along the existing US 93 during the twenty-year planning horizon. Potential improvements to the existing US 93 will be identified in the Polson Area Transportation Plan, which is currently under development at this time.

This alignment has the potential to impact a moderate number of residential parcels and sensitive areas, and has the potential to impact the highest number of 4(f) and 6(f) resources. This alignment received minimal support from the community.

EIS Alignment 4

Alignment 4 was unable to meet eight of the 18 screening criteria and was moderately able to meet five other screening criteria. Because this alignment travels through the existing roadway network and residential part of the city of Polson, this alignment has a very high access density throughout its urban section. This alignment would be unable to implement access control.

With the constrained environment surrounding the urban portion of this alignment, this alignment would be unable to provide additional ROW needed for non-motorized users or to upgrade the existing transportation facility to the current MDT roadway design standards. Due to the sharp horizontal curves throughout this alignment, the desired standard for a 45 mph urban principal arterial would not be met. This alignment also had steep grades, which would deter trucks from using this route.

This alignment has the potential to impact a moderate number of 4(f) and 6(f) resources and residential parcels, and was not an alignment desired by the community. All of the factors described above caused this alignment to be dropped from further consideration.

EIS Alignment 5

Alignment 5 was unable to meet three screening criteria. It was only moderately able to meet 10 additional screening criteria. Because a large portion of the length of this alignment travels through the city limits of Polson, the posted speed limit would be reduced to that of an urban principal arterial. The slower urban principal arterial speed, coupled with the number of long grades over four percent, could deter trucks from using this route.

This alignment travels through a large amount of remote, virgin terrain which has minimal connections to Polson's transportation grid system. With only minimal connections to the existing transportation system, this alignment is moderately able to provide connectivity to public parks and recreation facilities. A high overall construction cost and moderate maintenance cost also played a factor in this alignment's elimination.

This alignment had the potential to impact a moderate number of residential parcels and sensitive areas. Additionally, this alignment did not receive support from the community and was therefore not a preferred alignment. All of the factors described above caused this alignment to be dropped from further consideration.

EIS Alignment 7

Alignment 7 was unable to meet seven screening criteria and was moderately able to meet four additional screening criteria. Because this alignment travels through the roadway network and residential/commercial part of the city of Polson, this alignment has a very high access density throughout its urban section. This alignment would be unable to accommodate access control.

Due to the horizontal curves near the two bridges for this alignment, the desired criteria for a 45 mph urban principal arterial would not be met. This alignment also had steep grades and a slower speed associated with an urban arterial, which would deter trucks from using this route.

This alignment has the potential to impact a moderate number of 4(f) and 6(f) resources and received mixed feedback regarding its preference from the community. Additionally, this alignment would require two new bridges, and potentially impact the downtown core, especially in light of recent streetscape improvements to Main Street. All of the factors described above caused this alignment to be dropped from further consideration.

EIS Alignment 8

Alignment 8 was unable to meet eight screening criteria and was moderately able to meet three additional screening criteria. Because this alignment travels through the roadway network and residential/commercial part of the city of Polson, this alignment has a very high access density throughout its urban section. Similarly, this alignment would be unable to implement access control.

With the constrained environment surrounding the urban portion of this alignment, this alignment would be unable to provide additional ROW needed for non-motorized users or to upgrade the existing transportation facility to the current MDT roadway design standards. Due to the right angle horizontal curve near the bridge for this alignment, the desired criteria for a 45 mph urban principal arterial would not be met. This alignment also had steep grades, which may deter trucks from using this route.

This alignment has the potential to impact a moderate number of 4(f) and 6(f) resources and a large number of residential parcels. All of the factors described above caused this alignment to be dropped from further consideration.

Central Bridge Crossing

The Central Bridge Crossing alignment was unable to meet five screening criteria and was moderately able to meet five additional criteria. A high overall construction cost and maintenance cost played a factor in the Central Bridge Crossing's elimination. All of the factors described above caused this alignment to be dropped from further consideration.

6.2.10 Refined Hybrid Alignments

Community input, coupled with direction from the TOC, led to slight modifications of the five selected alignments to minimize residential impacts near Ponderrilla Hills. Since the original EIS alignments numbers 2 and 3 are relatively close to the Quantm generated alignments of the southern bridge crossing and the northern bridge crossing, a hybrid was developed between the southern bridge crossing alignment and EIS alignment number 3. A second hybrid was developed between the northern bridge crossing alignment and EIS alignment number 2. These two hybrid alignments, referred to as the "southern bridge crossing hybrid alignment" and the "northern bridge crossing hybrid alignment" respectively, are shown on Figure 6-2 on the following page. The third alignment under consideration, EIS 6, has been modified slightly from that presented in the 1995 EIS to follow the existing roadway of Ponderilla Drive. Should this alignment screen highest in the second level of screening, it is recommended to further explore modifications to deviate from Ponderilla Drive by traversing to the southeast along the irrigation canal system before tying into Kerr Dam Road.

The three hybrid alignments described above, and shown in Figure 6-2, are recommended to be carried forward into the second level of screening. The three hybrid alignments are reflective of the results of the first level screening, and capture the analysis results accordingly. It is noted that the three hybrid alignments are planning level "swaths" that may be subject to additional modifications after the second level of screening is completed.

SHORT REPORT

General Information		Site Information	
Analyst	*N. Fossen*	Intersection	*US 93 & South Shore Road*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/5/2011*	Jurisdiction	
Time Period	*AM Peak without bypass (EIS 6)*	Analysis Year	*2010*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes				1		1		2	1	2	1	
Lane Group				L		R		T	R	L	T	
Volume (vph)				118		222		436	83	168	347	
% Heavy Vehicles				2		2		2	2	2	2	
PHF				0.85		0.82		0.82	0.94	0.73	0.95	
Pretimed/Actuated (P/A)				P		P		P	P	P	P	
Startup Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Extension of Effective Green				2.0		2.0		2.0	2.0	2.0	2.0	
Arrival Type				3		3		3	3	3	3	
Unit Extension				3.0		3.0		3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume	0	0		0	0	0	0	0	0	0	0	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour				0		0		0	0	0	0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	WB Only	02	03	04	SB Only	Thru & RT	07	08
Timing	G = 17.0	G = 0.0	G = 0.0	G = 0.0	G = 12.0	G = 65.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y =	Y = 3	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 100.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate				139		271		532	88	230	365	
Lane Group Capacity				301		507		2306	1029	412	1435	
v/c Ratio				0.46		0.53		0.23	0.09	0.56	0.25	
Green Ratio				0.17		0.32		0.65	0.65	0.12	0.77	
Uniform Delay d_1				37.4		27.9		7.2	6.5	41.5	3.3	
Delay Factor k				0.50		0.50		0.50	0.50	0.50	0.50	
Incremental Delay d_2				5.0		4.0		0.2	0.2	5.4	0.4	
PF Factor				1.000		1.000		1.000	1.000	1.000	1.000	
Control Delay				42.4		31.9		7.4	6.6	46.9	3.7	
Lane Group LOS				D		C		A	A	D	A	
Approach Delay				35.5			7.3			20.4		
Approach LOS				D			A			C		
Intersection Delay	19.2			Intersection LOS						B		

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SHORT REPORT

General Information		Site Information	
Analyst	*N. Fossen*	Intersection	*US 93 & South Shore Road*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/5/11*	Jurisdiction	
Time Period	*PM Peak without bypass (EIS 6)*	Analysis Year	*2010*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes				1		1		2	1	2	1	
Lane Group				L		R		T	R	L	T	
Volume (vph)				222		303		607	185	373	526	
% Heavy Vehicles				2		2		2	2	2	2	
PHF				0.83		0.86		0.93	0.70	0.83	0.90	
Pretimed/Actuated (P/A)				P		P		P	P	P	P	
Startup Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Extension of Effective Green				2.0		2.0		2.0	2.0	2.0	2.0	
Arrival Type				3		3		3	3	3	3	
Unit Extension				3.0		3.0		3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume	0	0		0	0	0	0	0	0	0	0	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour				0		0		0	0	0	0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	WB Only	02	03	04	SB Only	Thru & RT	07	08
Timing	G = 25.0	G = 0.0	G = 0.0	G = 0.0	G = 23.0	G = 57.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y =	Y = 3	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 111.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate				267		352		653	264	449	584	
Lane Group Capacity				399		727		1821	813	712	1343	
v/c Ratio				0.67		0.48		0.36	0.32	0.63	0.43	
Green Ratio				0.23		0.46		0.51	0.51	0.21	0.72	
Uniform Delay d_1				39.2		20.9		16.1	15.8	40.1	6.3	
Delay Factor k				0.50		0.50		0.50	0.50	0.50	0.50	
Incremental Delay d_2				8.6		2.3		0.6	1.1	4.2	1.0	
PF Factor				1.000		1.000		1.000	1.000	1.000	1.000	
Control Delay				47.9		23.2		16.7	16.8	44.3	7.3	
Lane Group LOS				D		C		B	B	D	A	
Approach Delay				33.8			16.7			23.4		
Approach LOS				C			B			C		
Intersection Delay	23.5			Intersection LOS						C		

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SHORT REPORT

General Information		Site Information	
Analyst	*N. Fossen*	Intersection	*US 93 & 4th Avenue East*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/11*	Jurisdiction	
Time Period	*AM Peak without bypass*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	2	529	10	74	526	4	22	5	164	7	3	1
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	A	A	A	A	A	A	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	WB Only	EW Perm	03	04	NS Perm	06	07	08
Timing	G = 8.0	G = 83.0	G = 0.0	G = 0.0	G = 11.0	G = 0.0	G = 0.0	G = 0.0
	Y = 0	Y = 3	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0

Duration of Analysis (hrs) = 0.25 | Cycle Length C = 108.0

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	2	586		80	576			207			12	
Lane Group Capacity	641	1428		696	1568			162			130	
v/c Ratio	0.00	0.41		0.11	0.37			1.28			0.09	
Green Ratio	0.77	0.77		0.87	0.84			0.10			0.10	
Uniform Delay d_1	2.9	4.2		1.7	1.9			48.5			44.0	
Delay Factor k	0.11	0.11		0.11	0.11			0.50			0.50	
Incremental Delay d_2	0.0	0.2		0.1	0.1			164.0			1.4	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	2.9	4.4		1.8	2.1			212.5			45.4	
Lane Group LOS	A	A		A	A			F			D	
Approach Delay	4.4			2.0			212.5			45.4		
Approach LOS	A			A			F			D		
Intersection Delay	33.1			Intersection LOS						C		

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SHORT REPORT

General Information		Site Information	
Analyst	*N. Fossen*	Intersection	*US 93 & 4th Avenue East*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/11*	Jurisdiction	
Time Period	*PM Peak without bypass*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	2	687	17	83	641	2	76	2	265	4	1	4
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	A	A	A	A	A	A	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	WB Only	EW Perm	03	04	NS Perm	06	07	08
Timing	G = 8.0	G = 83.0	G = 0.0	G = 0.0	G = 11.0	G = 0.0	G = 0.0	G = 0.0
	Y = 0	Y = 3	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25					Cycle Length C = 108.0			

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	2	765		90	699			373			9	
Lane Group Capacity	572	1426		568	1569			156			149	
v/c Ratio	0.00	0.54		0.16	0.45			2.39			0.06	
Green Ratio	0.77	0.77		0.87	0.84			0.10			0.10	
Uniform Delay d_1	2.9	4.9		2.8	2.1			48.5			43.8	
Delay Factor k	0.11	0.14		0.11	0.11			0.50			0.50	
Incremental Delay d_2	0.0	0.4		0.1	0.2			645.2			0.8	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	2.9	5.3		2.9	2.3			693.7			44.6	
Lane Group LOS	A	A		A	A			F			D	
Approach Delay	5.3			2.4			693.7			44.6		
Approach LOS	A			A			F			D		
Intersection Delay	136.8			Intersection LOS						F		

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SHORT REPORT

General Information		Site Information	
Analyst	*N. Fossen*	Intersection	*2nd Avenue East & 1st Street E*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*AM Peak without bypass*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	11	379	126	128	262	15	95	17	115	21	24	9
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = 66.0	G = 0.0	G = 0.0	G = 0.0	G = 68.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 140.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	12	549		139	301			246			59	
Lane Group Capacity	415	845		223	871			717			761	
v/c Ratio	0.03	0.65		0.62	0.35			0.34			0.08	
Green Ratio	0.47	0.47		0.47	0.47			0.49			0.49	
Uniform Delay d_1	19.8	28.2		27.7	23.4			22.2			19.2	
Delay Factor k	0.50	0.50		0.50	0.50			0.50			0.50	
Incremental Delay d_2	0.1	3.9		12.4	1.1			1.3			0.2	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	20.0	32.0		40.1	24.5			23.5			19.4	
Lane Group LOS	B	C		D	C			C			B	
Approach Delay	31.8			29.4			23.5			19.4		
Approach LOS	C			C			C			B		
Intersection Delay	28.9			Intersection LOS						C		

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SHORT REPORT

General Information		Site Information	
Analyst	*N. Fossen*	Intersection	*2nd Avenue East & 1st Street E*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*PM Peak without bypass*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	12	441	99	120	486	7	173	25	221	39	47	25
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = 89.0	G = 0.0	G = 0.0	G = 0.0	G = 84.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 179.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	13	587		130	536			455			120	
Lane Group Capacity	260	900		223	924			649			655	
v/c Ratio	0.05	0.65		0.58	0.58			0.70			0.18	
Green Ratio	0.50	0.50		0.50	0.50			0.47			0.47	
Uniform Delay d_1	23.2	33.5		31.9	31.8			37.6			27.6	
Delay Factor k	0.50	0.50		0.50	0.50			0.50			0.50	
Incremental Delay d_2	0.4	3.7		10.7	2.7			6.2			0.6	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	23.6	37.1		42.5	34.5			43.8			28.2	
Lane Group LOS	C	D		D	C			D			C	
Approach Delay	36.9			36.0			43.8			28.2		
Approach LOS	D			D			D			C		
Intersection Delay	37.7			Intersection LOS						D		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*2nd Avenue East & Main Street*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*AM Peak without Bypass*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	12	415	137	117	241	14	3	5	3	4	5	1
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	A	A	A	A	A	A	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = 117.0	G = 0.0	G = 0.0	G = 0.0	G = 17.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25					Cycle Length C = 140.0			

