May, 2010

Hamilton Area Transportation Plan
(2009 Update)

Prepared for:

City of Hamilton,
Ravalli County,
and
Montana Department of Transportation

Prepared by:

CDM

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Clarification to the Adoption of the Hamilton Area Transportation Plan (2009 Update)

The *Hamilton Area Transportation Plan (2009 Update)* was formally adopted by both the Hamilton City Council and the Ravalli County Board of Commissioners as follows:

- The Hamilton City Council adopted the *Transportation Plan* on March 2, 1010 without exception or revision to the document as written.

- The Ravalli County Board of Commissioners adopted the *Transportation Plan* on April 30, 2010, **with various modifications**. The modifications adopted by the Ravalli County Board of County Commissioners, for its purposes and interpretation, are contained in the addendum to the *Transportation Plan* titled RAVALLI COUNTY'S ADDENDUM TO THE HAMILTON AREA TRANSPORTATION PLAN (2009 UPDATE). This four page addendum follows this sheet.

RAVALLI COUNTY'S ADDENDUM TO THE HAMILTON AREA TRANSPORTATION PLAN (2009 UPDATE)

Note to Readers: This addendum is intended to address several amendments the Ravalli County Board of Commissioners made to the Hamilton Area Transportation Plan (2009 Update) during adoption of the County version of the Plan. The specific amended provisions are noted below. Those section titles of the report that Ravalli County modified for its purposes are shaded grey in the affected section title in the body of the document. Reference this addendum when grey shading appears. Please note that the City of Hamilton adopted the Plan on March 2, 2010 without exception or revision.

Change Plan Name
The title of the document is hereby modified to "Ravalli County/Hamilton Area Transportation Plan" to reflect Ravalli County's amendments.

Executive Summary

- Page iv, MSN-2, replace "city business collector" with "**urban collector**"
- Page iv, MSN-3, replace "city business collector" with "**urban collector**"
- Page iv, MSN-10, replace "city residential collector" with "**urban collector**"
- Page v, Prioritized Policy Recommendation, replace with:
    - Policy "Formation of Transportation Advisory Committee" To provide for and facilitate the implementation of this and any related transportation plans, the City, County and MDT should create a Transportation Advisory Committee (TAC) to, with elected official approval: 1) develop transportation management strategies, 2) consider potential impacts of expanding city boundaries on transportation systems and levels of service, 3) develop and propose project implementation strategies, and 4) review design standards.
    - Policy "Development of Interlocal Agreements" "To provide for the orderly, predictable, cooperative and transparent expansion of municipal boundaries and urban services, to provide for the effective and efficient implementation of this and any other related plans, and to provide for consistent levels of service in the operation of surface transportation infrastructure and systems, Ravalli County and the City of Hamilton should develop and execute an interlocal agreement addressing: 1) a common understanding of the cooperative procedure to be used for the expansion of municipal boundaries, 2) coordination, facilitation and encouragement of the extension of municipal services to unincorporated areas immediately adjacent to or entirely surrounded by existing municipal limits to provide for a compact urban area and consistent and efficient levels of service between jurisdictions; 3) jurisdictional and operational responsibility for collector roadways and residential streets within Urban & Rural Delineation Areas "A" and "B", 4) development review processes for proposed private projects occurring within Urban & Rural Delineation Areas "A" and "B", and 5) financial and management responsibility for projects within Urban & Rural Delineation Areas "A" and "B".

Chapter 1

- Page 1-2, 1.2, delete “to” in 1st paragraph 2nd sentence … “**may likely occur**”
- Page 1-5, 1.3, delete third paragraph in its entirety
- Page 1-5, 1.3, Goal 1, delete paragraph A in its entirety
- Page 1-5, 1.3, Goal 1, paragraph E, amend to state: “Coordinate with applicable local advisory committees, which may include the TAC, County, State and Federal agencies as appropriate to implement the recommendations of the transportation plan and pursue funding sources.”

Chapter 5

- Page 5-3, 5.2, 2nd paragraph, delete 2nd sentence in its entirety
- Page 5-4, MSN-2, replace “business collector” with “**urban collector**”
- Page 5-5, MSN-3, delete “business” … “**urban collector**”
- Page 5-5, MSN-5, delete “residential”, … “**urban collector**”
- Page 5-6, MSN-6, delete “residential”, … “**urban collector**”
- Page 5-6, MSN-7, delete “business”, … “**urban collector**”
- Page 5-7, MSN-7, replace “may” … “**will require an access permit**”
- Page 5-8, MSN-10, delete “residential”, … “**urban collector**”
- Page 5-8, MSN-11, delete “residential”, … “**urban collector**”
- Page 5-9, MSN-12, delete “residential”, … “**urban collector**”
- Page 5-9, MSN-13, delete “residential”, … “**urban collector**”
- Page 5-10, MSN-16, delete “residential”, … “**urban collector**”
- Page 5-11, MSN-17, delete “residential”, … “**urban collector**”
- Page 5-11, MSN-18, delete “residential”, … “**urban collector**”
- Page 5-24, TSM-16, delete final sentence in its entirety
- Page 5-27, TSM-23, delete fifth sentence in its entirety

Chapter 8

- Page 8-7, (8.3.2), 1st paragraph, replace "growth" with "**improvement**"

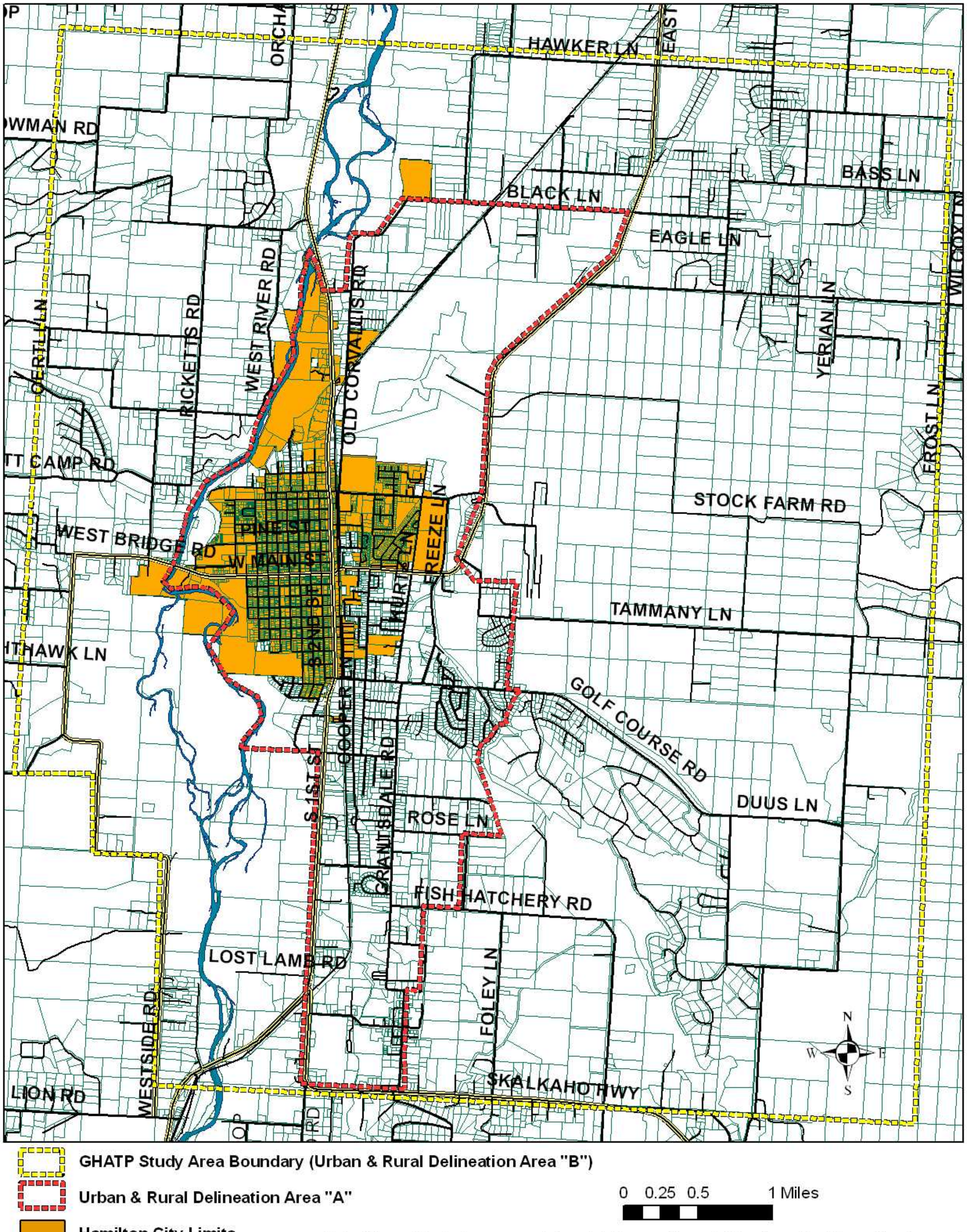
Other General Amendments

- Ravalli County will apply its adopted design standards (American Association of State Highway and Transportation Officials) as follows: 1) "**urban**" design standards for new roadways constructed, designated or proposed within the Urban & Rural Delineation Area "A" and 2) "**rural**" design standards for new roadways constructed, designated or proposed within the Urban & Rural Delineation Area "B". Ravalli County may subsequently decide to apply its adopted "urban" standards to locations in Area B due to unanticipated or substantial future growth.

- Ravalli County will adopt a standard eighty (80) foot roadway easement for roadways classified or designated as "collector" roadways constructed or proposed within the Urban & Rural Delineation Area "A", and a standard sixty (60) foot roadway easement for roadways classified or designated as "local access" constructed or proposed within the Urban & Rural Delineation Areas "A" and "B".

- Any and all references to "city" roadway design standards as may be applied to areas outside the current municipal boundaries are stricken from this plan and replaced with the appropriate corresponding County standards.

- The Plan recommendations may be amended by the County due to particular circumstances in place at the time a project is proposed to move forward, allowing for the project to proceed under reasonable conditions found to be appropriate and reasonable by the governing body at that time.



Notes: This map is for planning purposes only; the material shown on this page is information and should be used for reference only. GHATP study area boundary approximate. Data source: Ravalli County GIS & Planning Departments. Map created April 2010.

Hamilton Area Transportation Plan

(2009 Update)

Prepared For:

City of Hamilton, MT

Ravalli County, MT

Montana Department of Transportation

Prepared By:

CDM

50 West 14th Street Suite 200

Helena, MT 59601

Adopted By:

Hamilton City Council (March 2, 2010)

The Hamilton City Council adopted the Transportation Plan on March 2, 1010 without exception or revision to the document as written (see City of Hamilton Resolution 1147).

Ravalli County Commission (April 30, 2010)

The Ravalli County Board of Commissioners adopted the Transportation Plan on April 30, 2010, **with various modifications** (see Ravalli County Resolution 2539). The modifications adopted by the Ravalli County Board of County Commissioners, for its purposes and interpretation, are contained in the addendum to the Transportation Plan titled RAVALLI COUNTY'S ADDENDUM TO THE HAMILTON AREA TRANSPORTATION PLAN (2009 UPDATE).

Acknowledgements

The successful completion of this project was made possible through the cooperation and assistance of many individuals. The following people provided guidance and support throughout the course of this study:

Technical Advisory Committee (TAC) Members

Keith Smith	(City of Hamilton Public Works Department)
Dave Ohnstad	(Ravalli County Road and Bridge Department)
John Lavey	(Ravalli County Planning Department)
Sheila Ludlow	(Montana Department of Transportation – Statewide and Urban Planning Section)
Shane Stack	(Montana Department of Transportation – Missoula District Office)
Ron Uemura, P.E.	(RAM Engineering)

Citizens Advisory Committee (CAC) Members

Ron Ehli	(Chief, City of Hamilton Fire Department)
Steve Powell	(Interested Citizen)
Kathleen Driscoll	(Ravalli County Commissioner)
Chip Pigman	(Pigman Builders)
Dan Rothlisberger	(Interested Citizen)
Joanne Verwolf	(Ravalli County Coordinator, Summit Independent Living Center)
Ann Harding	(The Frame Shop and Gallery)
Al Mitchell	(City of Hamilton Councilor)
Dennis Stranger	(Transportation Plan Project Manager, City of Hamilton)
Kelly Hudson	(Western Regional Director, Rocky Mountain Laboratories)

City of Hamilton

Jerry Steele	(Mayor)
Mel Monson	(Councilor - Ward I)
Joe Petrusaitis	(Councilor - Ward I)
Nancy Hendrickson	(Councilor - Ward II)
Al Mitchell	(Councilor - Ward II)
Lynette Helgeland	(Councilor - Ward III)
Jenny West	(Councilor - Ward III)

Ravalli County Commission

Jim Rokosch	(Commissioner - District 1)
Greg Chilcott	(Commissioner - District 2)
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Very special thanks to Joanne Verwolf, Ravalli County Coordinator - Summit Independent Living Center, and the Ravalli County Transportation Advisory Committee (TAC), for their assistance in preparing Chapter 6 (Public Transportation) of this Transportation Plan.

Executive Summary

This update is intended to offer guidance for the decision-makers in the greater Hamilton community. It contains analysis of a multi-modal transportation system within the project's study area boundary. This Plan includes an examination of the traffic operations, roadway network, transit services, non-motorized transportation system, trip reduction strategies, and growth management techniques available to a growing community. This document also identifies the challenges with the various transportation systems and offers recommendations in the form of improvement projects and progressive programs that will mitigate existing concerns and/or meet future needs. This has been accomplished through meaningful dialogue with the public and dozens of stakeholders, along with the analysis of the Consultant team and both the Transportation Advisory Committee (TAC) and the Citizens Advisory Committee (CAC). Both of these committees were established exclusively for this planning project, and both provided oversight assistance in the development of this Transportation Plan Update.

This plan strives to achieve a balance in addressing existing challenges while at the same time planning for the future. Growth within the Hamilton area was projected using control totals available in the Hamilton Growth Policy (2009). From the available data, dwelling unit and employment growth was assigned to areas within the community likely to grow during the twenty year planning horizon (year 2030). By using a travel demand model, the percent increase in roadway traffic volumes was developed between the current year (year 2009) and the planning year (year 2030) to determine those areas that may realize increased traffic volumes. The model used current socio-economic data and growth trends to project traffic volumes, as presented in **Chapter 3** of the Plan. These projected traffic volumes identified future traffic problems within the area.

The analysis of the existing transportation system and future traffic conditions indicated a need for numerous improvements in the area. These infrastructure improvements are contained in **Chapter 5** of this plan and are broken down into three categories:

- Major Street Network (MSN) Recommendations,
- Transportation System Management (TSM) Recommendations, and
- Non-Motorized Network Recommendations & Considerations.

The Major Street Network (MSN) projects focus on upgrading entire corridors and/or the construction of new roadways. Eighteen (18) MSN projects are recommended at a total cost of approximately $27,535,000. TSM projects focus mainly on intersection improvements, such as the addition of turning lanes and signalization. A total of twenty six (26) TSM projects are recommended at an estimated cost of about $1,741,500. The Plan also strives to strengthen and/or reinforce policy and procedural actions for both non-motorized and motorized travel. **Chapter 8** of the plan presents concepts and guidelines for corridor preservation and access management principles, the utilization of Interlocal Agreements to implement the many recommendations found in the plan, transportation level of service guidance, and a variety of bicycle design guidelines.

In analyzing the numerous infrastructure projects that have been recommended in the Transportation Plan, seven (7) projects stand out as being of most value to the community, both in terms of addressing existing concerns and planning for future growth. Although the prioritization of these seven projects are best left to elected officials and the community as funding becomes available, the authors' "top seven" projects are listed below:

Top Seven Projects for Implementation
(in no order of priority)

MSN-2	Fairgrounds Road (Old Corvallis Road to Eastside Highway) *Reconstruct to city "business collector" standards within an 80 foot right-of-way (or easement). (Estimated Cost $2,700,000)*
MSN-3	Old Corvallis Road (Fairgrounds Road to GSK) *Reconstruct to city "business collector" standards within an 80 foot right-of-way (or easement). (Estimated Cost $5,800,000)*
MSN-10	New East-West Connector #1 (Old Corvallis Road to Eastside Highway) *Construct a new route between Old Corvallis Road and Eastside Highway. The new roadway should be built to city "residential collector" standards within an 80 foot right-of-way (or easement). (Estimated Cost $2,640,000)*
TSM-1	US Highway 93 Access Management Plan *Complete a comprehensive Access Management Plan for US Highway 93, beginning just south of the Bitterroot River where the recent US 93 construction project ends (near RP 49), all the way to the Angler's Roost Bridge (RP 43.7) area. MDT would complete this plan with local community participation. (Estimated Cost $130,000)*
TSM-7	Fairgrounds Road and Old Corvallis Road *Reconstruct to an urban intersection with curb and gutter, sidewalks, signing, and turn bays. (Estimated Cost $310,000)*
TSM-26	Hamilton Area Non-Motorized Plan *Develop a "Non-Motorized Transportation Plan". The current update to the Transportation Plan just begins to explore non-motorized planning in the community, and a full "Non-Motorized Transportation Plan" will allow the*

community to achieve a higher level of understanding and planning as it relates to bicyclists and pedestrians. (Estimated Cost $20,000)

Policy — Formation of Transportation Advisory Committee (TAC) and Usage of Interlocal Agreements
The City, County and MDT staff should create a formal Transportation Advisory Committee (TAC) to consider future transportation project implementation strategies, with elected official participation. Coincident to the business of a TAC, governmental Interlocal Agreements should be explored between the City and the County to better define implementation strategies between the project partners. (Cost unknown)

It is important to plan for the inevitable growth in the community by preserving roadway corridors, when able to do so, and also by recognizing the signs of declining levels of service on area intersections. Although this Transportation Plan is a tool that can be used to guide development of the transportation system in the future, local and state planners must continually re-evaluate the findings and recommendations in this document as growth is realized and development occurs.

If higher than anticipated growth is realized in the community, or if growth occurs in areas not originally planned for, transportation needs may be different from those analyzed in this plan. An update and re-evaluation of this document is recommended every five years if at all possible.

Finally, it must be explicitly stated that implementation of the many recommendations contained in the plan do not occur solely through expenditure of funds by the local government. Examples of plan implementation that occur at little to no cost to the local government can include the process of right-of-way (or easement) acquisition through development, as well as some TDM strategies. Elected officials, and the community at-large, should constantly seek out ways to partner with each other to create a truly multi-modal transportation system for the travelling public.

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Definitions

Access Management/Control – Controlling or limiting the types of access or the locations of access on major roadways to help improve the carrying capacity of a roadway, reduce potential conflicts, and facilitate reasonable land usage.

Average Daily Traffic (ADT) – The total amount of traffic observed, counted or estimated during a single, 24-hour period.

Annual Average Daily Traffic (AADT) – The average daily traffic averaged over a full year.

Americans with Disabilities Act (ADA) – The Federal regulations which govern minimum requirements for ensuring that transportation facilities and buildings are accessible to individuals with disabilities.

Bikeway – Any roadway, path, or way which in some manner is specifically designated as being open to bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.

Bike Path – A bikeway physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right of way (or easement) or within an independent right of way (or easement).

Bike Lane – A portion of a roadway which has been designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists.

Bike Route – A segment of a system of bikeways designated by the jurisdiction having authority with appropriate directional and informational markers, with or without a specific bicycle route number.

Capacity – The maximum sustainable flow rate at which vehicles can be expected to traverse a roadway during a specific time period given roadway, geometric, traffic, environmental, and control conditions. Capacity is usually expressed in vehicles per day (vpd) or vehicles per hour (vph).

Collector Roadway – Provides for land access and traffic circulation within and between residential neighborhoods, and commercial and industrial areas. It provides for the equal priority of the movement of traffic, coupled with access to residential, business and industrial areas. A collector roadway may at times traverse residential neighborhoods. Can be classified as either urban or rural (see Chapter 2).

Congested Flow – A traffic flow condition caused by a downstream bottleneck unable to pass through unsignalized intersections.

Context Sensitive Design (CSD) – A fairly new concept in transportation planning and highway design that integrates transportation infrastructure improvements to the context of the adjacent land uses and functions, with a greater sensitivity to transportation impacts on the environment and communities being realized.

Delay – The amount of time spent not moving due to a traffic signal being red, or being unable to pass through an unsignalized intersection.

Facility – A length of highway composed of connected section, segments, and points.

Level of Service (LOS) – A qualitative measure of how well an intersection or road segment is operating based on traffic volume and geometric conditions. The level of service "scale" represents the full range of operating conditions. The scale is based on the ability of an intersection or street segment to accommodate the amount of traffic using it, and can be used for both existing and projected conditions. The scale ranges from "A" which indicates little, if any, vehicle delay, to "F" which indicates significant vehicle delay and traffic congestion.

Local Roadway – Comprises all facilities not included in a higher system. Its primary purpose is to permit direct access to abutting lands and connections to higher systems. Usually through-traffic movements are intentionally discouraged.

Major Street Network (MSN) – The network of roadways defined for the Transportation Plan effort that include the interstate, principal arterials, minor arterials, collectors and some local roadways.

Minor Arterial Roadway – Interconnects with and augments the Principal Arterial system. It also provides access to lower classifications of roadways on the system and may allow for traffic to directly access destinations. They provide for movement within sub-areas of the study area, whose boundaries are largely defined by the Principal Arterial road system. They serve through traffic, while at the same time providing direct access for commercial, industrial, office and multifamily development but, generally, not for single-family residential properties. The purpose of this classification of roadway is to increase traffic mobility by connecting to both the Principal Arterial system and also providing access to adjacent land uses. A minor arterial roadway can be classified as either urban or rural (see Chapter 2).

Multi-modal – A transportation facility for different types of users or vehicles, including passenger cars and trucks, transit vehicles, bicycles, and pedestrians.

Oversaturation – A traffic condition in which the arrival flow rate exceeds capacity on a roadway lane or segment.

Peak Hour – The hour of greatest traffic flow at an intersection or on a roadway segment. Typically broken down into AM and PM peak hours.

Principal Arterial Roadway – Is the basic element of the study area's roadway system. All other functional classifications supplement the Principal Arterial network. Access to a Principal Arterial is generally limited to intersections with other principal arterials or to the interstate system. Direct access is minimal and controlled. The purpose of a principal arterial is to serve the major centers of activity, the highest traffic volume corridors, and the longest trip distances in the study area. This classification of roadways carries a high proportion of the total traffic within the study area. The major purpose is to provide for the expedient movement of traffic. A principal arterial roadway can be classified as either urban or rural (see Chapter 2).

Roadway – The area within a travelling section and is inclusive of all aspects of the structure (not just the "driving" surface).

Running speed – The actual vehicle speed while the vehicle is in motion (travel speed minus delay).

Service Life – The design life span of roadway based on capacity or physical characteristics.

Transportation Analysis Zone (TAZ) – Geographical zones identified throughout the study area based on land use characteristics and natural physical features for use in the traffic model developed for this project.

Transportation Demand Management (TDM) - Programs designed to maximize the people-moving capability of the transportation system by increasing the number of persons in a vehicle, or by influencing the time of, or need to, travel.

Travel speed – The speed at which a vehicle travels between two points including all intersection delay.

Volume to Capacity (V/C) Ratio – A qualitative measure comparing a roadways theoretical maximum capacity to the existing (or future) volumes. Commonly described as the result of the flow rate of a roadway lane divided by the capacity of the roadway lane.

Acronyms

AASHTO	American Association of State Highway and Transportation Officials
CFR	Code of Federal Regulations
CIP	Capital Improvement Program
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
HCM	Highway Capacity Manual
HCS	Highway Capacity Software
ISTEA	Intermodal Surface Transportation Efficiency Act
ITE	Institute of Transportation Engineers
MDT	Montana Department of Transportation
MPO	Metropolitan Planning Organization
MUTCD	Manual on Uniform Traffic Control Devices
TEA-21	Transportation Efficiency Act for the 21st Century
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
TIP	Transportation Improvement Program

Chapter 1
Project Introduction and Coordination

Chapter 1
Project Introduction and Coordination

1.1 Introduction

In 2001, the City of Hamilton undertook the development of a comprehensive Transportation Plan. The previous ten years saw significant growth both within the City and in the outlying areas of the County. The City lacked a transportation planning document, and the preparation of the Hamilton Transportation Plan in 2002 was a positive first step for improving transportation matters in the community. The Transportation Plan assessed those areas of the community directly within the city limits; however, it did not analyze travel characteristics in the unincorporated areas of Ravalli County adjacent to the city limits.

The Hamilton Transportation Plan Steering Committee (TPSC) was established to help guide the transportation planning process and to establish goals and priorities for the 2002 Transportation Plan. The committee also served to review the findings and guide the development of the Transportation Plan. The TPSC included representatives from the City Council, City Public Works, City Administration, the Montana Department of Transportation, the business community, development and contractor representatives, and Ravalli County. During the Plan development process, the TPSC also solicited input from local and regional emergency services providers, transit officials, and non-motorized advocates who commonly use the area's street and highway system. The 2002 Plan was a positive step in assessing and planning for the area's transportation infrastructure.

In an effort to be proactive and to serve the community's existing residents, while at the same time planning for growth, in 2008 the project partners decided the timing was right for preparing an update to the 2002 Transportation Plan. This update, called the 2009 Update, encompasses a much larger area than the 2002 Plan, and as such includes unincorporated lands adjacent to the City and within Ravalli County. Additionally, the Transportation Plan 2009 Update is being prepared on a parallel track to the City's Growth Policy Update and the City's Water Facilities Plan Update, lending to efficiency in data sharing and public outreach.

In 2009, the City of Hamilton, Ravalli County and MDT selected the firm of Camp Dresser & McKee (CDM) Inc. (i.e., the Consultant) of Helena, Montana to prepare the update to the 2002 Hamilton Transportation Plan. CDM coordinated with the consultants preparing other facility plan updates.

This update is intended to offer guidance for the decision-makers in the greater Hamilton community. It contains an analysis of the multi-modal transportation system in the Hamilton area. This Plan includes an examination of the traffic operations, roadway network, transit services, non-motorized transportation system, trip reduction strategies, and growth management techniques. This document also identifies concerns with the various transportation systems and offers recommendations in the form of improvement projects and progressive programs that will address existing concerns and/or meet future needs.

1.2 Study Area

All transportation plans begin by defining the study area. Sometimes this study area follows governmental boundaries such as city limits, but most often they include land outside city limits in which future growth may likely occur. As part of the Hamilton Area Transportation Plan (2009 Update), an evaluation of the past Transportation Plan's Study Area Boundary was undertaken in consultation with the City of Hamilton, Ravalli County, and the Montana Department of Transportation.

The 2002 study area boundary was established by the TPSC based on a number of parameters, including physical boundaries (including the Bitterroot River), water and sewer service area restrictions, current and projected development potential, and an intuitive review of the layout of the existing transportation system and the system users.

The study area boundary for the 2009 Update has been revised to follow Public Land Survey System (PLSS) geography and is shown in **Figure 1-1**. This revised study area boundary was the same boundary used for the Growth Policy Update and the Water Facilities Plan Update. This planning boundary encompasses lands under the jurisdiction of both the City of Hamilton and Ravalli County. This study boundary includes all of the major employers in the area, and includes all of the land projected to be used for employment centers in the next twenty years. It also includes developing residential land uses in the area, and those areas likely to increase the housing supply in the future and subsequently add traffic onto the transportation network.

The study area boundary was developed for two primary reasons. First, to include land where recent growth has occurred or is anticipated to occur in the foreseeable future and second, to include the 2002 Transportation Plan's study area.

It should be recognized that there are many other areas that are not formally included in the study area boundary that will exhibit development patterns affecting the area transportation system. These areas include rural areas within Ravalli County but outside of the defined study area boundary. These are not included in the study area due to both funding and jurisdictional constraints, however, cursory attempts at land use forecasting were made to capture the travel phenomena realized of Hamilton being a hub of activity for those living in the rural areas for overall transportation impacts through the travel demand modeling process. Land use changes outside of the "formal" boundary are still accounted for and incorporated into the travel demand model, however precise transportation system impacts are not identified for facilities outside of the "formal" study area boundary.

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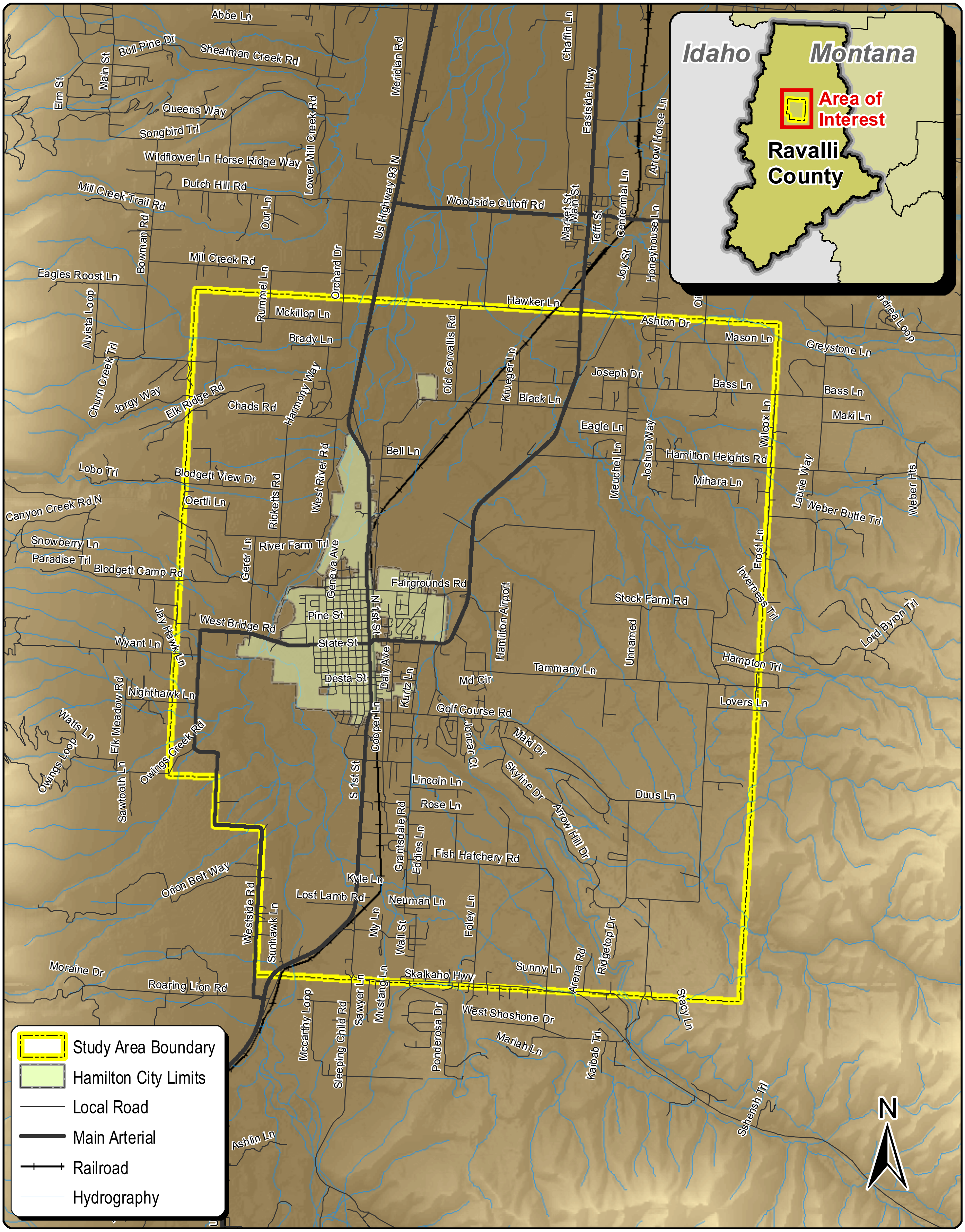

Figure 1-1
Study Area Boundary

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Hamilton Area Transportation Plan 2009 Update

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1.3 Community Transportation Goals and Objectives

The overall goal of this project is to update the existing 2002 Hamilton Transportation Plan. This 2002 plan was developed by Morrison Maierle, Inc. The intent of this project is to take an entirely fresh look at the condition of transportation issues in the greater Hamilton area.

This Transportation Plan Update is intended to facilitate community goals and improve the transportation infrastructure and services within the Hamilton area to meet the needs of existing and future land use. The Plan addresses regional transportation issues, overall travel convenience, traffic safety, and property access, in addition to potential special issues such as traffic calming and multi-modal connections. The Plan includes recommendations for short-term Transportation System Management (TSM) improvements, as well as recommended modifications and capital improvements to the Major Street Network (MSN). The Plan addresses all modes of transportation in a balanced attempt to meet the current and future transportation needs of the greater Hamilton area.

With this background in mind, it is important to recognize that "Goals and Objectives" have been developed to guide this Transportation Plan Update. These are adopted via the recently completed Hamilton Growth Policy Update (2009) document, in which the transportation related goals were vetted within the public process and represent the goals and objectives of the general population at the present time. These goals and objectives are carried forward for this project and are listed below:

Goal 1: Provide a safe, efficient and economical system of roads that enhances the community.

A. Adopt city design standards for construction of roads and streets in the unincorporated planning area.

B. Ensure that roads in new development efficiently connect to the existing road network.

C. Design access points to minimize traffic conflicts.

D. Evaluate the impact of new development on the transportation network and require mitigation when necessary.

E. Coordinate with local Transportation Advisory Committees, County, State and Federal agencies to implement the recommendations of the Transportation Plan and pursue funding sources.

F. Ensure adequate right-of-way is dedicated for future improvements.

G. Enhance east-west traffic circulation across US 93.

H. Prioritize intersection improvements based on congestion and safety needs.

Goal 2: Transportation should be designed to improve quality of life as well as move traffic.

A. Actively pursue alternative modes of transportation such as transit and trails and provide for the connectivity of pathways and trails.

B. Include pedestrian safety crossing features particularly on Highway 93 when making improvements to the road network.

C. Incorporate accessibility components to accommodate disabled residents into the design of transportation features

D. Continue to work with community groups to enhance gateway signage and landscaped areas for the entrances to Hamilton.

E. Control signage along Highway 93 to reduce clutter and promote clear views of the natural surroundings and enhance the community's image. Any signage and/or other wayfinding features within the MDT right-of-way is MDT's responsibility.