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	13	600		127	277			11			10	
Lane Group Capacity	908	1498		632	1544			210			211	
v/c Ratio	0.01	0.40		0.20	0.18			0.05			0.05	
Green Ratio	0.84	0.84		0.84	0.84			0.12			0.12	
Uniform Delay d_1	1.9	2.8		2.3	2.2			54.4			54.3	
Delay Factor k	0.11	0.11		0.11	0.11			0.50			0.50	
Incremental Delay d_2	0.0	0.2		0.2	0.1			0.5			0.4	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	1.9	3.0		2.4	2.3			54.9			54.8	
Lane Group LOS	A	A		A	A			D			D	
Approach Delay	3.0			2.3			54.9			54.8		
Approach LOS	A			A			D			D		
Intersection Delay	3.8			Intersection LOS						A		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*2nd Avenue East & Main Street*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*PM Peak without Bypass*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	14	507	115	134	547	8	135	20	174	111	19	134
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	A	A	A	A	A	A	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = 117.0	G = 0.0	G = 0.0	G = 0.0	G = 17.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 140.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	15	676		146	604			358			288	
Lane Group Capacity	629	1513		577	1554			135			132	
v/c Ratio	0.02	0.45		0.25	0.39			2.65			2.18	
Green Ratio	0.84	0.84		0.84	0.84			0.12			0.12	
Uniform Delay d_1	1.9	3.0		2.4	2.8			61.5			61.5	
Delay Factor k	0.11	0.11		0.11	0.11			0.50			0.50	
Incremental Delay d_2	0.0	0.2		0.2	0.2			764.2			555.9	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	1.9	3.2		2.6	3.0			825.7			617.4	
Lane Group LOS	A	A		A	A			F			F	
Approach Delay	3.2			2.9			825.7			617.4		
Approach LOS	A			A			F			F		
Intersection Delay	228.9			Intersection LOS						F		

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SHORT REPORT

General Information		Site Information	
Analyst	*N. Fossen*	Intersection	*South Shore Road & Heritage Ln*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/5/11*	Jurisdiction	
Time Period	*AM Peak without bypass (EIS 6)*	Analysis Year	*2010*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes		2	0	1	1		1		1			
Lane Group		TR		L	T		L		R			
Volume (vph)		217	103	19	290		48		5			
% Heavy Vehicles		2	2	2	2		2		2			
PHF		0.78	0.71	0.54	0.85		0.71		0.50			
Pretimed/Actuated (P/A)		A	A	A	A		P		P			
Startup Lost Time		2.0		2.0	2.0		2.0		2.0			
Extension of Effective Green		2.0		2.0	2.0		2.0		2.0			
Arrival Type		3		3	3		3		3			
Unit Extension		3.0		3.0	3.0		3.0		3.0			
Ped/Bike/RTOR Volume	0	0	0	0	0		0	0	0	0	0	
Lane Width		12.0		12.0	12.0		12.0		12.0			
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour		0		0	0		0		0			
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NB Only	06	07	08
Timing	G = 117.0	G = 0.0	G = 0.0	G = 0.0	G = 15.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25					Cycle Length C = 138.0			

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate		423		35	341		68		10			
Lane Group Capacity		2852		799	1579		192		172			
v/c Ratio		0.15		0.04	0.22		0.35		0.06			
Green Ratio		0.85		0.85	0.85		0.11		0.11			
Uniform Delay d_1		1.8		1.7	2.0		57.0		55.2			
Delay Factor k		0.11		0.11	0.11		0.50		0.50			
Incremental Delay d_2		0.0		0.0	0.1		5.1		0.6			
PF Factor		1.000		1.000	1.000		1.000		1.000			
Control Delay		1.9		1.7	2.0		62.1		55.8			
Lane Group LOS		A		A	A		E		E			
Approach Delay	1.9			2.0			61.3					
Approach LOS	A			A			E					
Intersection Delay	7.2			Intersection LOS						A		

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SHORT REPORT

General Information		Site Information	
Analyst	*N. Fossen*	Intersection	*South Shore Road & Heritage Ln*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/5/11*	Jurisdiction	
Time Period	*PM Peak without bypass (EIS 6)*	Analysis Year	*2010*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes		*2*	*0*	*1*	*1*		*1*		*1*			
Lane Group		*TR*		*L*	*T*		*L*		*R*			
Volume (vph)		*352*	*252*	*26*	*284*		*264*		*24*			
% Heavy Vehicles		*2*	*2*	*2*	*2*		*2*		*2*			
PHF		*0.95*	*0.82*	*0.71*	*0.87*		*0.97*		*0.83*			
Pretimed/Actuated (P/A)		*A*	*A*	*A*	*A*		*P*		*P*			
Startup Lost Time		*2.0*		*2.0*	*2.0*		*2.0*		*2.0*			
Extension of Effective Green		*2.0*		*2.0*	*2.0*		*2.0*		*2.0*			
Arrival Type		*3*		*3*	*3*		*3*		*3*			
Unit Extension		*3.0*		*3.0*	*3.0*		*3.0*		*3.0*			
Ped/Bike/RTOR Volume	*0*	*0*	*0*	*0*	*0*		*0*	*0*	*0*	*0*	*0*	
Lane Width		*12.0*		*12.0*	*12.0*		*12.0*		*12.0*			
Parking/Grade/Parking	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*
Parking/Hour												
Bus Stops/Hour		*0*		*0*	*0*		*0*		*0*			
Minimum Pedestrian Time		*3.2*			*3.2*			*3.2*			*3.2*	

Phasing	EW Perm	02	03	04	NB Only	06	07	08
Timing	G = *117.0*	G = *0.0*	G = *0.0*	G = *0.0*	G = *19.0*	G = *0.0*	G = *0.0*	G = *0.0*
	Y = *3*	Y = *0*	Y = *0*	Y = *0*	Y = *5*	Y = *0*	Y = *0*	Y = *0*
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *144.0*		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate		*678*		*37*	*326*		*272*		*29*			
Lane Group Capacity		*2686*		*579*	*1514*		*234*		*209*			
v/c Ratio		*0.25*		*0.06*	*0.22*		*1.16*		*0.14*			
Green Ratio		*0.81*		*0.81*	*0.81*		*0.13*		*0.13*			
Uniform Delay d_1		*3.2*		*2.7*	*3.1*		*62.5*		*55.3*			
Delay Factor k		*0.11*		*0.11*	*0.11*		*0.50*		*0.50*			
Incremental Delay d_2		*0.0*		*0.0*	*0.1*		*109.7*		*1.4*			
PF Factor		*1.000*		*1.000*	*1.000*		*1.000*		*1.000*			
Control Delay		*3.2*		*2.7*	*3.1*		*172.2*		*56.6*			
Lane Group LOS		*A*		*A*	*A*		*F*		*E*			
Approach Delay	*3.2*			*3.1*			*161.1*					
Approach LOS	*A*			*A*			*F*					
Intersection Delay	*38.6*			Intersection LOS						*D*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/11/2011*
Analysis Time Period	*AM Peak without bypass (EIS 6)*

Site Information

Intersection	*US 93 & Rocky Point Road*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *US 93* North/South Street: *Rocky Point Road*

Intersection Orientation: *East-West* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*5*	*435*			*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*1.00*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*5*	*472*	*0*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*171*		*6*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*185*	*0*	*6*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*5*						*191*	
C (m) (veh/h)	*1636*						*554*	
v/c	*0.00*						*0.34*	
95% queue length	*0.01*						*1.53*	
Control Delay (s/veh)	*7.2*						*14.9*	
LOS	*A*						*B*	
Approach Delay (s/veh)	--	--				*14.9*		
Approach LOS	--	--				*B*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*PM Peak without bypass*

Site Information

Intersection	*US 93 & Rocky Point Road*
Jurisdiction	
Analysis Year	*2030*

Project Description	
East/West Street: *US 93*	North/South Street: *Rocky Point Road*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*1*	*327*			*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*1.00*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*1*	*355*	*0*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*112*		*2*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*121*	*0*	*2*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*1*						*123*	
C (m) (veh/h)	*1636*						*649*	
v/c	*0.00*						*0.19*	
95% queue length	*0.00*						*0.69*	
Control Delay (s/veh)	*7.2*						*11.8*	
LOS	*A*						*B*	
Approach Delay (s/veh)	--	--				*11.8*		
Approach LOS	--	--				*B*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*AM Peak without bypass*

Site Information

Intersection	*12. US 93 & Irvine Flats Road*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *US 93*	North/South Street: *Irvine Flats Road*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*5*	*546*	*8*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*5*	*593*	*8*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*0*	*0*	*6*			
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.25*	*0.25*	*0.50*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*6*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*0*	*0*
Configuration		*LTR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*				
v (veh/h)	*5*	*0*		*6*				
C (m) (veh/h)	*1636*	*986*		*507*				
v/c	*0.00*	*0.00*		*0.01*				
95% queue length	*0.01*	*0.00*		*0.04*				
Control Delay (s/veh)	*7.2*	*8.7*		*12.2*				
LOS	*A*	*A*		*B*				
Approach Delay (s/veh)	--	--	*12.2*					
Approach LOS	--	--	*B*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*PM Peak without bypass*

Site Information

Intersection	*12. US 93 & Irvine Flats Road*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *US 93* — North/South Street: *Irvine Flats Road*

Intersection Orientation: *East-West* — Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	5	429	3	0	0	0
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	5	466	3	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	6	1	11			
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.60	0.25	0.44
Hourly Flow Rate, HFR (veh/h)	6	1	11	0	0	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	0	0
Configuration		LTR				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR				
v (veh/h)	5	0		18				
C (m) (veh/h)	1636	1103		574				
v/c	0.00	0.00		0.03				
95% queue length	0.01	0.00		0.10				
Control Delay (s/veh)	7.2	8.3		11.5				
LOS	A	A		B				
Approach Delay (s/veh)	--	--	11.5					
Approach LOS	--	--	B					

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ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/5/11*
Analysis Time Period	*AM Peak without bypass (EIS 6)*

Site Information

Intersection	*6. 4th Avenue East & 1st Stree*
Jurisdiction	
Analysis Year	*2010*

Project ID

East/West Street: *4th Avenue East* North/South Street: *1st Street East*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	5	1	4	58	5	23
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	16	224	92	18	206	18
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.92		0.92		0.92		0.92	
Flow Rate (veh/h)	10		92		359		261	
% Heavy Vehicles	0		0		0		0	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.5		0.7		0.0		0.1	
Prop. Right-Turns	0.4		0.3		0.3		0.1	
Prop. Heavy Vehicle	0.0		0.0		0.0		0.0	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.1		-0.0		-0.2		-0.0	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.01		0.08		0.32		0.23	
hd, final value (s)	5.31		5.28		4.33		4.54	
x, final value	0.01		0.13		0.43		0.33	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	3.3		3.3		2.3		2.5	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	260		342		609		511	
Delay (s/veh)	8.39		9.10		10.57		9.76	
LOS	A		A		B		A	
Approach: Delay (s/veh)	8.39		9.10		10.57		9.76	
LOS	A		A		B		A	
Intersection Delay (s/veh)	10.06							
Intersection LOS	B							

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ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/5/11*
Analysis Time Period	*PM Peak without bypass (EIS 6)*

Site Information

Intersection	*6. 4th Avenue East & 1st Stree*
Jurisdiction	
Analysis Year	*2010*

Project ID

East/West Street: *4th Avenue East*

North/South Street: *1st Street East*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	12	7	29	79	10	42
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	28	234	67	29	212	22
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.92		0.92		0.92		0.92	
Flow Rate (veh/h)	51		140		356		284	
% Heavy Vehicles	0		0		0		0	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.3		0.6		0.1		0.1	
Prop. Right-Turns	0.6		0.3		0.2		0.1	
Prop. Heavy Vehicle	0.0		0.0		0.0		0.0	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.3		-0.1		-0.1		-0.0	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.05		0.12		0.32		0.25	
hd, final value (s)	5.40		5.46		4.72		4.87	
x, final value	0.08		0.21		0.47		0.38	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	3.4		3.5		2.7		2.9	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	301		390		606		534	
Delay (s/veh)	8.85		9.93		11.77		10.89	
LOS	A		A		B		B	
Approach: Delay (s/veh)	8.85		9.93		11.77		10.89	
LOS	A		A		B		B	
Intersection Delay (s/veh)	10.98							
Intersection LOS	B							

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ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*AM Peak without bypass*

Site Information

Intersection	*4th Avenue East & 2nd Street E*
Jurisdiction	
Analysis Year	*2030*

Project ID

East/West Street: *4th Avenue East* North/South Street: *2nd Street East*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	16	77	7	8	94	21
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	5	28	21	37	24	19
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.92		0.92		0.92		0.92	
Flow Rate (veh/h)	107		132		57		86	
% Heavy Vehicles	0		0		0		0	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.2		0.1		0.1		0.5	
Prop. Right-Turns	0.1		0.2		0.4		0.2	
Prop. Heavy Vehicle	0.0		0.0		0.0		0.0	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.0		-0.1		-0.2		-0.0	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.10		0.12		0.05		0.08	
hd, final value (s)	4.37		4.26		4.33		4.46	
x, final value	0.13		0.16		0.07		0.11	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	2.4		2.3		2.3		2.5	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	357		382		307		336	
Delay (s/veh)	8.02		8.05		7.65		7.99	
LOS	A		A		A		A	
Approach: Delay (s/veh)	8.02		8.05		7.65		7.99	
LOS	A		A		A		A	
Intersection Delay (s/veh)	7.97							
Intersection LOS	A							

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ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*PM Peak without bypass*

Site Information

Intersection	*4th Avenue East & 2nd Street E*
Jurisdiction	
Analysis Year	*2030*

Project ID

East/West Street: *4th Avenue East* North/South Street: *2nd Street East*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	35	51	20	11	77	20
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	21	35	6	12	37	23
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.92		0.92		0.92		0.92	
Flow Rate (veh/h)	114		115		66		77	
% Heavy Vehicles	0		0		0		0	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.3		0.1		0.3		0.2	
Prop. Right-Turns	0.2		0.2		0.1		0.3	
Prop. Heavy Vehicle	0.0		0.0		0.0		0.0	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.0		-0.1		0.0		-0.2	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.10		0.10		0.06		0.07	
hd, final value (s)	4.32		4.27		4.52		4.34	
x, final value	0.14		0.14		0.08		0.09	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	2.3		2.3		2.5		2.3	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	364		365		316		327	
Delay (s/veh)	8.00		7.94		7.93		7.79	
LOS	A		A		A		A	
Approach: Delay (s/veh)	8.00		7.94		7.93		7.79	
LOS	A		A		A		A	
Intersection Delay (s/veh)	7.92							
Intersection LOS	A							

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ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*AM Peak without bypass (EIS 6)*