F. Land use decisions should take into consideration impacts on the airport and be compatible with airport plans.

Goal 3: New developments should pay for the impacts of their projects on infrastructure and services.

A. Explore methods such impact fees, annexation policies, adequate facility ordinances and exactions to recover the cost of infrastructure upgrades caused by the need to provide service to the development.

B. Encourage development where there is existing infrastructure or where facilities can cost-effectively be expanded for new growth.

C. Encourage partnerships and innovative approaches to improve facilities when necessary.

D. Regularly review and update utility main extension policies for oversizing lines, cost-recovery agreements and plant investment hook-up fees.

E. Analyze impact of new development on existing infrastructure to determine if there is capacity and examine the fiscal impact of upgrades.

F. Use financing mechanisms such as tax increment financing, grants, and special improvement districts to fund infrastructure projects.

G. Implement and update current impact fee system to reflect changing conditions.

1.4 Previous Transportation Planning Efforts

In the course of data collection, past plans and studies were obtained. From the review of these documents, applicable issues were incorporated into this Hamilton Area Transportation Plan (2009 Update). The contributing documents are as follows:

- Hamilton Growth Policy Update (2009);
- Hamilton Transportation Plan (2002);
- City of Hamilton Impact Fees for the Transportation System (February 2007 w/Addendum);
- City of Hamilton Subdivision Regulations (October 2006);
- City of Hamilton Zoning Map (2010);
- Ravalli County Impact Fee Feasibility Analysis (February 2006);
- Ravalli County Land Suitability Analysis (June 2008);
- Ravalli County Subdivision Regulations (May 2007);
- Ravalli County Airport Final Draft Environmental Assessment (EA);
- Miscellaneous Traffic Impact Studies (Ravalli County & City of Hamilton);
- City of Hamilton Public Works Standards;
- Ravalli County Roadway Design Standards;
- Ravalli County Roadway Improvement Schedule;
- Ravalli County Access Encroachment and Right-of-Way Management Policies;
- School Bus Routes;
- Postal Routes;
- Fire District Maps;
- Locally adopted master plans, public facility plans, and related development regulations;

- Municipal Code of the City of Hamilton;
- Montana Department of Transportation STIP and other Local Planning Documents
- U.S. Bureau of Census data;
- City building permits, County location and conformance permits, and utility records; and
- Socioeconomic data and projections compiled by the Planning Board, Montana Department of Commerce, and/or University of Montana.

1.5 Public Involvement Strategy

Public involvement is an important component in any successful transportation planning process. For this project, the goal of the City of Hamilton, Ravalli County, MDT, and the Consultant was to have significant and ongoing public involvement for this transportation planning process. Education and public outreach are an essential part of fulfilling the local entities' responsibility to successfully inform the public about the transportation planning process. All three contracting entities (Ravalli County, the City of Hamilton, and MDT) desired to empower the public to voice their ideas and values regarding transportation issues. The entities strove to ensure early and continuous public involvement in all major actions and decisions. To that end, a number of public involvement strategies were utilized to reach the most people possible and elicit meaningful participation. The interest of the public in transportation issues has increased with the community's rate of growth, and this plan update provided substantial and meaningful public outreach opportunities that:

- Educated the public on the critical elements of planning and engineering the community's transportation system;
- Responded to the increasing interest of the general public to participate in planning of the community; and
- Increased the public's investment in the Transportation Plan

1.5.1 Public Outreach Plan

A formal "public outreach plan" was completed within two weeks of the "notice-to-proceed" for the project. The public outreach plan included a month-by-month plan outlining the public outreach efforts to be conducted, including: advertising, newsletters, publications and handouts, meetings, and presentations. This served as a road map for conducting public outreach through the update process and allowed interested citizens to plan for their participation.

1.5.2 Committee Meetings

Both a Technical Advisory Committee (TAC) and a Citizens Advisory Committee (CAC) were established for this project. These two committees provided project oversight for this project by serving in an advisory capacity and also reviewing and commenting on materials over the project's duration. A total of six (6) meetings were held with each of these committees. Membership was composed of individuals as noted on the acknowledgements page of this document, and generally included representatives from the City of Hamilton, Ravalli County, the Montana Department of Transportation, and local business and citizen interests. These meetings were generally held every other month for the project's duration.

The interaction of the consultant with these two committees were considered to be the most important aspect of the exchange of information and ideas during the development of the Plan. During these meetings, the issues, problems, and possible solutions were identified and discussed. These meetings provided essential feedback during the development of the Plan and also provide the TAC and the CAC with numerous opportunities to become engaged.

1.5.3 Public Meetings

Two formal public meeting opportunities were offered during the planning process. The first public meeting was held after the field studies were completed and an analysis of the existing transportation system was performed. Because attendance was minimal for this effort, additional outreach occurred via the local Hamilton Farmer's Market. During this event, a booth was utilized to reach out to members of the public. This effort resulted in one-on-one dialogue with approximately 50 individuals about the project, with another 50 citizens estimated to peruse the information located within the booth.

The second public meeting was held after preliminary recommendations were developed and just prior to release of the public draft document of the Transportation Plan. After a brief presentation, individual work stations were set up for participants to move to their areas of interest and review and comment on the preliminary findings. This allowed participants to become fully engaged. The purpose of this venue was to present the types of recommended improvements and receive initial feedback from the community.

1.5.4 Public Hearings

Two public hearings were held after the public draft Transportation Plan was published. These public hearings were held separately with the Hamilton City Council and the Ravalli County Commission. These hearings were designed to obtain official comments from the public prior to final approval of the document and production of the final report.

1.5.5 Project Website

The results of the traffic studies and analyses conducted during the study process were made available to the public on the Internet website. The website was created by CDM and hosted by the Montana Department of Transportation at the following "world wide web (www)" address:

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

As sections of the report and graphic displays became available, they were posted on the web site for public review and comment. This enabled the public to stay abreast of the developments occurring during the planning process. It also provided an opportunity for the public to submit comments.

1.5.6 Meeting Announcements and Press Releases

Meeting announcements were developed by CDM and advertised in the Ravalli Republic as display ads at least two weeks prior to meetings. The ads announced the meeting location, time, and date, the format and purpose of the meeting, and the locations where documents may be reviewed (if applicable).

A project press release was also prepared and submitted to the Associated Press and the Ravalli Republic by email early on in the project's development to inform readers of this project.

1.5.7 Published Information

CDM produced two (2) newsletters in PDF format, and made them available on the project website. These newsletters described work in progress, results achieved, preliminary recommendations, and other related topics. The newsletters were structured to be user-friendly, with little or no engineering jargon.

Each newsletter included an invitation to the public to submit their comments and ideas to the team using any of the easy access methods listed above. The provided newsletters were made available electronically, except at public outreach activities, where hard copies were available to meeting attendees.

1.5.8 Consideration for Traditionally Underserved Populations

Additional efforts were made to involve traditionally underserved segments of the population in the transportation planning process, 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 assisted with these efforts:

- Public meetings were held in locations that were accessible and compliant with the Americans with Disabilities Act (ADA).
- To facilitate involvement of traditionally underserved populations, community leaders and organizations that represent these groups were consulted about how to most effectively reach their members.
- At public meetings, agency staff and the Consultant attempted to communicate as effectively as possible. Technical jargon was generally avoided to the extent possible, and appropriate dress and conduct was adhered to.

1.6 Coordination Summary

The following tables (**Table 1-1** thru **Table 1-4**) summarize the formal coordination that occurred over the course of this planning project. This includes all scheduled meetings, including Technical Advisory Committee (TAC) and Citizens Advisory Committee (CAC) meetings and workshops, and formal public meetings. Additionally, informal dialogue occurred regularly between agency partners and the consultants.

Table 1-1

Summary of TAC and CAC Activities

Date	Agency or Individual
04/15/2009	TAC Meeting No. 1
04/15/2009	CAC Meeting No. 1
06/10/2009	TAC Meeting No. 2
06/10/2009	CAC Meeting No. 2
08/10/2009	TAC Meeting No. 3
08/10/2009	CAC Meeting No. 3
09/21/2009	TAC Meeting No. 4
09/21/2009	CAC Meeting No. 4
11/16/2009	TAC Meeting No. 5
11/16/2009	CAC Meeting No. 5
01/11/2010	TAC Meeting No. 6
01/11/2010	CAC Meeting No. 6

Table 1-2

Summary of "Formal" Local Government Outreach Activities

Date	Agency or Individual
03/04/2009	Basis of Planning Workshop
07/07/2009	Ravalli County Commission Project Presentation
07/07/2009	Hamilton City Council Project Presentation
07/08/2009	Public Information Meeting No. 1
12/01/2009	Ravalli County Commission Project Presentation
12/01/2009	Hamilton City Council Project Presentation
01/06/2010	Public Information Meeting No. 2
03/02/2010	Hamilton City Council – Public Hearing
04/15/2010	Ravalli County Commission – Public Hearing
04/30/2010	Ravalli County Commission – Public Hearing

Table 1-3
Summary of "Other" Outreach Activities

Date	Agency or Individual
01/14/2009	Project Partner Project Kick-Off (City, County, MDT and CDM)
01/29/2009	Land Use Meeting with HDR, Applied Communication & City of Hamilton
03/20/2009	MDT Planning Staff Meeting (TransCad Model Discussion)
05/28/2009	Hamilton Planning Director Meeting (Outreach/Interview)
05/28/2009	Ravalli County Planning Director Meeting (Outreach/Interview)
05/28/2009	Bitterroot Bus / Summit ILC Meeting (Outreach/Interview)
06/11/2009	MDT Planning Staff Meeting (TransCad Model Discussion)
07/29/2009	MDT Planning & Traffic Safety Staff Meeting (Crash Analysis Discussion)
08/22/2009	Booth, Hamilton Farmers Market
08/27/2009	Project Meeting with Ryan Oster, Hamilton Chief of Police
08/27/2009	Project Meeting with Dave Hedditch, Ravalli County Airport Board Chair
10/12/2009	Hamilton School District – Board of Directors Outreach

Table 1-4
Summary of Team Bi-Weekly Conference Calls

Date	Agency or Individual
03/18/2009	Team Conference Call No. 1
04/01/2009	Team Conference Call No. 2
05/06/2009	Team Conference Call No. 3
05/20/2009	Team Conference Call No. 4
06/03/2009	Team Conference Call No. 5
06/17/2009	Team Conference Call No. 6
07/01/2009	Team Conference Call No. 7
07/15/2009	Team Conference Call No. 8
08/05/2009	Team Conference Call No. 9
08/19/2009	Team Conference Call No. 10
09/02/2009	Team Conference Call No. 11
10/07/2009	Team Conference Call No. 12
11/04/2009	Team Conference Call No. 13
11/18/2009	Team Conference Call No. 14
12/02/2009	Team Conference Call No. 15
12/16/2009	Team Conference Call No. 16

1.7 References

Morrison Maierle, Inc. June 2002. *Hamilton Transportation Plan 2002,* Hamilton, Montana.

Chapter 2
Existing Transportation System

Chapter 2
Existing Transportation System

2.1 Introduction

In an effort to clearly understand the existing traffic conditions in the community, it was necessary to gather current information about different aspects of the transportation system. Existing traffic volume data was used to determine weighted annual average daily traffic (AADT) volumes on major roadway segments within the study area. Traffic data other than the AADT was collected during the spring of 2009, during the month of May, while school was in session. The data was used to determine current operational characteristics, and to identify any traffic concerns that may exist or are likely to arise within the foreseeable future. A variety of information was gathered to help evaluate the system including:

- Existing functional classifications & study roadways;
- Existing traffic volume counts (2001 and 2009);
- Existing roadway corridor size;
- Intersection turning movement counts;
- Current traffic signal operation information;
- Intersection data required to conduct level of service analyses;
- Signing information (intersection control only); and
- Traffic crash records.

2.2 Roadway Functional Classification System

One of the initial steps in trying to understand a community's existing transportation system is to first identify what roadways will be evaluated as part of the larger planning process. A community's transportation system is made up of a hierarchy of roadways, with each roadway being classified according to certain criteria. Some of these criteria are geometric configuration, traffic volumes, spacing in the community transportation grid, speeds, etc. It is standard practice to examine roadways that are functionally classified as a collector, minor arterial, or principal arterial in a regional transportation plan project. These functional classifications can be encountered in both the "urban" and "rural" setting. The reasoning for examining the collector, minor arterial and principal arterial roadways, and not local roadways, is that when the major roadway system (i.e. collectors or above) is functioning to an acceptable level, then the local roadways are not used beyond their intended function. When problems begin to occur on the major roadway system, then vehicles and resulting issues begin to infiltrate neighborhood routes (i.e. local routes). As such, the overall health of a regional transportation system can be typically characterized by the health of the major roadway network. The roadways being studied under this Transportation Plan update, along with the appropriate functional classifications, are shown on **Figure 2-1** and **Figure 2-2**. It should be noted that the functional classifications shown on these figures are a mixture of "Federally Approved" classifications, locally defined "City" collector roadways, and locally defined "County" collector roadways. For the "Federally Approved Functional Classification" system, only four routes are defined: U.S. Highway 93, Secondary 269 (Eastside Highway), Secondary 531 (Main Street), and Municipal 53-32 (Hope Avenue).

Roadway functional classifications are typically defined as principal arterials; minor arterials; collector routes; and local streets. These definitions can apply to both an **urban** and a **rural** area, with some slight modifications. It is important to recognize that although volumes may differ on developed and rural sections of a street, it is important to maintain coordinated right-of-way standards to allow for efficient operation of roadways. A description of the most common functional roadway classifications, broken out by **"urban"** and **"rural"** classifications, is provided in the following sections.

Urban Principal Arterial System – The purpose of the principal arterial is to serve the major centers of activity, the highest traffic volume corridors, and the longest trip distances in an area. This group of roads carries a high proportion of the total traffic within the developed area. Most of the vehicles entering and leaving the area, as well as most of the through traffic bypassing the central business district, utilize principal arterials. Significant intra-area travel, such as between central business districts and outlying residential areas, and between major suburban centers, is served by principal arterials.

The spacing between principal arterials may vary from less than one mile in highly developed areas (e.g., the central business district), to five miles or more on the urban fringes. Principal arterials connect only to other principal arterials or to the interstate system.

The major purpose of the principal arterial is to provide for the expedient movement of traffic. Service to abutting land is a secondary concern. It is desirable to restrict on-street parking along principal arterial corridors. The speed limit on a principal arterial could range from 25 to 70 mph depending on the area setting.

Urban Minor Arterial Street System – The minor arterial street system interconnects with and augments the urban principal arterial system. It accommodates trips of moderate length at a somewhat lower level of travel mobility than principal arterials, and it distributes travel to smaller geographic areas. With an emphasis on traffic mobility, this street network includes all arterials not classified as principal arterials while providing access to adjacent lands.

The spacing of minor arterial streets may vary from several blocks to a half-mile in the highly developed areas of town, to several miles in the suburban fringes. They are not normally spaced more than one mile apart in fully developed areas.

On-street parking may be allowed on minor arterials if space is available. In many areas on-street parking along minor arterials is prohibited during peak travel periods. Posted speed limits on minor arterials would typically range between 25 and 55 mph, depending on the setting.

<u>Urban Collector Street System</u> – The urban collector street network serves a joint purpose. It provides equal priority to the movement of traffic, and to the access of residential, business, and industrial areas. This type of roadway differs from those of the arterial system in that collector roadways may traverse residential neighborhoods. The collector system distributes trips from the arterials to ultimate destinations. The collector streets also collect traffic from local streets in the residential neighborhoods, channeling it into the arterial system. On-street parking is usually allowed on most collector streets if space is available. Posted speed limits on collectors typically range between 25 and 45 mph.

<u>Urban Local Street System</u> – The local street network comprises all facilities not included in the higher systems. Its primary purpose is to permit direct access to abutting lands and connections to higher systems. Usually service to through-traffic movements is intentionally discouraged. On-street parking is usually allowed on the local street system. The speed limit on local streets is usually 25 mph.

<u>Rural Principal Arterial System</u> – The rural principal arterial system consists of a network of routes with the following service characteristics:

1. Corridor movement with trip length and density suitable for substantial statewide or interstate travel.

2. Movements between all, or virtually all, urban areas with populations over 50,000 and a large majority of those with populations over 25,000.

3. Integrated movement without stub connections except where unusual geographic or traffic flow conditions dictate otherwise (e.g., international boundary connections or connections to coastal cities).

In the more densely populated states, this class of highway includes most (but not all) heavily traveled routes that might warrant multilane improvements in the majority of states; the principal arterial system includes most (if not all) existing rural freeways.

The rural principal arterial system is stratified into the following two design types: (1) freeways and (2) other principal arterials.

<u>Rural Minor Arterial System</u> – The rural minor arterial road system, in conjunction with the rural principal arterial system, forms a network with the following service characteristics:

1. Linkage of cities, larger towns, and other traffic generators (such as major resort areas) that are capable of attracting travel over similarly long distances.

2. Integrated interstate and intercounty service.

3. Internal spacing consistent with population density, so that all developed areas of the state are within reasonable distances of arterial highways.

4. Corridor movements consistent with items (1) through (3) with trip lengths and travel densities greater than those predominantly served by rural collector or local systems.

Minor arterials therefore constitute routes, the design of which should be expected to provide for relatively high travel speeds and minimum interference to through movement.

Rural Collector System – The rural collector routes generally serve travel of primarily intracounty rather than statewide importance and constitute those routes on which (regardless of traffic volume) predominant travel distances are shorter than on arterial routes. Consequently, more moderate speeds may be typical. To define rural collectors more clearly, this system is subclassified according to the following criteria:

- Major Collector Roads. These routes (1) serve county seats not on arterial routes, larger towns not directly served by the higher systems, and other traffic generators of equivalent intracounty importance, such as consolidated schools, shipping points, county parks, and important mining and agricultural areas; (2) link these places with nearby larger towns or cities, or with routes of higher classifications; and (3) serve the more important intracounty travel corridors.

- Minor Collector Roads. These routes should (1) be spaced at intervals consistent with population density to accumulate traffic from local roads and bring all developed areas within reasonable distances of collector roads; (2) provide service to the remaining smaller communities; and (3) link the locally important traffic generators with their rural hinterland.

Rural Local Road System – The rural local road system, in comparison to collectors and arterial systems, primarily provides access to land adjacent to the collector network and serves travel over relatively short distances. The local road system constitutes all rural roads not classified as principal arterials, minor arterials, or collector roads. A very low-volume rural local road is a road that has a design ADT of 400 vehicles per day or less. The *AASHTO Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT < 400).*

Table 2-1 on the following page contains a summary of the major street network in and around the City of Hamilton proper with associated functional classifications and route purpose.

Table 2-1
Functional Street Classifications for Hamilton

Classification	Primary Function
FHWA Classified Routes	
Principal Arterials ➢ US Highway 93	Mobility
Major Collectors ➢ S-269 (Eastside Highway) ➢ S-531 (Main Street)	Land Access / Mobility
Minor Collectors ➢ M-53-32 (Hope Avenue)	Land Access / Mobility
City of Hamilton Classified Routes	
Minor Collectors ➢ Adirondac Avenue ➢ Pine Avenue ➢ Pickney Street ➢ State Street ➢ Marcus Street ➢ Fairgrounds Road ➢ Golf Course Road ➢ Ravalli Street ➢ 7th Street ➢ 4th Street ➢ Daly Avenue ➢ Kurtz Lane ➢ Freeze Lane ➢ Big Corral Road ➢ Grantsdale Road	Land Access / Mobility
Ravalli County Classified Routes (see note 1)	
Major Collectors ➢ Bowman Road (Ricketts Road to US Highway 93) ➢ Hamilton Heights Road (S-269 to Harvey Lane) ➢ Fairgrounds Road (Freeze Lane to S-269) ➢ Golf Course Road (US Highway 93 to Big Corral Road) ➢ Grantsdale Road (S-38 to Golf Course Road)	Land Access / Mobility
Minor Collectors ➢ West Bridge Road ➢ Old Corvallis Road ➢ Ricketts Road ➢ Riverside Cut-off ➢ Black Lane ➢ Bass Lane ➢ Blood Lane ➢ Hamilton Heights Road (Harvey Lane to Study Area Boundary) ➢ Bowman Road (Dutch Hill Road to Study Area Boundary) ➢ Golf Course Road (Big Corral Road to Tammany Lane)	Land Access / Mobility

Note 1: Ravalli County roadway classifications follow the AASHTO standards for rural roadways.

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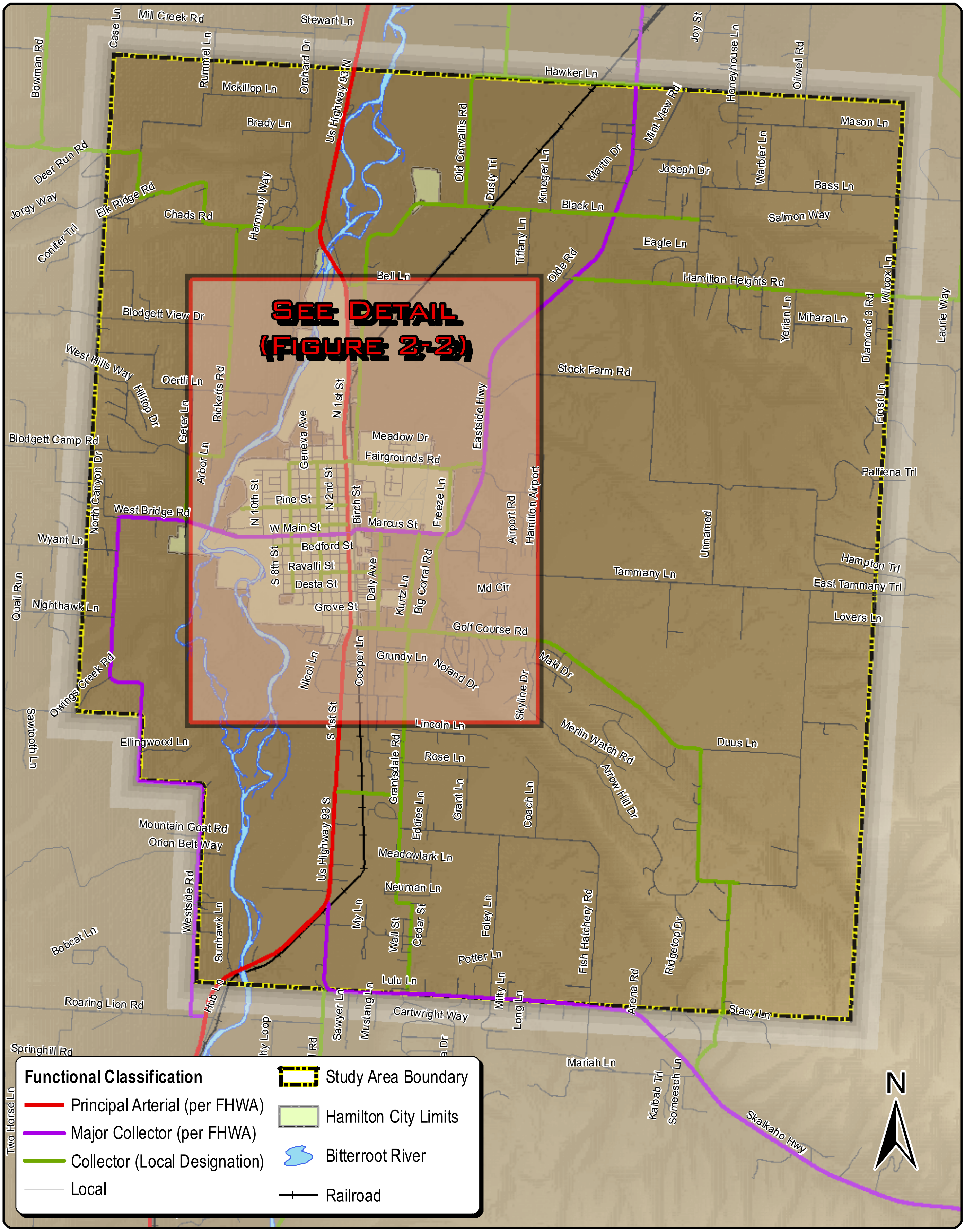

Figure 2-1

Roadway Functional Classification

0 0.5 1 1.5 2

Miles

Hamilton Area Transportation Plan 2009 Update

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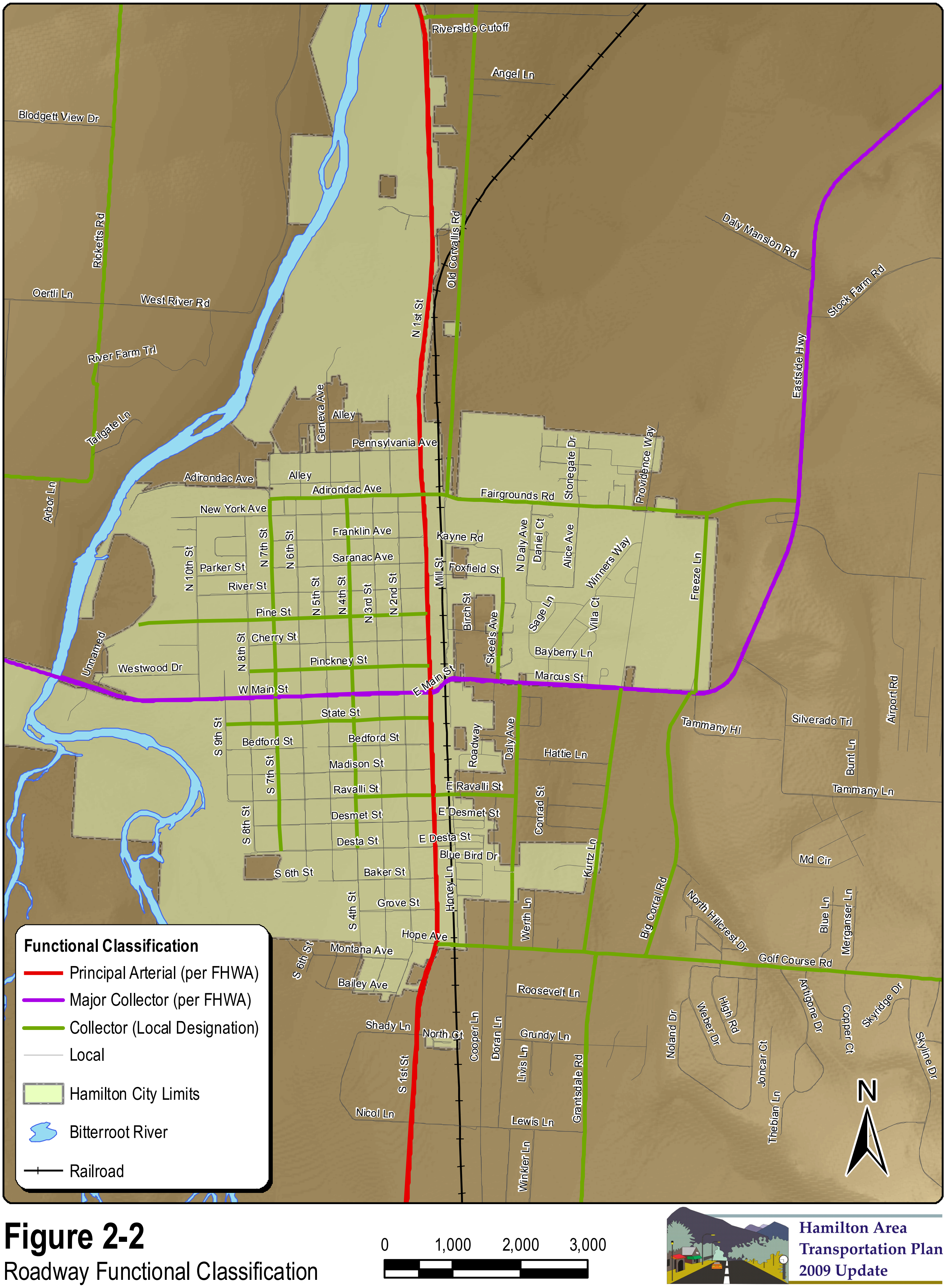

Figure 2-2

Roadway Functional Classification
Inset Area

Hamilton Area Transportation Plan
2009 Update

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2.3 Existing Traffic Volumes and Corridor Facility Size

When evaluating a roadway system it is generally good practice to compare the traffic average annual daily traffic (AADT) volumes to the approximate capacity of each roadway facility. US Highway 93 traffic data is collected by the Montana Department of Transportation. This is also true for some of the secondary roads in the study area. In addition, the Ravalli County Road and Bridge Department collects AADT volumes on many of the rural roadways in the study area.

Estimated AADT volumes were calculated based on the PM Peak Hour turning movement counts performed at eighteen of the intersections in the study area boundary. This is an acceptable methodology for planning level documents, as summarized in the Highway Capacity Manual 2000 and stated below:

> *Capacity and other traffic analyses frequently focus on the peak hour of traffic for the peak direction because it represents high capacity requirements. Because planning applications frequently deal with annual average daily traffic (AADT), the K factor is needed to provide a means to convert between daily and hourly volumes.*
>
> *For vehicle traffic, the proportion of AADT occurring in the analysis hour is referred to as the K-factor. The K-factor is highly dependent on the analysis hour selected, the specific characteristics of the roadway, and the location of the roadway. In converting hourly volumes to daily volumes, the hourly volume is divided by the K-factor.*

The Highway Capacity Manual 2000 offers default values to be used in the conversion of peak hourly volumes to AADT volumes for planning purposes. In this case, a default K factor of 0.10 was identified, which in practice means that the PM peak hour traffic volumes are 10 percent of the estimated AADT volumes. Thus, AADT volumes were estimated for the year 2009 based on turning movement counts, and are shown on **Figure 2-3** and **Figure 2-4**. In areas where estimated 2009 volumes are not available due to a lack of turning movement counts, AADT's are shown as originally represented in the 2002 Hamilton Transportation Plan.

All roadways within the study area boundary are predominately two-lane roadways, with the exception of US Highway 93, which has both five-lane and four-lane segments.

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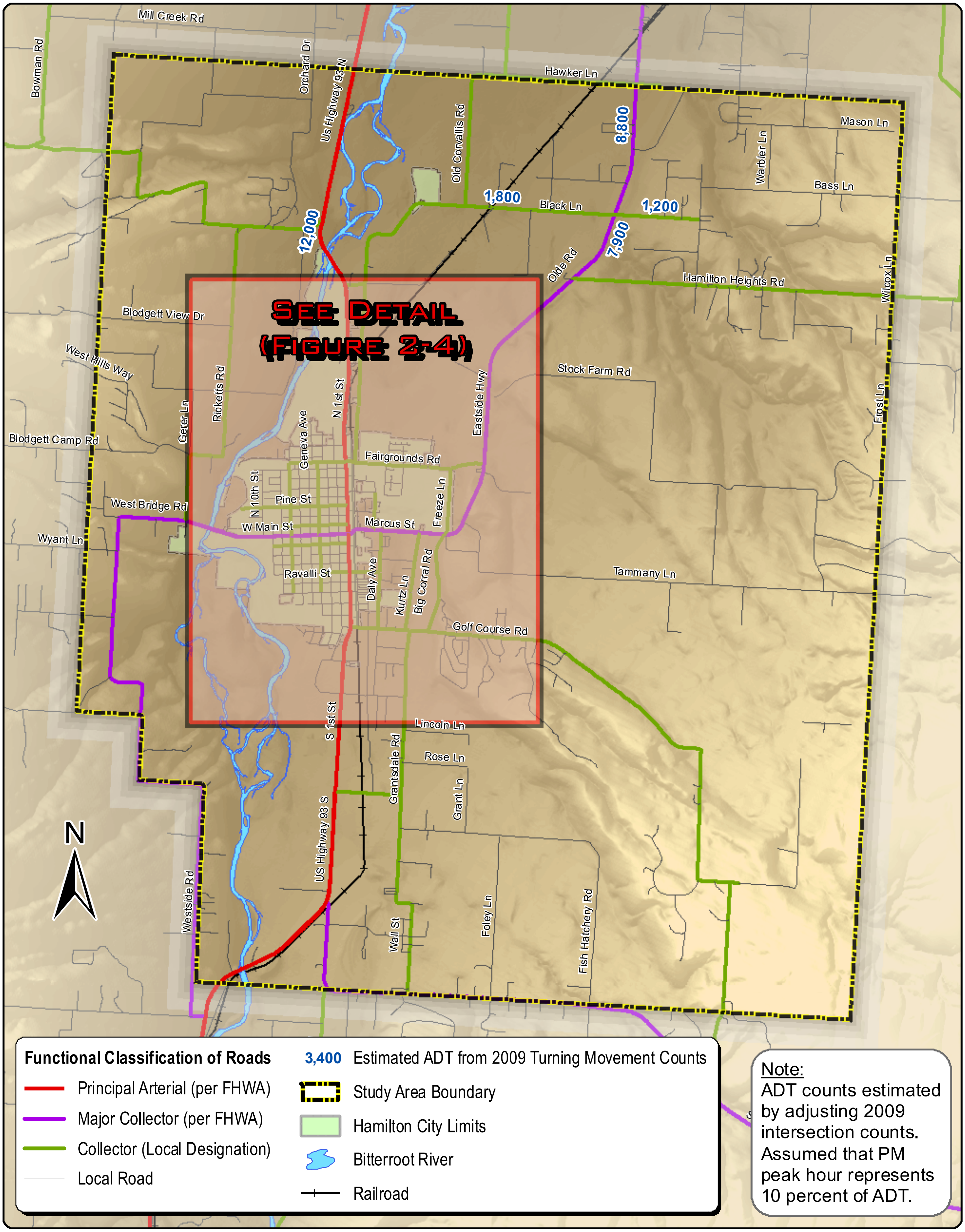

Figure 2-3

Estimated Average Daily Traffic (ADT) Volumes

0 0.5 1 1.5 2

Miles

Hamilton Area Transportation Plan 2009 Update

CDM

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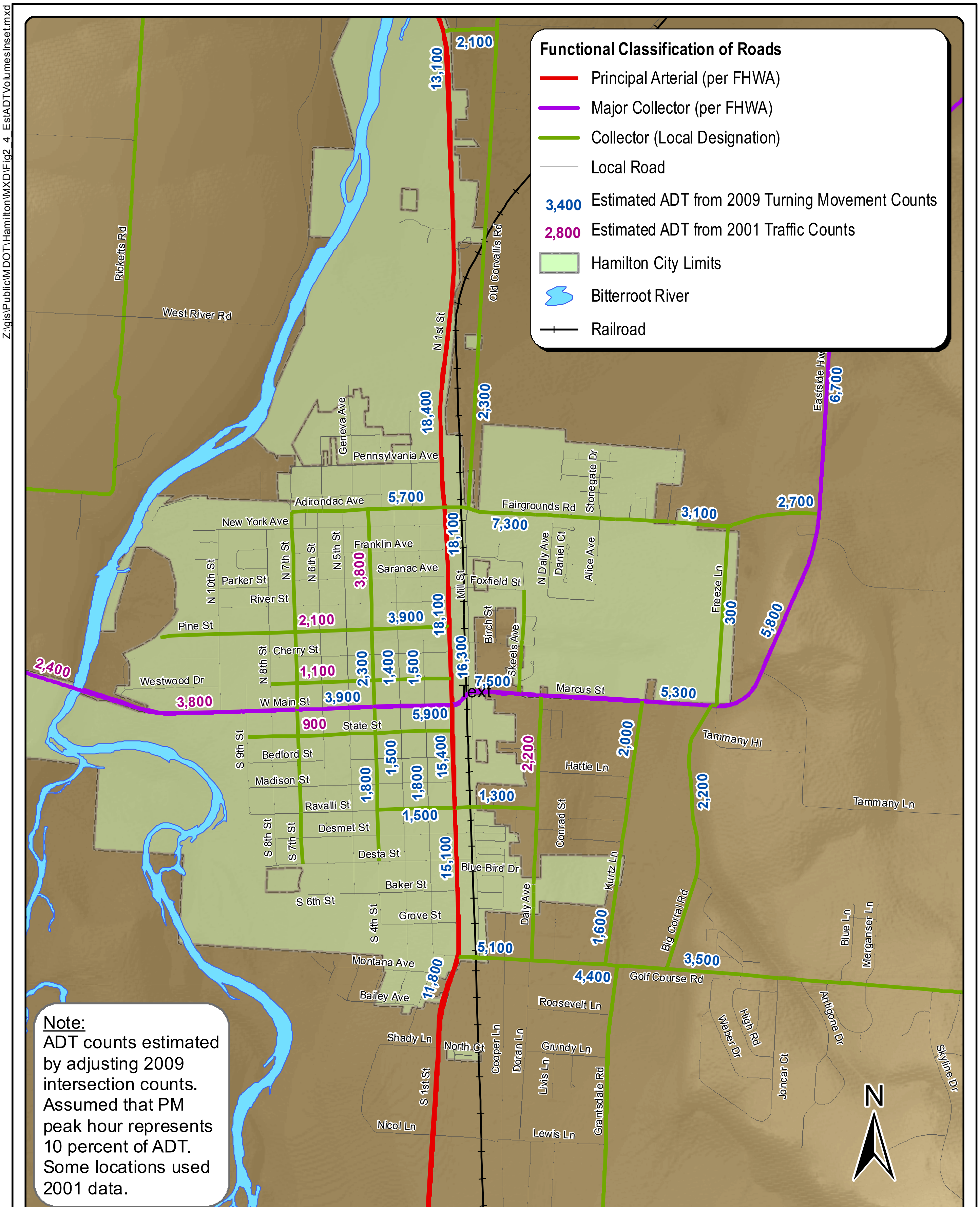

Figure 2-4

Estimated Average Daily Traffic (ADT) Volumes
Inset Area

0 1,000 2,000 3,000 4,000
Feet

Hamilton Area Transportation Plan 2009 Update

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2.4 Existing Levels of Service

Roadway systems are ultimately controlled by the function of major intersections. Intersection failure directly reduces the number of vehicles that can be accommodated during the peak hours that have the highest demand and the total daily capacity of a corridor. As a result of this strong impact on corridor function, intersection improvements can be a very cost-effective means of increasing a corridor's traffic volume capacity. In some circumstances, corridor expansion projects may be able to be delayed with correct intersection improvements. Due to the significant portion of total expense for roadway construction projects used for project design, construction, mobilization, and adjacent area rehabilitation, a careful analysis must be made of the expected service life from intersection-only improvements. If adequate design life can be achieved with only improvements to the intersection, then a corridor expansion may not be the most efficient solution. With that in mind, it is important to determine how well the major intersections are functioning by determining their Level of Service (LOS).