Site Information

Intersection	*7. 7th Street East/West & Main*
Jurisdiction	
Analysis Year	*2030*

Project ID

East/West Street: *7th Street East/West*

North/South Street: *Main Street*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	0	251	74	44	148	0
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	27	0	40	0	0	0
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR			
PHF	0.92		0.92		0.92			
Flow Rate (veh/h)	352		207		72			
% Heavy Vehicles	0		0		0			
No. Lanes	1		1		1		0	
Geometry Group	1		1		1			
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.0		0.2		0.4			
Prop. Right-Turns	0.2		0.0		0.6			
Prop. Heavy Vehicle	0.0		0.0		0.0			
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2		
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6		
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7		
hadj, computed	-0.1		0.0		-0.3			

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20			
x, initial	0.31		0.18		0.06			
hd, final value (s)	4.18		4.49		4.83			
x, final value	0.41		0.26		0.10			
Move-up time, m (s)	2.0		2.0		2.0			
Service Time, t_s (s)	2.2		2.5		2.8			

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	602		457		322			
Delay (s/veh)	10.03		9.04		8.35			
LOS	B		A		A			
Approach: Delay (s/veh)	10.03		9.04		8.35			
LOS	B		A		A			
Intersection Delay (s/veh)	9.51							
Intersection LOS	A							

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ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*PM Peak without bypass (EIS 6)*

Site Information

Intersection	*7. 7th Street East/West & Main*
Jurisdiction	
Analysis Year	*2030*

Project ID

East/West Street: *7th Street East/West* North/South Street: *Main Street*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	3	258	51	8	209	0
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	52	1	63	0	0	0
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR			
PHF	0.92		0.92		0.92			
Flow Rate (veh/h)	338		235		125			
% Heavy Vehicles	0		0		0			
No. Lanes	1		1		1		0	
Geometry Group	1		1		1			
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.0		0.0		0.4			
Prop. Right-Turns	0.2		0.0		0.5			
Prop. Heavy Vehicle	0.0		0.0		0.0			
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2		
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6		
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7		
hadj, computed	-0.1		0.0		-0.2			

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20			
x, initial	0.30		0.21		0.11			
hd, final value (s)	4.41		4.62		4.96			
x, final value	0.41		0.30		0.17			
Move-up time, m (s)	2.0		2.0		2.0			
Service Time, t_s (s)	2.4		2.6		3.0			

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	588		485		375			
Delay (s/veh)	10.50		9.60		8.98			
LOS	B		A		A			
Approach: Delay (s/veh)	10.50		9.60		8.98			
LOS	B		A		A			
Intersection Delay (s/veh)	9.92							
Intersection LOS	A							

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*AM Peak without bypass (EIS 6)*

Site Information

Intersection	*10. 7th Avenue West & 2nd Stre*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *7th Avenue West*	North/South Street: *2nd Street West*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*0*	*251*	*32*	*330*	*99*	*2*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*272*	*34*	*358*	*107*	*2*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*5*	*6*	*93*	*4*	*8*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*5*	*6*	*101*	*4*	*8*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*0*	*358*		*112*			*12*	
C (m) (veh/h)	*1494*	*1266*		*531*			*130*	
v/c	*0.00*	*0.28*		*0.21*			*0.09*	
95% queue length	*0.00*	*1.17*		*0.79*			*0.30*	
Control Delay (s/veh)	*7.4*	*9.0*		*13.6*			*35.5*	
LOS	*A*	*A*		*B*			*E*	
Approach Delay (s/veh)	--	--	*13.6*			*35.5*		
Approach LOS	--	--	*B*			*E*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*PM Peak without bypass (EIS 6)*

Site Information

Intersection	*10. 7th Avenue West & 2nd Stre*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *7th Avenue West*	North/South Street: *2nd Street West*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*0*	*199*	*15*	*181*	*299*	*26*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*216*	*16*	*196*	*324*	*28*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*22*	*12*	*142*	*9*	*6*	*4*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*23*	*13*	*154*	*9*	*6*	*4*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*0*	*196*		*190*			*19*	
C (m) (veh/h)	*1218*	*1348*		*521*			*193*	
v/c	*0.00*	*0.15*		*0.36*			*0.10*	
95% queue length	*0.00*	*0.51*		*1.66*			*0.32*	
Control Delay (s/veh)	*8.0*	*8.1*		*15.8*			*25.7*	
LOS	*A*	*A*		*C*			*D*	
Approach Delay (s/veh)	--	--	*15.8*			*25.7*		
Approach LOS	--	--	*C*			*D*		

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ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*AM Peak without bypass (EIS 6)*

Site Information

Intersection	*7th Avenue East & 7th Street E*
Jurisdiction	
Analysis Year	*2030*

Project ID

East/West Street: *7th Avenue East* North/South Street: *7th Street East*

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	30	65	13	24	57	12
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	19	81	12	8	51	23
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.92		0.92		0.92		0.92	
Flow Rate (veh/h)	116		100		121		87	
% Heavy Vehicles	0		0		0		0	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.3		0.3		0.2		0.1	
Prop. Right-Turns	0.1		0.1		0.1		0.3	
Prop. Heavy Vehicle	0.0		0.0		0.0		0.0	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.0		-0.0		-0.0		-0.1	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.10		0.09		0.11		0.08	
hd, final value (s)	4.49		4.50		4.48		4.41	
x, final value	0.14		0.12		0.15		0.11	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	2.5		2.5		2.5		2.4	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	366		350		371		337	
Delay (s/veh)	8.25		8.14		8.27		7.93	
LOS	A		A		A		A	
Approach: Delay (s/veh)	8.25		8.14		8.27		7.93	
LOS	A		A		A		A	
Intersection Delay (s/veh)	8.16							
Intersection LOS	A							

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ALL-WAY STOP CONTROL ANALYSIS

General Information

Analyst	N. Fossen
Agency/Co.	CDM
Date Performed	5/11/2011
Analysis Time Period	PM Peak without bypass (EIS 6)

Site Information

Intersection	7th Avenue East & 7th Street E
Jurisdiction	
Analysis Year	2030

Project ID

East/West Street: 7th Avenue East

North/South Street: 7th Street East

Volume Adjustments and Site Characteristics

Approach	Eastbound			Westbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	40	103	26	33	49	4
%Thrus Left Lane						

Approach	Northbound			Southbound		
Movement	L	T	R	L	T	R
Volume (veh/h)	24	90	23	5	101	37
%Thrus Left Lane						

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.92		0.92		0.92		0.92	
Flow Rate (veh/h)	182		92		147		154	
% Heavy Vehicles	0		0		0		0	
No. Lanes	1		1		1		1	
Geometry Group	1		1		1		1	
Duration, T	0.25							

Saturation Headway Adjustment Worksheet

Prop. Left-Turns	0.2		0.4		0.2		0.0	
Prop. Right-Turns	0.2		0.0		0.2		0.3	
Prop. Heavy Vehicle	0.0		0.0		0.0		0.0	
hLT-adj	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
hRT-adj	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6	-0.6
hHV-adj	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
hadj, computed	-0.0		0.1		-0.1		-0.1	

Departure Headway and Service Time

hd, initial value (s)	3.20		3.20		3.20		3.20	
x, initial	0.16		0.08		0.13		0.14	
hd, final value (s)	4.72		4.93		4.72		4.63	
x, final value	0.24		0.13		0.19		0.20	
Move-up time, m (s)	2.0		2.0		2.0		2.0	
Service Time, t_s (s)	2.7		2.9		2.7		2.6	

Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Capacity (veh/h)	432		342		397		404	
Delay (s/veh)	9.19		8.64		8.85		8.77	
LOS	A		A		A		A	
Approach: Delay (s/veh)	9.19		8.64		8.85		8.77	
LOS	A		A		A		A	
Intersection Delay (s/veh)	8.90							
Intersection LOS	A							

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/5/11*
Analysis Time Period	*AM Peak without bypass (EIS 6)*

Site Information

Intersection	*13. US 93 & Caffrey Road*
Jurisdiction	
Analysis Year	*2010*

Project Description

East/West Street: *Caffrey Road* | North/South Street: *US 93*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*116*	*521*	*0*	*1*	*453*	*9*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*126*	*566*	*0*	*1*	*492*	*9*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*2*	*0*	*1*	*2*	*1*
Configuration	*L*	*T*	*TR*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*5*	*1*	*49*	*1*	*1*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*5*	*1*	*53*	*1*	*1*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*126*	*1*		*2*			*59*	
C (m) (veh/h)	*1074*	*1016*		*145*			*575*	
v/c	*0.12*	*0.00*		*0.01*			*0.10*	
95% queue length	*0.40*	*0.00*		*0.04*			*0.34*	
Control Delay (s/veh)	*8.8*	*8.5*		*30.2*			*12.0*	
LOS	*A*	*A*		*D*			*B*	
Approach Delay (s/veh)	--	--	*30.2*			*12.0*		
Approach LOS	--	--	*D*			*B*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*N. Fossen*	Intersection	*13. US 93 & Caffrey Road*
Agency/Co.	*CDM*	Jurisdiction	
Date Performed	*5/5/11*	Analysis Year	*2010*
Analysis Time Period	*PM Peak without bypass (EIS 6)*		

Project Description

East/West Street: *Caffrey Road*	North/South Street: *US 93*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	82	716	4	1	714	14
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	89	778	4	1	776	15
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	1	2	1
Configuration	L	T	TR	L	T	R
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	7	0	47	1	0	1
Peak-Hour Factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR (veh/h)	7	0	51	1	0	1
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L		LTR			LTR	
v (veh/h)	89	1		2			58	
C (m) (veh/h)	838	845		165			401	
v/c	0.11	0.00		0.01			0.14	
95% queue length	0.36	0.00		0.04			0.50	
Control Delay (s/veh)	9.8	9.3		27.1			15.5	
LOS	A	A		D			C	
Approach Delay (s/veh)	--	--	27.1			15.5		
Approach LOS	--	--	D			C		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*AM Peak without bypass (EIS 6)*

Site Information

Intersection	*15. Kerr Dam Road & Grenier La*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *Grenier Lane*

North/South Street: *Kerr Dam Road*

Intersection Orientation: *North-South*

Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*0*	*121*	*87*	*21*	*55*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*131*	*94*	*22*	*59*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*16*	*0*	*10*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*17*	*0*	*10*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*1*	*0*
Configuration					*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*				
v (veh/h)	*0*	*22*		*27*				
C (m) (veh/h)	*1558*	*1356*		*755*				
v/c	*0.00*	*0.02*		*0.04*				
95% queue length	*0.00*	*0.05*		*0.11*				
Control Delay (s/veh)	*7.3*	*7.7*		*9.9*				
LOS	*A*	*A*		*A*				
Approach Delay (s/veh)	--	--		*9.9*				
Approach LOS	--	--		*A*				

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*PM Peak without bypass (EIS 6)*

Site Information

Intersection	*15. Kerr Dam Road & Grenier La*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *Grenier Lane* | North/South Street: *Kerr Dam Road*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*0*	*110*	*34*	*9*	*148*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*119*	*36*	*9*	*160*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*37*	*0*	*16*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*40*	*0*	*17*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*1*	*0*
Configuration					*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*				
v (veh/h)	*0*	*9*		*57*				
C (m) (veh/h)	*1432*	*1438*		*735*				
v/c	*0.00*	*0.01*		*0.08*				
95% queue length	*0.00*	*0.02*		*0.25*				
Control Delay (s/veh)	*7.5*	*7.5*		*10.3*				
LOS	*A*	*A*		*B*				
Approach Delay (s/veh)	--	--	*10.3*					
Approach LOS	--	--	*B*					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*N. Fossen*	Intersection	*16. Kerr Dam Road & Back Road*
Agency/Co.	*CDM*	Jurisdiction	
Date Performed	*5/10/2011*	Analysis Year	*2030*
Analysis Time Period	*AM Peak without bypass*		

Project Description	
East/West Street: *Back Road*	North/South Street: *Kerr Dam Road*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*4*	*181*	*0*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*4*	*196*	*0*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*18*	*0*	*5*			
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*19*	*0*	*5*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*0*	*0*
Configuration		*LTR*				

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*					*LTR*	
v (veh/h)	*4*	*0*					*24*	
C (m) (veh/h)	*1636*	*1389*					*836*	
v/c	*0.00*	*0.00*					*0.03*	
95% queue length	*0.01*	*0.00*					*0.09*	
Control Delay (s/veh)	*7.2*	*7.6*					*9.4*	
LOS	*A*	*A*					*A*	
Approach Delay (s/veh)	--	--				*9.4*		
Approach LOS	--	--				*A*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*PM Peak without bypass*

Site Information

Intersection	*16. Kerr Dam Road & Back Road*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *Back Road*	North/South Street: *Kerr Dam Road*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*8*	*96*	*0*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*8*	*104*	*0*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*17*	*0*	*4*			
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*18*	*0*	*4*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*0*	*0*
Configuration		*LTR*				