Level of Service (LOS) is a qualitative measure developed by the transportation profession to quantify driver perception for such elements as travel time, number of stops, total amount of stopped delay, and impediments caused by other vehicles. It provides a scale that is intended to match the perception by motorists of the operation of the intersection. Level of Service provides a means for identifying intersections that are experiencing operational difficulties, as well as providing a scale to compare intersections with each other. The level of service scale represents the full range of operating conditions. The scale is based on the ability of an intersection or roadway segment to accommodate the amount of traffic using it. The scale ranges from "A" which indicates little, if any, vehicle delay, to "F" which indicates significant vehicle delay and traffic congestion. The LOS analysis was conducted according to the procedures outlined in the Transportation Research Board's Highway Capacity Manual – Special Report 209 using the Highway Capacity Software, version 4.1f.

In order to calculate the LOS, 18 intersections on the Major Street Network were counted during the spring of 2009. These intersections included 6 signalized intersections and 12 high-volume unsignalized intersections in the Hamilton area. Each intersection was counted between 7:00 a.m. to 9:00 a.m. and 4:00 p.m. and 6:00 p.m., to ensure that the intersection's peak volumes were represented. Based upon this data, the operational characteristics of each intersection were obtained.

2.4.1 Signalized Intersections

For signalized intersections, recent research has determined that average control delay per vehicle is the best available measure of level of service. Control delay takes into account uniform delay, incremental delay, and initial queue delay. The amount of control delay that a vehicle experiences is approximately equal to the time elapsed from when a vehicle joins a queue at the intersection (or arrives at the stop line when there is no queue) until the vehicle departs from the stopped position at the head of the queue. The control delay is primarily a function of volume, capacity, cycle length, green ratio, and the pattern of vehicle arrivals.

The following table identifies the relationship between level of service and average control delay per vehicle. The procedures used to evaluate signalized intersections use detailed information on geometry, lane use, signal timing, peak hour volumes, arrival types and other parameters. This information is then used to calculate delays and determine the capacity of each intersection. Generally, an intersection is determined to be functioning adequately if operating at LOS C or better. **Table 2-2** shows the LOS by control delay for signalized intersections.

Table 2-2
Level of Service Criteria (Signalized Intersections)

	Control Delay per Vehicle (sec)
A	< 10
B	10 to 20
C	20 to 35
D	35 to 50
E	50 to 80
F	> 80

Source: The Transportation Research Board's *Highway Capacity Manual*

Using these techniques and the data collected in the spring of 2009, the LOS for the signalized intersections was calculated. **Table 2-3** shows the AM and PM peak hour LOS for each individual leg of the intersections, as well as the intersections as a whole. The intersection LOS is shown graphically in **Figure 2-5** and **Figure 2-6**.

Table 2-3
Existing (2009) Level of Service for Signalized Intersections

Intersection	AM Peak Hour					PM Peak Hour				
	EB	WB	NB	SB	INT	EB	WB	NB	SB	INT
US 93 & Adirondac Avenue/Fairgrounds Road	F	E	B	B	C	D	C	C	B	C
US 93 & Pine Street	F	-	A	A	B	F	-	A	A	D
US 93 & Main Street/Marcus Street	B	B	B	B	B	B	B	B	B	B
US 93 & Ravalli Street	D	D	A	A	A	E	C	A	A	B
US 93 & Golf Course Road/Hope Avenue	D	F	A	A	E	C	F	A	A	C
2nd Street & Main Street	B	B	B	B	B	B	A	B	B	B

(Abbreviations used in the table are as follows: EB = eastbound; WB = westbound; NB = northbound; SB = southbound; INT = intersections as a whole)

CDM

2.4.2 Unsignalized Intersections

Level of service for unsignalized intersections is based on the delay experienced by each movement within the intersection, rather than on the overall stopped delay per vehicle at the intersection. This difference from the method used for signalized intersections is necessary since the operating characteristics of a stop-controlled intersection are substantially different. Driver expectations and perceptions are also entirely different. For two-way stop controlled intersections, the through traffic on the major (uncontrolled) roadway experiences no delay at intersection. Conversely, vehicles turning left from the minor roadway experience more delay than other movements and at times can experience significant delay. Vehicles on the minor roadway, which are turning right or going across the major roadway, experience less delay than those turning left from the same approach. Due to this situation, the level of service assigned to a two-way stop controlled intersection is based on the average delay for vehicles on the minor roadway approach.

Levels of service for all-way stop controlled intersections are also based on delay experienced by the vehicles at the intersection. Since there is no major roadway, the highest delay could be experienced by any of the approaching roadways. Therefore, the level of service is based on the approach with the highest delay as shown in **Table 2-4**. This table shows the LOS criteria for both the all-way and two-way stop controlled intersections.

Table 2-4
Level of Service Criteria (Stop Controlled Intersections)

Level of Service	Delay (seconds/vehicle)
A	< 10
B	10 to 15
C	15 to 25
D	25 to 35
E	35 to 50
F	> 50

Source: The Transportation Research Board's *Highway Capacity Manual*

Using the above guidelines, the data collected in the spring of 2009 and calculation techniques for two-way stop controls and all-way stop controls, the LOS was calculated for 12 intersections. **Table 2-5** and **Table 2-6** show the detailed results of the performance level turning movement breakout for each unsignalized intersection. The intersection LOS is shown graphically in **Figure 2-5** and **Figure 2-6**.

Table 2-5
Existing (2009) Level of Service for Unsignalized Intersections

Unsignalized Intersection	AM Peak Hour			PM Peak Hour		
	Delay	LOS	V/C	Delay	LOS	V/C
US 93 & Riverside Cutoff	-	-	-	-	-	-
Westbound Left	22.7	C	0.30	38.1	E	0.39
Westbound Right	9.9	A	0.02	11.6	B	0.09
Southbound Left	8.5	A	0.05	10.1	B	0.03
Old Corvallis Road/Mill Street & Fairgrounds Road	-	-	-	-	-	-
Eastbound Left/Thru/Right	8.1	A	0.06	8.0	A	0.05
Westbound Left/Thru/Right	7.8	A	0.01	8.1	A	0.01
Northbound Left/Thru/Right	15.4	C	0.07	16.5	C	0.13
Southbound Left/Thru/Right	13.9	B	0.18	19.5	C	0.38
Freeze Lane & Fairgrounds Road	-	-	-	-	-	-
Westbound Left/Thru	7.4	A	0.01	7.8	A	0.00
Northbound Left	10.4	B	0.04	11.1	B	0.02
Northbound Right	8.7	A	0.01	9.5	A	0.00
Eastside Highway & Fairgrounds Road	-	-	-	-	-	-
Eastbound Left/Right	13.9	B	0.20	20.8	C	0.47
Northbound Left/Thru	8.3	A	0.02	7.9	A	0.03
Eastside Highway & Kurtz Road	-	-	-	-	-	-
Eastbound Left/Thru/Right	8.5	A	0.20	7.6	A	0.01
Westbound Left/Thru/Right	7.7	A	0.02	8.2	A	0.02
Northbound Left/Thru/Right	61.5	F	0.68	25.2	D	0.48
Southbound Left	41.4	E	0.04	17.9	C	0.01
Southbound Thru/Right	26.5	D	0.42	16.3	C	0.26
Eastside Highway & Black Lane/Bass Lane	-	-	-	-	-	-
Eastbound Left/Thru/Right	23.1	C	0.25	44.9	E	0.66
Westbound Left/Thru/Right	22.1	C	0.37	23.6	C	0.23
Northbound Left/Thru/Right	8.6	A	0.02	8.1	A	0.01
Southbound Left/Thru/Right	7.9	A	0.02	8.6	A	0.03
3rd Street & Main Street	-	-	-	-	-	-
Eastbound Left/Thru/Right	8.86	A		10.75	B	
Westbound Left/Thru/Right	8.70	A		9.34	A	
Northbound Left/Thru/Right	8.00	A		8.90	A	
Southbound Left/Thru/Right	8.03	A		9.07	A	
4th Street & Main Street	-	-	-	-	-	-
Eastbound Left/Thru/Right	9.45	A		10.79	B	
Westbound Left/Thru/Right	8.95	A		9.16	A	
Northbound Left/Thru/Right	8.78	A		9.12	A	

Southbound Left/Thru/Right	8.41	A		8.92	A	

Table 2-6
Existing (2009) Level of Service for Unsignalized Intersections

Unsignalized Intersection	AM Peak Hour			PM Peak Hour		
	Delay	LOS	V/C	Delay	LOS	V/C
Golf Course Road & Big Corral Road	-	-	-	-	-	-
Eastbound Left/Thru	8	A	0.29	7.7	A	0.06
Southbound Left/Right	11.2	B	0.14	11.9	B	0.22
Golf Course Road & Kurtz Lane	-	-	-	-	-	-
Eastbound Left/Thru	8.3	A	0.07	7.8	A	0.02
Southbound Left/Right	13.8	B	0.18	12.9	B	0.23
Eastside Highway & Tammany Lane	-	-	-	-	-	-
Westbound Left/Right	12.1	B	0.12	16.3	C	0.27
Southbound Left/Thru	7.7	A	0.03	8.4	A	0.05
Eastside Highway & Airport Road	-	-	-	-	-	-
Westbound Left/Right	10.1	B	0.02	12.9	B	0.07
Southbound Left/Thru	7.7	A	0.01	8.4	A	0.02

The existing conditions LOS study in the Hamilton area shows that two signalized and three unsignalized intersections are currently functioning at LOS D or lower. These five intersections indicate potential opportunities for closer examination and further intersection improvement measures to mitigate "operational" conditions. These are shown in **Table 2-7**.

Table 2-7
Existing Intersections Functioning at a LOS D or Lower

Intersection		AM Peak	PM Peak
US 93 & Pine Street	S	F	D
US 93 & Golf Course Road/Hope Avenue	S	E	C
US 93 & Riverside Cutoff	U	C	E
Kurtz Lane & Marcus Street/Eastside Highway	U	F	D
Eastside Highway & Black Lane/Bass Lane	U	C	E

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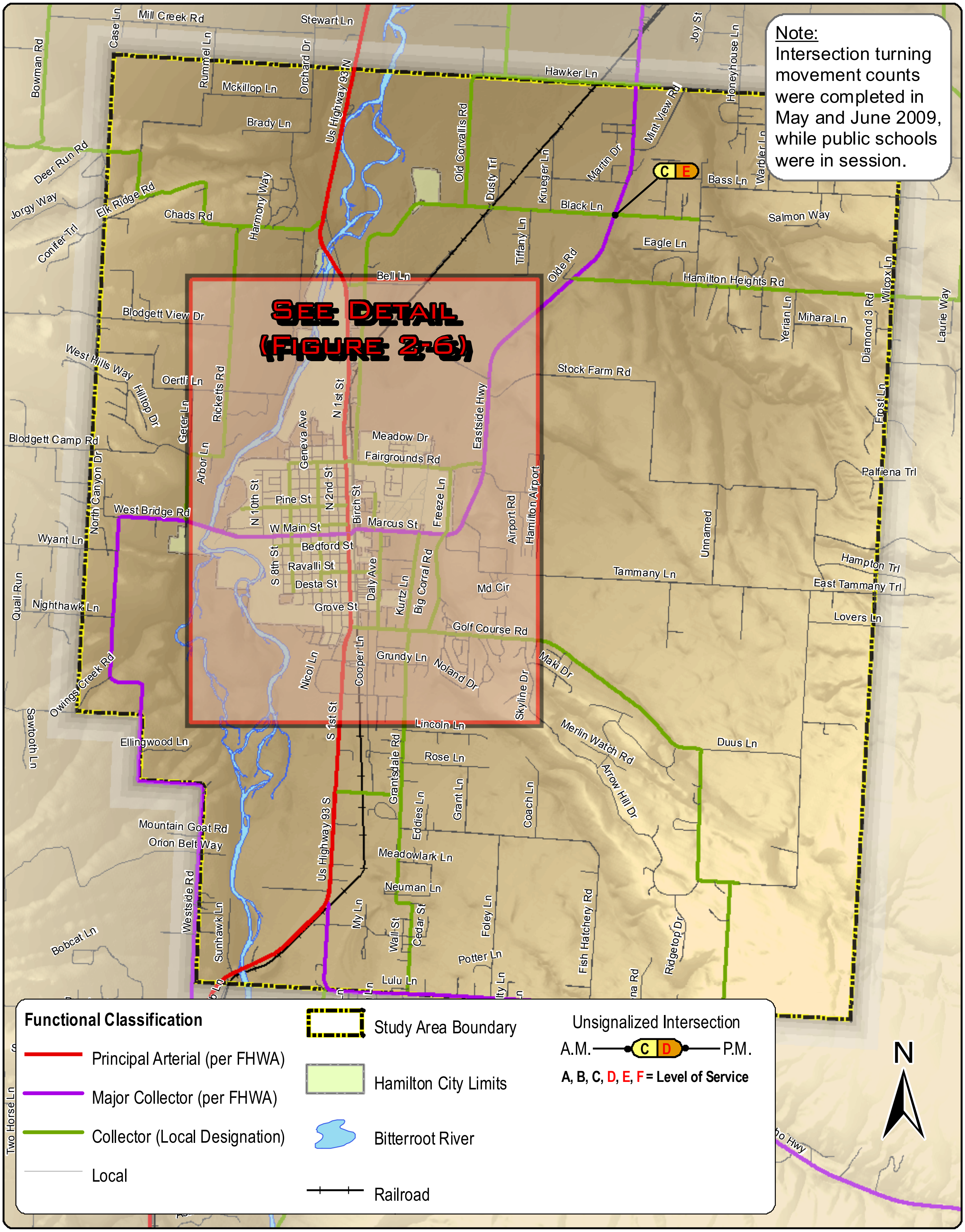

Figure 2-5

Intersection Level of Service

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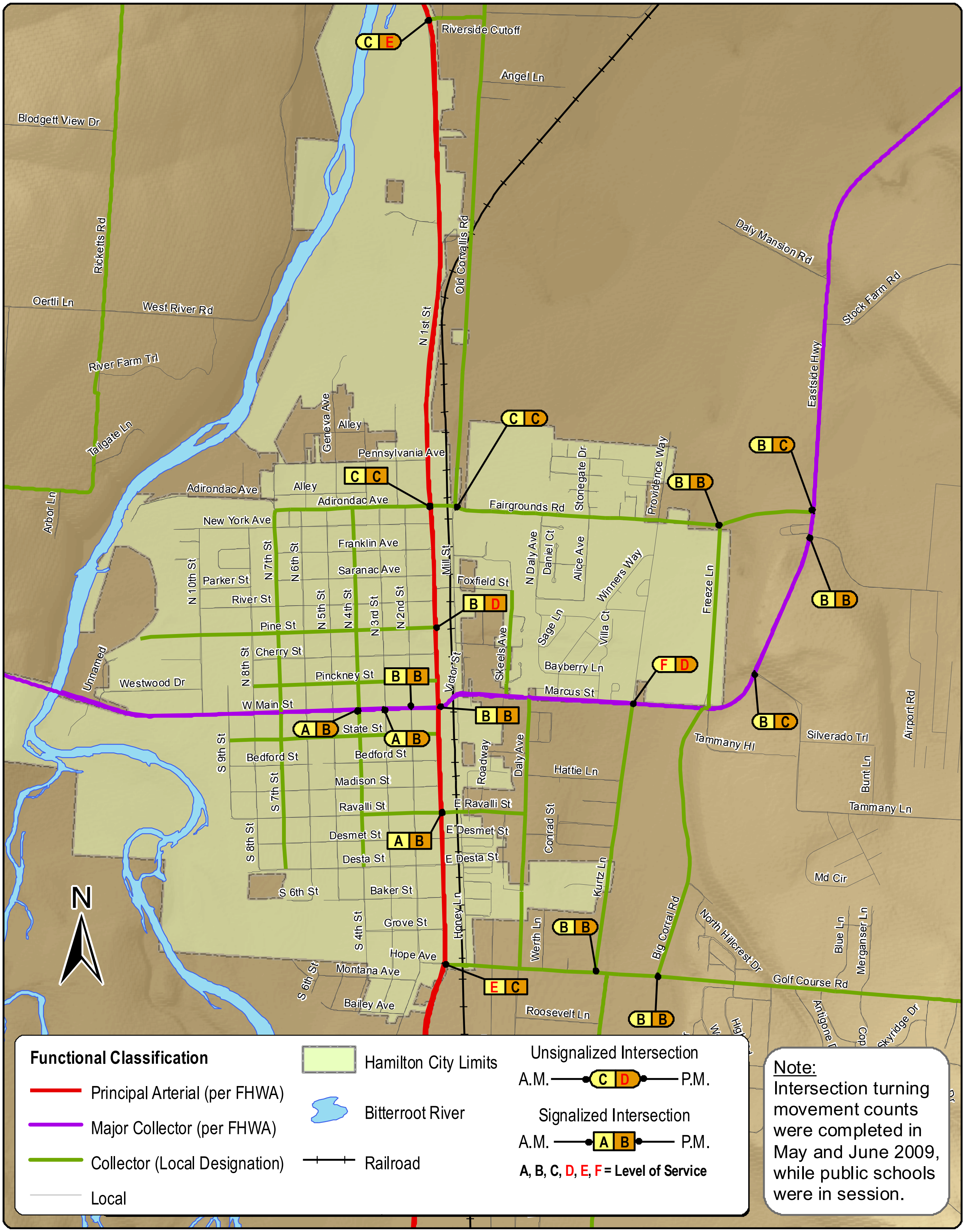

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Figure 2-6

Intersection Level of Service
Inset Area

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2.5 Existing City Signing Inventory (Intersection Control)

A cursory review and data collection effort was made of the traffic control signs within the City of Hamilton. Signs were not inventoried along the numerous County roadways and/or State of Montana maintained facilities. The inventory was conducted to provide a record of stop sign locations throughout the residential areas of the City of Hamilton.

Hamilton has a varied use of stop signs for intersection traffic control. During the project development activities there were quite a few public comments on the perceived inconsistent use of stop signs in the community. From a technical perspective, stop signs should only be used in accordance with engineering judgment and as specified in the Manual on Uniform Traffic Control Devices (MUTCD) guidance. Use of signs in situations other than as specified in the MUTCD are typically not warranted and should be avoided.

For completeness, the relevant sections of the MUTCD that address this matter are included below:

Section 2B.05 STOP Sign Applications

Guidance:

STOP signs should be used if engineering judgment indicates that one or more of the following conditions exist:

A. Intersection of a less important road with a main road where application of the normal right-of-way rule would not be expected to provide reasonable compliance with the law;

B. Street entering a through highway or street;

C. Unsignalized intersection in a signalized area; and/or

D. High speeds, restricted view, or crash records indicate a need for control by the STOP sign.

Standard:

Because the potential for conflicting commands could create driver confusion, STOP signs shall not be installed at intersections where traffic control signals are installed and operating.

Portable or part-time STOP signs shall not be used except for emergency and temporary traffic control zone purposes.

Guidance:

STOP signs should not be used for speed control.

STOP signs should be installed in a manner that minimizes the numbers of vehicles having to stop. At intersections where a full stop is not necessary at all times, consideration should be given to using less restrictive measures such as YIELD signs.

Once the decision has been made to install two-way stop control, the decision regarding the appropriate street to stop should be based on engineering judgment. In most cases, the street carrying the lowest volume of traffic should be stopped.

A STOP sign should not be installed on the major street unless justified by a traffic engineering study.

<u>Support:</u>

The following are considerations that might influence the decision regarding the appropriate street upon which to install a STOP sign where two streets with relatively equal volumes and/or characteristics intersect:

A. Stopping the direction that conflicts the most with established pedestrian crossing activity or school walking routes;

B. Stopping the direction that has obscured vision, dips, or bumps that already require drivers to use lower operating speeds;

C. Stopping the direction that has the longest distance of uninterrupted flow approaching the intersection; and

D. Stopping the direction that has the best sight distance to conflicting traffic.

Section 2B.07 Multiway Stop Applications

<u>Support:</u>

Multiway stop control can be useful as a safety measure at intersections if certain traffic conditions exist. Safety concerns associated with multiway stops include pedestrians, bicyclists, and all road users expecting other road users to stop. Multiway stop control is used where the volume of traffic on the intersecting roads is approximately equal. The restrictions on the use of STOP signs described in Section 2B.05 also apply to multiway stop applications.

<u>Guidance:</u>

The decision to install multiway stop control should be based on an engineering study.

The following criteria should be considered in the engineering study for a multiway STOP sign installation:

A. Where traffic control signals are justified, the multiway stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.

B. A crash problem, as indicated by 5 or more reported crashes in a 12-month period that are susceptible to correction by a multiway stop installation.

C. Minimum volumes:

   1. The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day, and

   2. The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour, but

   3. If the 85th-percentile approach speed of the major-street traffic exceeds 65 km/h or exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the above values.

D. Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.

<u>Option:</u>

Other criteria that may be considered in an engineering study include:

A. The need to control left-turn conflicts;

B. The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes;

C. Locations where a road user, after stopping, cannot see conflicting traffic and is not able to reasonably safely negotiate the intersection unless conflicting cross traffic is also required to stop; and

D. An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multiway stop control would improve traffic operational characteristics of the intersection.

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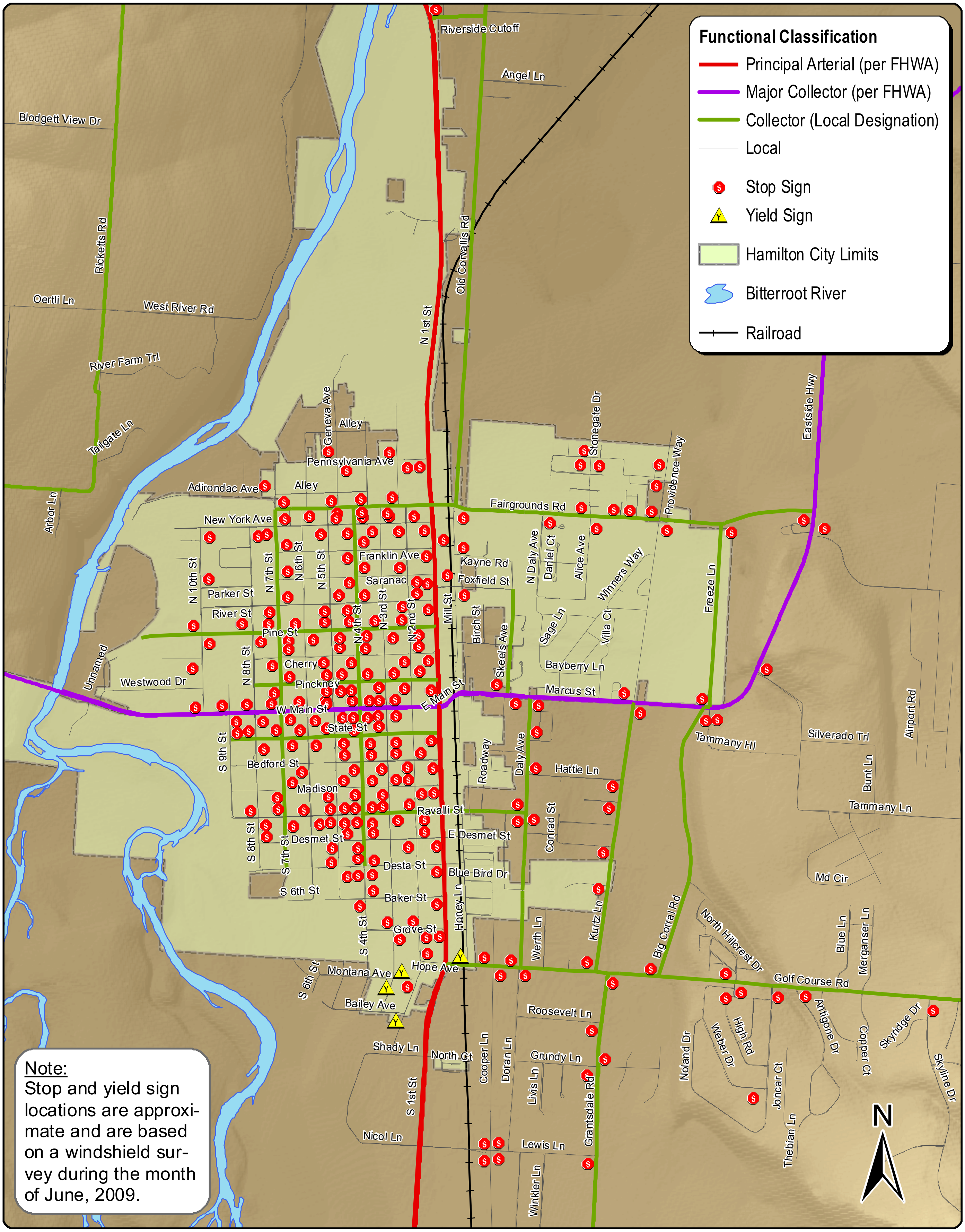

Figure 2-7

Intersection Control Signs
Inset Area

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2.6 Existing Crash Analysis

The purpose of this section is to document the number of crashes, severity of crashes, and overall intersection crash rates at the eighteen intersections being studied as part of this plan effort. The MDT Traffic and Safety Bureau provided crash information and data for use in the Hamilton Area Transportation Plan (2009 Update). The crash information was analyzed to identify intersections with crash characteristics that may warrant further study. General crash characteristics were evaluated along with potential causes. The crash information covers the three-year time period from January 1st, 2006 to December 31st, 2008. For this analysis eighteen intersections constituting the major signalized and un-signalized intersections were included (see **Table 2-8**). These intersections were defined for this analysis within the project scope of work. These eighteen intersections are considered to be the major, more important intersections within the planning study area boundary. They generally also include the higher volume intersections found within the study area boundary as well.

Using crash information provided by the MDT Traffic and Safety Bureau, an initial step at defining crash locations and types were made for the subject intersections being studied as part of the transportation planning effort. Subsequent to this initial review, CDM personnel researched the various crash number, crash types, and specific crash locations via analysis of the *Crash Investigators Reports* provided by the MDT at the MDT Headquarters. Three analyses were performed to rank the intersections based on different crash characteristics. First, the intersections were ranked by number of crashes. A summary of these intersections, along with the number of crashes at each intersection, is shown in **Table 2-8**.

Table 2-8
Intersection Crashes in the Three-Year Period
(January 1, 2006 thru December 31, 2008)

INTERSECTION		# CRASHES
Intersections with 16-21 crashes		
US 93 & Main Street/Marcus Street	S	16
Intersections with 11-15 crashes		
US 93 & Adirondac Avenue/Fairgrounds Road	S	13
Eastside Highway & Black Lane/Bass Lane	U-2W	13
US 93 & Golf Course Road/Hope Avenue	S	11
Eastside Highway & Fairgrounds Road	U-1W	11
Intersections with 6-10 crashes		
US 93 & Ravalli Street	S	10
US 93 & Pine Street	S	6
Intersections with 0-5 crashes		
Kurtz Lane & Marcus Street/Eastside Highway	U-2W	4
Old Corvallis Road/Mill Street & Fairgrounds Road	U-2W	3
Kurtz Lane & Golf Course Road	U-1W	3
2nd Street & Main Street	S	3
4th Street & Main Street	U-4W	3
US 93 & Riverside Cutoff	U-1W	2
Big Corral Road & Golf Course Road	U-1W	2
Eastside Highway & Tammany Lane	U-1W	1
Eastside Highway & Airport Road	U-1W	1
Freeze Lane & Fairgrounds Road	U-1W	1
3rd & Main Street	U-4W	0

S=Signalized intersection; U-1W=Unsignalized one-way stop controlled;
U-2W=Unsignalized two-way stop controlled; U-3W=Unsignalized three-way stop controlled;
U-4W=Unsignalized four-way stop controlled.

It should be noted that only eighteen intersections identified for analysis for the transportation plan were included in this analysis. The intersection shown in **Table 2-8** as having zero crashes is included for completeness only.

The second analysis involved a more detailed look at the crashes to determine the MDT "severity index rating". The severity index is a ratio that allows the analyst to see where the most severe types of crashes occur. Crashes were broken into three categories of severity: property damage only (PDO), non-incapacitating and possible injury crash, and fatality or incapacitating injury. Each of these three types is given a different rating: one (1) for a property damage only crash; three (3) for an injury crash; and eight (8) for a crash that resulted in a fatality. The MDT severity index for the intersections in the analysis is shown in **Table 2-9**. The calculation used to figure the severity index rating is as follows:

$$\textbf{MDT Severity Index} = \frac{1(\#\ PDO) + 3(\#\ Non\text{-}Incapacitating\ or\ Possible\ Injury) + 8(\#\ Fatality\ or\ Incapacitating\ Injury)}{Total\ Number\ of\ Crashes\ in\ a\ Three\text{-}Year\ Period}$$

The third analysis ranked the number of crashes against the annual average daily traffic (AADT) entering each intersection, expressed in crashes per million entering vehicles (MEV). A summary of the intersections in the analysis is shown in **Table 2-10**. The formula used to determine the intersection crash rate, expressed in crashes per million entering vehicles (MEV), as shown in **Table 2-10**, is as follows:

$$\textbf{Intersection Crash Rate} = \frac{Total\ number\ of\ crashes\ in\ three-year\ period}{(AADT\ Entering\ the\ Intersection) \times (3\ years) \times \left(365\frac{days}{year}\right) \Big/ 1{,}000{,}000\ vehicles}$$

Note that the Average Annual Daily Traffic (AADT) utilized for each of the eighteen intersections was calculated by adding up all of the intersection leg entering volumes collected during the PM peak hour period, and multiplying that number by 10. This is based on an assumption that the PM peak hour volumes are approximately 10 percent of the AADT for any given location under consideration. In actuality, data obtained from MDT Traffic Count Station A-056 suggests the PM peak hour may be approximately 11.76 percent of the AADT, however for purposes of this planning level analysis the 10 percent “rule-of-thumb” was considered to be adequate. Of note is that the 11.76 percent value is an average number based on yearly data collected between the time period of 1986 thru 2007. During that time frame the actual percentage ranged from a low value of 10.90 percent (years 2000 and 2001) to a high value of 13.30 percent (year 1991). MDT Traffic Count Station A-056 is located 2.5 miles north of Hamilton, near reference post 9RP) 51, on route N-7 (US Highway 93).

Table 2-9
Intersection Crash Analysis – MDT Severity Index

INTERSECTION	PDO	Possible/Non-Incapacitating Injury	Fatality/ Incapacitating Injury	Severity Index
Intersections with 3.25 - 3.50 Severity Index				
Kurtz Lane & Golf Course Road	2	0	1	3.33
Eastside Highway & Tammany Lane	2	1	1	3.25
Intersections with 3.00 – 3.24 Severity Index				
Eastside Highway & Airport Road	0	1	0	3.00
Intersections with 2.75 - 2.99 Severity Index				
-				
Intersections with 2.50 - 2.74 Severity Index				
US 93 & Adirondac Avenue/Fairgrounds Road	8	3	2	2.54
Intersections with 2.25 - 2.49 Severity Index				
Eastside Highway & Black Lane/Bass Lane	6	6	1	2.46
Old Corvallis Road/Mill Street & Fairgrounds Road	1	2	0	2.33
4th Street & Main Street	1	2	0	2.33
Intersections with 2.00 - 2.49 Severity Index				
Big Corral Road & Golf Course Road	1	1	0	2.00
Intersections with 1.75 - 1.99 Severity Index				
-				
Intersections with 1.50 - 1.74 Severity Index				
US 93 & Pine Street	4	2	0	1.67
Intersections with 1.00 - 1.49 Severity Index				
Eastside Highway & Fairgrounds Road	8	3	0	1.55
US 93 & Golf Course Road/Hope Avenue	8	3	0	1.55
Kurtz Lane & Marcus Street/Eastside Highway	3	1	0	1.50
US 93 & Main Street/Marcus Street	14	2	0	1.25
US 93 & Ravalli Street	9	1	0	1.20
US 93 & Riverside Cutoff	2	0	0	1.00
Freeze Lane & Fairgrounds Road	1	0	0	1.00
2nd Street & Main Street	3	0	0	1.00
3rd Street & Main Street	0	0	0	-

Table 2-10
Intersection Crash Rate

Intersection		Number of Crashes	Volume	Rate
Intersections with 1.00 – 1.50 Intersection Crash Rate				
Eastside Highway & Fairgrounds Road	U-1W	11	7,120	1.41
Eastside Highway & Black Lane/Bass Lane	U-2W	13	9,820	1.21
Intersections with 0.5 - 0.99 Intersection Crash Rate				
US 93 & Main Street/Marcus Street	S	16	22,190	0.66
US 93 & Golf Course Road/Hope Avenue	S	11	15,860	0.63
Kurtz Lane & Marcus Street/Eastside Highway	U-2W	4	6,570	0.56
Eastside Highway & Tammany Lane	U-1W	4	6,590	0.55
US 93 & Ravalli Street	S	10	16,770	0.54
US 93 & Adirondac Avenue/Fairgrounds Road	S	13	23,340	0.51
Kurtz Lane & Golf Course Road	U-1W	3	5,360	0.51
Intersections with 0.00 - 0.49 Intersection Crash Rate				
4th Street & Main Street	U-4W	3	5,970	0.46
Big Corral Road & Golf Course Road	U-1W	2	4,750	0.38
Old Corvallis Road/Mill Street & Fairgrounds Road	U-2W	3	7,860	0.35
Freeze Lane & Fairgrounds Road	U-1W	1	3,140	0.29
US 93 & Pine Street	S	6	19,150	0.29
2nd Street & Main Street	S	3	11,660	0.23
Eastside Highway & Airport Road	U-1W	1	5,710	0.16
US 93 & Riverside Cutoff	U-1W	2	13,620	0.13
3rd Street & Main Street	U-4W	0	5,650	0.00

S=Signalized intersection; U-1W=Unsignalized one-way stop controlled; U-2W=Unsignalized two-way stop controlled; U-3W=Unsignalized three-way stop controlled; U-4W=Unsignalized four-way stop controlled.

**AADT was calculated by adding the entering peak PM volumes of all legs of the intersection and multiplying by 10.*

(Assumes peak hour PM volumes are 10% of AADT.)

In order to give the intersections included in the crash analysis an even rating, a composite rating score was developed based on the three analyses presented above. The intersections were rated based on their position on each of the three previous tables, giving each equal weight. For example, the intersection of Eastside Highway and Fairgrounds Road was given a ranking of 4 for its position in **Table 2-8**, another ranking of 10 for its position in **Table 2-9**, and a ranking of 1 for its location in **Table 2-10**. Thus its composite rating is 15. Refer to **Table 2-11** for the composite rating of each intersection.

Table 2-11
Intersection Crash Analysis – Composite Rating

Intersection	Crash No.	Severity No.	Rate No.	Composite Ranking
Eastside Highway & Black Lane/Bass Lane	2	5	2	9
US 93 & Adirondac Avenue/Fairgrounds Road	2	4	8	14
Eastside Highway & Fairgrounds Road	4	10	1	15
US 93 & Main Street/Marcus Street	1	13	3	17
US 93 & Golf Course Road/Hope Avenue	4	10	4	18
Kurtz Lane & Golf Course Road	9	1	8	18
Eastside Highway & Tammany Lane	15	2	6	23
Kurtz Lane & Marcus Street/Eastside Highway	8	12	5	25
4th Street & Main Street	9	6	10	25
Old Corvallis Road/Mill Street & Fairgrounds Road	9	6	12	27
US 93 & Ravalli Street	6	14	8	28
US 93 & Pine Street	7	9	13	29
Big Corral Road & Golf Course Road	13	8	12	33
Eastside Highway & Airport Road	15	3	16	34
2nd Street & Main Street	9	15	15	39
Freeze Lane & Fairgrounds Road	15	15	13	43
US 93 & Riverside Cutoff	13	15	17	45
3rd Street & Main Street	18	18	18	54

Intersections that were identified through the composite rating score method, as described previously, which warrant further study and may be in need of mitigation to specifically address crash trends are listed below. The locations of these intersections are shown on **Figure 2-8** and **Figure 2-9**.

- Eastside Highway & Black Lane/Bass Lane
- Eastside Highway & Fairgrounds Road
- Eastside Highway & Tammany Lane
- Kurtz Lane & Golf Course Road
- US 93 & Golf Course Road/Hope Avenue
- US 93 & Main Street/Marcus Street
- US 93 & Adirondac Avenue/Fairgrounds Road

The identified intersections will be evaluated further to determine what type of mitigation measures may be possible to reduce specific crash trends (if any) and/or severity. Some intersections noted above have already been studied in greater detail and have had mitigation plans developed. An example is the intersection of Eastside Highway & Black Lane/Bass Lane. An intersection improvement project is currently in development that will improve operational characteristics at the intersection, and likely result in lower observed crashes in the future. This intersection is currently projected for construction in fiscal year 2012.

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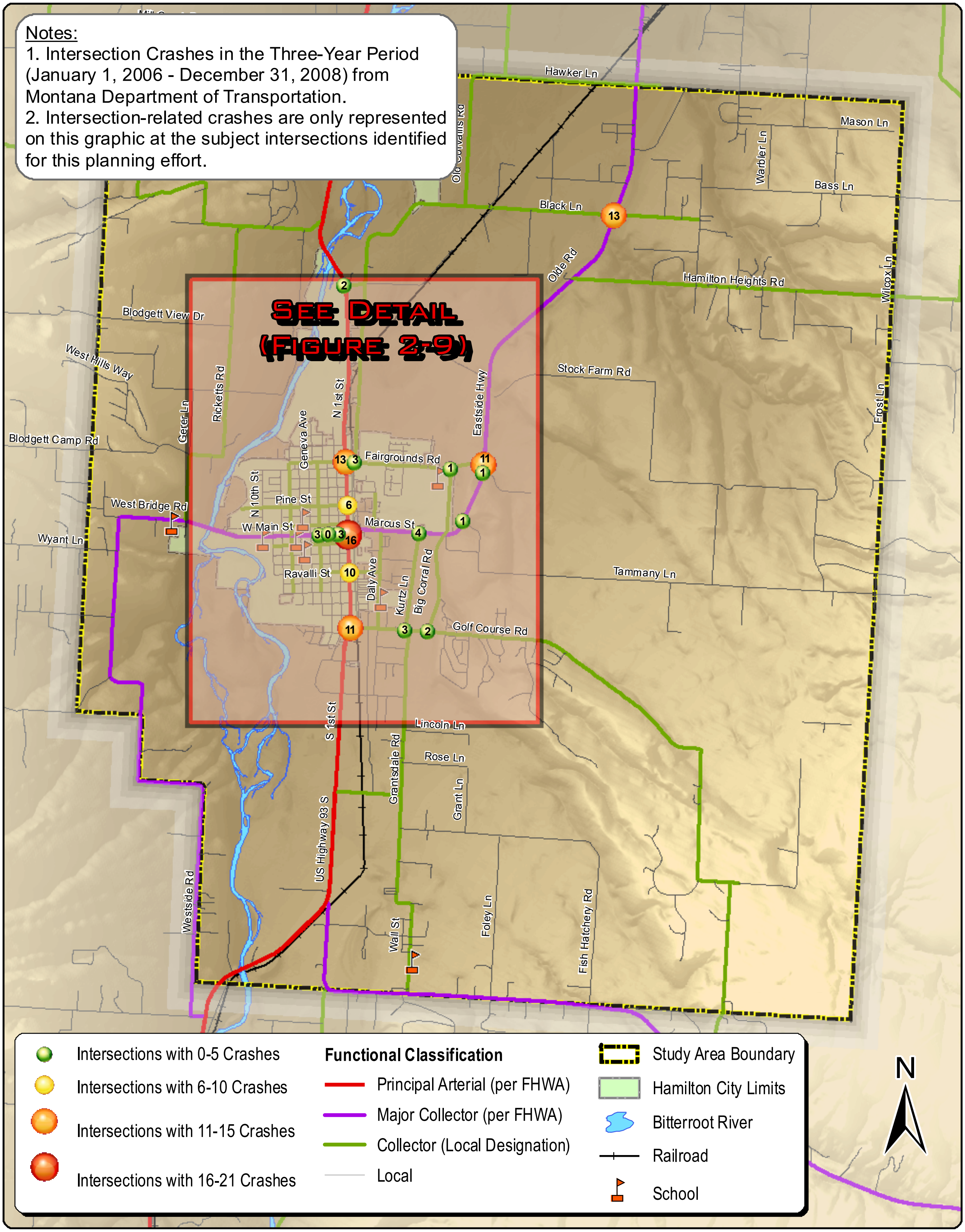

Figure 2-8
Crash Analysis

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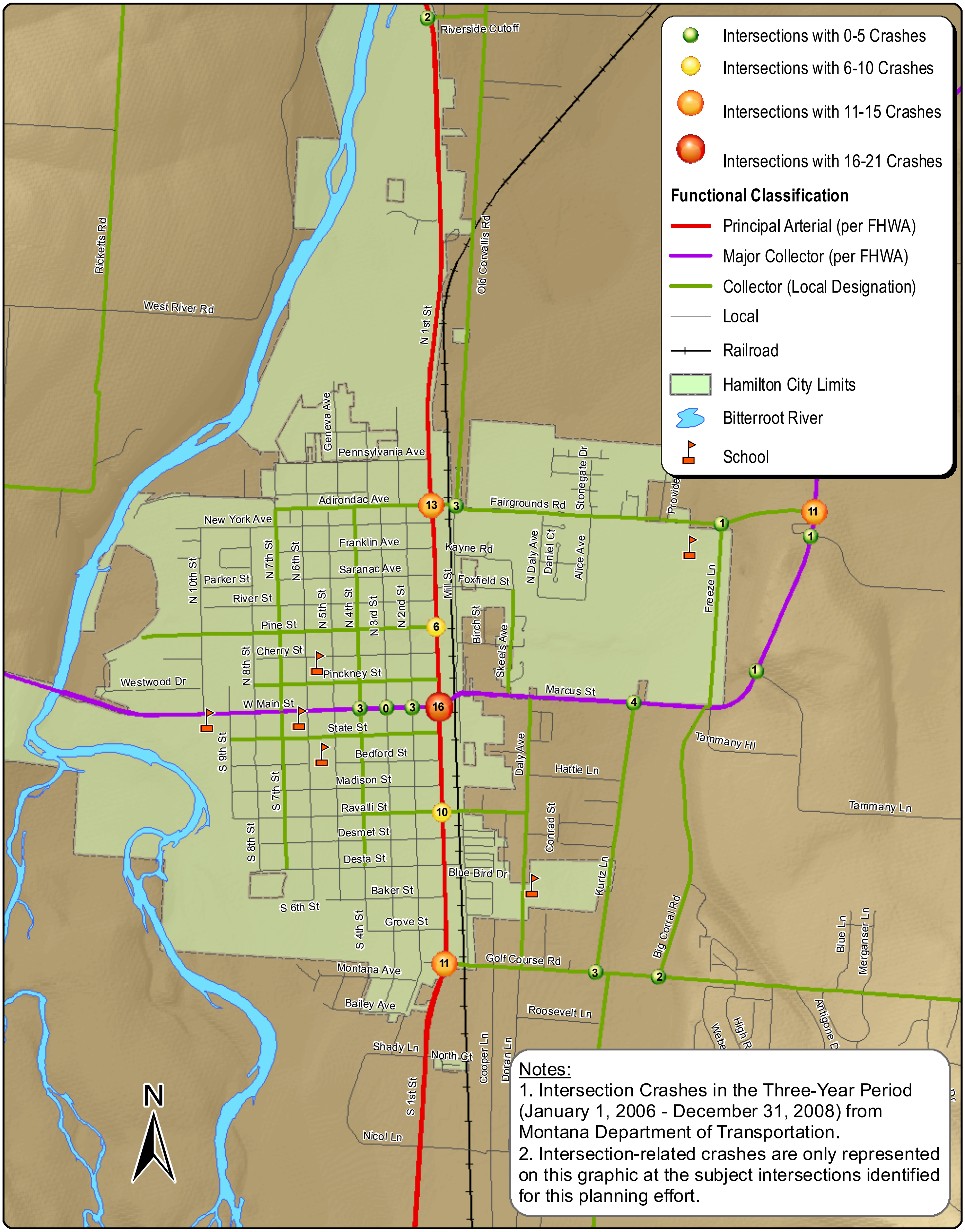

Notes:
1. Intersection Crashes in the Three-Year Period (January 1, 2006 - December 31, 2008) from Montana Department of Transportation.
2. Intersection-related crashes are only represented on this graphic at the subject intersections identified for this planning effort.

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Figure 2-9
Crash Analysis
Inset Area

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2.7 References

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Chapter 3
Travel Demand Forecasting

Chapter 3
Travel Demand Forecasting

3.1 Introduction

This chapter describes the method and process used to predict growth in the Hamilton area up to the year 2030. By using population, employment and other socio-economic trends as aids, the future transportation requirements for the Hamilton area are determined. A model of the transportation system for the Hamilton area was developed and assessed with the additions and changes to the system that are projected to occur up to the year 2030 being applied to the model to forecast the future transportation conditions. From this model, the percent change in traffic volumes between the current year and the planning year were noted and from this data estimated year 2030 traffic volumes were obtained.

3.2 Socio-Economic Trends

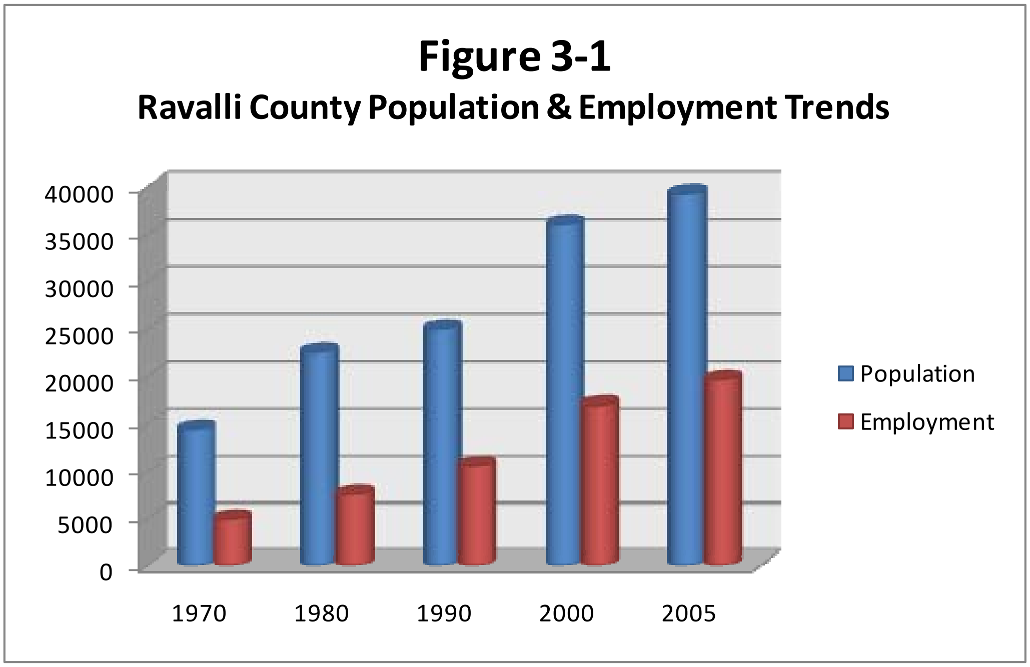
There is a direct relationship between motor vehicle travel growth and population and economic growth in Ravalli County. The population in Ravalli County has seen a significant population increase since 1990 with an increase of nearly 57%. A major concern to the influx of traffic volumes in Ravalli County is the rapid community population growth with particular interest to the City of Hamilton. There has been substantial employment growth in Ravalli County since 1990 with the county experiencing an 85% increase in employment. **Table 3-1** and **Figure 3-1** show the population and employment numbers for Ravalli County between 1970 and 2005.

Table 3-1
Ravalli County Population and Employment Trends (1970-2005)

Year	Population *	Employment **
1970	14,409	4,938
1980	22,493	7,490
1990	25,010	10,611
2000	36,070	16,963
2005	39,229	19,684

* Source: U.S. Bureau of the Census, Census of Population

** Source: U.S. Department of Commerce, Bureau of Economic Analysis



The population trends within Ravalli County in relation to the incorporated cities and the rural area are shown in **Table 3-2** and **Figure 3-2**. The incorporated cities in Ravalli County are Hamilton, Darby, Pinesdale (incorporated in 1990), and Stevensville. Each incorporated city, as well as the rural area, has seen a consistent population increase since 1980. Hamilton has seen the highest population increase of 62% between 1990 and 2005, while Stevensville has more than doubled in population during the same time period.

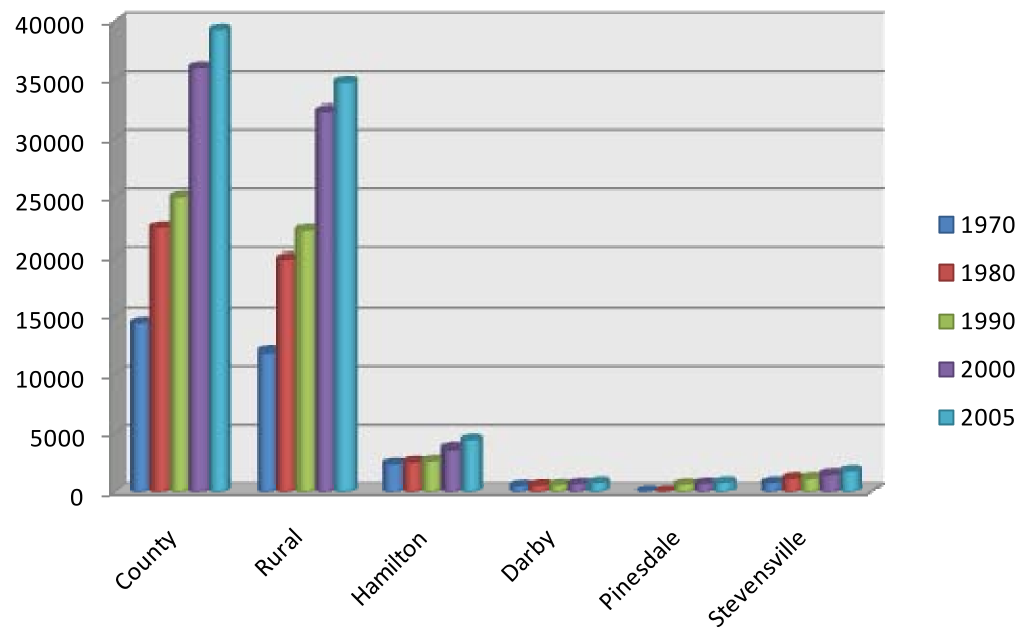
Table 3-2
Incorporated Cities in Ravalli County Historic Population Trends (1970-2005)

Year	County	Rural	Hamilton	Darby	Pinesdale	Stevensville
1970	14,409	11,910	2,499	538	~	829
1980	22,493	19,832	2,661	581	~	1,207
1990	25,010	22,273	2,737	625	670	1,221
2000	36,070	32,365	3,705	710	742	1,553
2005	39,229	34,786	4,443	835	832	1,855

* Source: U.S. Bureau of the Census, Census of Population

~ Not incorporated when census population was conducted

Figure 3-2
Incorporated Cities in Ravalli County
Historic Population Trends (1970-2005)



In recent decades there were other notable changes in Ravalli County's population. In Ravalli County, and elsewhere in Montana and the nation, the population's age profile got older. Between 1970 and 2000, the number of county residents under the age of 18 increased by 4,168 persons, residents age 18 to 64 increased by 14,058 persons, and residents 65 and older increased by 3,435 persons. As "Baby Boomers" got older, they simply had fewer children than their parents. The change in age can be seen in **Table 3-3**. The percentage of each age group is shown graphically in **Figure 3-3**. From this figure, it is apparent that there has been an increase in the age group of 18-64 and a decrease in people less than 18 years of age. A more detailed age distribution for Ravalli County for the year 2000 is shown in **Figure 3-4**.

Table 3-3
Ravalli County Age Distribution (1970-2000)

Year	Age			
	<18	18-64	65+	Total
1970	5,063	7,192	2,154	14,409
1980	6,934	12,581	2,978	22,493
1990	6,851	14,009	4,150	25,010
2000	9,231	21,250	5,589	36,070
Change (1970-2000)	4,168	14,058	3,435	21,661

* Source: U.S. Bureau of the Census, Census of Population

~ Not incorporated when census population was conducted

Figure 3-3
Ravalli County Age Distribution (1970-2000)

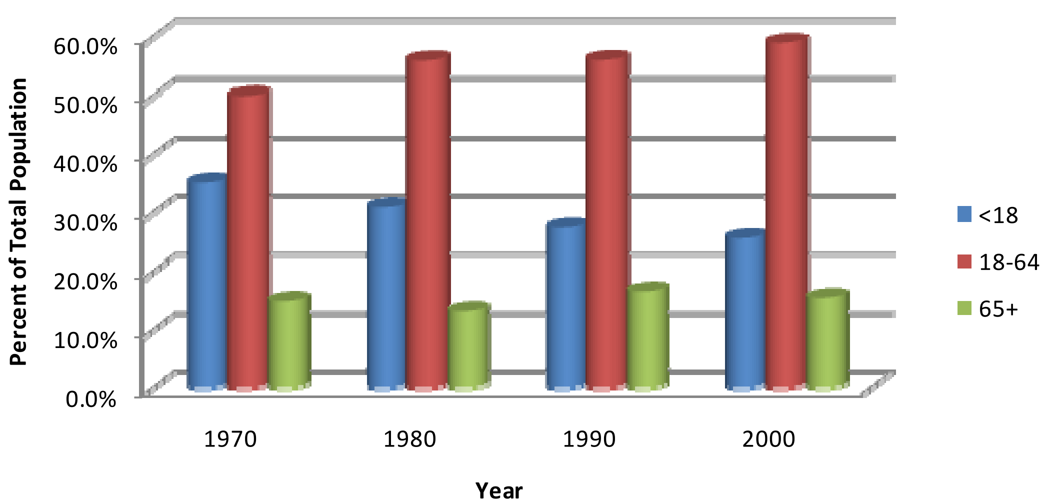
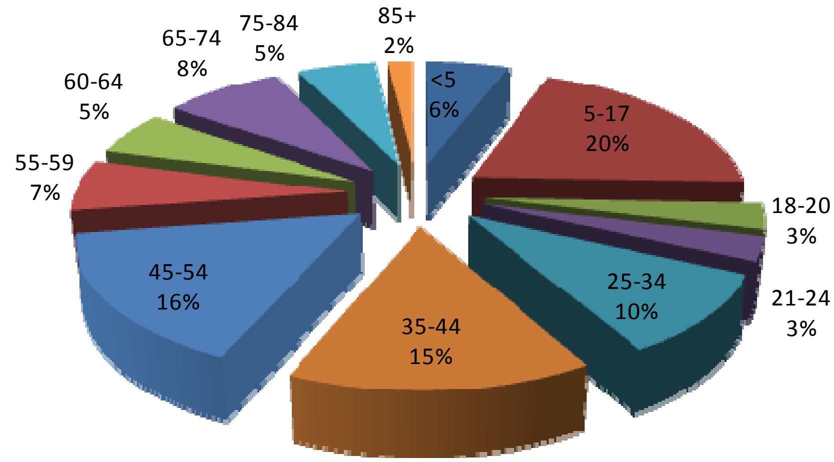


Figure 3-4
Ravalli County Age Distribution (2000)



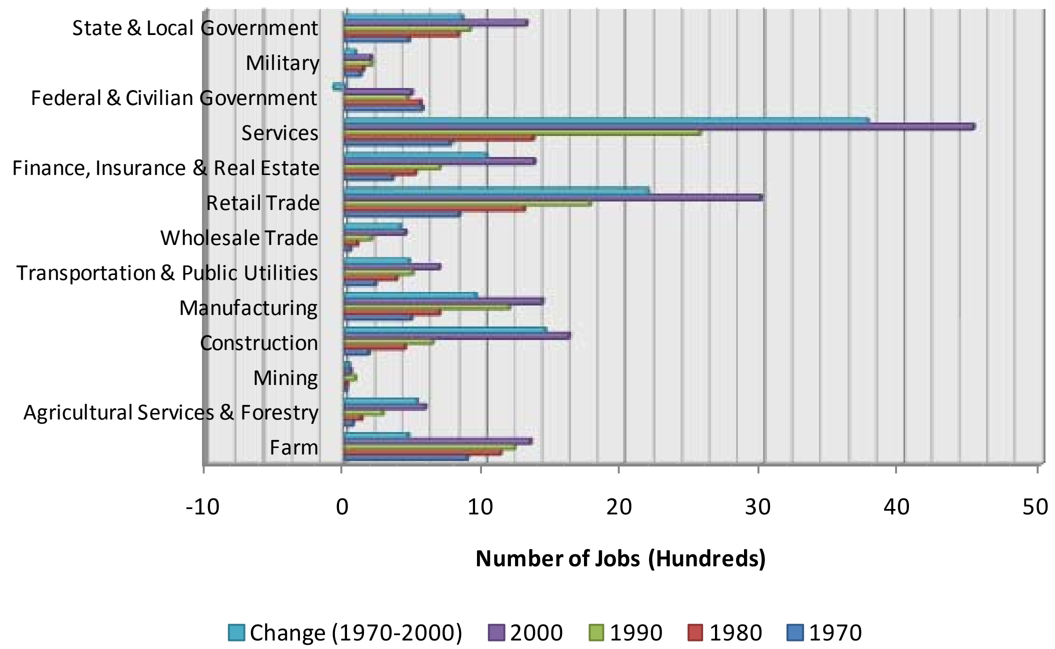
In 2000, there were 16,963 jobs in Ravalli County. This number is over three times the amount of 4,938 jobs that existed in 1970. Every sector has seen an increase in jobs since 1970, except for federal and civilian government, with the service industry experiencing the largest increase. **Table 3-4** displays countywide employment by economic sector from 1970 through 2000. This information is shown graphically in **Figure 3-5**.

Table 3-4
Ravalli County Employment Trends by Economic Sector (1970-2000)

Economic Sector	1970	1980	1990	2000	Change (1970 – 2000)
Farm	875	1,116	1,217	1,333	458
Agricultural Services & Forestry	60	121	275	583	523
Mining	13	16	76	41	28
Construction	175	437	637	1,613	1,438
Manufacturing	484	685	1,178	1,419	935
Transportation & Public Utilities	221	376	490	685	464
Wholesale Trade	39	92	193	441	402
Retail Trade	817	1,288	1,766	2,991	2,174
Finance, Insurance & Real Estate	347	514	687	1,361	1,014
Services	765	1,353	2,550	4,518	3,753
Federal & Civilian Government	563	549	454	485	-78
Military	113	134	193	189	76
State & Local Government	466	809	895	1,304	838
Total Employment	**4,938**	**7,490**	**10,611**	**16,963**	

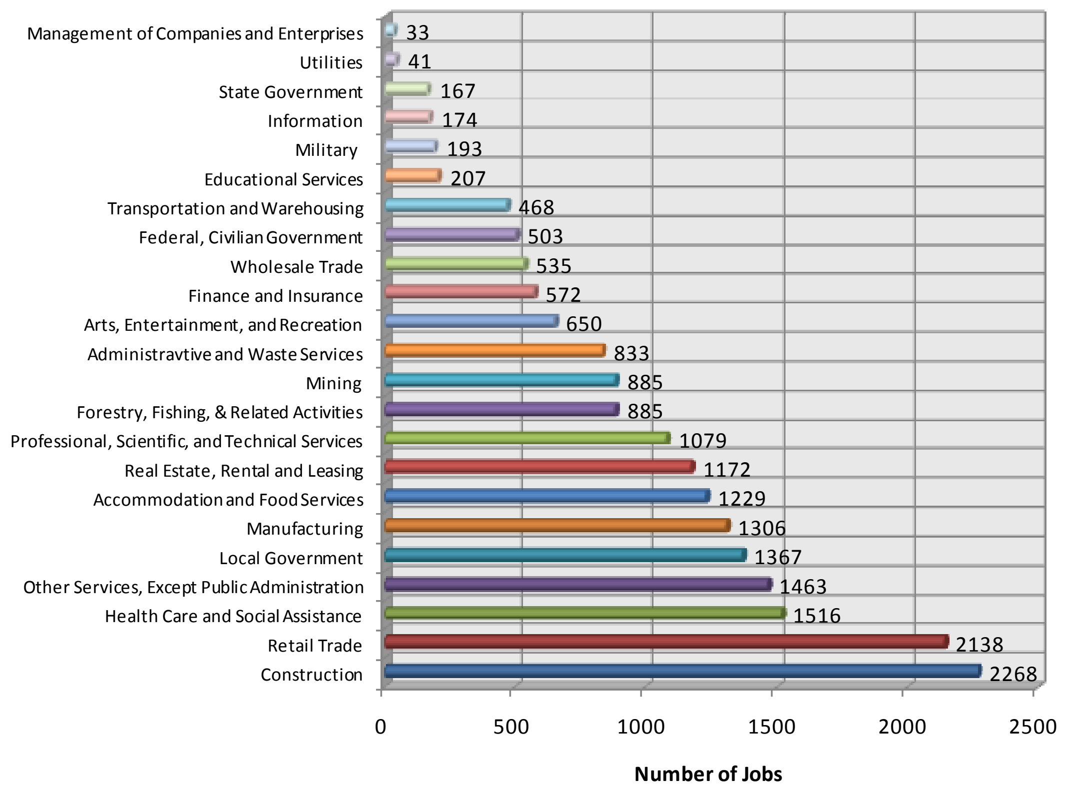
Source: U.S. Bureau of the Census, Census of Population

Figure 3-5
Ravalli County Employment Trends by Economic Sector (1970-2000)



An "alternate employment categorization" for Ravalli County in the year 2005 is shown in **Figure 3-6**. The employment in this figure is shown by economic sector based on classification by the North American Industry Classification System (NAICS). This type of classification is the standard for all employment figures after 2000. NAICS classification is a more detailed method to demonstrate employment numbers than the economic sector approach. The highest employment sector for Ravalli County based on NAICS is construction. Retail trade closely follows construction for the second highest employment sector, followed by health care and social assistance.

Figure 3-6
Ravalli County Employment Trends by NAICS (2005)



The economic trend data shown in **Figure 3-5** and **Figure 3-6** is anticipated considering the significant population growth in Ravalli County. The countywide population growth has generated a predominant increase in construction and retail jobs. With an influx of people moving to Ravalli County, it is implicit there will be a higher demand for construction jobs as well as positions in retail. The basic principal of considering economic trends is that ultimately, the numbers and types of jobs relate to vehicle travel on the local transportation system.

3.3 Population Projections

Population projections are used to predict future travel patterns, and to analyze the potential performance capabilities of the Hamilton area transportation system. Projections of the study area's future population are gathered from the recent Hamilton Growth Policy Update completed by Kate McMahon of Applied Communications. These projections for growth in the city area and planning area are based on State of Montana population projections for Ravalli County. The amount of growth in Ravalli County that will be captured by the city and planning area is distributed in proportion to the population distribution from the 2000 U.S. Census.

Based on this method, the population for 2010 was compared to actual building permits and septic permits for new construction from 2000 to 2008 to confirm that projected growth was comparable to actual growth. To determine the number of projected dwelling units, population was divided by household size from the 2000 Census. As noted in **Table 3.5**, it is projected that by 2030, there will be an increase of 2,686 dwelling units between year 2010 and year 2030 within the Transportation Plan's study area boundary. It is very likely that a portion of these new units will be annexed to the City. The projected population increase within the Transportation Plan's study area boundary between the year 2010 and the year 2030 is 6,223 persons.

Table 3-5
Projected Population and Dwelling Units in City and Planning Area

	Year 2000	Year 2010	Year 2030	Increase (2010 – 2030)
City Population	3,705	4,807	5,288	481
City Dwelling Units	1,915	2,392	2,631	239
Planning Area Population	5,799	6,789	12,531	5,742
Planning Area Dwelling Units	2,535	2,997	5,444	2,447
Total Population	9,504	11,596	17,819	6,223
Total Dwelling Units	4,450	5,389	8,075	2,686

Source: Hamilton Growth Policy Update (2009)

3.4 Employment Projections

Employment numbers are used in the traffic model to help distribute vehicle traffic as accurately as possible. Places with high levels of employment will tend to generate high levels of vehicle traffic. The traffic generated is based in part on the employment type: either retail or non-retail jobs. Non-retail jobs consist of all types of jobs broken out by the NAICS classifications shown in **Figure 3-5** excluding "retail trade."