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*					*LTR*	
v (veh/h)	*8*	*0*					*22*	
C (m) (veh/h)	*1636*	*1500*					*909*	
v/c	*0.00*	*0.00*					*0.02*	
95% queue length	*0.01*	*0.00*					*0.07*	
Control Delay (s/veh)	*7.2*	*7.4*					*9.1*	
LOS	*A*	*A*					*A*	
Approach Delay (s/veh)	--	--				*9.1*		
Approach LOS	--	--				*A*		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*US 93 & South Shore Road*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*AM Peak with Bypass (North)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes				1		1		2	1	2	1	
Lane Group				L		R		T	R	L	T	
Volume (vph)				118		222		337	64	129	266	
% Heavy Vehicles				2		2		2	2	2	2	
PHF				0.92		0.92		0.92	0.92	0.92	0.92	
Pretimed/Actuated (P/A)				P		P		P	P	P	P	
Startup Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Extension of Effective Green				2.0		2.0		2.0	2.0	2.0	2.0	
Arrival Type				3		3		3	3	3	3	
Unit Extension				3.0		3.0		3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume	0	0		0	0	0	0	0	0	0	0	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour				0		0		0	0	0	0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	WB Only	02	03	04	SB Only	Thru & RT	07	08
Timing	G = 17.0	G = 0.0	G = 0.0	G = 0.0	G = 12.0	G = 65.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y =	Y = 3	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 100.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate				128		241		366	70	140	289	
Lane Group Capacity				301		507		2306	1029	412	1435	
v/c Ratio				0.43		0.48		0.16	0.07	0.34	0.20	
Green Ratio				0.17		0.32		0.65	0.65	0.12	0.77	
Uniform Delay d_1				37.1		27.3		6.8	6.4	40.4	3.1	
Delay Factor k				0.50		0.50		0.50	0.50	0.50	0.50	
Incremental Delay d_2				4.4		3.2		0.1	0.1	2.2	0.3	
PF Factor				1.000		1.000		1.000	1.000	1.000	1.000	
Control Delay				41.5		30.4		7.0	6.5	42.6	3.4	
Lane Group LOS				D		C		A	A	D	A	
Approach Delay				34.3			6.9			16.2		
Approach LOS				C			A			B		
Intersection Delay	18.3			Intersection LOS						B		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*US 93 & South Shore Road*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*PM Peak with Bypass (North)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes				1		1		2	1	2	1	
Lane Group				L		R		T	R	L	T	
Volume (vph)				222		303		470	144	285	403	
% Heavy Vehicles				2		2		2	2	2	2	
PHF				0.92		0.92		0.92	0.92	0.92	0.92	
Pretimed/Actuated (P/A)				P		P		P	P	P	P	
Startup Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Extension of Effective Green				2.0		2.0		2.0	2.0	2.0	2.0	
Arrival Type				3		3		3	3	3	3	
Unit Extension				3.0		3.0		3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume	0	0		0	0	0	0	0	0	0	0	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour				0		0		0	0	0	0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	WB Only	02	03	04	SB Only	Thru & RT	07	08
Timing	G = 25.0	G = 0.0	G = 0.0	G = 0.0	G = 23.0	G = 57.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y =	Y = 3	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 111.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate				241		329		511	157	310	438	
Lane Group Capacity				399		727		1821	813	712	1343	
v/c Ratio				0.60		0.45		0.28	0.19	0.44	0.33	
Green Ratio				0.23		0.46		0.51	0.51	0.21	0.72	
Uniform Delay d_1				38.6		20.5		15.3	14.6	38.3	5.7	
Delay Factor k				0.50		0.50		0.50	0.50	0.50	0.50	
Incremental Delay d_2				6.6		2.0		0.4	0.5	1.9	0.6	
PF Factor				1.000		1.000		1.000	1.000	1.000	1.000	
Control Delay				45.2		22.5		15.7	15.1	40.3	6.3	
Lane Group LOS				D		C		B	B	D	A	
Approach Delay				32.1			15.6			20.4		
Approach LOS				C			B			C		
Intersection Delay	22.1			Intersection LOS						C		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*US 93 & 4th Avenue East*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*AM Peak with Bypass (North)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	2	401	8	56	397	3	13	3	96	7	3	1
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	A	A	A	A	A	A	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	WB Only	EW Perm	03	04	NS Perm	06	07	08
Timing	G = 8.0	G = 83.0	G = 0.0	G = 0.0	G = 11.0	G = 0.0	G = 0.0	G = 0.0
	Y = 0	Y = 3	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 108.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	2	445		61	435			121			12	
Lane Group Capacity	730	1427		809	1568			163			151	
v/c Ratio	0.00	0.31		0.08	0.28			0.74			0.08	
Green Ratio	0.77	0.77		0.87	0.84			0.10			0.10	
Uniform Delay d_1	2.9	3.8		1.3	1.7			47.1			43.9	
Delay Factor k	0.11	0.11		0.11	0.11			0.50			0.50	
Incremental Delay d_2	0.0	0.1		0.0	0.1			26.0			1.0	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	2.9	3.9		1.3	1.8			73.1			44.9	
Lane Group LOS	A	A		A	A			E			D	
Approach Delay	3.9			1.8			73.1			44.9		
Approach LOS	A			A			E			D		
Intersection Delay	11.2			Intersection LOS						B		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*US 93 & 4th Avenue East*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*PM Peak with Bypass (North)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	2	521	13	63	484	2	44	1	154	4	1	4
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	A	A	A	A	A	A	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	WB Only	EW Perm	03	04	NS Perm	06	07	08
Timing	G = 8.0	G = 83.0	G = 0.0	G = 0.0	G = 11.0	G = 0.0	G = 0.0	G = 0.0
	Y = 0	Y = 3	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 108.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	2	580		68	528			216			9	
Lane Group Capacity	670	1426		701	1569			157			149	
v/c Ratio	0.00	0.41		0.10	0.34			1.38			0.06	
Green Ratio	0.77	0.77		0.87	0.84			0.10			0.10	
Uniform Delay d_1	2.9	4.2		1.7	1.9			48.5			43.8	
Delay Factor k	0.11	0.11		0.11	0.11			0.50			0.50	
Incremental Delay d_2	0.0	0.2		0.1	0.1			203.9			0.8	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	2.9	4.4		1.7	2.0			252.4			44.6	
Lane Group LOS	A	A		A	A			F			D	
Approach Delay	4.4			2.0			252.4			44.6		
Approach LOS	A			A			F			D		
Intersection Delay	41.8			Intersection LOS						D		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*2nd Avenue East & 1st Street E*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*AM Peak with Bypass (North)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	8	282	94	96	197	11	85	15	103	21	24	9
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = 66.0	G = 0.0	G = 0.0	G = 0.0	G = 68.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 140.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	9	409		104	226			220			59	
Lane Group Capacity	479	845		328	871			719			767	
v/c Ratio	0.02	0.48		0.32	0.26			0.31			0.08	
Green Ratio	0.47	0.47		0.47	0.47			0.49			0.49	
Uniform Delay d_1	19.7	25.3		23.0	22.3			21.7			19.2	
Delay Factor k	0.50	0.50		0.50	0.50			0.50			0.50	
Incremental Delay d_2	0.1	2.0		2.5	0.7			1.1			0.2	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	19.8	27.3		25.5	23.0			22.8			19.4	
Lane Group LOS	B	C		C	C			C			B	
Approach Delay	27.2			23.8			22.8			19.4		
Approach LOS	C			C			C			B		
Intersection Delay	24.7			Intersection LOS						C		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*2nd Avenue East & 1st Street E*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*PM Peak with Bypass (North)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	9	329	74	90	367	5	154	22	198	39	47	25
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = 89.0	G = 0.0	G = 0.0	G = 0.0	G = 84.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25					Cycle Length C = 179.0			

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	10	438		98	404			406			120	
Lane Group Capacity	360	901		334	924			651			669	
v/c Ratio	0.03	0.49		0.29	0.44			0.62			0.18	
Green Ratio	0.50	0.50		0.50	0.50			0.47			0.47	
Uniform Delay d_1	22.9	29.8		26.5	28.9			35.6			27.5	
Delay Factor k	0.50	0.50		0.50	0.50			0.50			0.50	
Incremental Delay d_2	0.1	1.9		2.2	1.5			4.5			0.6	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	23.1	31.7		28.7	30.4			40.1			28.1	
Lane Group LOS	C	C		C	C			D			C	
Approach Delay	31.5			30.1			40.1			28.1		
Approach LOS	C			C			D			C		
Intersection Delay	33.1			Intersection LOS						C		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*2nd Avenue East & Main Street*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*AM Peak with Bypass (North)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	8	266	88	88	180	11	2	4	2	4	5	1
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	A	A	A	A	A	A	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = 117.0	G = 0.0	G = 0.0	G = 0.0	G = 17.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 140.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	9	385		96	208			8			10	
Lane Group Capacity	977	1498		808	1544			212			211	
v/c Ratio	0.01	0.26		0.12	0.13			0.04			0.05	
Green Ratio	0.84	0.84		0.84	0.84			0.12			0.12	
Uniform Delay d_1	1.9	2.4		2.1	2.1			54.3			54.3	
Delay Factor k	0.11	0.11		0.11	0.11			0.50			0.50	
Incremental Delay d_2	0.0	0.1		0.1	0.0			0.3			0.4	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	1.9	2.5		2.2	2.2			54.6			54.8	
Lane Group LOS	A	A		A	A			D			D	
Approach Delay	2.5			2.2			54.6			54.8		
Approach LOS	A			A			D			D		
Intersection Delay	3.7			Intersection LOS						A		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*2nd Avenue East & Main Street*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*PM Peak with Bypass (North)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	*1*	*1*	*0*	*1*	*1*	*0*	*0*	*1*	*0*	*0*	*1*	*0*
Lane Group	*L*	*TR*		*L*	*TR*			*LTR*			*LTR*	
Volume (vph)	*9*	*325*	*73*	*100*	*409*	*6*	*97*	*15*	*125*	*112*	*20*	*136*
% Heavy Vehicles	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Pretimed/Actuated (P/A)	*A*	*A*	*A*	*A*	*A*	*A*	*P*	*P*	*P*	*P*	*P*	*P*
Startup Lost Time	*2.0*	*2.0*		*2.0*	*2.0*			*2.0*			*2.0*	
Extension of Effective Green	*2.0*	*2.0*		*2.0*	*2.0*			*2.0*			*2.0*	
Arrival Type	*3*	*3*		*3*	*3*			*3*			*3*	
Unit Extension	*3.0*	*3.0*		*3.0*	*3.0*			*3.0*			*3.0*	
Ped/Bike/RTOR Volume	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Lane Width	*12.0*	*12.0*		*12.0*	*12.0*			*12.0*			*12.0*	
Parking/Grade/Parking	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*
Parking/Hour												
Bus Stops/Hour	*0*	*0*		*0*	*0*			*0*			*0*	
Minimum Pedestrian Time		*3.2*			*3.2*			*3.2*			*3.2*	

Phasing	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = *117.0*	G = *0.0*	G = *0.0*	G = *0.0*	G = *17.0*	G = *0.0*	G = *0.0*	G = *0.0*
	Y = *3*	Y = *0*	Y = *0*	Y = *0*	Y = *3*	Y = *0*	Y = *0*	Y = *0*
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *140.0*		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	*10*	*432*		*109*	*452*			*257*			*292*	
Lane Group Capacity	*750*	*1514*		*767*	*1553*			*135*			*132*	
v/c Ratio	*0.01*	*0.29*		*0.14*	*0.29*			*1.90*			*2.21*	
Green Ratio	*0.84*	*0.84*		*0.84*	*0.84*			*0.12*			*0.12*	
Uniform Delay d_1	*1.9*	*2.5*		*2.1*	*2.5*			*61.5*			*61.5*	
Delay Factor k	*0.11*	*0.11*		*0.11*	*0.11*			*0.50*			*0.50*	
Incremental Delay d_2	*0.0*	*0.1*		*0.1*	*0.1*			*433.0*			*569.3*	
PF Factor	*1.000*	*1.000*		*1.000*	*1.000*			*1.000*			*1.000*	
Control Delay	*1.9*	*2.6*		*2.2*	*2.6*			*494.5*			*630.8*	
Lane Group LOS	*A*	*A*		*A*	*A*			*F*			*F*	
Approach Delay	*2.6*			*2.5*			*494.5*			*630.8*		
Approach LOS	*A*			*A*			*F*			*F*		
Intersection Delay	*202.2*			Intersection LOS						*F*		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*South Shore Road & Heritage Ln*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*AM Peak with Bypass (North)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes		2	0	1	1		1		1			
Lane Group		TR		L	T		L		R			
Volume (vph)		217	103	19	290		48		5			
% Heavy Vehicles		2	2	2	2		2		2			
PHF		0.92	0.92	0.92	0.92		0.92		0.92			
Pretimed/Actuated (P/A)		A	A	A	A		P		P			
Startup Lost Time		2.0		2.0	2.0		2.0		2.0			
Extension of Effective Green		2.0		2.0	2.0		2.0		2.0			
Arrival Type		3		3	3		3		3			
Unit Extension		3.0		3.0	3.0		3.0		3.0			
Ped/Bike/RTOR Volume	0	0	0	0	0		0	0	0	0	0	
Lane Width		12.0		12.0	12.0		12.0		12.0			
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour		0		0	0		0		0			
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NB Only	06	07	08
Timing	G = 117.0	G = 0.0	G = 0.0	G = 0.0	G = 15.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 138.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate		348		21	315		52		5			
Lane Group Capacity		2861		858	1579		192		172			
v/c Ratio		0.12		0.02	0.20		0.27		0.03			
Green Ratio		0.85		0.85	0.85		0.11		0.11			
Uniform Delay d_1		1.8		1.6	1.9		56.5		55.0			
Delay Factor k		0.11		0.11	0.11		0.50		0.50			
Incremental Delay d_2		0.0		0.0	0.1		3.4		0.3			
PF Factor		1.000		1.000	1.000		1.000		1.000			
Control Delay		1.8		1.6	2.0		59.9		55.3			
Lane Group LOS		A		A	A		E		E			
Approach Delay	1.8			2.0			59.5					
Approach LOS	A			A			E					
Intersection Delay	6.3			Intersection LOS						A		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*South Shore Road & Heritage Ln*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*PM Peak with Bypass (North)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes		2	0	1	1		1		1			
Lane Group		TR		L	T		L		R			
Volume (vph)		352	252	26	285		264		24			
% Heavy Vehicles		2	2	2	2		2		2			
PHF		0.92	0.92	0.92	0.92		0.92		0.92			
Pretimed/Actuated (P/A)		A	A	A	A		P		P			
Startup Lost Time		2.0		2.0	2.0		2.0		2.0			
Extension of Effective Green		2.0		2.0	2.0		2.0		2.0			
Arrival Type		3		3	3		3		3			
Unit Extension		3.0		3.0	3.0		3.0		3.0			
Ped/Bike/RTOR Volume	0	0	0	0	0		0	0	0	0	0	
Lane Width		12.0		12.0	12.0		12.0		12.0			
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour		0		0	0		0		0			
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NB Only	06	07	08
Timing	G = 117.0	G = 0.0	G = 0.0	G = 0.0	G = 19.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 5	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 144.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate		657		28	310		287		26			
Lane Group Capacity		2702		592	1514		234		209			
v/c Ratio		0.24		0.05	0.20		1.23		0.12			
Green Ratio		0.81		0.81	0.81		0.13		0.13			
Uniform Delay d_1		3.2		2.6	3.0		62.5		55.2			
Delay Factor k		0.11		0.11	0.11		0.50		0.50			
Incremental Delay d_2		0.0		0.0	0.1		133.7		1.2			
PF Factor		1.000		1.000	1.000		1.000		1.000			
Control Delay		3.2		2.7	3.1		196.2		56.4			
Lane Group LOS		A		A	A		F		E			
Approach Delay	3.2			3.1			184.6					
Approach LOS	A			A			F					
Intersection Delay	46.6			Intersection LOS						D		

 HCS+™ Version 5.4 Generated: 5/11/2011 11:55 AM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*US 93 & Rocky Point Road*
Agency/Co.	*CDM*	Jurisdiction	
Date Performed	*5/10/2011*	Analysis Year	*2030*
Analysis Time Period	*AM Peak with Bypass (North)*		

Project Description

East/West Street: *US 93*	North/South Street: *Rocky Point Road*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*5*	*441*			*168*	*49*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*1.00*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*5*	*479*	*0*	*0*	*182*	*53*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*171*		*6*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*185*	*0*	*6*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*5*						*191*	
C (m) (veh/h)	*1344*						*415*	
v/c	*0.00*						*0.46*	
95% queue length	*0.01*						*2.36*	
Control Delay (s/veh)	*7.7*						*20.9*	
LOS	*A*						*C*	
Approach Delay (s/veh)	--	--				*20.9*		
Approach LOS	--	--				*C*		