The job growth analysis presented in **Table 3-6** shows an estimated 34,440 total jobs available in the year 2030 for the entire area of Ravalli County. This amounts to a projected job increase of 14,756 new jobs between 2005 and 2030.

Table 3-6
Ravalli County Projected Employment Units

Year	Total Jobs
2005	19,684
2010	22,600
2015	25,560
2020	28,420
2025	31,330
2030	34,440
Total Change (2005-2030)	(+) 14,756

Source: NPA Data Services, Inc.
DOCUMENTATION FOR REGIONAL ECONOMIC PROJECTIONS SERIES (REPS)
DEMOGRAPHIC TOTAL POPULATION DATABASE 2008 Update

For purposes of this transportation plan and subsequent travel demand modeling, it is important to understand two unique characteristics of this forecasted job growth:

- Of the 14,756 new jobs forecasted, what portion are "retail" jobs and what portion are "non-retail" jobs, and
- Of the job forecasts, what proportion will occur within the transportation plan's "study area boundary"

For the proportioning of the retail and non-retail jobs, data obtained from the Montana Department of Labor and Industry was analyzed for the year 2005, by North American Industry Classification System (NAICS) categories, to ascertain the proportional ratio of retail jobs to non-retail jobs within Ravalli County. Data collected for this purpose is as shown in **Table 3-7**.

Table 3-7
Job Proportions for Ravalli County (2008 Data)

Year/Percentage	Jobs		
	Retail	Non-Retail	Total
2005	2,138	17,546	19,684
Percentage	10.9%	89.1%	N/A

Source: Montana Department of Labor and Industry (2008 Data)

Note that a retail job percentage of 10.9% is likely a function of the unique occurrence of professional, agricultural, construction and related commercial sectors found within Ravalli County in general. Aside from portions of Hamilton, there are very few "retail" clusters within the County. This nuance appears to be confirmed by this lower than expected proportion of retail jobs from the NAICS dataset. Going forward, it is recommended to utilize a 15 percent proportioning for future retail jobs for this transportation planning exercise.

The final data analysis pertinent to job growth is to develop the percentage of the overall job forecast that will occur within the transportation plan's study area boundary. To that end, two sources were analyzed for comparison purposes. The first source was the Montana Department of Labor and Industry data for the year 2008 as provided to the Montana Department of Transportation for travel demand modeling purposes. From this source, the data suggests the following:

Total Jobs within Project Study Area Boundary:	*6,181 jobs*
Total Jobs in Dataset for Ravalli County:	*13,676 jobs*
Percentage of Jobs within Study Area Boundary:	*45.2 percent*

The second source analyzed was the US Census Bureau's County Business Pattern index for the year 2005. In that dataset, data for Ravalli County was queried by extracting total jobs within Ravalli County and also extracting total jobs within the zip code area 59840. It is important to recognize that total jobs reported from this dataset are lower than the US Census Bureau estimates previously presented. For purposes of this exercise, this is acceptable as a strict proportioning of the number of jobs within the study area boundary to Ravalli County as a whole are needed. Additionally, the zip code area of 59840 is slightly larger than the transportation plan study area boundary, so the focus of this second method was to check for an "order-of-magnitude" percentage to compare to the previous method. Based on this data, the following was realized:

Total Jobs Reported within Zip Code Area 59840:	*4,601 jobs*
Total Jobs Reported in Dataset for Ravalli County:	*8,762 jobs*
Percentage of Jobs within Zip Code Area 59840:	*52.5 percent*

After reviewing these two methods, it is assumed that 45.2 percent of the total predicted job growth, between 2005 and 2030, will occur within the transportation plan's study area boundary. As such, of the 14,756 new jobs in the entire limits of Ravalli County, **6,670 jobs are expected to occur within this transportation plan's study area boundary**. This expected job growth, to be realized between the year 2005 and the year 2030, will amount to 1,000 (or 15%) new retail jobs and 5,670 (or 85%) new non-retail jobs. A summary of the number of projected jobs, by planning year, can be found in **Table 3-8** below.

Table 3-8
Within Study Area Boundary - Projected Employment Units

Year	Jobs		
	Retail	Non-Retail	Total
2005	1,335	7,562	8,897
2010	1,532	8,683	10,215
2015	1,733	9,820	11,553
2020	1,927	10,919	12,846
2025	2,124	12,037	14,161
2030	2,335	13,232	15,567
Total Change (2005-2030)	(+) 1,000	(+) 5,670	(+) 6,670

Source: NPA Data Services, Inc.

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DEMOGRAPHIC TOTAL POPULATION DATABASE 2008 Update

3.5 Allocation of Growth

The new growth predicted in sections 3.2, 3.3 and 3.4 of this document ultimately become input into the *Transcad* travel demand model. In fact, the Montana Department of Transportation's modeling of future traveling patterns out to the year 2030 planning horizon required identification of future socioeconomic characteristics within each census tract and census block. County population and employment projections were translated to predictions of increases in housing and employment within the City of Hamilton and the planning area boundary. This information was obtained via the recent Hamilton Growth Policy Update and the analysis presented herein. During that effort, consideration was given to recent land use trends, land availability and development capabilities, land use regulations, planned public improvements, and known development proposals.

Figure 3-7 and **Figure 3-8** show where potential dwelling unit increases are expected to be developed up to the year 2030 in the planning area boundary. **Figure 3-9** and **Figure 3-10** show where potential non-retail job increases are expected to be developed. **Figure 3-11** and **Figure 3-12** show where potential retail job increases are expected to be developed.

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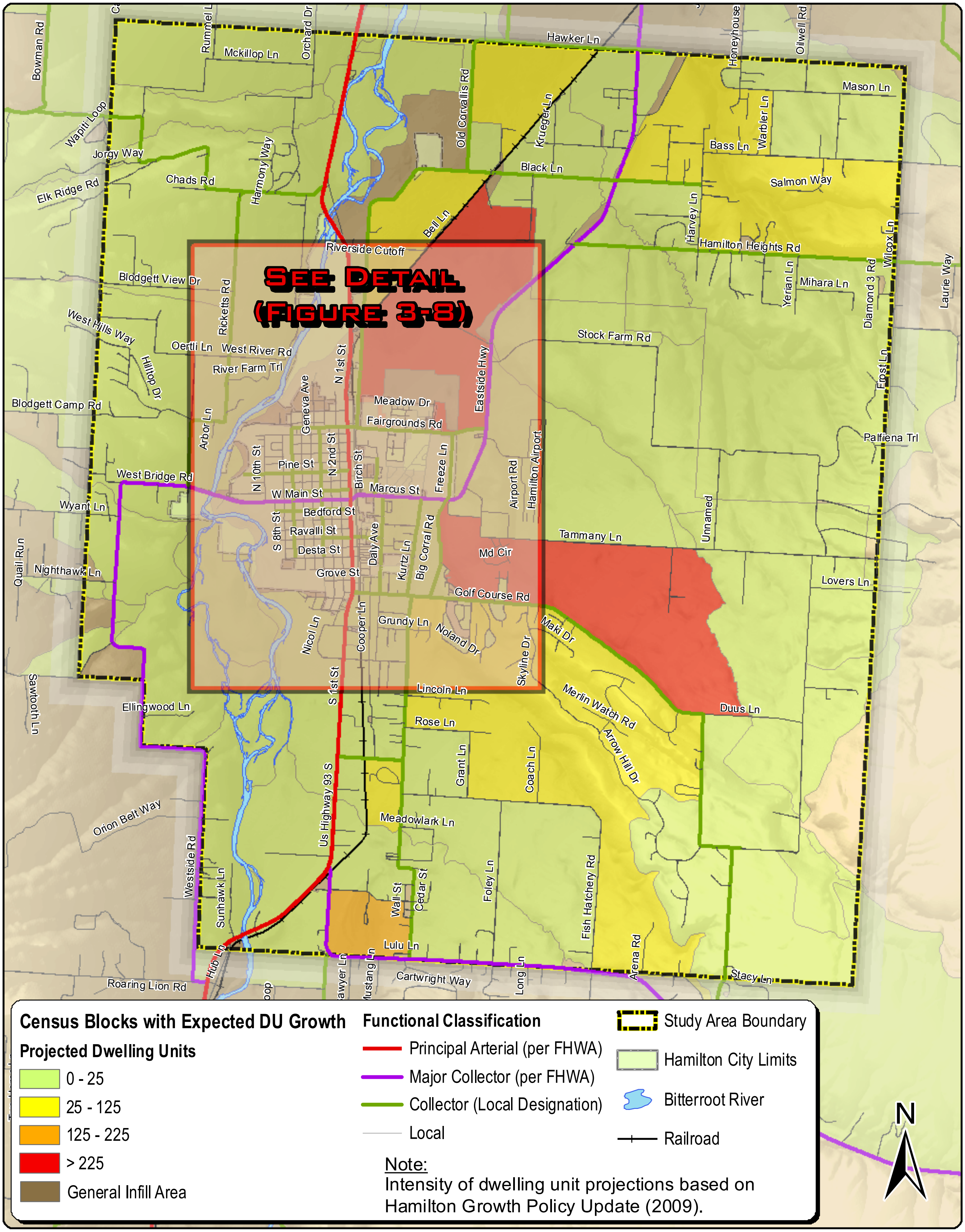

Figure 3-7

Year 2030 Projected Dwelling Units

0 0.5 1 1.5 2

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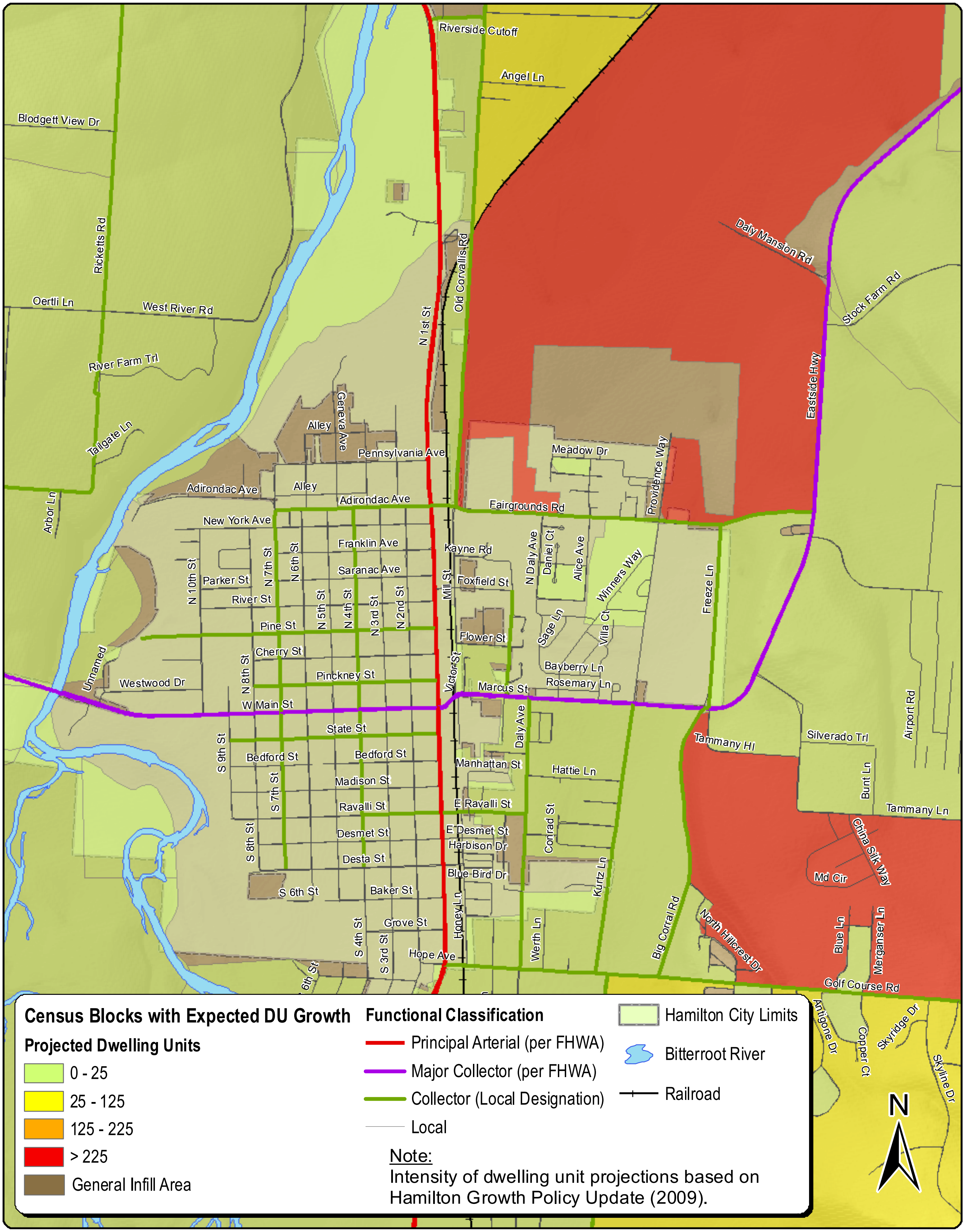

Figure 3-8

Year 2030 Projected Dwelling Units
Inset Area

0 1,000 2,000 3,000 4,000
Feet

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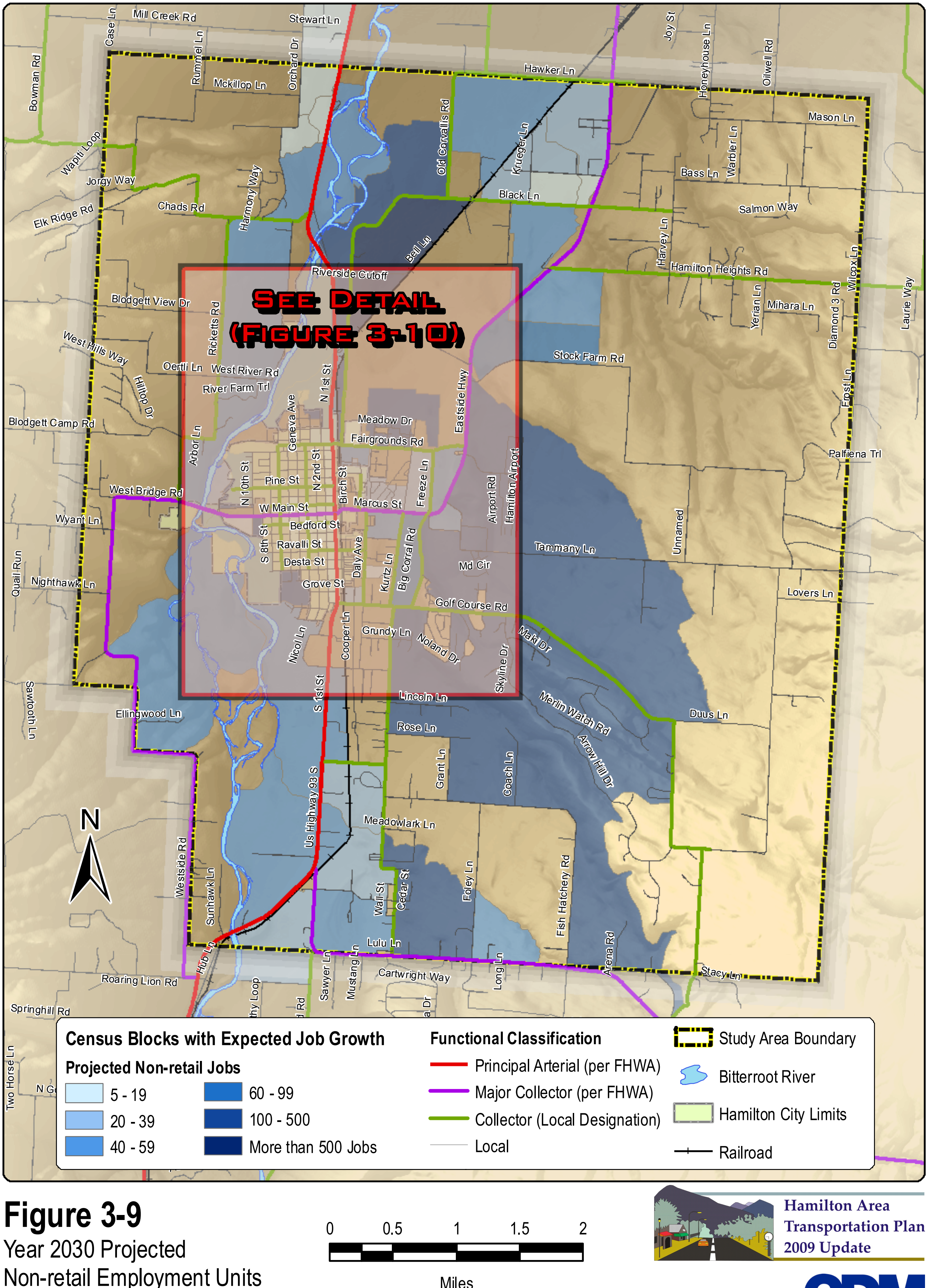

Figure 3-9

Year 2030 Projected
Non-retail Employment Units

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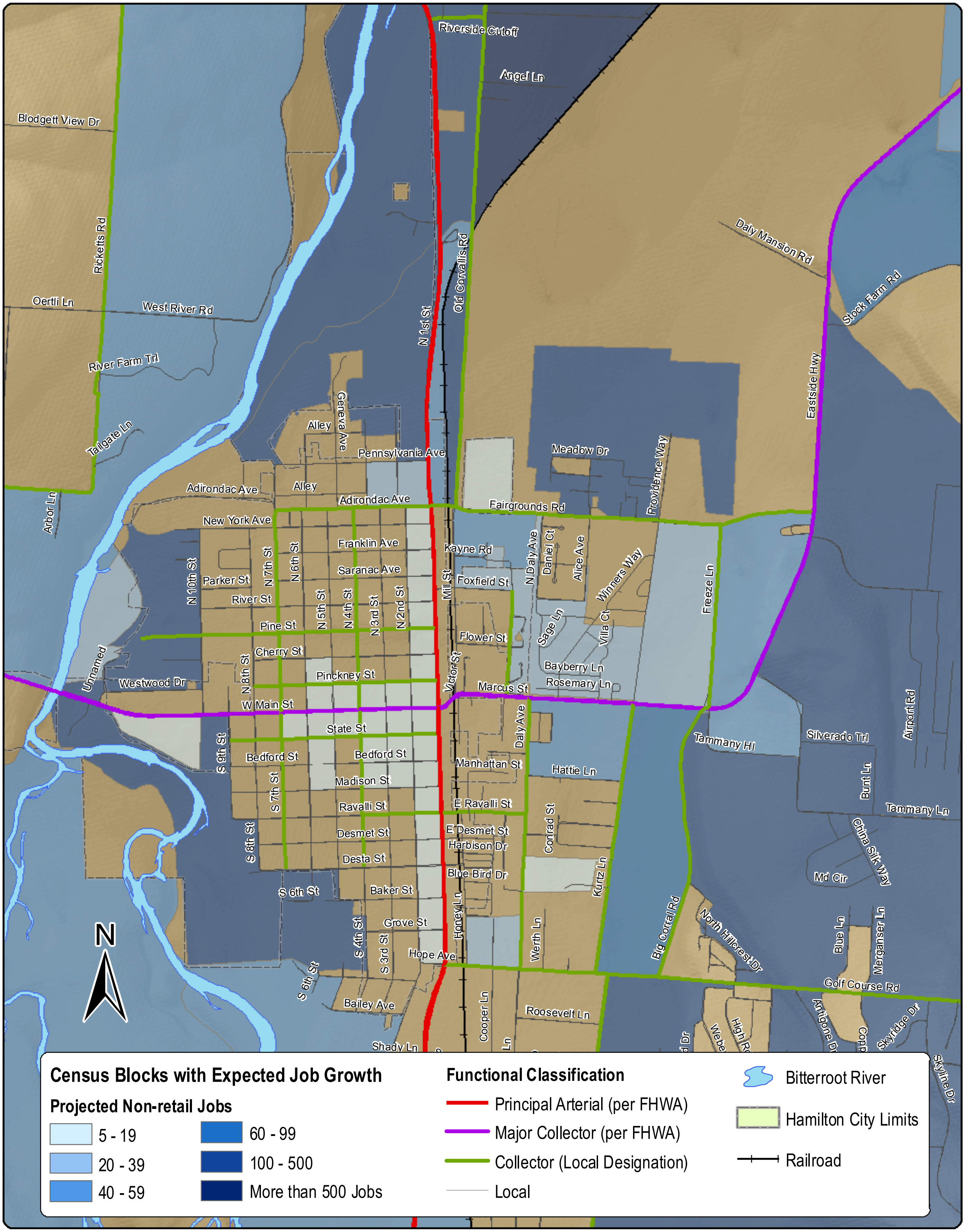

Figure 3-10

Year 2030 Projected
Non-retail Employment Units
Inset Area

0 1,000 2,000 3,000 4,000
Feet

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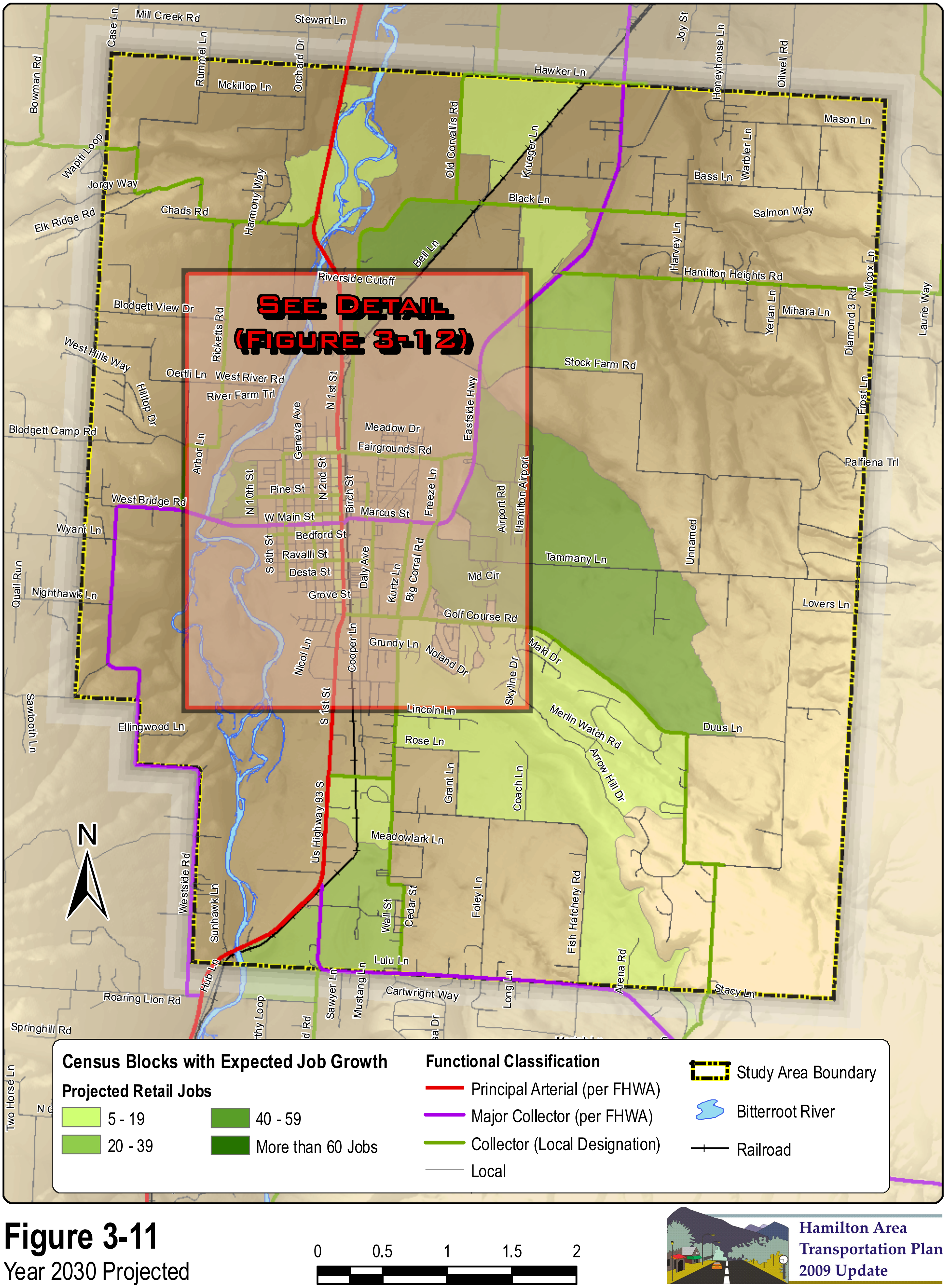

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Figure 3-11
Year 2030 Projected
Retail Employment Units

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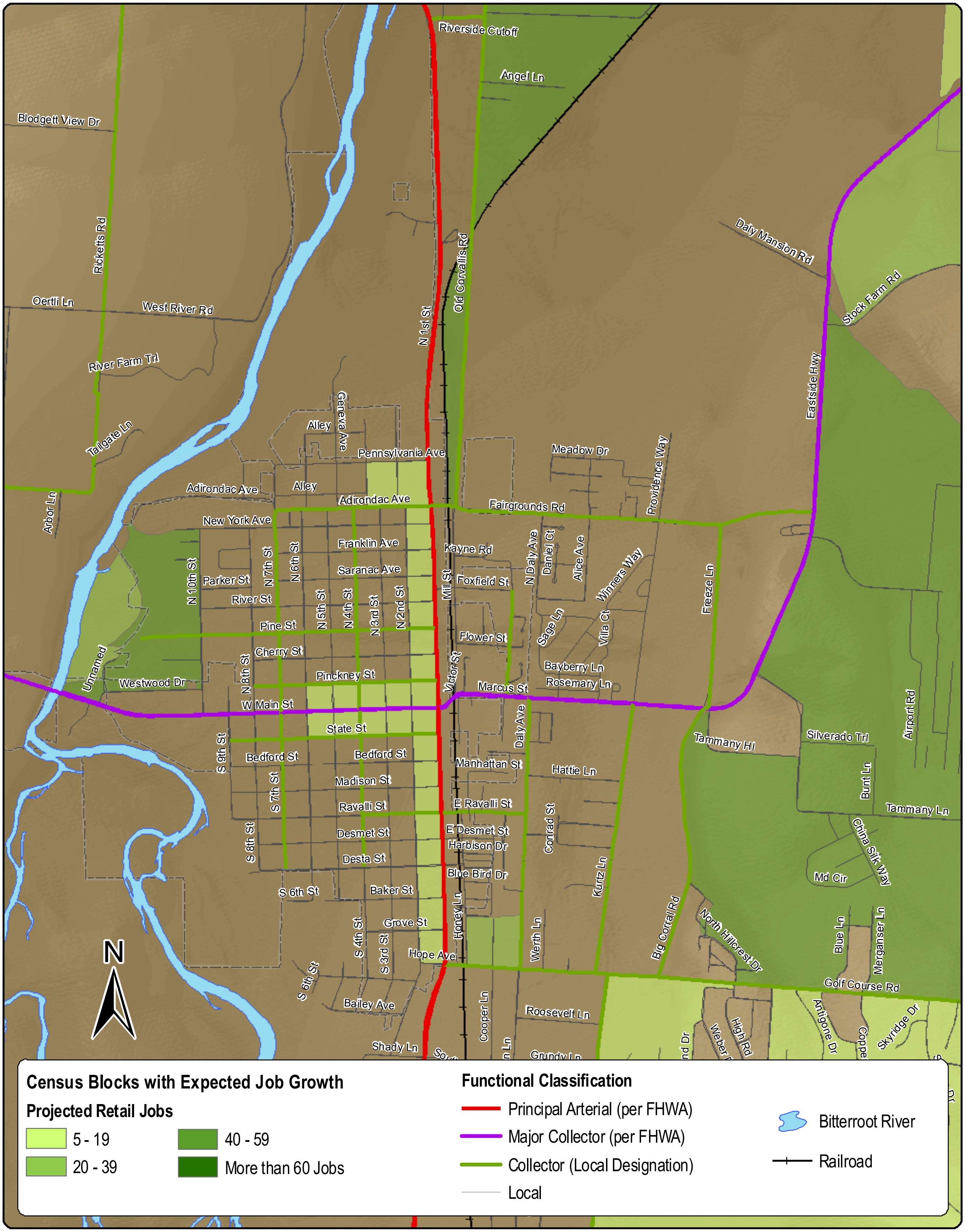

Figure 3-12

Year 2030 Projected
Retail Employment Units
Inset Area

0 1,000 2,000 3,000 4,000

Feet

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3.6 Traffic Model Development

All of the characteristics of the various areas of the greater Hamilton area combine to create the traffic patterns present in the community today. To build a model to represent this condition, the population information was collected from the 2000 census, and employment information was gathered from the Montana Department of Labor and Industry, second quarter of 2006, and was carefully scrutinized by local agency planners and MDT modeling staff. Then, based on the results of the Hamilton Growth Policy Update, model input was entered to update the model to year 2008 conditions.

The roadway network / centerline information was provided by the Ravalli County GIS office. This information was substantially supplemented by input from staff at the City of Hamilton, Ravalli County, and the Montana Department of Transportation who have substantial local knowledge and were able to increase the accuracy of the base model.

The GIS files, population census information, and employment information are readily available. The TransCAD software is designed to use this information as input data. TransCAD has been developed by the Caliper Corporation of Newton, Massachusetts, and version 4.0 was used as the transportation modeling software for this project. TransCAD performs a normal modeling process of generating, distributing and assigning traffic in order to generate traffic volumes. These traffic volumes are then compared to actual ground counts and adjustments are made to "calibrate", or ensure the accuracy of, the model. This is further explained below:

Trip Generation

Trip Generation consists of applying nationally developed trip rates to land use quantities by the type of land use in the area. The trip generation step actually consists of two individual steps: trip production and trip attraction. Trip production and trip attraction helps to "explain" why the trip is made. Trip production is based on relating trips to various household characteristics. Trip attraction considers activities that might attract trip makers, such as offices, shopping centers, schools, hospitals and other households. The number of productions and attractions in the area is determined and is then used in the distribution phase.

Trip Distribution

Trip distribution is the process in which a trip from one area is connected with a trip from another area. These trips are referred to as trip exchanges.

Mode Split

Mode choice is the process by which the amount of travel will be made by each available mode of transportation. There are two major types: automobile and transit. The automobile mode is generally split into drive alone and shared ride modes. For the Hamilton travel demand model, there were no "mode split" assignments (i.e. all trips are assumed to be automobile mode).

Trip Assignment

Once the trip distribution element is completed, the trip assignment tags those trips to the Major Street Network (MSN). The variables that influence this are travel time, length, and capacity.

To develop a transportation model, the modeling area must be established. The modeling area is, by necessity, much larger than the Study Area. Traffic generated from outlying communities or areas contributes to the traffic load within the Study Area, and is therefore important to accuracy of the model. Additionally, it is desirable to have a large model area for use in future projects.

The future year model was developed specifically for the year 2030 planning horizon. The 2030 model is used in this document to evaluate future traffic volumes, since 2030 is the horizon year for this document. The information contained earlier in this Chapter was used to determine the additions and changes to the traffic volumes in 2030.

The modeling area was subdivided by using census tracts and census blocks, as previously described in this chapter. Census blocks are typically small in the downtown and existing neighborhood areas, and grow geographically larger in the less densely developed areas. The census blocks & census tracts were used to divide the population and employment growth anticipated to occur between now and 2030.

3.7 Traffic Volume Projections

The travel demand model utilized for this project is the same model used for the Missoula Area Transportation Plan. However, because the Transcad model contains a very large area (i.e. Ravalli County south to Hamilton and a large portion of Missoula County), results obtained around the perimeter boundaries of the model cannot be accepted "as is".

For this Transportation Plan Update, the model was used as a tool to obtain relative percent increases along the community's roadway facilities given projected growth between the base year 2008 and the planning year 2030. This is an appropriate analyses method given the size of Hamilton and the tools available. As an example, the model may have a 2008 volume and a 2030 volume, and the variable of interest becomes the percent increase between those two volumes. Within the study area boundary and for the major roadways of interest, this percent increase is represented graphically on **Figure 3-13** and **Figure 3-14**. The percent increase is then applied to known Average Daily Traffic (ADT) volumes on the roadway system to calculate estimated future ADT volumes. This exercise results in expected ADT volumes as shown on **Figure 3-15** and **Figure 3-16**.