 HCS+™ Version 5.4 Generated: 5/11/2011 12:03 PM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*J. Jespersen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*PM Peak with Bypass (North)*

Site Information

Intersection	*US 93 & Rocky Point Road*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *US 93* | North/South Street: *Rocky Point Road*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*1*	*330*			*375*	*160*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*1.00*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*1*	*358*	*0*	*0*	*407*	*173*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*112*		*2*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*121*	*0*	*2*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*1*						*123*	
C (m) (veh/h)	*1004*						*334*	
v/c	*0.00*						*0.37*	
95% queue length	*0.00*						*1.65*	
Control Delay (s/veh)	*8.6*						*21.9*	
LOS	*A*						*C*	
Approach Delay (s/veh)	--	--				*21.9*		
Approach LOS	--	--				*C*		

 HCS+™ Version 5.4 Generated: 5/11/2011 12:02 PM

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*12. US 93 & Irvine Flats Road*
Agency/Co.	*CDM*	Jurisdiction	
Date Performed	*5/10/2011*	Analysis Year	*2030*
Analysis Time Period	*AM Peak with Bypass (North)*		

Project Description	
East/West Street: *US 93*	North/South Street: *Irvine Flats Road*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*5*	*480*	*7*	*8*	*242*	*30*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*5*	*521*	*7*	*8*	*263*	*32*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*0*	*0*	*6*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*6*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*5*	*8*		*6*			*0*	
C (m) (veh/h)	*1278*	*1049*		*557*				
v/c	*0.00*	*0.01*		*0.01*				
95% queue length	*0.01*	*0.02*		*0.03*				
Control Delay (s/veh)	*7.8*	*8.5*		*11.5*				
LOS	*A*	*A*		*B*				
Approach Delay (s/veh)	--	--	*11.5*					
Approach LOS	--	--	*B*					

 HCS+™ Version 5.4 Generated: 5/11/2011 12:04 PM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*J. Jespersen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*PM Peak with Bypass (North)*

Site Information

Intersection	*12. US 93 & Irvine Flats Road*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *US 93* | North/South Street: *Irvine Flats Road*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*5*	*377*	*2*	*12*	*516*	*23*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*5*	*409*	*2*	*13*	*560*	*24*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*6*	*1*	*11*	*0*	*0*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*6*	*1*	*11*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*5*	*13*		*18*			*0*	
C (m) (veh/h)	*1001*	*1159*		*364*				
v/c	*0.00*	*0.01*		*0.05*				
95% queue length	*0.02*	*0.03*		*0.16*				
Control Delay (s/veh)	*8.6*	*8.1*		*15.4*				
LOS	*A*	*A*		*C*				
Approach Delay (s/veh)	--	--	*15.4*					
Approach LOS	--	--	*C*					

 HCS+™ Version 5.4 Generated: 5/11/2011 12:04 PM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*J. Jespersen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*AM Peak with Bypass (North)*

Site Information

Intersection	*13. US 93 & Caffrey Road*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *Caffrey Road* | North/South Street: *US 93*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*126*	*566*	*0*	*1*	*362*	*7*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*136*	*615*	*0*	*1*	*393*	*7*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*2*	*0*	*1*	*2*	*1*
Configuration	*L*	*T*	*TR*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*556*	*111*	*5004*	*1*	*1*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*604*	*120*	*5439*	*1*	*1*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*136*	*1*		*2*			*6163*	
C (m) (veh/h)	*1170*	*974*		*0*			*592*	
v/c	*0.12*	*0.00*					*10.41*	
95% queue length	*0.39*	*0.00*					*699.68*	
Control Delay (s/veh)	*8.5*	*8.7*					*4253*	
LOS	*A*	*A*		*F*			*F*	
Approach Delay (s/veh)	--	--				*4253*		
Approach LOS	--	--				*F*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*J. Jespersen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*PM Peak with Bypass (North)*

Site Information

Intersection	*13. US 93 & Caffrey Road*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *Caffrey Road* | North/South Street: *US 93*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*89*	*778*	*5*	*1*	*571*	*11*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*96*	*845*	*5*	*1*	*620*	*11*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*2*	*0*	*1*	*2*	*1*
Configuration	*L*	*T*	*TR*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*667*	*0*	*4782*	*1*	*0*	*1*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*724*	*0*	*5197*	*1*	*0*	*1*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*96*	*1*		*2*			*5921*	
C (m) (veh/h)	*961*	*797*		*0*			*459*	
v/c	*0.10*	*0.00*					*12.90*	
95% queue length	*0.33*	*0.00*					*685.99*	
Control Delay (s/veh)	*9.2*	*9.5*					*5376*	
LOS	*A*	*A*		*F*			*F*	
Approach Delay (s/veh)	--	--				*5376*		
Approach LOS	--	--				*F*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*15. Kerr Dam Road & Grenier La*
Agency/Co.	*CDM*	Jurisdiction	
Date Performed	*5/10/2011*	Analysis Year	*2030*
Analysis Time Period	*AM Peak with Bypass (North)*		

Project Description

East/West Street: *Grenier Lane*	North/South Street: *Kerr Dam Road*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*0*	*197*	*141*	*35*	*93*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*214*	*153*	*38*	*101*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*22*	*0*	*14*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*23*	*0*	*15*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*1*	*0*
Configuration					*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*				
v (veh/h)	*0*	*38*		*38*				
C (m) (veh/h)	*1504*	*1203*		*608*				
v/c	*0.00*	*0.03*		*0.06*				
95% queue length	*0.00*	*0.10*		*0.20*				
Control Delay (s/veh)	*7.4*	*8.1*		*11.3*				
LOS	*A*	*A*		*B*				
Approach Delay (s/veh)	--	--	*11.3*					
Approach LOS	--	--	*B*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*J. Jespersen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*PM Peak with Bypass (North)*

Site Information

Intersection	*15. Kerr Dam Road & Grenier La*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *Grenier Lane*	North/South Street: *Kerr Dam Road*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*0*	*178*	*55*	*16*	*250*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*193*	*59*	*17*	*271*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*53*	*0*	*22*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*57*	*0*	*23*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*1*	*0*
Configuration					*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*				
v (veh/h)	*0*	*17*		*80*				
C (m) (veh/h)	*1304*	*1325*		*571*				
v/c	*0.00*	*0.01*		*0.14*				
95% queue length	*0.00*	*0.04*		*0.48*				
Control Delay (s/veh)	*7.8*	*7.8*		*12.3*				
LOS	*A*	*A*		*B*				
Approach Delay (s/veh)	--	--	*12.3*					
Approach LOS	--	--	*B*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*J. Jespersen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*AM Peak with Bypass (North)*

Site Information

Intersection	*16. Kerr Dam Road & Back Road*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *Back Road* — North/South Street: *Kerr Dam Road*

Intersection Orientation: *North-South* — Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*5*	*234*	*0*	*0*	*69*	*20*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*5*	*254*	*0*	*0*	*74*	*21*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*18*	*0*	*5*			
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*19*	*0*	*5*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*0*	*0*
Configuration		*LTR*				

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*					*LTR*	
v (veh/h)	*5*	*0*					*24*	
C (m) (veh/h)	*1512*	*1323*					*700*	
v/c	*0.00*	*0.00*					*0.03*	
95% queue length	*0.01*	*0.00*					*0.11*	
Control Delay (s/veh)	*7.4*	*7.7*					*10.3*	
LOS	*A*	*A*					*B*	
Approach Delay (s/veh)	--	--				*10.3*		
Approach LOS	--	--				*B*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*16. Kerr Dam Road & Back Road*
Agency/Co.	*CDM*	Jurisdiction	
Date Performed	*5/10/2011*	Analysis Year	*2030*
Analysis Time Period	*PM Peak with Bypass (North)*		

Project Description	
East/West Street: *Back Road*	North/South Street: *Kerr Dam Road*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*11*	*124*	*0*	*0*	*161*	*37*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*11*	*134*	*0*	*0*	*174*	*40*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*17*	*0*	*4*			
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*18*	*0*	*4*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*0*	*0*
Configuration		*LTR*				

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*					*LTR*	
v (veh/h)	*11*	*0*					*22*	
C (m) (veh/h)	*1368*	*1463*					*676*	
v/c	*0.01*	*0.00*					*0.03*	
95% queue length	*0.02*	*0.00*					*0.10*	
Control Delay (s/veh)	*7.7*	*7.5*					*10.5*	
LOS	*A*	*A*					*B*	
Approach Delay (s/veh)	--	--				*10.5*		
Approach LOS	--	--				*B*		

 HCS+™ Version 5.4 Generated: 5/11/2011 12:00 PM

SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*US 93 & South Shore Road*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*AM Peak with Bypass (South)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes				*1*		*1*		*2*	*1*	*2*	*1*	
Lane Group				*L*		*R*		*T*	*R*	*L*	*T*	
Volume (vph)				*118*		*222*		*332*	*63*	*129*	*265*	
% Heavy Vehicles				*2*		*2*		*2*	*2*	*2*	*2*	
PHF				*0.92*		*0.92*		*0.92*	*0.92*	*0.92*	*0.92*	
Pretimed/Actuated (P/A)				*P*		*P*		*P*	*P*	*P*	*P*	
Startup Lost Time				*2.0*		*2.0*		*2.0*	*2.0*	*2.0*	*2.0*	
Extension of Effective Green				*2.0*		*2.0*		*2.0*	*2.0*	*2.0*	*2.0*	
Arrival Type				*3*		*3*		*3*	*3*	*3*	*3*	
Unit Extension				*3.0*		*3.0*		*3.0*	*3.0*	*3.0*	*3.0*	
Ped/Bike/RTOR Volume	*0*	*0*		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	
Lane Width				*12.0*		*12.0*		*12.0*	*12.0*	*12.0*	*12.0*	
Parking/Grade/Parking	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*	*N*	*0*	*N*
Parking/Hour												
Bus Stops/Hour				*0*		*0*		*0*	*0*	*0*	*0*	
Minimum Pedestrian Time		*3.2*			*3.2*			*3.2*			*3.2*	

Phasing	WB Only	02	03	04	SB Only	Thru & RT	07	08
Timing	G = *17.0*	G = *0.0*	G = *0.0*	G = *0.0*	G = *12.0*	G = *65.0*	G = *0.0*	G = *0.0*
	Y = *3*	Y = *0*	Y = *0*	Y = *0*	Y =	Y = *3*	Y = *0*	Y = *0*
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *100.0*		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate				*128*		*241*		*361*	*68*	*140*	*288*	
Lane Group Capacity				*301*		*507*		*2306*	*1029*	*412*	*1435*	
v/c Ratio				*0.43*		*0.48*		*0.16*	*0.07*	*0.34*	*0.20*	
Green Ratio				*0.17*		*0.32*		*0.65*	*0.65*	*0.12*	*0.77*	
Uniform Delay d_1				*37.1*		*27.3*		*6.8*	*6.4*	*40.4*	*3.1*	
Delay Factor k				*0.50*		*0.50*		*0.50*	*0.50*	*0.50*	*0.50*	
Incremental Delay d_2				*4.4*		*3.2*		*0.1*	*0.1*	*2.2*	*0.3*	
PF Factor				*1.000*		*1.000*		*1.000*	*1.000*	*1.000*	*1.000*	
Control Delay				*41.5*		*30.4*		*7.0*	*6.5*	*42.6*	*3.4*	
Lane Group LOS				*D*		*C*		*A*	*A*	*D*	*A*	
Approach Delay				*34.3*			*6.9*			*16.3*		
Approach LOS				*C*			*A*			*B*		
Intersection Delay	*18.4*			Intersection LOS						*B*		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*US 93 & South Shore Road*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*PM Peak with Bypass (South)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes				1		1		2	1	2	1	
Lane Group				L		R		T	R	L	T	
Volume (vph)				222		303		462	141	285	402	
% Heavy Vehicles				2		2		2	2	2	2	
PHF				0.92		0.92		0.92	0.92	0.92	0.92	
Pretimed/Actuated (P/A)				P		P		P	P	P	P	
Startup Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Extension of Effective Green				2.0		2.0		2.0	2.0	2.0	2.0	
Arrival Type				3		3		3	3	3	3	
Unit Extension				3.0		3.0		3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume	0	0		0	0	0	0	0	0	0	0	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour				0		0		0	0	0	0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	WB Only	02	03	04	SB Only	Thru & RT	07	08
Timing	G = 25.0	G = 0.0	G = 0.0	G = 0.0	G = 23.0	G = 57.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y =	Y = 3	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 111.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate				241		329		502	153	310	437	
Lane Group Capacity				399		727		1821	813	712	1343	
v/c Ratio				0.60		0.45		0.28	0.19	0.44	0.33	
Green Ratio				0.23		0.46		0.51	0.51	0.21	0.72	
Uniform Delay d_1				38.6		20.5		15.3	14.5	38.3	5.7	
Delay Factor k				0.50		0.50		0.50	0.50	0.50	0.50	
Incremental Delay d_2				6.6		2.0		0.4	0.5	1.9	0.6	
PF Factor				1.000		1.000		1.000	1.000	1.000	1.000	
Control Delay				45.2		22.5		15.7	15.1	40.3	6.3	
Lane Group LOS				D		C		B	B	D	A	
Approach Delay				32.1			15.5			20.4		
Approach LOS				C			B			C		
Intersection Delay	22.2			Intersection LOS						C		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*US 93 & 4th Avenue East*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*AM Peak with Bypass (South)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	2	400	8	55	396	3	13	3	95	7	3	1
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	A	A	A	A	A	A	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	WB Only	EW Perm	03	04	NS Perm	06	07	08
Timing	G = 8.0	G = 83.0	G = 0.0	G = 0.0	G = 11.0	G = 0.0	G = 0.0	G = 0.0
	Y = 0	Y = 3	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 108.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	2	444		60	433			120			12	
Lane Group Capacity	731	1427		809	1568			163			152	
v/c Ratio	0.00	0.31		0.07	0.28			0.74			0.08	
Green Ratio	0.77	0.77		0.87	0.84			0.10			0.10	
Uniform Delay d_1	2.9	3.8		1.3	1.7			47.1			43.9	
Delay Factor k	0.11	0.11		0.11	0.11			0.50			0.50	
Incremental Delay d_2	0.0	0.1		0.0	0.1			25.4			1.0	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	2.9	3.9		1.3	1.8			72.5			44.9	
Lane Group LOS	A	A		A	A			E			D	
Approach Delay	3.9			1.8			72.5			44.9		
Approach LOS	A			A			E			D		
Intersection Delay	11.1			Intersection LOS						B		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*US 93 & 4th Avenue East*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*PM Peak with Bypass (South)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	2	520	13	62	483	2	44	1	153	4	1	4
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	A	A	A	A	A	A	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	WB Only	EW Perm	03	04	NS Perm	06	07	08
Timing	G = 8.0	G = 83.0	G = 0.0	G = 0.0	G = 11.0	G = 0.0	G = 0.0	G = 0.0
	Y = 0	Y = 3	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 108.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	2	579		67	527			215			9	
Lane Group Capacity	670	1426		702	1569			157			149	
v/c Ratio	0.00	0.41		0.10	0.34			1.37			0.06	
Green Ratio	0.77	0.77		0.87	0.84			0.10			0.10	
Uniform Delay d_1	2.9	4.2		1.7	1.9			48.5			43.8	
Delay Factor k	0.11	0.11		0.11	0.11			0.50			0.50	
Incremental Delay d_2	0.0	0.2		0.1	0.1			201.3			0.8	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	2.9	4.4		1.7	2.0			249.8			44.6	
Lane Group LOS	A	A		A	A			F			D	
Approach Delay	4.4			2.0			249.8			44.6		
Approach LOS	A			A			F			D		
Intersection Delay	41.3			Intersection LOS						D		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*2nd Avenue East & 1st Street E*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*AM Peak with Bypass (South)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	8	275	91	95	195	11	85	15	103	21	24	9
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = 66.0	G = 0.0	G = 0.0	G = 0.0	G = 68.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25					Cycle Length C = 140.0			

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	9	398		103	224			220			59	
Lane Group Capacity	481	845		337	871			719			767	
v/c Ratio	0.02	0.47		0.31	0.26			0.31			0.08	
Green Ratio	0.47	0.47		0.47	0.47			0.49			0.49	
Uniform Delay d_1	19.7	25.1		22.8	22.3			21.7			19.2	
Delay Factor k	0.50	0.50		0.50	0.50			0.50			0.50	
Incremental Delay d_2	0.1	1.9		2.3	0.7			1.1			0.2	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	19.8	27.0		25.2	23.0			22.8			19.4	
Lane Group LOS	B	C		C	C			C			B	
Approach Delay	26.9			23.7			22.8			19.4		
Approach LOS	C			C			C			B		
Intersection Delay	24.5			Intersection LOS						C		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*2nd Avenue East & 1st Street E*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*PM Peak with Bypass (South)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	9	320	72	89	362	5	155	22	198	39	47	25
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = 89.0	G = 0.0	G = 0.0	G = 0.0	G = 84.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 179.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	10	426		97	398			407			120	
Lane Group Capacity	365	901		343	924			650			669	
v/c Ratio	0.03	0.47		0.28	0.43			0.63			0.18	
Green Ratio	0.50	0.50		0.50	0.50			0.47			0.47	
Uniform Delay d_1	22.9	29.6		26.3	28.8			35.7			27.5	
Delay Factor k	0.50	0.50		0.50	0.50			0.50			0.50	
Incremental Delay d_2	0.1	1.8		2.1	1.5			4.5			0.6	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	23.1	31.4		28.4	30.3			40.2			28.1	
Lane Group LOS	C	C		C	C			D			C	
Approach Delay	31.2			29.9			40.2			28.1		
Approach LOS	C			C			D			C		
Intersection Delay	33.0			Intersection LOS						C		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*2nd Avenue East & Main Street*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*AM Peak with Bypass (South)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	8	265	87	87	178	11	2	4	2	4	5	1
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	A	A	A	A	A	A	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = 117.0	G = 0.0	G = 0.0	G = 0.0	G = 17.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25					Cycle Length C = 140.0			

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	9	383		95	205			8			10	
Lane Group Capacity	979	1498		810	1543			212			211	
v/c Ratio	0.01	0.26		0.12	0.13			0.04			0.05	
Green Ratio	0.84	0.84		0.84	0.84			0.12			0.12	
Uniform Delay d_1	1.9	2.4		2.1	2.1			54.3			54.3	
Delay Factor k	0.11	0.11		0.11	0.11			0.50			0.50	
Incremental Delay d_2	0.0	0.1		0.1	0.0			0.3			0.4	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	1.9	2.5		2.2	2.2			54.6			54.8	
Lane Group LOS	A	A		A	A			D			D	
Approach Delay	2.5			2.2			54.6			54.8		
Approach LOS	A			A			D			D		
Intersection Delay	3.7			Intersection LOS						A		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*2nd Avenue East & Main Street*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*AM Peak with Bypass (South)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	9	324	73	99	404	6	104	16	134	112	20	135
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	A	A	A	A	A	A	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = 117.0	G = 0.0	G = 0.0	G = 0.0	G = 17.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 140.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	10	431		108	446			276			291	
Lane Group Capacity	755	1514		768	1553			135			132	
v/c Ratio	0.01	0.28		0.14	0.29			2.04			2.20	
Green Ratio	0.84	0.84		0.84	0.84			0.12			0.12	
Uniform Delay d_1	1.9	2.5		2.1	2.5			61.5			61.5	
Delay Factor k	0.11	0.11		0.11	0.11			0.50			0.50	
Incremental Delay d_2	0.0	0.1		0.1	0.1			494.8			565.9	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	1.9	2.6		2.2	2.6			556.3			627.4	
Lane Group LOS	A	A		A	A			F			F	
Approach Delay	2.6			2.5			556.3			627.4		
Approach LOS	A			A			F			F		
Intersection Delay	216.8			Intersection LOS						F		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*South Shore Road & Heritage Ln*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*AM Peak with Bypass (South)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes		2	0	1	1		1		1			
Lane Group		TR		L	T		L		R			
Volume (vph)		217	103	19	290		48		5			
% Heavy Vehicles		2	2	2	2		2		2			
PHF		0.92	0.92	0.92	0.92		0.92		0.92			
Pretimed/Actuated (P/A)		A	A	A	A		P		P			
Startup Lost Time		2.0		2.0	2.0		2.0		2.0			
Extension of Effective Green		2.0		2.0	2.0		2.0		2.0			
Arrival Type		3		3	3		3		3			
Unit Extension		3.0		3.0	3.0		3.0		3.0			
Ped/Bike/RTOR Volume	0	0	0	0	0		0	0	0	0	0	
Lane Width		12.0		12.0	12.0		12.0		12.0			
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour		0		0	0		0		0			
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NB Only	06	07	08
Timing	G = 117.0	G = 0.0	G = 0.0	G = 0.0	G = 15.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 138.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate		348		21	315		52		5			
Lane Group Capacity		2861		858	1579		192		172			
v/c Ratio		0.12		0.02	0.20		0.27		0.03			
Green Ratio		0.85		0.85	0.85		0.11		0.11			
Uniform Delay d_1		1.8		1.6	1.9		56.5		55.0			
Delay Factor k		0.11		0.11	0.11		0.50		0.50			
Incremental Delay d_2		0.0		0.0	0.1		3.4		0.3			
PF Factor		1.000		1.000	1.000		1.000		1.000			
Control Delay		1.8		1.6	2.0		59.9		55.3			
Lane Group LOS		A		A	A		E		E			
Approach Delay	1.8			2.0			59.5					
Approach LOS	A			A			E					
Intersection Delay	6.3			Intersection LOS						A		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*South Shore Road & Heritage Ln*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*PM Peak with Bypass (South)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes		2	0	1	1		1		1			
Lane Group		TR		L	T		L		R			
Volume (vph)		351	251	26	285		264		24			
% Heavy Vehicles		2	2	2	2		2		2			
PHF		0.92	0.92	0.92	0.92		0.92		0.92			
Pretimed/Actuated (P/A)		A	A	A	A		P		P			
Startup Lost Time		2.0		2.0	2.0		2.0		2.0			
Extension of Effective Green		2.0		2.0	2.0		2.0		2.0			
Arrival Type		3		3	3		3		3			
Unit Extension		3.0		3.0	3.0		3.0		3.0			
Ped/Bike/RTOR Volume	0	0	0	0	0		0	0	0	0	0	
Lane Width		12.0		12.0	12.0		12.0		12.0			
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour		0		0	0		0		0			
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NB Only	06	07	08
Timing	G = 117.0	G = 0.0	G = 0.0	G = 0.0	G = 19.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 5	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 144.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate		655		28	310		287		26			
Lane Group Capacity		2702		593	1514		234		209			
v/c Ratio		0.24		0.05	0.20		1.23		0.12			
Green Ratio		0.81		0.81	0.81		0.13		0.13			
Uniform Delay d_1		3.2		2.6	3.0		62.5		55.2			
Delay Factor k		0.11		0.11	0.11		0.50		0.50			
Incremental Delay d_2		0.0		0.0	0.1		133.7		1.2			
PF Factor		1.000		1.000	1.000		1.000		1.000			
Control Delay		3.2		2.7	3.1		196.2		56.4			
Lane Group LOS		A		A	A		F		E			
Approach Delay	3.2			3.1			184.6					
Approach LOS	A			A			F					
Intersection Delay	46.6			Intersection LOS						D		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*J. Jespersen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*AM Peak with Bypass (South)*

Site Information

Intersection	*US 93 & Rocky Point Road*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *US 93*	North/South Street: *Rocky Point Road*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*5*	*441*			*168*	*49*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*1.00*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*5*	*479*	*0*	*0*	*182*	*53*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*171*		*0*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*185*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*5*						*185*	
C (m) (veh/h)	*1344*						*408*	
v/c	*0.00*						*0.45*	
95% queue length	*0.01*						*2.30*	
Control Delay (s/veh)	*7.7*						*20.9*	
LOS	*A*						*C*	

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*J. Jespersen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*PM Peak with Bypass (South)*

Site Information

Intersection	*US 93 & Rocky Point Road*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *US 93* | North/South Street: *Rocky Point Road*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*1*	*330*			*375*	*160*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*1.00*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*1*	*358*	*0*	*0*	*407*	*173*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*112*		*2*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*121*	*0*	*2*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*1*						*123*	
C (m) (veh/h)	*1004*						*334*	
v/c	*0.00*						*0.37*	
95% queue length	*0.00*						*1.65*	
Control Delay (s/veh)	*8.6*						*21.9*	
LOS	*A*						*C*	
Approach Delay (s/veh)	--	--				*21.9*		
Approach LOS	--	--				*C*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*J. Jespersen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*AM Peak with Bypass (South)*

Site Information

Intersection	*12. US 93 & Irvine Flats Road*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *US 93* — North/South Street: *Irvine Flats Road*

Intersection Orientation: *East-West* — Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*4*	*405*	*6*	*6*	*179*	*22*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*4*	*440*	*6*	*6*	*194*	*23*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*0*	*0*	*5*	*1*	*0*	*2*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*5*	*1*	*0*	*2*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*4*	*6*		*5*			*3*	
C (m) (veh/h)	*1365*	*1125*		*619*			*587*	
v/c	*0.00*	*0.01*		*0.01*			*0.01*	
95% queue length	*0.01*	*0.02*		*0.02*			*0.02*	
Control Delay (s/veh)	*7.6*	*8.2*		*10.9*			*11.2*	
LOS	*A*	*A*		*B*			*B*	
Approach Delay (s/veh)	--	--	*10.9*			*11.2*		
Approach LOS	--	--	*B*			*B*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*12. US 93 & Irvine Flats Road*
Agency/Co.	*CDM*	Jurisdiction	
Date Performed	*5/10/2011*	Analysis Year	*2030*
Analysis Time Period	*PM Peak with Bypass (South)*		

Project Description

East/West Street: *US 93*	North/South Street: *Irvine Flats Road*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*4*	*318*	*2*	*9*	*381*	*17*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*4*	*345*	*2*	*9*	*414*	*18*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*5*	*1*	*9*	*24*	*0*	*7*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*5*	*1*	*9*	*26*	*0*	*7*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
v (veh/h)	*4*	*9*		*15*			*33*	
C (m) (veh/h)	*1138*	*1223*		*458*			*336*	
v/c	*0.00*	*0.01*		*0.03*			*0.10*	
95% queue length	*0.01*	*0.02*		*0.10*			*0.32*	
Control Delay (s/veh)	*8.2*	*8.0*		*13.1*			*16.9*	
LOS	*A*	*A*		*B*			*C*	
Approach Delay (s/veh)	--	--	*13.1*			*16.9*		
Approach LOS	--	--	*B*			*C*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*J. Jespersen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*AM Peak with Bypass (South)*

Site Information

Intersection	*13. US 93 & Caffrey Road*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *Caffrey Road*	North/South Street: *US 93*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*133*	*596*	*0*	*1*	*362*	*7*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*144*	*647*	*0*	*1*	*393*	*7*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*2*	*0*	*1*	*2*	*1*
Configuration	*L*	*T*	*TR*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*662*	*132*	*5960*	*1*	*1*	*0*
Peak-Hour Factor, PHF	*1.00*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*662*	*143*	*6478*	*1*	*1*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*144*	*1*		*2*			*7283*	
C (m) (veh/h)	*1170*	*948*		*0*			*588*	
v/c	*0.12*	*0.00*					*12.39*	
95% queue length	*0.42*	*0.00*					*840.13*	
Control Delay (s/veh)	*8.5*	*8.8*					*5141*	
LOS	*A*	*A*		*F*			*F*	
Approach Delay (s/veh)	--	--				*5141*		
Approach LOS	--	--				*F*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*J. Jespersen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*PM Peak with Bypass (South)*

Site Information

Intersection	*13. US 93 & Caffrey Road*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *Caffrey Road*	North/South Street: *US 93*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*94*	*819*	*5*	*1*	*571*	*11*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*102*	*890*	*5*	*1*	*620*	*11*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*2*	*0*	*1*	*2*	*1*
Configuration	*L*	*T*	*TR*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*795*	*0*	*5696*	*1*	*0*	*1*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*864*	*0*	*6191*	*1*	*0*	*1*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*102*	*1*		*2*			*7055*	
C (m) (veh/h)	*961*	*767*		*0*			*445*	
v/c	*0.11*	*0.00*					*15.85*	
95% queue length	*0.36*	*0.00*					*829.44*	
Control Delay (s/veh)	*9.2*	*9.7*					*6706*	
LOS	*A*	*A*		*F*			*F*	
Approach Delay (s/veh)	--	--				*6706*		
Approach LOS	--	--				*F*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*J. Jespersen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*AM Peak with Bypass (South)*

Site Information

Intersection	*15. Kerr Dam Road & Grenier La*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *Grenier Lane*