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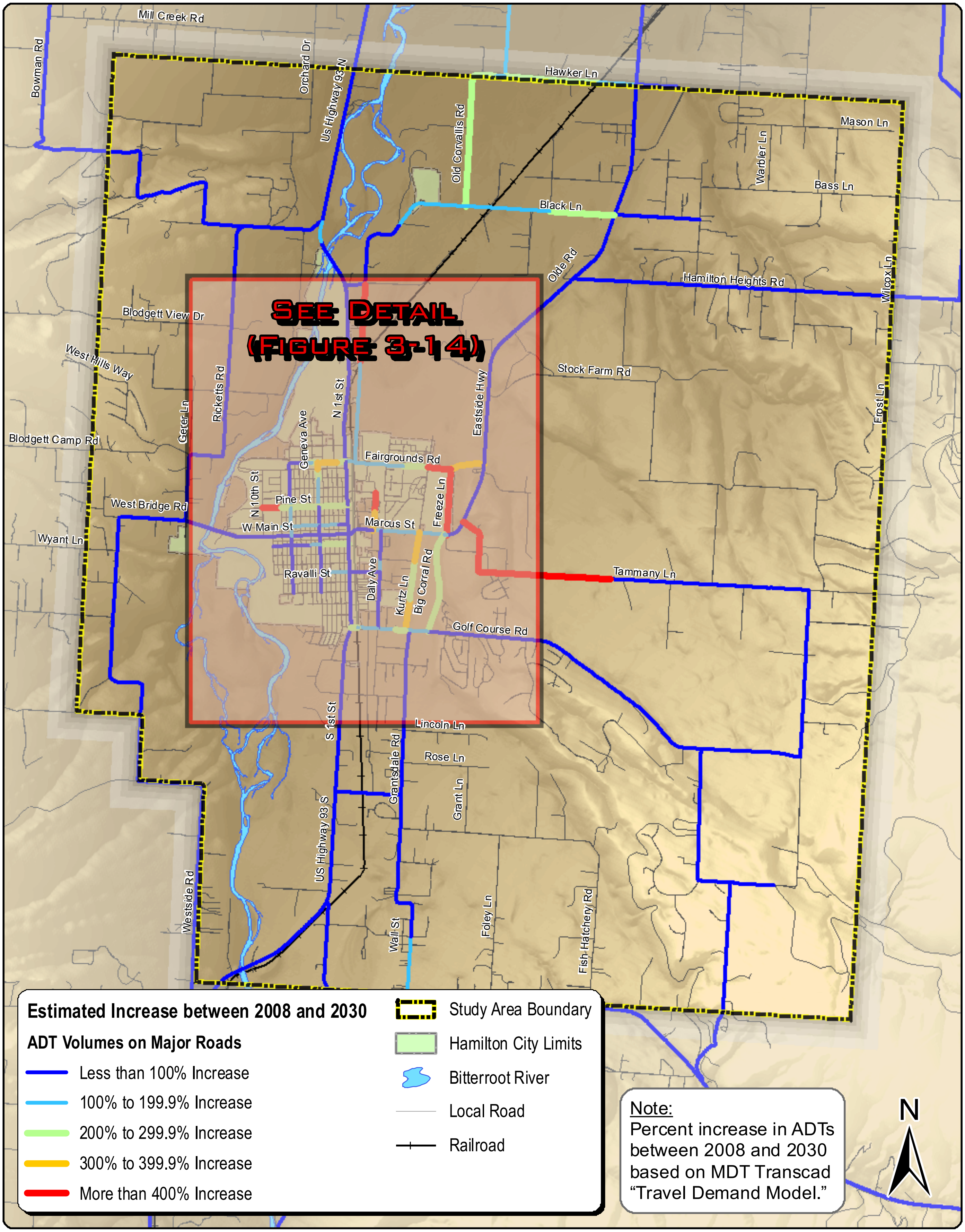

Figure 3-13

Percent Increase in Average Daily Traffic (ADT) Volumes - Year 2030

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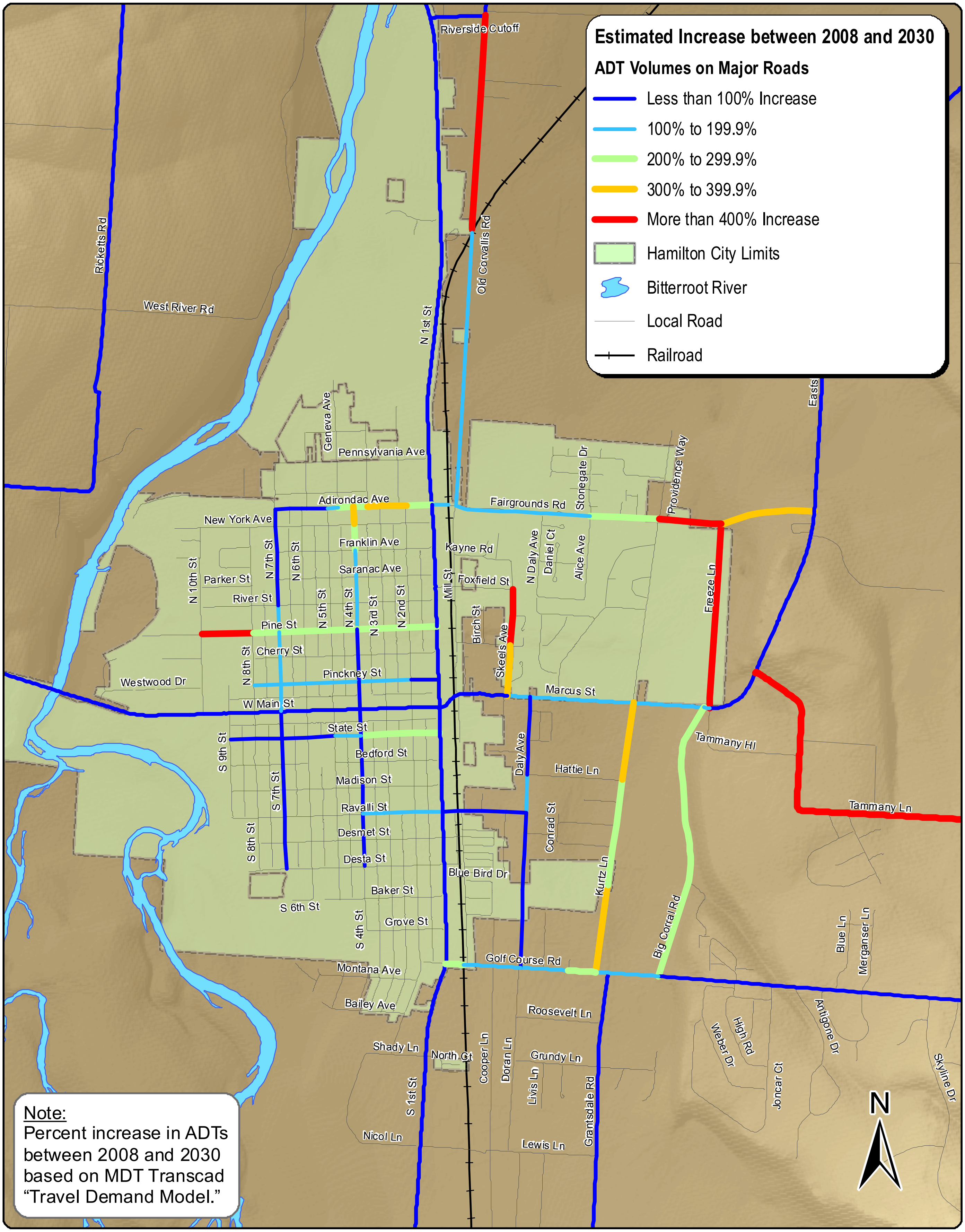

Figure 3-14

Percent Increase in Average Daily Traffic (ADT) Volumes - Year 2030
Inset Area

0 1,000 2,000 3,000
Feet

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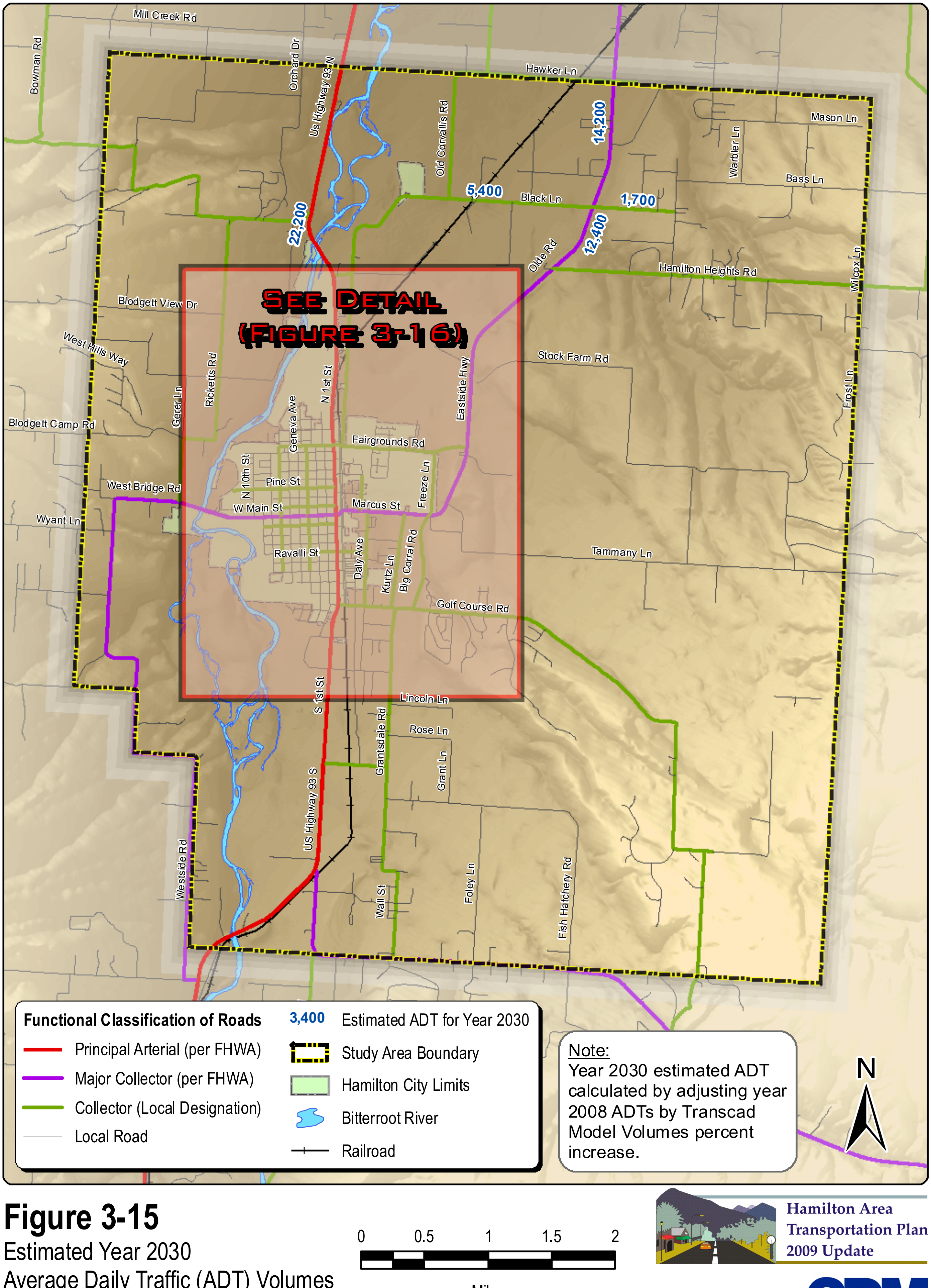

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Figure 3-15

Estimated Year 2030
Average Daily Traffic (ADT) Volumes

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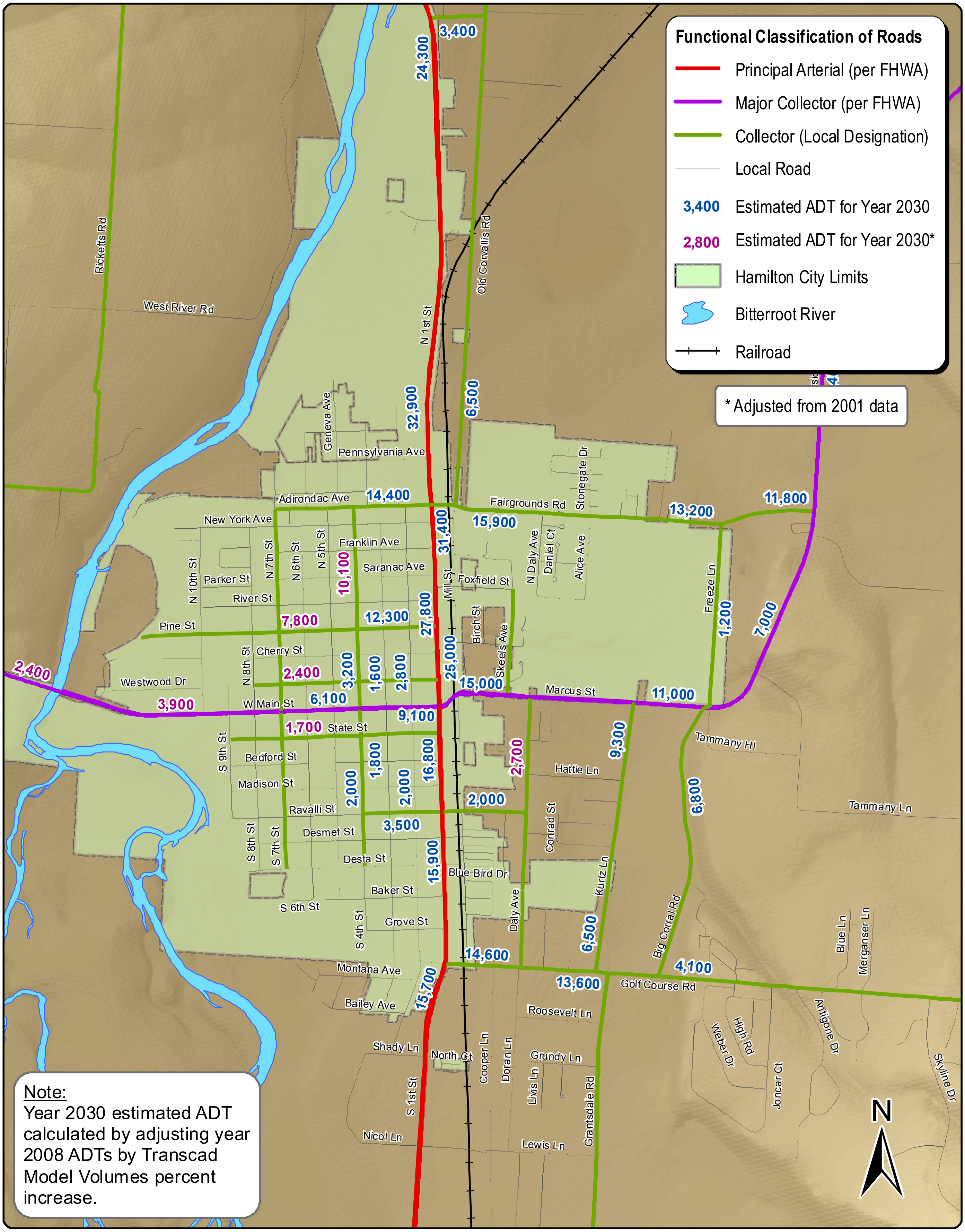

Figure 3-16
Estimated Year 2030
Average Daily Traffic (ADT) Volumes
Inset Area

0 1,000 2,000 3,000 4,000
Feet

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3.8 References

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Chapter 4
Identification of Concerns

Chapter 4
Identification of Concerns

4.1 Introduction

This chapter identifies areas of the transportation system that do not meet the typical industry standards of traffic engineering and transportation planning, and also the expectations and/or perceptions of the community. In general, it is important to identify issues and concerns before mitigation strategies can be developed. The identification of "concerns" is the result of intensive data collection, analysis, field observation, and public input. Over the development of this Transportation Plan Update, these tools have been used to assess all of the collected data to develop an understanding of the "concerns" with the existing transportation system. This becomes a necessary step and forms the basis for developing mitigation strategies. The development of mitigation (i.e. project recommendations) becomes the follow-up step to plan for correction of the identified concerns. Identified concerns may fall into one or more of the following categories:

- Intersection levels of service
- Signal warrant analysis
- Corridor levels of service
- Safety (i.e. crash analyses)

Each of these areas is expanded upon in this chapter.

4.2 Intersection Levels of Service

Roadway systems are ultimately controlled by the function of the major intersections. Intersection failure directly reduces the number of vehicles that can be accommodated during the peak hours that have the highest demand and the total daily capacity of a corridor. As a result of this strong impact on corridor function, intersection improvements can be a very cost-effective means of increasing a corridor's traffic volume capacity. In some circumstances, corridor expansion projects may be able to be delayed with correct intersection improvements. Due to the significant portion of total expense for roadway construction projects used for project design, construction, mobilization, and adjacent area rehabilitation, a careful analysis must be made of the expected service life from intersection-only improvements. If adequate design life can be achieved with only improvements to the intersection, then a corridor expansion may not be the most efficient solution. With that in mind, it is important to determine how well the major intersections are functioning by determining their Level of Service (LOS).

Level of service (LOS) is a qualitative measure developed by the transportation profession to quantify driver perception for such elements as travel time, number of stops, total amount of stopped delay, and impediments caused by other vehicles. It provides a scale that is intended to match the perception by motorists of the operation of the intersection. Level of Service provides a means for identifying intersections that are experiencing operational difficulties, as well as providing a scale to compare intersections with each other. The level of service scale represents the full range of operating conditions. The scale is based on the ability of an intersection or roadway segment to accommodate the amount of traffic using it. The scale ranges from "A" which indicates little, if any, vehicle delay, to "F" which indicates significant vehicle delay and traffic congestion. The LOS analysis was conducted according to the procedures outlined in the Transportation Research Board's Highway Capacity Manual – Special Report 209 using the Highway Capacity Software, version 4.1c.

In order to calculate the LOS, 18 intersections on the Major Street Network were counted during the spring of 2009. These intersections included 6 signalized intersections and 12 high-volume unsignalized intersections in the Hamilton area. Each intersection was counted between 7:00 a.m. to 9:00 a.m. and 4:00 p.m. and 6:00 p.m., to ensure that the intersection's peak volumes were represented. Based upon this data, the operational characteristics of each intersection were obtained.

The LOS study in the Hamilton area shows that two signalized and three unsignalized intersections are currently functioning at LOS D or lower. These five intersections indicate potential opportunities for closer examination and further intersection improvement measures to mitigate "operational" conditions. These are shown in **Table 4-1**.

Table 4-1
Existing Intersections Functioning at a LOS D or Lower

Intersection		AM Peak	PM Peak
US 93 & Pine Street	S	F	D
US 93 & Golf Course Road/Hope Avenue	S	E	C
US 93 & Riverside Cutoff	U	C	E
Kurtz Lane & Marcus Street/Eastside Highway	U	F	D
Eastside Highway & Black Lane/Bass Lane	U	C	E

(S)ignalized
(U)nsignalized

In addition to operational characteristics identified through the Level of Service analysis described in **Chapter 2** and reiterated above, field reviews were performed at each of the eighteen (18) subject intersections. Observations were made and recorded, and are presented on the following pages.

4.2.1 Signalized Intersections Field Observations

US-93 & Fairgrounds Road/Adirondac Avenue

- Vehicles observed running yellow and red (mostly) phases of signal cycle. This occurred primarily on the Fairgrounds Road and Adironac Avenue legs of the intersection.
- Some vehicle conflicts noted when eastbound vehicles turning north maneuver in front of thru westbound vehicles.
- Stacking of vehicles observed on the east and west legs of the intersection.

US-93 & Pine Street

- Numerous access points directly adjacent to intersection causes some conflicting vehicle maneuvers (gas station, paint store, realty office).
- Sight distance concerns with vehicles leaving adjacent access and turning traffic on US Highway 93.
- If there is traffic backed up on southbound US Highway 93, drivers tend to use gas station approach to travel to Pine Street (westbound movement).

US-93 & Main Street/Marcus Street

- Eastbound traffic on Main Street has sight distance concerns due to Marcus Street roadway curve and large tree on the west leg of the intersection.
- Parking on Main Street is very close to the intersection and causes some sight distance issues.

US-93 & Ravalli Street

- Numerous access points directly adjacent to intersection cause some conflicting vehicle maneuvers (gas station and restaurant).

US-93 & Golf Course Road/Hope Avenue

- Perception of inadequate signal operations by drivers at traffic signal. Observed several drivers get out of their car to press the pedestrian crosswalk button to make a left turn coming from the west.

2nd Street & Main Street

- Noted sight distance concerns at intesection due to diagonal street parking being close to the intesection quadrants. Also observed vehicles inching out into the intersection to make tight-turn-on red (RTOR) very frequently.

4.2.2 Unsignalized Intersections Field Observations

US-93 & Riverside Cutoff

- This was a fairly busy intersection with large trucks using the Riverside Cutoff leg – presumably hauling pit run material to construction sites.
- Side street traffic (i.e. Riverside Cutoff leg) observed using the middle lane on US Highway 93 as a storage lane to merge in southbound US Highway 93 traffic flow.
- Appearance of speeding vehicles on US Highway 93, both travelling out of town (northbound) and into town (southbound). No speed studies were performed to verify this observation.

Old Corvallis Road/Mill Street & Fairgrounds Road

- Westbound traffic on Fairgrounds Road appears to travel fast. No speed studies were performed to verify this observation.
- Poor definition at intersection. Northbound drivers were observed short-cutting the stop sign on the southeast quadrant by turning through the gravel parking area.
- Numerous vehicles were observed backing up on the east leg of Fairgrounds Road due to congestion at US Highway 93.

Freeze Lane & Fairgrounds Road

- Observed the two westerly school entrances on Fairgrounds Road used most often for school access. The school entrance on south Freeze lane also used for school traffic. The intersection of Freeze Lane and Fairgrounds Road doesn't encounter much "school related" traffic.
- Noted a maximum of 3 cars queued up on the Freeze Lane leg with Fairgrounds road during peak hours.

Eastside Highway & Fairgrounds Road

- Appearance of speeding vehicles on Eastside Highway near the intersection with Fairgrounds Road. No speed studies were performed to verify this observation.
- Sight distance concerns are present for those vehicles on Fairgrounds Road wanting to turn left onto Eastside highway due to the curve and grade differential on Eastside Highway to the south.

- During peak hours 7 cars were observed to stack up on the eastbound leg of Fairgrounds Road, waiting to turn left onto Eastside Highway (i.e. northbound).

Kurtz Lane & Eastside Highway

- The left-turn lane on southbound Kurtz Lane was not observed to be used. For the northbound leg of Kurtz Lane, there is a slight alignment issue that causes drivers to veer slightly to the right as they continue northbound through the intersection.

- There was a fair amount of school related traffic observed at the intersection (i.e. school buses, parents, etc.).

- Drivers on the south leg of Kurtz Lane sometimes had difficulty seeing west on Marcus Street due to sight distance obstructions on adjacent private property (fence and tree).

Eastside Highway & Black Lane/Bass Lane

- Appearance of speeding vehicles on Eastside Highway near the intersection with Black Lane/Bass Lane. No speed studies were performed to verify this observation.

- Bass Lane and Black Lane are slightly offset and do not align. This causes some operation difficulties when vehicles are present on both legs of this intersection.

- The eastbound leg of Black Lane has a large gravel right turn area that is often times used by right-turning vehicles trying to get though the intersection quicker.

3rd Street & Main Street

- Observed vehicles inching out into the intersection to make right-turns (very frequently).

- Observed vehicular traffic backed up through the intersection during peak hours due to timing and traffic volume at the adjacent intersection of 2nd Street and Main Street.

4th Street & Main Street

- Observed vehicles inching out into the intersection to make right-turns (very frequently).

Big Corral Road & Golf Course Road

- Intersection could be improved with presence of turn lanes and/or other channelization features. It exhibits a very large pavement area.

Kurtz Lane & Golf Course Road

- There was a fair amount of school related traffic observed at the intersection (i.e. school buses, parents, etc.).
- Grantsdale Road appears to generate a lot of traffic between Kurtz Lane and Big Corral Road.
- Alignment issues between Grantsdale Road and Kurtz Lane. Re-alignment of these two legs opposite each other would drastically improve intersection operations.

Eastside Highway & Tammany Lane

- Appearance of speeding vehicles on Eastside Highway near the intersection with Tammany Lane. No speed studies were performed to verify this observation.
- Vehicles observed going slow as they travelled north (uphill) on Eastside Highway (after turning from Tammany Lane), with vehicles pulling up behind them and hitting their brakes.
- Some confusion over Tammany Lane and the adjacent private residence driveway. Observed drivers pulling into residence driveway thinking it was Tammany Lane.

Eastside Highway & Airport Road

- Observed some vehicles stacked on Eastside Highway desiring to turn on to Airport Road. Several thru vehicles observed "tailgating" the turning vehicles due to speed differentials.
- Also observed vehicles go around turning cars in both directions (i.e. passing in opposite travel lane).

4.3 Signal Warrant Analysis

A planning level signal warrant analysis was conducted using the data available from turning movement counts to determine if any of the existing unsignalized intersections with unacceptable Levels of Service (LOS) met signal warrants. None of the study intersections met warrants for future signalization at the present time, but should be monitored as the community grows as suggested in Chapter 5 of this Transportation Plan. Several public comments were voiced that certain intersection "needed signals", however according to the 2003 Edition of the *Manual on Uniform Traffic Control Devices (MUTCD)*, there are eight (8) signal warrants that must be analyzed for the installation of a traffic control signal. The MUTCD states that a traffic signal should not be installed unless one or more warrants are satisfied.

The eight (8) signal warrants that must be analyzed are as follows:

1. Eight-Hour Vehicular Volume

This warrant is intended for application at locations where a large volume of intersection traffic is the principal reason to consider the installation of a traffic signal (Condition A) or where the traffic volume on the major street is so heavy that traffic on the minor street experiences excessive delay or conflict in entering or crossing the major street (Condition B) during any eight (8) hours of an average day. The criteria for Warrant 1 may be met if either Condition A or Condition B is met. The combination of Condition A and B are not required. This warrant was not analyzed due to insufficient project data.

2. Four- Hour Vehicular Volume

This warrant is intended for locations where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal. This warrant requires that the combination of the major-street traffic (total of both approaches) and the higher-volume minor-street traffic (on direction only) reach the designated minimum volume during any four (4) hours of an average day. This warrant was based upon a combination of AM and PM peak hour volumes to account for the four-hour period. This warrant was not met for any of the unsignalized intersections identified for study.

3. Peak Hour

This warrant is intended for use at a location where during any one (1) hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street. This warrant also requires that the combination of the major-street traffic (total of both approaches) and the higher-volume minor-street traffic (on direction only) reach the designated minimum volume. The peak hour warrant was conducted assuming that this peak hour would fall within the peak periods. This warrant was not met for any of the unsignalized intersections identified for study.

4. Pedestrian Volume

The Pedestrian Volume signal warrant is intended for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street. This warrant was not analyzed due to insufficient project data.

5. School Crossing

This warrant addresses the unique characteristics that a nearby school may have on the roadways. It requires that the major roadway be unsafe to cross and that there are no other feasible crossings in the area. This warrant was not analyzed due to insufficient project data.

6. COORDINATED SIGNAL SYSTEM

Progressive movement in a coordinated signal system sometimes necessitates installing traffic control signals at intersections where they would not otherwise be needed in order to maintain proper platooning of vehicles. This warrant was not met for any of the intersections under consideration.

7. CRASH EXPERIENCE

The Crash Experience signal warrant conditions are intended for application where the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal. This warrant was not met for any of the unsignalized intersections identified for study.

8. ROADWAY NETWORK

This warrant is intended for locations where the installation of a traffic signal may encourage concentration and organization of traffic flow on a roadway network. This warrant was not met for any of the intersections under consideration.

Note that as the community grows, the installation of a traffic signal is not always the best mitigation for operational and/or safety concerns. Since vehicular delay and the frequency of some types of crashes are sometimes greater under traffic signal control than under STOP sign control, consideration should be given to providing alternatives to traffic control signals, even if one or more of the signal warrants has been satisfied. Some of the available alternatives may include, but are not limited to, the following:

- Installing signs along the major street to warn road users approaching the intersection;
- Relocating the stop line(s) and making other changes to improve the sight distance at the intersection;
- Installing measures designed to reduce speeds on the approaches;
- Installing a flashing beacon at the intersection to supplement STOP sign control;
- Installing flashing beacons on warning signs in advance of a STOP sign controlled intersection on major- and/or minor-street approaches;
- Adding one or more lanes on a minor-street approach to reduce the number of vehicles per lane on the approach;

- Revising the geometrics at the intersection to channelize vehicular movements and reduce the time required for a vehicle to complete a movement, which could also assist pedestrians;
- Installing roadway lighting if a disproportionate number of crashes occur at night;
- Restricting one or more turning movements, perhaps on a time-of-day basis, if alternate routes are available;
- If the warrant is satisfied, installing multi-way STOP sign control;
- Installing a roundabout; and
- Employing other alternatives, depending on conditions at the intersection.

4.4 Corridor Volumes, Capacity and Levels of Service

The corridors shown on **Figure 2-1** and **Figure 2-2** in Chapter 2 were evaluated for Average Daily Traffic (ADT) volumes under comparison with facility size and general planning level estimates. Roadway capacity is of critical importance when looking at the growth of a community. As traffic volume increases, the vehicle flow deteriorates. When traffic volumes approach and exceed the available capacity, the roadway begins to "fail". For this reason it is important to look at the size and configuration of the current roadways and determine if these roadways need to be expanded to accommodate the existing or future traffic needs. The capacity of a roadway is a function of a number of factors including intersection function, land use adjacent to the roadway, access and intersection spacing, roadway alignment and grade, speed, turning movements, vehicle fleet mix, adequate roadway design, land use controls, roadway network management, and good planning and maintenance. Proper use of all of these tools will increase the number of vehicles that a specific lane segment may carry. However, the number of lanes is the primary factor in evaluating roadway capacity since any lane configuration has an upper volume limit regardless of how carefully it has been designed.

The size of a roadway is based upon the anticipated traffic demand. It is desirable to size the arterial network to comfortably accommodate the traffic demand that is anticipated to occur 20 years from the time it is constructed. The selection of a 20-year design period represents a desire to receive the most benefit from an individual construction project's service life within reasonable planning limits. The design, bidding, mobilization, and repair to affected adjacent properties can consume a significant portion of an individual project's budget. Frequent projects to make minor adjustments to a roadway can therefore be prohibitively expensive. As roadway capacity generally is provided in large increments, a long term horizon is necessary. The collector and local roadway network are often sized to meet the local needs of the adjacent properties.

There are two measurements of a roadway's capacity, Average Daily Traffic (ADT) and Peak Hour. ADT measures the average number of vehicles a given roadway carries over a 24- hour period. Since traffic does not usually flow continuously at the maximum rate, ADT is not a statement of maximum capacity. Peak Hour measures the number of vehicles that a roadway can physically accommodate during the busiest hour of the day. It is therefore more of a maximum traffic flow rate measurement than ADT. When the Peak Hour is exceeded, the traveling public will often perceive the roadway as "broken" even though the roadway's ADT is within the expected volume. Therefore, it is important to consider both elements during design of corridors and intersections.

The size of the roadway and the required right-of-way is a function of the land use that will occur along the roadway corridor. These uses will dictate the vehicular traffic characteristics, travel by pedestrians and bicyclists, and need for on-street parking. The right-of-way required should always be based upon the ultimate facility size. The actual amount of traffic that can be handled by a roadway is dependent upon the presence of parking, number of driveways and intersections, intersection traffic control, and roadway alignment. The data presented in **Table 4-2** indicates the approximate volumes that can be accommodated by a particular roadway in "Vehicles per Day (VPD)". As indicated in table, the actual traffic that a roadway can handle will vary based upon a variety of elements including: roadway grade; alignment; pavement condition; number of intersections and driveways; the amount of turning movements; and the vehicle fleet mix. Roadway capacities can be increased under "ideal management conditions" (Column 2 in **Table 4-2**) that take into account such factors as limiting direct access points to a facility, adequate roadway geometrics and improvements to sight distance. By implementing these control features, vehicles can be expected to operate under an improved Level of Service and potentially safer operating conditions.

Table 4-2
Approximate Volumes for Planning of Future Roadway Improvements

Road Segment	Historical Management Volumes	Ideal Management Volumes
Two Lane Road	Up to 12,000 VPD	Up to 15,000 VPD
Three Lane Road	Up to 18,000 VPD	Up to 22,500 VPD
Four Lane Road	Up to 24,000 VPD	Up to 30,000 VPD
Five Lane Road	Up to 35,000 VPD	Up to 43,750 VPD

Table 4-2 shows capacity levels which are appropriate for planning purposes in developing areas within the study area. In newly developing areas, there are opportunities to achieve additional lane capacity improvements. The careful, appropriate, and consistent use of the capacity guidelines listed above can provide for long-term cost savings and help maintain infrastructure at a scale comfortable to the community.

Two important factors to consider in achieving additional capacity are peak hour demand and access control. Traffic volumes shown in **Table 4-2** are 24-hour averages; however, traffic is not smoothly distributed during the day. The Major Street Network shows significant peaks of demand, especially the work "rush" hour. These limited times create the greatest periods of stress on the transportation system. By concentrating large volumes in a brief period of time, a roadway's short-term capacity may be exceeded and a roadway user's perception of congestion is strongly influenced. The use of pedestrian and bicycle programs as discussed in **Chapter 5** and TDM measures can help to smooth out the peaks and thereby extend the adequate service life of a specific roadway configuration. The Transportation Plan strongly recommends the pursuit of such measures as low-cost means of meeting a portion of expected transportation demand.

Each time a roadway is intersected by a driveway or another roadway it raises the potential for conflicts between transportation users. The resulting conflicts can substantially reduce the roadway's ability to carry traffic if conflicts occur frequently. This basic principle is the design basis for the interstate highway system, which carefully restricts access to designated entrance and exit points. Arterial roadways are intended to serve the longest trip distances in an area and the highest traffic volume corridors. Access control is therefore very important on the higher volume elements of a community's transportation system. Collector roadways, and especially local roadways, do provide higher levels of immediate property access required for transportation users to enter and exit the roadway network. In order to achieve volumes in excess of that shown in Column 3 of **Table 4-2**, access controls should be put in place by the appropriate governing body. It is strongly recommended that access control standards appropriate to each classification of roadway be incorporated into the subdivision and zoning regulations of the City of Hamilton and Ravalli County. Ravalli County already has adopted access management criteria in its Access Encroachment Policy. Follow up monitoring of the effects of access control will aid in future transportation planning efforts.

4.5 Vehicle Crash Analysis

The MDT Traffic and Safety Bureau provided crash information and data for use in the Hamilton Area Transportation Plan (2009 Update). The crash information was analyzed to identify intersections with crash characteristics that may warrant further study. General crash characteristics were determined along with probable roadway deficiencies. The crash information covered the three-year time period from January 1st, 2006 to December 31st, 2008. For this analysis, only eighteen intersections were included. These intersections are as shown in **Table 2-8** in **Chapter 2** of this Transportatio Plan Update, and constitute the eighteen major signalized and un-signalized intersections that were defined for this analysis within the project scope of work. Several intersections were identified to warrant further study to specifically address crash trends, and these are listed below. The locations of these intersections are shown on **Figure 2-8** and **Figure 2-9** in **Chapter 2**.

- Eastside Highway & Black Lane/Bass Lane
- Eastside Highway & Fairgrounds Road
- Eastside Highway & Tammany Lane
- Kurtz Lane & Golf Course Road
- US 93 & Golf Course Road/Hope Avenue
- US 93 & Main Street/Marcus Street
- US 93 & Adirondac Avenue/Fairgrounds Road

4.6 References

Federal Highway Administration (FHWA). *Manual on Uniform Traffic Control Devices 2003 Edition,* Washington D.C.

Morrison Maierle, Inc. June 2002. *Hamilton Transportation Plan 2002, Chapter 2,* Hamilton, Montana.

Robert Peccia & Associates, Inc. April 2009. *Greater Bozeman Area Transportation Plan (2007 Update) - Chapter 4,* Bozeman, Montana.

Chapter 5
Transportation System Recommendations

Chapter 5
Transportation System Recommendations

The Hamilton Transportation Plan 2002 contained a wide variety of transportation system projects that were recommended for future implementation. Specific projects were recommended within the general confines of the following two categories:

- Major Improvement Projects
- Transportation System Management (TSM) Improvement Projects

Within this chapter a brief summary as to the status of the previously recommended projects is provided, as well as whether they have been carried forward for consideration in the 2009 Transportation Plan Update. In addition, newly identified transportation system projects are presented.

5.1 Status of Major Improvement Projects (MIP) from 2002 Hamilton Transportation Plan

A list of recommended major street network (MSN) projects that were recommended as part of the 2002 Hamilton Transportation Plan and their status as of this plan update are listed in this section. The 2002 Transportation Plan included 18 recommended Major Improvement Projects. Of these projects, 3 were completed and 15 have not been completed. The various 18 projects recommended from the previous plan and their resultant status is shown below in **Table 5-1**.

Table 5-1
MIP Projects from the 2002 Transportation Plan and Status for 2009 Update

Project ID	Location of Past Project	Past Recommendation	Status for this Plan Update
1	Fairgrounds Road / S-269 (Eastside Highway)	Signalize intersection and re-align Airport Access Road to line up across from Fairgrounds Road	Not completed, modified and included herein as **MSN-1**
2	Kurtz Lane / S-269 (Marcus Street)	Add a designated northbound left-turn lane and a designated southbound right-turn lane	Not completed, modified and included herein as **TSM-11**
3	Adirondac Avenue / Fairgrounds Road / US 93	Option A: Modify signal phasing to allow protected movements on westbound Fairgrounds Road Option B: Add a protected left-turn lane on westbound Fairgrounds Road and a protected right-turn lane on northbound US 93	Not completed, modified and included herein as **TSM-12**

Project ID	Location of Past Project	Past Recommendation	Status for this Plan Update
4	Pine Street / US 93	Signalize the intersection and add a designated pedestrian crossing	Completed
5	Ravalli Street / US 93	Signalize the intersection and add a designated pedestrian crossing	Completed
6	Golf Course Road / US 93	Add a designated westbound right-turn lane & provide protected signal time for the north/south movements	Not completed, modified and included herein as **TSM-10**
7	Big Corral Road (Golf Course Road to S-269)	Widen to a collector standard with urban features (sidewalks, curb and gutter, relocation of utilities, etc.)	Not completed, modified and included herein as **MSN-17**
8	Kurtz Lane (Golf Course Road to S-269)	Widen to a collector standard with urban features (sidewalks, curb and gutter, etc.)	Not completed, modified and included herein as **MSN-18**
9	Daly Avenue (Golf Course Road to S-269)	Widen to a collector standard with urban features (sidewalks, curb and gutter, relocation of utilities, etc.)	Not completed, modified and included herein as **MSN-13**
10	Old Corvallis Road (Fairgrounds Road to Riverside Cutoff)	Widen to a collector standard with urban features (sidewalks, curb and gutter, etc.)	Not completed, modified and included herein as **MSN-3**
11	Seventh Street (Adirondac Avenue to Desta Street)	Replace roadway pavement and construct sidewalk & curb and gutter.	Not completed, modified and included herein as **MSN-14**
12	S-269 (Freeze Lane to US 93)	Install center left-turn lanes on S-269 at Kurtz Lane, Daly Avenue & Skeels Avenue	Not completed, modified and included herein as **MSN-15**
13	Ravalli Street (US 93 to Daly Avenue)	Widen the street to urban collector standards with two lanes of travel, on-street bike lanes, and sidewalks	Not completed, modified and included herein as **MSN-16**
14	Freeze Lane (S-269 to Fairgrounds Road)	Widen the roadway to a minimum 60 feet residential collector standard with adequate travel lanes, on-street parking, sidewalks & curb and gutter	Not completed, and not carried forward in this Plan Update
15	Kurtz Lane (S-269 to Fairgrounds Road)	Widen the street to urban collector standards with two lanes of travel, on-street parking and bike lanes, sidewalks & curb and gutter	Completed

Project ID	Location of Past Project	Past Recommendation	Status for this Plan Update
16	Providence Way (North of Fairgrounds Road)	Widen the street to urban collector standards with two lanes of travel, on-street parking and bike lanes, sidewalks & curb and gutter	Not completed, modified and included herein as **MSN-11**
17	Skeels Avenue Extension (S-269 to Fairgrounds Road)	Extend the street to Fairgrounds Road and construct to commercial collector standard	Not completed, modified and included herein as **MSN-5**
18	Connector Road (US 93 to Old Corvallis Road)	Construct a public street between US 93 and Old Corvallis Road to provide east-west connectivity	Not completed, modified and included herein as **MSN-7**

5.2 Recommended Major Street Network (MSN) Improvement Projects

During the preparation of this Plan Update, a number of MSN projects were identified. Estimated project costs are included for each project. These costs are "planning level" estimates and do not include possible right-of-way, utility, traffic management, or other heavily variable costs. They do include mandatory "incidental & direct cost (IDC)" factors as required by federal requirements.

It is important to acknowledge that many of the recommended roadway improvements call for "urban" type roadways in areas that are currently "rural" in nature. In many cases, urban roadway typical sections have been identified to match existing Hamilton Department of Public Works standard typical sections. This is not an effort to force urban roadway sections on all rural roadways, however as the community grows these corridors will likely require certain urban features as traffic volumes increase, in context with adjacent land uses.

The following list of MSN projects are **not** in any particular order with respect to priority:

MSN-1 Fairgrounds Road and Eastside Highway (S-269)

Identified Concerns: Operational, Capacity, & Safety
Project Timeline: Long Term Implementation (> 10 years)

Project Description: This intersection currently experiences operational issues due to its location at the base of a rising grade on southbound S-269, the increasing volumes of traffic on S-269, and the speed of vehicles travelling S-269. There are two recommendations that should be considered for this intersection. Recommendation number 1 could be considered a short-term, interim improvement until which time recommendation number 2 can become feasible. Recommendation number 1 consists of the addition of a southbound right-turn lane on S-269 at the intersection to allow right-turning vehicles to get out of the traffic stream. This movement is a predominant movement at the intersection due to the location of the high school and Fairgrounds Road being the first primary route into Hamilton from S-269. This short-term improvement would greatly improve the operations of the intersection. To implement this improvement, a right-turn lane warrant analysis will need to be completed in accordance with MDT policies and procedures. Additionally, for this to be feasible, the intersection would have to be signalized, which means signal warrants would have to be met. It would also be desirable to separate the left-turn and right-turn movements via designated lanes on the Fairgrounds Road leg of the intersection. Recommendation number 2 can be considered a long-term improvement and is subject to cooperation of the landowner located on the northwest quadrant of the intersection. If and when the private property develops, it is recommended that Fairgrounds Road be relocated to the north of its present location to position it farther away from the rising grade of S-269 south of the existing Fairgrounds Road. This should be coupled with the relocation of the Hamilton Airport Road across the newly relocated Fairgrounds Road. This is a long-term project that will be subject to private landowner cooperation. The resulting intersection may or may not meet traffic signalization warrants.

Estimated Cost (Recommendation No. 1): *$475,000*
Estimated Cost (Recommendation No. 2): *$925,000*

MSN-2 Fairgrounds Road (Old Corvallis Road to Eastside Highway)

Identified Concerns: Operational, Capacity, Safety, & Multi-Modal
Project Timeline: Short Term Implementation (0 – 2 years)

Project Description: Reconstruct this road to an urban "business collector" standard with on-street bicycle lanes, curb and gutter, and sidewalks. It is envisioned that this roadway facility will utilize an 80 foot right-of-way. This project will improve east-west travel in this portion of town via improved drainage, improved non-motorized features, and better visibility for vehicles and pedestrians. This route is an important link connecting the west side of US Highway 93 to Eastside Highway, and receives considerable traffic due to the location of the high school. Note that the portion from Freeze Lane to Eastside Highway is under Ravalli County jurisdiction, and roadway improvements may be more "rural" in nature until traffic volumes suggest otherwise. Also of note is the portion between US Highway 93 and Old Corvallis Road should be assessed for improvements and channelization with this particular project's development, however right-of-way constraints are highly likely on the east leg of US Highway 93 and Old Corvallis Road.

Estimated Cost: *$2,700,000*

MSN-3 Old Corvallis Road (Fairgrounds Road to GSK)

Identified Concerns: Operational, Capacity, Safety & Multi-Modal
Project Timeline: Medium Term Implementation (2 – 5 years)

Project Description: Given the long-term growth potential along Old Corvallis Road, the facility should be reconstructed to an urban "business collector" standard. A large majority of the growth predicted within the study area boundary is predicted to occur along Old Corvallis Road. The area commonly referred to as "Area 3" will be served primarily along this route. The existing route is narrow with no room for non-motorized travel and limited shoulders. The newly constructed roadway should exhibit urban features to include curb and gutter, on-street bicycle lanes (each direction), sidewalk, and appropriate signage/pavement markings. Additional right-of-way may be needed for a reconstructed facility. It is envisioned that this roadway facility will utilize an 80 foot right-of-way. The route would begin at Fairgrounds Road and traverse to just past the Glaxo Smith Kline (GSK) eastern property boundary.

Estimated Cost: *$5,800,000*

MSN-4 Tammany Lane (Golf Course Road to Lovers Lane)

Identified Concerns: Maintenance
Project Timeline: Medium Term Implementation (2 – 5 years)

Project Description: This is the only portion of Tammany Lane that is gravel. Although a low priority, this remaining section of Tammany Lane should be paved with asphalt for dust control and improved ride ability.

Estimated Cost: *$60,000*

MSN-5 Skeels Avenue (Foxfield Street to Fairgrounds Road)

Identified Concerns: Operational & Multi-Modal
Project Timeline: Medium Term Implementation (2 – 5 years)

Project Description: Extend Skeels Avenue from Foxfield Street to Fairgrounds Road. This should be extended as an urban "residential collector" standard to the geometrics of the existing paved portions of Skeels Avenue, which utilize a 60 foot right-of-way and a 41 foot "back of curb" to "back of curb" street section. This extension will serve to relieve traffic pressure at the intersection of Fairgrounds Road and US 93, and will improve access for the industrial uses at the northern end of Skeels Avenue.

Estimated Cost: *$565,000*

MSN-6 New North-South Connector (Golf Course Road to Tammany Lane)

Identified Concerns: Operational, Capacity, & Multi-Modal
Project Timeline: Long Term Implementation (> 10 years)

Project Description: It is suggested that a new north-south connector roadway be constructed between Tammany Lane and Golf Course Road when development of private land occurs. Currently, there is no through connection in the area as shown on **Figure 5-2**. A new urban "residential collector" route would be desirable near the theoretical extension of Skyline Drive, straight north to Tammany Lane. The exact location would be dependent on private development plans, however the intent would be to provide another north-south connection in the area. This is especially important for emergency services response times. It is envisioned that this roadway facility would require an 80 foot right-of-way.

Estimated Cost: *$1,350,000*

MSN-7 New East-West Connector (Old Corvallis Road to US Highway 93)

Identified Concerns: Operational, Capacity, & Access
Project Timeline: Medium Term Implementation (2 – 5 years)

Project Description: Given the growth projected for areas north and east of Old Corvallis Road, it is suggested that a new cross-connector be designed and constructed to provide an alternate route between Old Corvallis Road and US Highway 93. This new connection would potentially relieve some traffic at the intersection of Fairgrounds Road and Old Corvallis Road as well. The new road should be built to urban "business collector" standards, and should be located just north of the railroad track crossing on Old Corvallis Road. It is envisioned that this new connection would utilize an 80 foot right-of-way. The route could potentially be placed between the Massa Ace Building Supply building and the First American Title building. This location would necessitate a slight shift south of the current graveled roadway to not affect parking at the Ace Hardware location. Some right-of-way acquisition would be required. An alternate location may be at a location farther south, where Ravalli County retains a 60 foot roadway easement. This location is approximately directly east of the southernmost approach to the existing K-Mart store.

The formalization of any access point between US Highway 93 and Old Corvallis Road may require an access permit from Ravalli County and/or the Montana Department of Transportation. As part of the permitting process, a comprehensive analysis would be required to confirm that US Highway 93 operations would not be degraded to unacceptable levels of service.

Estimated Cost: $155,000

MSN-8 Westside Highway (US Highway 93 to West Bridge Road)

Identified Concerns: Maintenance
Project Timeline: Medium Term Implementation (2 – 5 years)

Project Description: This facility is in various stages of surface deterioration. This is a low volume road with several alignment changes along the route, low density adjacent land uses, and limited potential for further development. Because of this, a full reconstruct of this facility will not likely be warranted out to the planning horizon of this plan. It is suggested, however, that routine mill and overlay be completed on the facility as funding becomes available and in accordance with the County's overall priority system. Ravalli County does have it in their capital improvement plans to complete an overlay project for a portion of this route.

Estimated Cost: $335,000

MSN-9 Ricketts Road (Blodgett Camp Road to east of Arbor Lane)

Identified Concerns: Maintenance
Project Timeline: Medium Term Implementation (2 – 5 years)

Project Description: It is suggested that this segment of Ricketts Road be milled and overlaid as funding becomes available and in accordance with the County's overall priority system. The completion of this segment should complement the recently overlaid section of Ricketts Road between West Bridge Road and Blodgett Camp Road.

Estimated Cost: $65,000

MSN-10 New East-West Connector #1 (Old Corvallis Road to Eastside Highway)

Identified Concerns: Operational, Capacity, & Multi-Modal
Project Timeline: Long Term Implementation (> 10 years)

Project Description: Given the growth projected for areas north and east of Old Corvallis Road, it is suggested that a new cross-connector be designed and constructed to provide an alternate route between Old Corvallis Road and Eastside Highway. The new road should be built to urban "residential collector" standards, and should be located approximately opposite and directly west of the existing Stock Farm Road intersection with Eastside Highway. It is envisioned that this roadway facility would utilize an 80 foot right-of-way. Because there is a significant water body located about one-half mile west of Eastside Highway along this alignment, the new route would potentially have to have several curves in it as it approached Old Corvallis Road. This will be an important connection as development occurs, and it must be noted that it will only happen when private development activities commence, if and when they do. Without private developer participation, it is unlikely that this connection could ever come to fruition. Additionally, the exact route isn't important to know at this time, however some type of east-west connection in the general vicinity is important as the community grows. Note that an access permit would be required for any new connection to Eastside Highway from the Montana Department of Transportation.

Estimated Cost: *$2,640,000*

MSN-11 Providence Way Extension (Fairgrounds Road to MSN-10 Roadway)

Identified Concerns: Operational, Capacity, & Multi-Modal
Project Timeline: Long Term Implementation (> 10 years)

Project Description: Providence Way should be extended north of Fairgrounds Road and connect up with the future east-west route identified under MSN-10. This road should be constructed to an urban "residential collector" standard and include curb and gutter, storm drainage, sidewalks, and two travel lanes (one in each direction). It is envisioned that this roadway facility would utilize a 60 foot right-of-way. This will be an important connection as development occurs in the area. It must be noted that it will only happen when private development activities commence, if and when they do. Without private developer participation, it is unlikely that this connection could ever come to fruition.

Estimated Cost: *$835,000*

MSN-12 New East-West Connector #2 (Old Corvallis Road to Eastside Highway)

Identified Concerns: Operational, Capacity, & Multi-Modal
Project Timeline: Long Term Implementation (> 10 years)

Project Description: Given the growth projected for areas north and east of Old Corvallis Road, it is suggested that a second "new" cross-connector be designed and constructed to provide an alternate route between Old Corvallis Road and Eastside Highway. The new road should be built to urban "residential collector" standards, and should be located near the new Council on Aging (COA) facility and traverse approximately directly east to Eastside Highway. It is envisioned that this roadway facility would utilize an 80 foot right-of-way. The new route would potentially curve northeast as it approaches Eastside Highway to create a new intersection just north of the existing curve on S-269. This will be an equally important connection to MSN-10, as development occurs. It must be noted that it will only happen when private development activities commence, if and when they do. Without private developer participation, it is unlikely that this connection could ever come to fruition. Additionally, the exact route isn't important to know at this time, however some type of east-west connection in the general vicinity is important as the community grows. Note that an access permit would be required for any new connection to Eastside Highway from the Montana Department of Transportation.

Estimated Cost: *$3,000,000*

MSN-13 <u>Daly Avenue (Golf Course Road to Marcus Street)</u>

Identified Concerns: Operational, Capacity, Safety & Multi-Modal
Project Timeline: Long Term Implementation (> 10 years)

Project Description: As a long-term project, it is recommended to reconstruct this street to an urban "residential collector" standard with curb and gutter and sidewalk. This is an extremely narrow corridor, and for a complete reconstruction of the facility, additional right-of-way will be needed to attain a minimum 60 foot right-of-way limit. This would be a difficult design project as irrigation ditches, on-street parking, and multiple utilities abound within the existing right-of-way limits, which are estimated to be approximately 42 feet. This long-term project does have value to the community, especially as a major access route to the elementary school.

Estimated Cost: *$1,950,000*

MSN-14 <u>Seventh Street (Adirondac Avenue to Desta Street)</u>

Identified Concerns: Maintenance
Project Timeline: Long Term Implementation (> 10 years)

Project Description: This collector facility has deteriorating sections of asphalt along the route and some drainage issues. It is recommended to mill and overlay this facility for its entire one-mile length to improve rideability and encourage better drainage.

Estimated Cost: *$2,340,000*

MSN-15 Marcus Street (Freeze Lane to US 93)

Identified Concerns: Operational, Capacity, & Safety
Project Timeline: Long Term Implementation (> 10 years)

Project Description: Install center left-turn lanes along Marcus Street at Kurtz Lane, Daly Avenue, and Skeels Avenue. This will require pavement widening at various locations along the facility. Available right-of-way along the route varies from 60 feet at the west end to 70 feet at the east end. There has been some public sentiment expressed about the speed differentials between US Highway 93 and Daly Avenue on this route, as some vehicles are increasing speeds heading eastbound (generally to rural areas) and some decrease their speeds heading eastbound (to turn onto Daly Avenue). A speed zone study was completed for this section of road in 2009, partially in response to these sentiments, and approval of signing modifications are currently pending with the Montana Transportation Commission.

Estimated Cost: *$175,000*

MSN-16 Ravalli Street (US Highway 93 to Daly Avenue)

Identified Concerns: Operational, Capacity, Safety & Multi-Modal
Project Timeline: Long Term Implementation (> 10 years)

Project Description: As a long-term project, it is recommended to reconstruct this street to an urban "residential collector" street standard with curb and gutter and sidewalk. This is an extremely narrow corridor, and for a complete reconstruction of the facility, additional right-of-way will be needed to attain a minimum 60 foot right-of-way limit. This would be a difficult design project as on-street parking and multiple utilities abound within the existing right-of-way limits. This long-term project does have value to the community, especially as a major access route to the elementary school.

Estimated Cost: *$600,000*

MSN-17 Big Corral Road (Golf Course Road to Marcus Street)

Identified Concerns: Operational, Capacity, Safety & Multi-Modal
Project Timeline: Long Term Implementation (> 10 years)

Project Description: As a long-term project, it is recommended to reconstruct this street to an urban "residential collector" standard with curb and gutter and sidewalk. Additional right-of-way will be needed to attain a minimum 60 foot right-of-way limit. This is a narrow corridor with several roadside hazards present. Additional right-of-way will be needed to attain for this improvement.

Estimated Cost: *$2,325,000*

MSN-18 Kurtz Lane (Golf Course Road to Marcus Street)

Identified Concerns: Operational, Capacity, Safety & Multi-Modal
Project Timeline: Long Term Implementation (> 10 years)

Project Description: As a long-term project, it is recommended to reconstruct this street to an urban "residential collector" standard with curb and gutter and sidewalk. This is a narrow corridor with several roadside hazards present. Additional right-of-way will be needed to attain a minimum 80 foot right-of-way limit. Additionally, irrigation facilities are present in the corridor. Additional right-of-way will be needed to attain for this improvement.

Estimated Cost: *$1,240,000*

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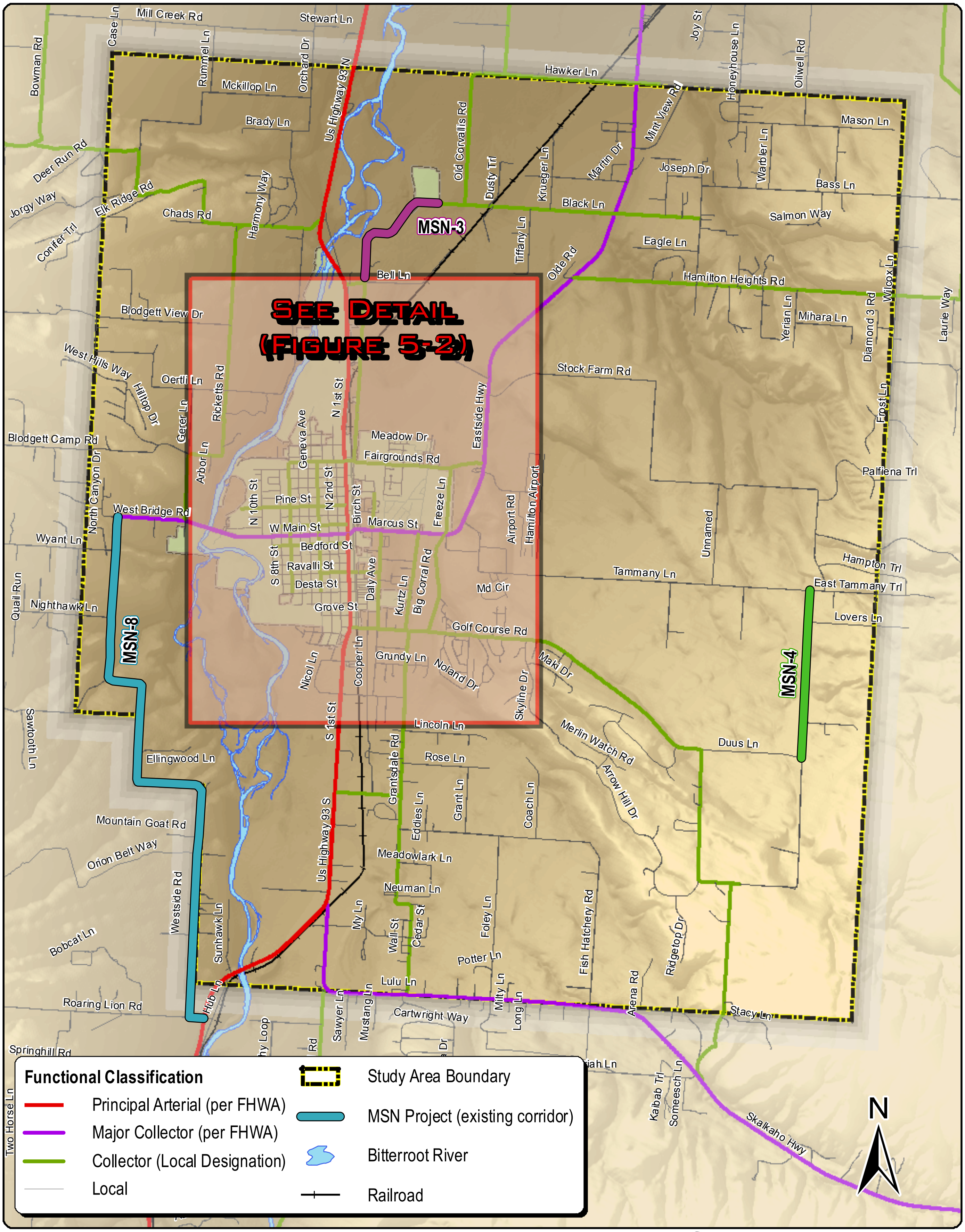

Figure 5-1
Major Street Network (MSN) Recommendations

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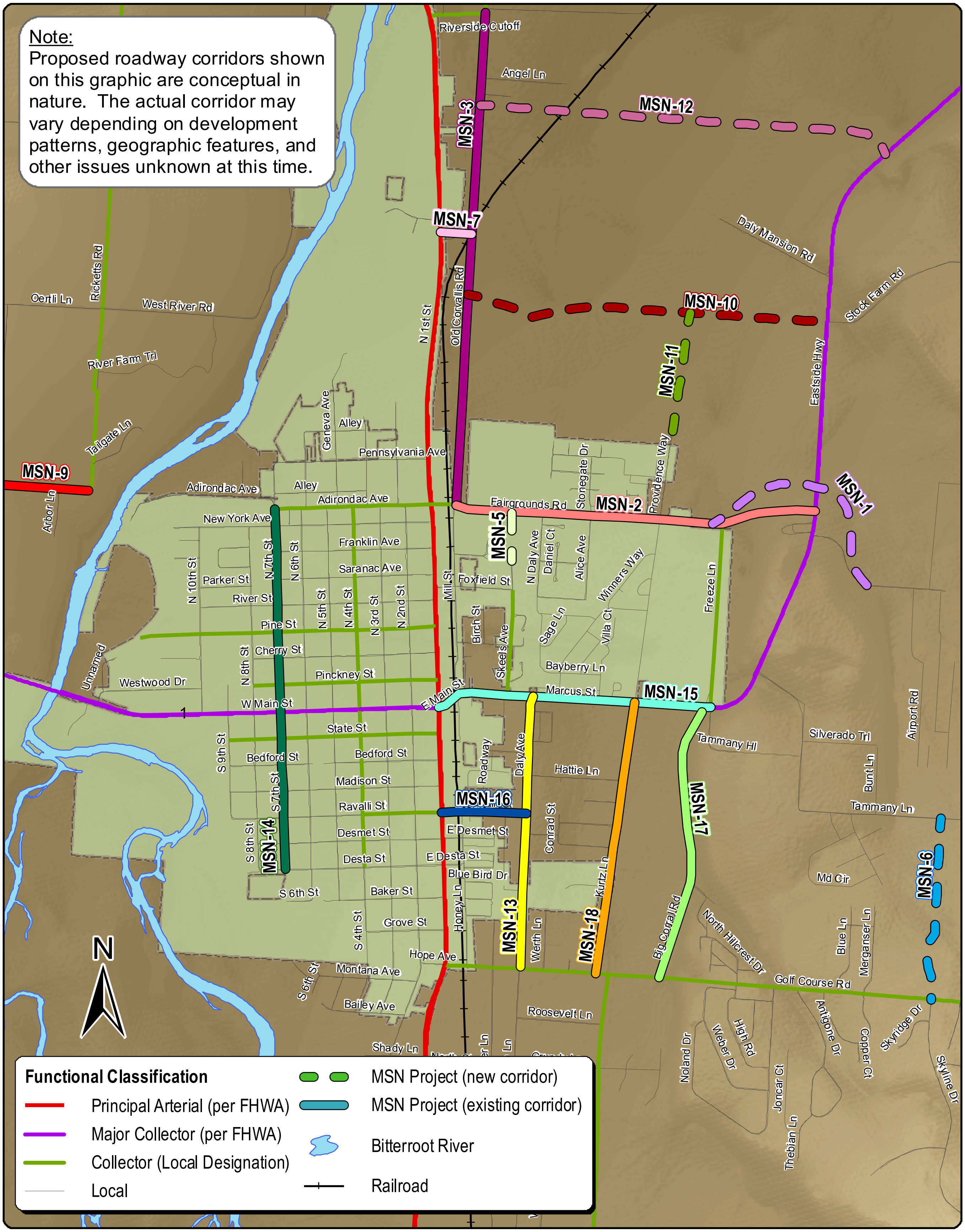

Figure 5-2

Major Street Network (MSN) Recommendations Inset Area

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5.3 Status of Transportation System Management (TSM) Projects from 2002 Hamilton Transportation Plan

A total of 6 TSM projects were recommended in the 2002 Transportation Plan. The status of these projects were reviewed to determine which have been completed, which are no longer valid, and which projects should be included as part of this plan update. Of the 6 projects, 2 were completed and 4 were not completed. The complete listing of the 6 projects, and their subsequent status for this 2009 Update to the Transportation Plan, are listed in **Table 5-2**.

Table 5-2
TSM Projects from the 2002 Transportation Plan and Status for 2009 Update

Project ID	Location of Past Project	Past Recommendation	Status for this Plan Update
19	S-531 (Main Street) & 3rd Street	Remove flashing span-wire and place four-way stop signs	Completed
20	S-531 (Main Street) & 4th Street	Add additional stop signs on Main Street to make a four-way stop sign controlled intersection	Completed
21	Pinckney Street & 2nd Street Stop Signs	Option A: Remove stop signs from Pinckney Street and place on 2nd Street Option B: Implement four-way stop sign control	Not completed, not carried forward in Plan Update
22	Pinckney Street & 3rd Street Stop Signs	Option A: Remove stop signs from Pinckney Street and place on 3rd Street Option B: Implement four-way stop sign control	Not completed, not carried forward in Plan Update
23	US 93 Signal Interconnect	Connect hard wire or telemetry interconnect between US93 signals (five total)	Not completed, modified and included herein as **TSM-22**
24	Ravalli Street / US 93 Crossing Guard Pilot Project	Pilot project to provide a crossing guard and document pedestrian volumes to satisfy signal warrant for potential new signal	Not completed, not carried forward in Plan Update (signal now installed at Ravalli Street)

5.4 Recommended Transportation System Management (TSM) Improvement Projects

During the preparation of this plan, a number of transportation system management (TSM) projects were identified. Estimated project costs are included for each recommended project. These costs are "planning level" estimates and do not include possible right-of-way, utility, traffic management, or other heavily variable costs.

They do include mandatory "incidental & direct cost (IDC)" factors as required by federal requirements.

The following list of TSM projects are not in any particular order with respect to priority:

TSM-1 <u>US Highway 93 Access Management Plan</u>

Identified Concerns: Access Management
Project Timeline: Short Term Implementation (0 – 2 years)

Project Description: A comprehensive Access Management Plan should be completed along US Highway 93, beginning just south of the Bitterroot River where the recent US 93 construction project ends, near reference post (RP) 49, all the way to the Angler's Roost Bridge (RP 43.7) area. This entire length of US 93 is categorized by multiple driveway approaches, numerous driveway turning movements, and vehicle stacking in the center two-way, left-turn lane (TWLTL), resulting in conflicting operations due to the prevalence of private driveways. A formal Access Management Plan would allow for one-on-one dialogue with each property owner to devise a strategy to combine drive accesses, restrict problematic accesses, and/or totally remove unneeded accesses. The potential also exists to install raised medians in the center turn lanes at strategic locations to control access operational issues. The success of a formal Access Management Plan depends on aggressive outreach to all affected parties, plus a basic strategy on why access control will benefit both the adjacent land uses as well as the traveling public. It is envisioned that the MDT would be responsible for initiating this project, with significant participation from the City of Hamilton, Ravalli County, and affected landowners along the corridor.

Estimated Cost: *$130,000*

TSM-2 <u>US Highway 93 and Marcus/Main Street</u>

Identified Concerns: Operational & Safety
Project Timeline: Short Term Implementation (0 – 2 years)

Project Description: Remove the large tree located on the northeast quadrant of this intersection. It presents a sight obstruction for eastbound traffic on Main Street desiring to turn left (i.e. northbound) onto US Highway 93.

Estimated Cost: *$2,500*

TSM-3 <u>Daly Avenue and East Ravalli Street</u>

Identified Concerns: Operational & Safety
Project Timeline: Short Term Implementation (0 – 2 years)

Project Description: Modify the fencing and vegetation located at the northwest quadrant of this three-legged stop controlled intersection. The height of the private landowner fence and associated vegetation creates a sight obstacle that should be removed for better visibility. This will require landowner cooperation.

Estimated Cost: *$5,000*

TSM-4 <u>Development of Access Management Regulations</u>

Identified Concerns: Access Management
Project Timeline: Short Term Implementation (0 – 2 years)

Project Description: Section 8.2 of this report offers guidance on access management principles and why access management is needed within a community. The narrative contained in section 8.2 are guidelines only, and to add substance to the discussion a community generally needs to adopt access management regulations through both an Access Management Ordinance and also a Corridor Preservation Ordinance. The MDT and Ravalli County have access management regulations in place for facilities under their jurisdiction, however most local jurisdictions do not. It is highly recommended that the City of Hamilton pursue developing its own access management regulations through adoption of both an Access Management Ordinance and a Corridor Preservation Ordinance – and that these ordinances closely align with Ravalli County's policy such that when land is annexed in the future, the planning of access's will be complementary.

Estimated Cost: *$15,000*

TSM-5 <u>Kurtz Lane Functional Classification</u>

Identified Concerns: System Management
Project Timeline: Short Term Implementation (0 – 2 years)

Project Description: Kurtz Lane, between S-269 and Fairgrounds Road, should be functionally classified as a collector route in accordance with the local community functional classification system (i.e. not a Federally designated route). The facility was recently constructed, and functions as a collector route given the location of the recreational fields and adjacent high school.