North/South Street: *Kerr Dam Road*

Intersection Orientation: *North-South*

Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*0*	*63*	*45*	*10*	*27*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*68*	*48*	*10*	*29*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*17*	*0*	*10*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*18*	*0*	*10*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*1*	*0*
Configuration					*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*				
v (veh/h)	*0*	*10*		*28*				
C (m) (veh/h)	*1597*	*1485*		*890*				
v/c	*0.00*	*0.01*		*0.03*				
95% queue length	*0.00*	*0.02*		*0.10*				
Control Delay (s/veh)	*7.3*	*7.4*		*9.2*				
LOS	*A*	*A*		*A*				
Approach Delay (s/veh)	--	--	*9.2*					
Approach LOS	--	--	*A*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*J. Jespersen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*PM Peak with Bypass (South)*

Site Information

Intersection	*15. Kerr Dam Road & Grenier La*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *Grenier Lane*	North/South Street: *Kerr Dam Road*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*0*	*57*	*18*	*5*	*72*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*61*	*19*	*5*	*78*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*39*	*0*	*17*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*42*	*0*	*18*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*1*	*0*
Configuration					*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*				
v (veh/h)	*0*	*5*		*60*				
C (m) (veh/h)	*1533*	*1531*		*878*				
v/c	*0.00*	*0.00*		*0.07*				
95% queue length	*0.00*	*0.01*		*0.22*				
Control Delay (s/veh)	*7.3*	*7.4*		*9.4*				
LOS	*A*	*A*		*A*				
Approach Delay (s/veh)	--	--	*9.4*					
Approach LOS	--	--	*A*					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*16. Kerr Dam Road & Back Road*
Agency/Co.	*CDM*	Jurisdiction	
Date Performed	*5/10/2011*	Analysis Year	*2030*
Analysis Time Period	*AM Peak with Bypass (South)*		

Project Description	
East/West Street: *Back Road*	North/South Street: *Kerr Dam Road*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*5*	*200*	*0*	*0*	*60*	*17*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*5*	*217*	*0*	*0*	*65*	*18*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*18*	*0*	*5*			
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*19*	*0*	*5*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*0*	*0*
Configuration		*LTR*				

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*					*LTR*	
v (veh/h)	*5*	*0*					*24*	
C (m) (veh/h)	*1527*	*1365*					*740*	
v/c	*0.00*	*0.00*					*0.03*	
95% queue length	*0.01*	*0.00*					*0.10*	
Control Delay (s/veh)	*7.4*	*7.6*					*10.0*	
LOS	*A*	*A*					*B*	
Approach Delay (s/veh)	--	--				*10.0*		
Approach LOS	--	--				*B*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*J. Jespersen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*PM Peak with Bypass (South)*

Site Information

Intersection	*16. Kerr Dam Road & Back Road*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *Back Road*
North/South Street: *Kerr Dam Road*
Intersection Orientation: *North-South*
Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*9*	*106*	*0*	*0*	*140*	*32*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*9*	*115*	*0*	*0*	*152*	*34*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*17*	*0*	*4*			
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*18*	*0*	*4*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*0*	*0*
Configuration		*LTR*				

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*					*LTR*	
v (veh/h)	*9*	*0*					*22*	
C (m) (veh/h)	*1401*	*1487*					*718*	
v/c	*0.01*	*0.00*					*0.03*	
95% queue length	*0.02*	*0.00*					*0.09*	
Control Delay (s/veh)	*7.6*	*7.4*					*10.2*	
LOS	*A*	*A*					*B*	
Approach Delay (s/veh)	--	--				*10.2*		
Approach LOS	--	--				*B*		

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SHORT REPORT

General Information		Site Information	
Analyst	*N. Fossen*	Intersection	*US 93 & South Shore Road*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/5/2011*	Jurisdiction	
Time Period	*AM Peak with bypass (EIS 6)*	Analysis Year	*2010*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes				1		1		2	1	2	1	
Lane Group				L		R		T	R	L	T	
Volume (vph)				117		220		327	62	128	264	
% Heavy Vehicles				2		2		2	2	2	2	
PHF				0.85		0.82		0.82	0.94	0.73	0.95	
Pretimed/Actuated (P/A)				P		P		P	P	P	P	
Startup Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Extension of Effective Green				2.0		2.0		2.0	2.0	2.0	2.0	
Arrival Type				3		3		3	3	3	3	
Unit Extension				3.0		3.0		3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume	0	0		0	0	0	0	0	0	0	0	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour				0		0		0	0	0	0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	WB Only	02	03	04	SB Only	Thru & RT	07	08
Timing	G = 17.0	G = 0.0	G = 0.0	G = 0.0	G = 12.0	G = 65.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y =	Y = 3	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 100.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate				138		268		399	66	175	278	
Lane Group Capacity				301		507		2306	1029	412	1435	
v/c Ratio				0.46		0.53		0.17	0.06	0.42	0.19	
Green Ratio				0.17		0.32		0.65	0.65	0.12	0.77	
Uniform Delay d_1				37.4		27.8		6.9	6.4	40.8	3.1	
Delay Factor k				0.50		0.50		0.50	0.50	0.50	0.50	
Incremental Delay d_2				5.0		3.9		0.2	0.1	3.2	0.3	
PF Factor				1.000		1.000		1.000	1.000	1.000	1.000	
Control Delay				42.3		31.7		7.1	6.5	44.0	3.4	
Lane Group LOS				D		C		A	A	D	A	
Approach Delay				35.3			7.0			19.1		
Approach LOS				D			A			B		
Intersection Delay	19.8			Intersection LOS						B		

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SHORT REPORT

General Information		Site Information	
Analyst	*N. Fossen*	Intersection	*US 93 & South Shore Road*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/5/2011*	Jurisdiction	
Time Period	*PM Peak with bypass (EIS 6)*	Analysis Year	*2010*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes				1		1		2	1	2	1	
Lane Group				L		R		T	R	L	T	
Volume (vph)				220		300		456	139	283	399	
% Heavy Vehicles				2		2		2	2	2	2	
PHF				0.83		0.86		0.93	0.70	0.83	0.90	
Pretimed/Actuated (P/A)				P		P		P	P	P	P	
Startup Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Extension of Effective Green				2.0		2.0		2.0	2.0	2.0	2.0	
Arrival Type				3		3		3	3	3	3	
Unit Extension				3.0		3.0		3.0	3.0	3.0	3.0	
Ped/Bike/RTOR Volume	0	0		0	0	0	0	0	0	0	0	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour				0		0		0	0	0	0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	WB Only	02	03	04	SB Only	Thru & RT	07	08
Timing	G = 25.0	G = 0.0	G = 0.0	G = 0.0	G = 23.0	G = 57.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y =	Y = 3	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 111.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate				265		349		490	199	341	443	
Lane Group Capacity				399		727		1821	813	712	1343	
v/c Ratio				0.66		0.48		0.27	0.24	0.48	0.33	
Green Ratio				0.23		0.46		0.51	0.51	0.21	0.72	
Uniform Delay d_1				39.2		20.8		15.2	15.0	38.7	5.7	
Delay Factor k				0.50		0.50		0.50	0.50	0.50	0.50	
Incremental Delay d_2				8.4		2.3		0.4	0.7	2.3	0.7	
PF Factor				1.000		1.000		1.000	1.000	1.000	1.000	
Control Delay				47.6		23.1		15.6	15.7	41.0	6.3	
Lane Group LOS				D		C		B	B	D	A	
Approach Delay				33.7			15.6			21.4		
Approach LOS				C			B			C		
Intersection Delay	23.1			Intersection LOS						C		

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SHORT REPORT

General Information		Site Information	
Analyst	*N. Fossen*	Intersection	*US 93 & 4th Avenue East*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/11*	Jurisdiction	
Time Period	*AM Peak with bypass (EIS 6)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	2	399	8	55	395	3	13	3	95	7	3	1
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	A	A	A	A	A	A	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	WB Only	EW Perm	03	04	NS Perm	06	07	08
Timing	G = 8.0	G = 83.0	G = 0.0	G = 0.0	G = 11.0	G = 0.0	G = 0.0	G = 0.0
	Y = 0	Y = 3	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 108.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	2	443		60	432			120			12	
Lane Group Capacity	732	1427		810	1568			163			152	
v/c Ratio	0.00	0.31		0.07	0.28			0.74			0.08	
Green Ratio	0.77	0.77		0.87	0.84			0.10			0.10	
Uniform Delay d_1	2.9	3.8		1.3	1.7			47.1			43.9	
Delay Factor k	0.11	0.11		0.11	0.11			0.50			0.50	
Incremental Delay d_2	0.0	0.1		0.0	0.1			25.4			1.0	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	2.9	3.9		1.3	1.8			72.5			44.9	
Lane Group LOS	A	A		A	A			E			D	
Approach Delay	3.9			1.8			72.5			44.9		
Approach LOS	A			A			E			D		
Intersection Delay	11.1			Intersection LOS						B		

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SHORT REPORT

General Information		Site Information	
Analyst	N. Fossen	Intersection	US 93 & 4th Avenue East
Agency or Co.	CDM	Area Type	All other areas
Date Performed	5/10/11	Jurisdiction	
Time Period	PM Peak with bypass (EIS 6)	Analysis Year	2030

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	2	519	13	62	482	2	44	1	153	4	1	4
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	A	A	A	A	A	A	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	WB Only	EW Perm	03	04	NS Perm	06	07	08
Timing	G = 8.0	G = 83.0	G = 0.0	G = 0.0	G = 11.0	G = 0.0	G = 0.0	G = 0.0
	Y = 0	Y = 3	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 108.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	2	578		67	526			215			9	
Lane Group Capacity	671	1426		703	1569			157			149	
v/c Ratio	0.00	0.41		0.10	0.34			1.37			0.06	
Green Ratio	0.77	0.77		0.87	0.84			0.10			0.10	
Uniform Delay d_1	2.9	4.2		1.6	1.9			48.5			43.8	
Delay Factor k	0.11	0.11		0.11	0.11			0.50			0.50	
Incremental Delay d_2	0.0	0.2		0.1	0.1			201.3			0.8	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	2.9	4.4		1.7	2.0			249.8			44.6	
Lane Group LOS	A	A		A	A			F			D	
Approach Delay	4.4			2.0			249.8			44.6		
Approach LOS	A			A			F			D		
Intersection Delay	41.4			Intersection LOS						D		

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SHORT REPORT

General Information		Site Information	
Analyst	*N. Fossen*	Intersection	*2nd Avenue East & 1st Street E*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*AM Peak with bypass (EIS 6)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	8	280	93	96	197	11	84	15	102	23	26	10
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = 66.0	G = 0.0	G = 0.0	G = 0.0	G = 68.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0

Duration of Analysis (hrs) = 0.25 | Cycle Length C = 140.0

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	9	405		104	226			218			64	
Lane Group Capacity	479	845		331	871			718			763	
v/c Ratio	0.02	0.48		0.31	0.26			0.30			0.08	
Green Ratio	0.47	0.47		0.47	0.47			0.49			0.49	
Uniform Delay d_1	19.7	25.3		23.0	22.3			21.7			19.3	
Delay Factor k	0.50	0.50		0.50	0.50			0.50			0.50	
Incremental Delay d_2	0.1	1.9		2.5	0.7			1.1			0.2	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	19.8	27.2		25.4	23.0			22.8			19.5	
Lane Group LOS	B	C		C	C			C			B	
Approach Delay	27.0			23.8			22.8			19.5		
Approach LOS	C			C			C			B		
Intersection Delay	24.6			Intersection LOS						C		

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SHORT REPORT

General Information		Site Information	
Analyst	*N. Fossen*	Intersection	*2nd Avenue East & 1st Street E*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*PM Peak with bypass (EIS 6)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	9	326	73	90	365	5	153	22	196	42	50	27
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = 89.0	G = 0.0	G = 0.0	G = 0.0	G = 84.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 179.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	10	433		98	402			403			129	
Lane Group Capacity	361	901		338	924			647			661	
v/c Ratio	0.03	0.48		0.29	0.44			0.62			0.20	
Green Ratio	0.50	0.50		0.50	0.50			0.47			0.47	
Uniform Delay d_1	22.9	29.7		26.4	28.9			35.6			27.8	
Delay Factor k	0.50	0.50		0.50	0.50			0.50			0.50	
Incremental Delay d_2	0.1	1.8		2.2	1.5			4.5			0.7	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	23.1	31.6		28.6	30.4			40.1			28.4	
Lane Group LOS	C	C		C	C			D			C	
Approach Delay	31.4			30.0			40.1			28.4		
Approach LOS	C			C			D			C		
Intersection Delay	33.0			Intersection LOS						C		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*2nd Avenue East & Main Street*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*AM Peak with Bypass (EIS 6)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	8	260	86	87	178	87	2	4	2	4	5	1
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	A	A	A	A	A	A	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = 117.0	G = 0.0	G = 0.0	G = 0.0	G = 17.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25					Cycle Length C = 140.0			

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	9	376		95	288			8			10	
Lane Group Capacity	898	1499		816	1480			212			211	
v/c Ratio	0.01	0.25		0.12	0.19			0.04			0.05	
Green Ratio	0.84	0.84		0.84	0.84			0.12			0.12	
Uniform Delay d_1	1.9	2.4		2.1	2.3			54.3			54.3	
Delay Factor k	0.11	0.11		0.11	0.11			0.50			0.50	
Incremental Delay d_2	0.0	0.1		0.1	0.1			0.3			0.4	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	1.9	2.5		2.2	2.3			54.6			54.8	
Lane Group LOS	A	A		A	A			D			D	
Approach Delay	2.5			2.3			54.6			54.8		
Approach LOS	A			A			D			D		
Intersection Delay	3.6			Intersection LOS						A		

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SHORT REPORT

General Information		Site Information	
Analyst	*J. Jespersen*	Intersection	*2nd Avenue East & Main Street*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/10/2011*	Jurisdiction	
Time Period	*PM Peak with Bypass (EIS6)*	Analysis Year	*2030*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Lane Group	L	TR		L	TR			LTR			LTR	
Volume (vph)	9	318	72	99	404	6	96	14	124	108	19	130
% Heavy Vehicles	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed/Actuated (P/A)	A	A	A	A	A	A	P	P	P	P	P	P
Startup Lost Time	2.0	2.0		2.0	2.0			2.0			2.0	
Extension of Effective Green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival Type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour	0	0		0	0			0			0	
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = 117.0	G = 0.0	G = 0.0	G = 0.0	G = 17.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 140.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate	10	424		108	446			254			279	
Lane Group Capacity	755	1513		774	1553			135			132	
v/c Ratio	0.01	0.28		0.14	0.29			1.88			2.11	
Green Ratio	0.84	0.84		0.84	0.84			0.12			0.12	
Uniform Delay d_1	1.9	2.5		2.1	2.5			61.5			61.5	
Delay Factor k	0.11	0.11		0.11	0.11			0.50			0.50	
Incremental Delay d_2	0.0	0.1		0.1	0.1			423.3			525.8	
PF Factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control Delay	1.9	2.6		2.2	2.6			484.8			587.3	
Lane Group LOS	A	A		A	A			F			F	
Approach Delay	2.6			2.5			484.8			587.3		
Approach LOS	A			A			F			F		
Intersection Delay	190.3			Intersection LOS						F		

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SHORT REPORT

General Information		Site Information	
Analyst	*N. Fossen*	Intersection	*South Shore Road & Heritage Ln*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/5/11*	Jurisdiction	
Time Period	*AM Peak with bypass (EIS 6)*	Analysis Year	*2010*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes		2	0	1	1		1		1			
Lane Group		TR		L	T		L		R			
Volume (vph)		215	102	19	288		48		5			
% Heavy Vehicles		2	2	2	2		2		2			
PHF		0.78	0.71	0.54	0.85		0.71		0.50			
Pretimed/Actuated (P/A)		A	A	A	A		P		P			
Startup Lost Time		2.0		2.0	2.0		2.0		2.0			
Extension of Effective Green		2.0		2.0	2.0		2.0		2.0			
Arrival Type		3		3	3		3		3			
Unit Extension		3.0		3.0	3.0		3.0		3.0			
Ped/Bike/RTOR Volume	0	0	0	0	0		0	0	0	0	0	
Lane Width		12.0		12.0	12.0		12.0		12.0			
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour		0		0	0		0		0			
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NB Only	06	07	08
Timing	G = 117.0	G = 0.0	G = 0.0	G = 0.0	G = 15.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 3	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 138.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate		420		35	339		68		10			
Lane Group Capacity		2852		800	1579		192		172			
v/c Ratio		0.15		0.04	0.21		0.35		0.06			
Green Ratio		0.85		0.85	0.85		0.11		0.11			
Uniform Delay d_1		1.8		1.7	2.0		57.0		55.2			
Delay Factor k		0.11		0.11	0.11		0.50		0.50			
Incremental Delay d_2		0.0		0.0	0.1		5.1		0.6			
PF Factor		1.000		1.000	1.000		1.000		1.000			
Control Delay		1.8		1.7	2.0		62.1		55.8			
Lane Group LOS		A		A	A		E		E			
Approach Delay	1.8			2.0			61.3					
Approach LOS	A			A			E					
Intersection Delay	7.2			Intersection LOS						A		

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SHORT REPORT

General Information		Site Information	
Analyst	*N. Fossen*	Intersection	*South Shore Road & Heritage Ln*
Agency or Co.	*CDM*	Area Type	*All other areas*
Date Performed	*5/5/11*	Jurisdiction	
Time Period	*PM Peak with bypass (EIS 6)*	Analysis Year	*2010*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of Lanes		2	0	1	1		1		1			
Lane Group		TR		L	T		L		R			
Volume (vph)		349	249	25	283		264		24			
% Heavy Vehicles		2	2	2	2		2		2			
PHF		0.95	0.82	0.71	0.87		0.97		0.83			
Pretimed/Actuated (P/A)		A	A	A	A		P		P			
Startup Lost Time		2.0		2.0	2.0		2.0		2.0			
Extension of Effective Green		2.0		2.0	2.0		2.0		2.0			
Arrival Type		3		3	3		3		3			
Unit Extension		3.0		3.0	3.0		3.0		3.0			
Ped/Bike/RTOR Volume	0	0	0	0	0		0	0	0	0	0	
Lane Width		12.0		12.0	12.0		12.0		12.0			
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/Hour												
Bus Stops/Hour		0		0	0		0		0			
Minimum Pedestrian Time		3.2			3.2			3.2			3.2	

Phasing	EW Perm	02	03	04	NB Only	06	07	08
Timing	G = 117.0	G = 0.0	G = 0.0	G = 0.0	G = 19.0	G = 0.0	G = 0.0	G = 0.0
	Y = 3	Y = 0	Y = 0	Y = 0	Y = 5	Y = 0	Y = 0	Y = 0
Duration of Analysis (hrs) = 0.25						Cycle Length C = 144.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adjusted Flow Rate		671		35	325		272		29			
Lane Group Capacity		2686		583	1514		234		209			
v/c Ratio		0.25		0.06	0.21		1.16		0.14			
Green Ratio		0.81		0.81	0.81		0.13		0.13			
Uniform Delay d_1		3.2		2.7	3.1		62.5		55.3			
Delay Factor k		0.11		0.11	0.11		0.50		0.50			
Incremental Delay d_2		0.0		0.0	0.1		109.7		1.4			
PF Factor		1.000		1.000	1.000		1.000		1.000			
Control Delay		3.2		2.7	3.1		172.2		56.6			
Lane Group LOS		A		A	A		F		E			
Approach Delay	3.2			3.1			161.1					
Approach LOS	A			A			F					
Intersection Delay	38.9			Intersection LOS						D		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*AM Peak with bypass (EIS 6)*

Site Information

Intersection	*US 93 & Rocky Point Road*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *US 93*	North/South Street: *Rocky Point Road*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*5*	*441*			*168*	*49*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*1.00*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*5*	*479*	*0*	*0*	*182*	*53*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*171*		*6*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*185*	*0*	*6*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*5*						*191*	
C (m) (veh/h)	*1344*						*415*	
v/c	*0.00*						*0.46*	
95% queue length	*0.01*						*2.36*	
Control Delay (s/veh)	*7.7*						*20.9*	
LOS	*A*						*C*	
Approach Delay (s/veh)	--	--				*20.9*		
Approach LOS	--	--				*C*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*PM Peak with bypass (EIS 6)*

Site Information

Intersection	*US 93 & Rocky Point Road*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *US 93* North/South Street: *Rocky Point Road*

Intersection Orientation: *East-West* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*1*	*330*			*375*	*160*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*1.00*	*1.00*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*1*	*358*	*0*	*0*	*407*	*173*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*112*		*2*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*1.00*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*121*	*0*	*2*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*1*						*123*	
C (m) (veh/h)	*1004*						*334*	
v/c	*0.00*						*0.37*	
95% queue length	*0.00*						*1.65*	
Control Delay (s/veh)	*8.6*						*21.9*	
LOS	*A*						*C*	
Approach Delay (s/veh)	--	--				*21.9*		
Approach LOS	--	--				*C*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*AM Peak with bypass (EIS 6)*

Site Information

Intersection	*12. US 93 & Irvine Flats Road*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *US 93* | North/South Street: *Irvine Flats Road*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*5*	*480*	*7*	*8*	*242*	*30*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*5*	*521*	*7*	*8*	*263*	*32*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*0*	*0*	*6*			
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*6*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*0*	*0*
Configuration		*LTR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*				
v (veh/h)	*5*	*8*		*6*				
C (m) (veh/h)	*1278*	*1049*		*557*				
v/c	*0.00*	*0.01*		*0.01*				
95% queue length	*0.01*	*0.02*		*0.03*				
Control Delay (s/veh)	*7.8*	*8.5*		*11.5*				
LOS	*A*	*A*		*B*				
Approach Delay (s/veh)	--	--	*11.5*					
Approach LOS	--	--	*B*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*PM Peak with bypass (EIS 6)*

Site Information

Intersection	*12. US 93 & Irvine Flats Road*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *US 93*

North/South Street: *Irvine Flats Road*

Intersection Orientation: *East-West*

Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*5*	*377*	*2*	*12*	*516*	*23*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*5*	*409*	*2*	*13*	*560*	*24*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*6*	*1*	*11*			
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.60*	*0.25*	*0.44*
Hourly Flow Rate, HFR (veh/h)	*6*	*1*	*11*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*0*	*0*
Configuration		*LTR*				

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*				
v (veh/h)	*5*	*13*		*18*				
C (m) (veh/h)	*1001*	*1159*		*406*				
v/c	*0.00*	*0.01*		*0.04*				
95% queue length	*0.02*	*0.03*		*0.14*				
Control Delay (s/veh)	*8.6*	*8.1*		*14.3*				
LOS	*A*	*A*		*B*				
Approach Delay (s/veh)	--	--	*14.3*					
Approach LOS	--	--	*B*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/5/11*
Analysis Time Period	*AM Peak with bypass (EIS 6)*

Site Information

Intersection	*13. US 93 & Caffrey Road*
Jurisdiction	
Analysis Year	*2010*

Project Description

East/West Street: *Caffrey Road*	North/South Street: *US 93*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*136*	*609*	*0*	*2*	*530*	*10*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*147*	*661*	*0*	*2*	*576*	*10*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*2*	*0*	*1*	*2*	*1*
Configuration	*L*	*T*	*TR*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*3*	*1*	*25*	*1*	*1*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*3*	*1*	*27*	*1*	*1*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*147*	*2*		*2*			*31*	
C (m) (veh/h)	*999*	*937*		*105*			*445*	
v/c	*0.15*	*0.00*		*0.02*			*0.07*	
95% queue length	*0.52*	*0.01*		*0.06*			*0.22*	
Control Delay (s/veh)	*9.2*	*8.9*		*40.0*			*13.7*	
LOS	*A*	*A*		*E*			*B*	
Approach Delay (s/veh)	--	--	*40.0*			*13.7*		
Approach LOS	--	--	*E*			*B*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/5/11*
Analysis Time Period	*PM Peak with bypass (EIS 6)*

Site Information

Intersection	*13. US 93 & Caffrey Road*
Jurisdiction	
Analysis Year	*2010*

Project Description

East/West Street: *Caffrey Road* North/South Street: *US 93*

Intersection Orientation: *North-South* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*96*	*837*	*5*	*2*	*836*	*17*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*104*	*909*	*5*	*2*	*908*	*18*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*2*	*0*	*1*	*2*	*1*
Configuration	*L*	*T*	*TR*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*3*	*0*	*23*	*1*	*0*	*1*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*3*	*0*	*24*	*1*	*0*	*1*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
v (veh/h)	*104*	*2*		*2*			*27*	
C (m) (veh/h)	*746*	*754*		*116*			*324*	
v/c	*0.14*	*0.00*		*0.02*			*0.08*	
95% queue length	*0.48*	*0.01*		*0.05*			*0.27*	
Control Delay (s/veh)	*10.6*	*9.8*		*36.6*			*17.1*	
LOS	*B*	*A*		*E*			*C*	
Approach Delay (s/veh)	--	--	*36.6*			*17.1*		
Approach LOS	--	--	*E*			*C*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*AM Peak with bypass (EIS 6)*

Site Information

Intersection	*15. Kerr Dam Road & Grenier La*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *Grenier Lane* North/South Street: *Kerr Dam Road*

Intersection Orientation: *North-South* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*0*	*204*	*147*	*37*	*97*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*221*	*159*	*40*	*105*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*21*	*0*	*13*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*22*	*0*	*14*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*1*	*0*
Configuration					*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*				
v (veh/h)	*0*	*40*		*36*				
C (m) (veh/h)	*1499*	*1190*		*594*				
v/c	*0.00*	*0.03*		*0.06*				
95% queue length	*0.00*	*0.10*		*0.19*				
Control Delay (s/veh)	*7.4*	*8.1*		*11.5*				
LOS	*A*	*A*		*B*				
Approach Delay (s/veh)	--	--	*11.5*					
Approach LOS	--	--	*B*					

 HCS+™ Version 5.4 Generated: 5/10/2011 10:30 AM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/10/11*
Analysis Time Period	*PM Peak with bypass (EIS 6)*

Site Information

Intersection	*15. Kerr Dam Road & Grenier La*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *Grenier Lane* | North/South Street: *Kerr Dam Road*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*0*	*185*	*57*	*17*	*260*	*0*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*201*	*61*	*18*	*282*	*0*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*51*	*0*	*21*
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*55*	*0*	*22*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*1*	*0*
Configuration					*LTR*	

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*				
v (veh/h)	*0*	*18*		*77*				
C (m) (veh/h)	*1292*	*1314*		*555*				
v/c	*0.00*	*0.01*		*0.14*				
95% queue length	*0.00*	*0.04*		*0.48*				
Control Delay (s/veh)	*7.8*	*7.8*		*12.5*				
LOS	*A*	*A*		*B*				
Approach Delay (s/veh)	--	--	*12.5*					
Approach LOS	--	--	*B*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*AM Peak with bypass (EIS 6)*

Site Information

Intersection	*16. Kerr Dam Road & Back Road*
Jurisdiction	
Analysis Year	*2030*

Project Description

East/West Street: *Back Road*	North/South Street: *Kerr Dam Road*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*5*	*207*	*0*	*0*	*61*	*17*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*5*	*224*	*0*	*0*	*66*	*18*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*18*	*0*	*5*			
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*19*	*0*	*5*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*0*	*0*
Configuration		*LTR*				

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*					*LTR*	
v (veh/h)	*5*	*0*					*24*	
C (m) (veh/h)	*1526*	*1357*					*732*	
v/c	*0.00*	*0.00*					*0.03*	
95% queue length	*0.01*	*0.00*					*0.10*	
Control Delay (s/veh)	*7.4*	*7.7*					*10.1*	
LOS	*A*	*A*					*B*	
Approach Delay (s/veh)	--	--				*10.1*		
Approach LOS	--	--				*B*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*N. Fossen*
Agency/Co.	*CDM*
Date Performed	*5/10/2011*
Analysis Time Period	*PM Peak with bypass (EIS 6)*

Site Information

Intersection	*16. Kerr Dam Road & Back Road*
Jurisdiction	
Analysis Year	*2030*

Project Description	
East/West Street: *Back Road*	North/South Street: *Kerr Dam Road*
Intersection Orientation: *North-South*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*10*	*110*	*0*	*0*	*142*	*33*
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*	*0.92*
Hourly Flow Rate, HFR (veh/h)	*10*	*119*	*0*	*0*	*154*	*35*
Percent Heavy Vehicles	*0*	--	--	*0*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*17*	*0*	*4*			
Peak-Hour Factor, PHF	*0.92*	*0.92*	*0.92*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*18*	*0*	*4*	*0*	*0*	*0*
Percent Heavy Vehicles	*0*	*0*	*0*	*0*	*0*	*0*
Percent Grade (%)	*0*			*0*		
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*0*	*0*
Configuration		*LTR*				

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*					*LTR*	
v (veh/h)	*10*	*0*					*22*	
C (m) (veh/h)	*1397*	*1482*					*710*	
v/c	*0.01*	*0.00*					*0.03*	
95% queue length	*0.02*	*0.00*					*0.10*	
Control Delay (s/veh)	*7.6*	*7.4*					*10.2*	
LOS	*A*	*A*					*B*	
Approach Delay (s/veh)	--	--				*10.2*		
Approach LOS	--	--				*B*		

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