Estimated Cost: *(No Cost Incurred)*

TSM-6 Tammany Lane Functional Classification

Identified Concerns: System Management
Project Timeline: Short Term Implementation (0 – 2 years)

Project Description: Tammany Lane should be functionally classified as a collector route and added to the functional classification system as shown on Figure 2-1 and Figure 2-2, in accordance with the local community functional classification system (i.e. not a Federally designated route). It is classified as a "rural minor collector" according to Ravalli County's classification system. The facility is predominately paved, and new residential growth and some commercial growth has recently occurred. This is expected to continue over time. The addition of this route to the functional classifications system will establish the future design guidelines as development continues in the area.
Estimated Cost: *(No Cost Incurred)*

TSM-7 Fairgrounds Road and Old Corvallis Road

Identified Concerns: Operational, Capacity, Safety & Multi-Modal
Project Timeline: Medium Term Implementation (2 – 5 years)

Project Description: This intersection is a very large intersection with poor definition and roadside clutter. It is recommended that the intersection be reconstructed to a true urban intersection with curb and gutter, sidewalks, signing, and turn bays. At a minimum, the following geometric features should be included at the intersection:

- Eastbound left-turn lane (on Fairgrounds Road)
- Eastbound thru/right-turn lane (on Fairgrounds Road)
- Southbound right-turn lane (on Old Corvallis Road)
- Southbound thru/left-turn lane (on old Corvallis Road)

The above lane use changes could be completed with simple pavement marking and signing – without the need for a full-fledged reconstruction project.
Estimated Cost: *$310,000*

TSM-8 Golf Course Road and Kurtz Lane/Grantsdale Road

Identified Concerns: Operational, Safety & Multi-Modal
Project Timeline: Long Term Implementation (> 10 years)

Project Description: This intersection is heavily travelled, especially during school drop-off and pick-up periods. The minor legs of the intersection (i.e. Kurtz Lane and Granstdale Road) are slightly offset. The intersection operation would improve from better sight distance and geometry if the minor legs could be re-aligned such that they are opposite each other. This would necessitate a slight shift of Grantsdale Road to the west, and a slight shift of Kurtz Lane to the east. For this improvement to happen, right-of-way would have to be acquired from the adjacent landowners, so the improvement is dependent on landowner participation. From a planning perspective, this improvement would add to safety and operational characteristics of the intersection. This improvement may also serve to establish the Grantsdale Road/Kurtz Lane corridor as an alternative north/south corridor to US Highway 93 (see MSN-18).

Estimated Cost: *$220,000*

TSM-9 Golf Course Road and Big Corral Road

Identified Concerns: Operational
Project Timeline: Short Term Implementation (0 – 2 years)

Project Description: This intersection is operating at an acceptable level of service, however as a "tee" intersection it does have a very large pavement area that is not very well defined. It is recommended that a raised gore island be installed on the north leg (i.e. Big Corral Road) to better define the travel movements. For the southbound movement, there should be a delineated left-turn lane and a delineated right-turn lane. The raised gore island would provide separation between the southbound left-turn movement (off of Big Corral Road) and the westbound right-turn movement (off of Golf Course Road).

Estimated Cost: *$30,000*

TSM-10 Golf Course Road and US Highway 93

Identified Concerns: Operational
Project Timeline: Medium Term Implementation (2 – 5 years)

Project Description: As development occurs in areas between Tammany Lane and Golf Course Road, traffic will increase along Golf Course Road and affect the larger intersections. This predominately includes the intersection of Golf Course Road with US Highway 93. A westbound right-turn lane should be added to the intersection on the Golf Course Road leg when warrants are met and as approved by the MDT. This would require the relocation of the signal standard on the northeast quadrant of the intersection, and also some delineation work associated with the adjacent gas station, however long-term this will be a predominant movement at this intersection.

Estimated Cost: *$130,000*

TSM-11 Kurtz Lane and Marcus Street

Identified Concerns: Operational
Project Timeline: Medium Term Implementation (2 – 5 years)

Project Description: At this intersection a northbound left-turn lane should be added on Kurtz Lane, directly opposite the existing southbound left-turn lane on the north side of Marcus Street. An adjacent combination thru- / right-turn lane should also be striped for the northbound movement off Kurtz Lane. Kurtz Lane south of this intersection was recently overlaid with asphalt.

Estimated Cost: *$45,000*

TSM-12 US Highway 93 and Adirondac Avenue/Fairgrounds Road

Identified Concerns: Operational
Project Timeline: Medium Term Implementation (2 – 5 years)

Project Description: At this intersection a northbound protected left-turn phase should be added as traffic volumes grow and development occurs to the north and west. Under existing conditions, a protected left-turn phase is not warranted at the intersection, however as development occurs along Old Corvallis Road, heavier southbound volumes on US 93 will reduce gaps for northbound left-turning traffic. A protected left-turn warrant analysis should be undertaken every two years to identify the appropriate time for implementation of the protected phase. It is suggested that the City of Hamilton be responsible for completing this warrant analysis, either in-house or through the use of a consultant, as this need will be driven from urban scale growth in the area in the future.

Estimated Cost: *$35,000*

TSM-13 US Highway 93 Crossings

Identified Concerns: Safety & Multi-Modal
Project Timeline: Short Term Implementation (0 – 2 years)

Project Description: There are four (4) locations along US Highway 93 through Hamilton proper that are marked as pedestrian crosswalks with flags, as follows:

- Fox Field
- State
- Bedford
- DeSmet

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These are separate from signalized crossings. At the flagged crossings, public sentiment expressed has been generally positive and the community appreciates having the flags. It is recommended to heighten the visibility of these four locations by trimming vegetation in and around the pedestrian crossing signs and also replacing these signs, as they are somewhat faded due to their age. In addition, most flags have faded and no longer retain their bright orange color. These should be replaced more frequently.

Estimated Cost: *$5,000*

TSM-14 <u>State Street Traffic Calming</u>

Identified Concerns: Operational, Safety & Multi-Modal
Project Timeline: Short Term Implementation (0 – 2 years)

Project Description: State Street is an extremely wide parallel facility to Main Street. Because of its width and traffic volume, some construe the facility as a barrier between downtown Hamilton proper and the multiple destinations south of State Street. It is recommended that curb bulb-outs be installed at the intersections of State Street and 2nd Street, 3rd Street and 4th Street to reduce pedestrian crossing distance and heighten visibility of pedestrians in the area. These could be combined with decorative crosswalks and/or appropriate signage. Note that these types of improvements should be done with sensitivity to storm drainage considerations, snow plowing operations, and the type of traffic found on State Street – including the turning radius needs of the City's fire vehicles.

Estimated Cost: *$105,000*

TSM-15 <u>Riverside Cutoff and Old Corvallis Road Signing</u>

Identified Concerns: Maintenance
Project Timeline: Short Term Implementation (0 – 2 years)

Project Description: This "tee" intersection should have a permanent barricade installed on the east leg of the tee intersection, directly opposite Riverside cutoff.

Estimated Cost: *$2,000*

TSM-16 <u>US Highway 93 and Riverside Cutoff Signal Warrant Analysis</u>

Identified Concerns: Operational & Access Management
Project Timeline: Medium Term Implementation (2 – 5 years)

Project Description: This intersection should be monitored every three years to see if traffic signal warrants may be met. As growth occurs in "Area 3" and development continues, this intersection may realize increased traffic for those wanting to bypass Old Corvallis Road, the predominant movement that may warrant installation of a traffic signal would be the westbound to southbound left-turn movement at the intersection. A traffic signal warrant analysis should be completed every three years to review traffic volumes for the peak-hour warrant. It is suggested that the City of Hamilton be responsible for completing this warrant analysis, either in-house or through the use of a consultant, as this need will be driven from urban scale growth in the area east of Old Corvallis Road in the future.

Estimated Cost: *$5,000*

TSM-17 Hamilton Downtown Master Plan

Identified Concerns: Operational & Multi-Modal
Project Timeline: Medium Term Implementation (2 – 5 years)

Project Description: In response to several public comments on the need for parking assessments in the downtown, it is recommended that a Downtown Master Plan be completed that includes a detailed parking component, in addition to a wayfinding and signage component. The delivery of a parking supply and demand study cannot be completed under the framework of this Transportation Plan Update. A Downtown Master Plan would be valuable to set goals on land use in the downtown, aesthetics, economics, and infrastructure requirements. Downtown parking supply and demand strategies are most often addressed through a Downtown Master Plan for communities the size of Hamilton.

Estimated Cost: *$65,000*

TSM-18 Eastside Highway and Black Lane/Bass Lane

Identified Concerns: Operational, Capacity & Safety
Project Timeline: Short Term Implementation (0 – 2 years)

Project Description: This intersection has had several crashes in recent years, and due to increasing volumes along Eastside Highway, a reconfiguration of this intersection is necessary. It is recommended that designated left-turn bays be provided for both the north and south legs of Eastside Highway, with appropriate tapers. In addition, the minor legs should be modified to separate the left-turn movements. Note that the MDT does have a project programmed to accomplish these objectives in the near future. The project also incorporates roadway grade reductions and the re-alignment of Black Lane and Bass Lane.

Estimated Cost: *$175,000*

TSM-19 Eastside Highway and Hamilton Heights Road

Identified Concerns: Operational
Project Timeline: Long Term Implementation (> 10 years)

Project Description: This intersection exhibits sight distance concerns due to the grading on the east side of S-269. It is suggested that project developers contact the adjacent landowners to obtain a construction permit to lay back the steep back slopes on the northeast and south east quadrants of the intersection. This minor improvement would improve sight distance for all vehicles at this intersection. In addition, in future years and as traffic volumes increase on Eastside Highway, a long-term suggested improvement would be to install a southbound left-turn lane at the intersection, with the appropriate taper length for the speed of the facility. Approval from the MDT is required.

Estimated Cost: *$165,000*

TSM-20 Eastside Highway and Hawker Lane/Corvallis Cemetery Road

Identified Concerns: Operational
Project Timeline: Long Term Implementation (> 10 years)

Project Description: In future years and as traffic volumes increase on Eastside Highway, install a southbound left-turn lane at the intersection, with the appropriate taper length for the speed of the facility. Approval from the MDT is required.

Estimated Cost: *$150,000*

TSM-21 Community Transit Perception Survey

Identified Concerns: Multi-Modal
Project Timeline: Short Term Implementation (0 – 2 years)

Project Description: Public transportation is discussed in greater detail in Chapter 6 of this transportation plan update. Two transportation studies were funded by MDT in 2008. Both studies involved public surveys, as well as, transit provider input.

The Five Valleys Regional Transit Study conducted by LSC Transportation Consultants and Highway 93 Corridor Study conducted by Fehr & Peers Transportation Consultants have recommended expanding the vanpool program as "*a reasonable immediate or near-term alternative that could provide commuter service and reduce single occupancy vehicles* ". These findings are supported by the wait list. Through the development of wait lists, MRTMA currently has 217 individuals. The program could be expanded by seven routes:

- Hamilton to downtown Missoula
- Florence to downtown Missoula
- Hamilton to University of Montana
- Stevensville to South Reserve
- Stevensville to North Reserve
- Missoula to Hamilton
- Missoula to Stevensville

The Five Valleys Regional Transit Study recommended a subscription bus service be implemented for Hamilton commuters in the fall of 2011. The US 93 Corridor Study Transit Analysis recommended a Peak Hour Fixed route service to be implemented in 2010, with service being expanded to include non-peak hour fixed route bus service in 2015.

The public should be engaged and queried about the role public transit may have in the community as the area grows. Allocating funds and resources towards a full transit system will not be prudent if it does not capture additional trips and mode share. Until a detailed community survey can be completed, there is no sound, fundamental basis for ridership potential and usage. It would be recommended that this effort is sponsored by one of the project partners to this transportation plan, either in house or by retaining a qualified public relations consultant with experience in transit systems.

Estimated Cost: $35,000

TSM-22 US 93 Signal Interconnect

Identified Concerns: Operational
Project Timeline: Medium Term Implementation (2 – 5 years)

Project Description: Through coordination with the MDT, construct hard wire or a telemetry interconnect system between the five traffic signals of US Highway 93 and the intersecting roads noted below:

- Adirondac Avenue/Fairgrounds Road
- Pine Street
- West Main Street/Marcus Street
- Ravalli Street
- Golf Course Road

These improvements will help establish logical platoon flows on US Highway 93 and increase gaps in the traffic stream for side street turning vehicles. Additionally, public sentiment expressed during public outreach is that pedestrian crossing times are bare minimums and that in some areas more pedestrian time is needed due to the presence of school aged children crossing US Highway 93. This may need to be factored in when signal timing changes are explored.

Estimated Cost: *$45,000*

TSM-23 US 93 and Blood Lane Signal Warrant Analysis

Identified Concerns: Operational & Access Management
Project Timeline: Medium Term Implementation (2 – 5 years)

Project Description: This intersection should be monitored every three years to see if traffic signal warrants may be met. As growth occurs in the area, this intersection may realize increased traffic for those wanting to access US Highway 93 southbound from Blood Lane, especially if development occurs in the area. The predominant movement that may warrant installation of a traffic signal would be the westbound to southbound left-turn movement at the intersection. A traffic signal warrant analysis should be completed every three years to review traffic volumes for the peak-hour warrant. It is suggested that the City of Hamilton be responsible for completing this warrant analysis, either in-house or through the use of a consultant, as this need will be driven from urban scale growth in the area in the future. An additional improvement may be the reconstruction of the roadway to a collector standard from Grantsdale Road to US Highway 93. Currently, the roadway is in poor conditions and is within a 30 foot easement.

Estimated Cost: *$5,000 (warrant analysis only)*

TSM-24 Hamilton Stop Sign Removals

Identified Concerns: Operational
Project Timeline: Short Term Implementation (0 – 2 years)

Project Description: There are several locations within Hamilton proper that have stop signs at locations that do not meet the intent of the Manual on Uniform Traffic Control Devices (MUTCD), as summarized in Section 2.5 of this Transportation Plan. These locations are defined below, and it is recommended that these stop signs be removed in accordance with MUTCD procedures.

Estimated Cost: *$12,000*

Ravalli Street & S. 8th Street

- Remove NW quadrant stop sign
- Remove SE quadrant stop sign

Ravalli Street & S. 5th Street
- Remove NW quadrant stop sign
- Remove SE quadrant stop sign

Desmet Street & S. 5th Street
- Remove NE quadrant stop sign
- Remove SW quadrant stop sign

Desmet Street & S. 2nd Street
- Remove NE quadrant stop sign
- Remove SW quadrant stop sign

Desta Street & S. 5th Street
- Remove NW quadrant stop sign
- Remove SE quadrant stop sign

Desta Street & S. 4th Street
- Remove NW quadrant stop sign
- Remove SE quadrant stop sign

New York Avenue & N. 3rd Street
- Remove NE quadrant stop sign
- Remove SW quadrant stop sign

New York Avenue & N. 2nd Street
- Remove NE quadrant stop sign
- Remove SW quadrant stop sign

Saranac & N. 2nd Street
- Remove NW quadrant stop sign
- Remove SE quadrant stop sign

River Street & N. 5th Street
- Remove NE quadrant stop sign
- Remove SW quadrant stop sign

TSM-25 Hamilton Area Comprehensive Safety Plan

Identified Concerns: Safety
Project Timeline: Short Term Implementation (0 – 2 years)

Project Description: The City should pursue development of a Comprehensive Safety Plan that seeks to address comprehensive safety matters via engineering, education, enforcement, and emergency services. It is highly likely that in the near future grant monies may be

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made available to Montana communities on a competitive basis for the development of safety plans. The development of a Comprehensive Safety Plan will allow for extensive outreach to the community, as well as an assessment of all safety related matters of importance, including but not limited to, seat belt usage, enforcement considerations, emergency service needs, and education. Note that a Comprehensive Safety Plan incorporates much more than a basic infrastructure assessment.

Estimated Cost: *$30,000*

TSM-26 Hamilton Area Non-Motorized Plan

Identified Concerns: Multi-Modal
Project Timeline: Short Term Implementation (0 – 2 years)

Project Description: The City should pursue development of a Non-Motorized Transportation Plan for the community. The current update to the Transportation Plan just begins to explore non-motorized planning in the community, and a full Non-Motorized Transportation Plan will allow the community to achieve a higher level of understanding and planning as it relates to bicyclists and pedestrians. There appears to be enough interest in the community to make non-motorized infrastructure a higher priority as the community grows.

Estimated Cost: *$20,000*

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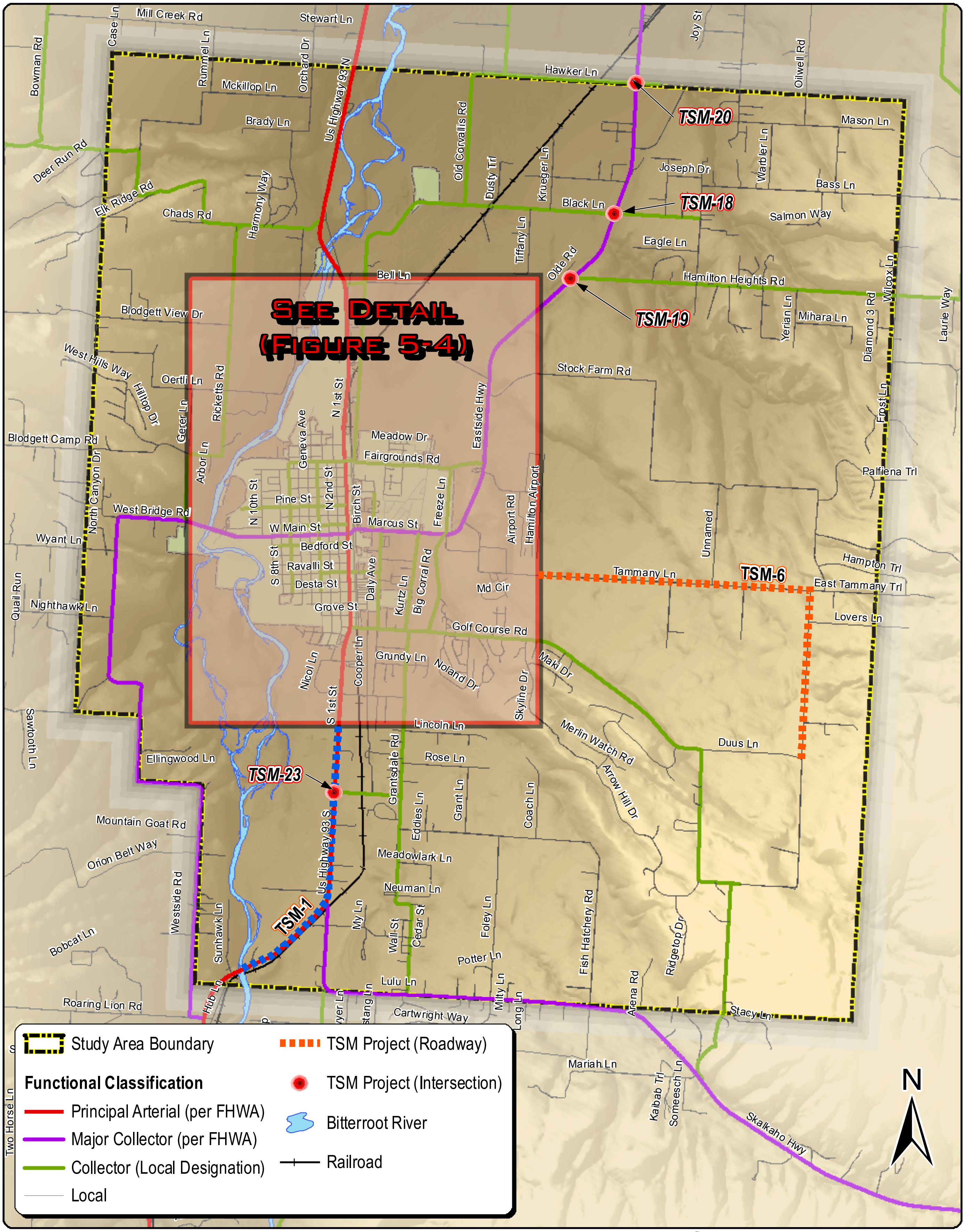

Figure 5-3

Transportation System Management (TSM) Recommendations

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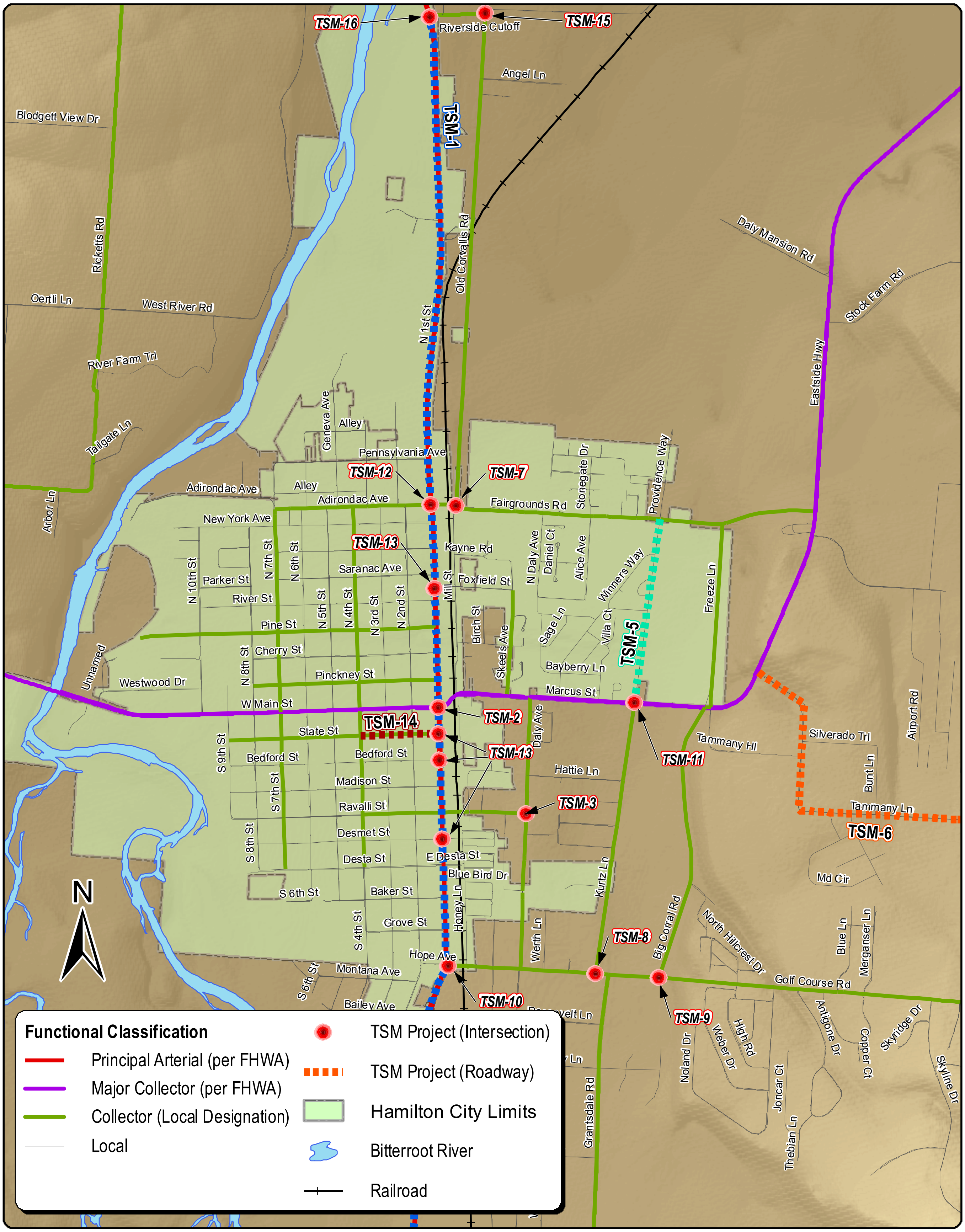

Figure 5-4

Transportation System Management (TSM) Recommendations Inset Area

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5.5 Recommended Non-Motorized Network and Considerations

In general terms, non-motorized travel refers to pedestrians and bicyclists within the Hamilton community. This can be furthered supplemented by equestrian users, skateboarders, unicyclists, and others. The Hamilton community has not previously undergone any sort of planning process for non-motorized transportation. The information contained herein is, in reality, the first attempt to plan a true non-motorized transportation network within the community. The focus of this planning is creating a non-motorized network that will provide continuity through the community and connect logical destinations. It is grounded in reality and the recommendations contained have to be balanced with the needs of other travel modes, predominately vehicles.

Bicycle facilities vary dramatically from simply additional signage to separated paved facilities along exclusive rights-of-way. The following projects in **Table 5-3** through **Table 5-6** have been identified through public involvement, existing and anticipated future travel demand, significant destinations for bicyclists, and the existing bicycle network. Detailed engineering cost estimates should be undertaken at the time of project implementation for each project.

5.5.1 Bicycle Lanes

A bicycle lane provides a striped and stenciled lane for one-way travel on a street or highway. Many of the identified bicycle lanes will be completed through roadway improvements funded by new development. Some of the identified projects will need to be completed by the City of Hamilton, Ravalli County, or MDT through retrofit or as part of maintenance activities (striping and signage only). Bicycle lanes can provide the following benefits:

For Pedestrians:

- Greater separation from traffic, especially in the absence of on-street parking or a planter strip, increasing comfort and safety. This is important to young children walking, playing or riding their bikes on curbside sidewalks.
- Reduced splash from vehicles passing through puddles (a total elimination of splash where puddles are completely contained within the bike lane).
- An area for people in wheelchairs to travel where there are no sidewalks, or where sidewalks are in poor repair or do not meet ADA standards.
- A space for wheelchair users to turn on and off curb cut ramps away from moving traffic.
- The opportunity to use tighter corner radii, which reduces intersection crossing distance and tends to slow turning vehicles.

- In dry climates, a reduction in dust raised by passing vehicles, as they drive further from unpaved surfaces.

For Motorists:

- Greater ease and more opportunities to exit from driveways (thanks to improved sight distance).
- Greater effective turning radius at corners and driveways, allowing large vehicles to turn into side streets without off-tracking onto curb.
- A buffer for parked cars, making it easier for motorists to park, enter and exit vehicles safely and efficiently. This requires a wide enough bike lane so bicyclists aren't "doored."
- Less wear and tear of the pavement, if bike lanes are restriped by moving travel lanes (heavier motor vehicles no longer travel in the same well-worn ruts).

For Other Modes:

- Transit: A place to pull over next to the curb out of the traffic stream.
- Emergency vehicles: Additional pavement area to maneuver around stopped traffic, when compared to roadway sections without bicycle lanes, thereby decreasing response time.
- Bicyclists: Greater acceptance of people bicycling on the road, as motorists are reminded that they are not the only roadway users;
- Non-motorized modes: An increase in use, by increasing comfort to both pedestrians and bicyclists (this could leave more space for motorists driving and parking).

For the Community (Livability factors):

- A traffic calming effect when bike lanes are striped by narrowing travel lanes.
- Better definition of travel lanes where road is wide (lessens the "sea of asphalt" look).
- An improved buffer to trees, allowing greater plantings of green canopies, which also has a traffic calming effect.

Opportunities for bicycle lanes are contained in **Table 5-3**.

Table 5-3
Recommended Bicycle Lanes

Street	From	To	Notes *
Fairgrounds Road	Old Corvallis Road	Freeze Lane	Install on-street bicycle lanes on both sides of Fairgrounds Road when the roadway project is developed to an urban collector standard
Old Corvallis Road	Fairgrounds Road	Glaxo Smith Kline (GSK) eastern property line	Install on-street bicycle lanes on both sides of Old Corvallis Road when the roadway project is developed to an urban collector standard
4th Street	Adirondac Avenue	Grove Street	Install on-street bicycle lanes on both sides of 4th Street, with appropriate signage
Golf Course Road	US Highway 93	Big Corral Road	Install on-street bicycle lanes on both sides of Golf Course Road, with appropriate signage
Marcus Street	US Highway 93	Big Corral Road	Install on-street bicycle lanes on both sides of Marcus Street, with appropriate signage
Skeels Avenue	Marcus Street	Fox Field Street	Install on-street bicycle lanes on both sides of Skeels Avenue, with appropriate signage
West Main Street	North 4th Street	US Highway 93	Install on-street bicycle lanes on both sides of West Main Street, with appropriate signage

** Proposed bicycle lanes on MDT routes will require MDT approval.*

5.5.2 Shared Roadways

Shared roadways are any on-street facility where bicycles share the travel lanes with automobiles. Typically, these facilities occur on local roadways or on roadways with low traffic volumes and speeds. Treatments most often include “Share the Road” signs and pavement markings. In addition, wayfinding signage, traffic diverters and other types of traffic calming can be used in urban environments. The level of treatment varies between facilities and is dictated by traffic conditions and safety.

It should be noted that the use of “Share the Road” signs in rural conditions needs to be carefully considered and planned. The use of signs may give the bicycle rider a false sense of security as they may be interpreted as defining a “safe” place for bicyclists to travel. Conversely, the expense and resources of adding “Share the Road” signs may be excessive for some municipal budgets, and as such careful consideration is needed.

Because of these issues, and recognizing the sensitivity to signing rural bicycle routes as "Share the Road" facilities, the following evaluation criteria is suggested when weighing whether to sign predominately rural routes within the study area boundary. This criteria is currently utilized by the Montana Department of Transportation:

Criteria No. 1

Local government, bicycle club, or other interested citizen can submit requests for "Share the Road" signs to the affected jurisdiction (i.e. MDT, Ravalli County or the City of Hamilton). Jurisdiction staff verifies that the route is used by bicyclists on a continuous basis over several seasons. If not, signs will not be installed. If yes, proceed to criteria number 2.

Criteria No. 2

Candidate sites for signage are limited to rural and transitional areas with a posted speed limit of 45 mph or greater. If not, signs will not be installed. If yes, proceed to criteria number 3.

Criteria No. 3

Average annual daily traffic must be greater than 1,000 vehicles per day (vpd). If not, signs will not be installed. If yes, proceed to criteria number 4.

Criteria No. 4

Minimum paved surface width less than 24 feet. If yes, sign may be installed. If not, proceed to criteria number 5.

Criteria No. 5

Usable shoulder width less than 2 feet. If yes, signs may be installed.

Suggested shared roadways are identified in **Table 5-4**.

Table 5-4
Suggested Shared Roadways

Street	From	To	Notes
Old Corvallis Road	Riverside Cutoff	Hawker Lane	This roadway segment should be signed as a "share-the-road" facility
Eastside Highway	Hawker Lane	Big Corral Road	This roadway segment should be signed as a "share-the-road" facility
Big Corral Road	Golf Course Road	Marcus Street	This roadway segment should be signed as a "share-the-road" facility
Daly Avenue	Golf Course Road	Marcus Street	This roadway segment should be signed as a "share-the-road" facility
Ravalli Street	4th Street	Daly Avenue	This roadway segment should be signed as a "share-the-road" facility
North 7th Street	Adirondac Avenue	Desta Street	This roadway segment should be signed as a "share-the-road" facility
North 10th Street	West Main Street	New York Avenue	This roadway segment should be signed as a "share-the-road" facility
New York Avenue	North 7th Street	North 10th Street	This roadway segment should be signed as a "share-the-road" facility
Desta Street	North 7th Street	US Highway 93	This roadway segment should be signed as a "share-the-road" facility
Grove Street	South 2nd Street	South 4th Street	This roadway segment should be signed as a "share-the-road" facility
South 2nd Street	Grove Street	Shady Lane	This roadway segment should be signed as a "share-the-road" facility
Shady Lane/Nicol Lane loop	South 2nd Street	US Highway 93 (South)	This roadway segment should be signed as a "share-the-road" facility
Geneva Avenue	City Park	Adirondac Avenue	This roadway segment should be signed as a "share-the-road" facility
Grantsdale Road	Golf Course Road	Skalkaho Highway	This roadway segment should be signed as a "share-the-road" facility
Westside Highway	West Bridge Road	US Highway 93 (South)	This roadway segment should be signed as a "share-the-road" facility

5.5.3 Shoulder Bikeways

Roadway shoulders can offer many of the benefits of bicycle lanes without the same level of infrastructure cost associated with bicycle lane stencils and signage. Roadway shoulders are ideal for rural roadways where bicyclists are present. Roadway shoulders should be a minimum of 4 feet wide. If a rumble strip is necessary it should be as close to the white (fog) line as possible and have regular skips to allow bicyclists to leave the shoulder to avoid obstructions or obstacles if necessary.

The American Association of State Highway and Transportation Officials (AASHTO) acknowledge the following benefits of shoulder bikeways in three important areas: safety, capacity and maintenance.

Safety - highways with paved shoulders have lower accident rates with the following benefits:

- Provide space to make evasive maneuvers
- Accommodate driver error
- Add a recovery area to regain control of a vehicle, as well as lateral clearance to roadside objects such as guardrail, signs and poles (highways require a "clear zone," and paved shoulders give the best recoverable surface)
- Provide space for disabled vehicles to stop or drive slowly
- Provide increased sight distance for through vehicles and for vehicles entering the roadway
- Contribute to driving ease and reduced driver strain
- Reduce passing conflicts between motor vehicles and bicyclists and pedestrians
- Make the crossing pedestrian more visible to motorists
- Provide for storm water discharge farther from the travel lanes, reducing hydroplaning, splash and spray to following vehicles, pedestrians and bicyclists.

Capacity - highways with paved shoulders can carry more traffic with the following benefits:

- Provide more intersection and safe stopping sight distance
- Allow for easier exiting from travel lanes to side streets and roads (also a safety benefit)
- Provide greater effective turning radius for trucks
- Provide space for off-tracking of truck's rear wheels in curved sections
- Provide space for disabled vehicles, mail delivery and bus stops
- Provide space for bicyclists to ride at their own pace

Maintenance - highways with paved shoulders are easier to maintain with the following benefits:

- Provide structural support to the pavement

- Discharge water further from the travel lanes, reducing the undermining of the base and subgrade
- Provide space for maintenance operations and snow storage
- Provide space for portable maintenance signs

Roadways within the study area boundary that are that are recommended for shoulder bikeways are listed in **Table 5-5**.

Table 5-5
Recommended Expanded Shoulder (Minimum of 4-feet)

Street	From	To	Notes
Skalkaho Highway	US Highway 93	Arena Road	Narrow roadway with no shoulders – popular touring route; Skalkaho Highway is a MDT facility - therefore any future shoulder widening would be coordinated/approved by the MDT.

5.5.4 Shared-Use Paths

A shared-use path provides bicycle travel on a rideable surface within a right-of-way completely separated from any street or highway. Shared-use paths should be designed to be ten feet wide. **Table 5-6** lists the recommended shared-use paths to complement the existing network.

Table 5-6
Recommended Shared-Use Paths

Street / Route	From	To	Notes
River Trail	Park	Anglers Roost	This shared-use path is a very long-term vision for a recreational path along the Bitterroot River. There will be several hurdles to development of the entire path, the primary of which is private land ownership at various locations along the route. However from a planning perspective, it is important to identify this amenity for the community and begin the dialogue on how to begin implementation of this potential community asset.

Skeels Avenue	Foxfield Street	Fairgrounds Road	Install shared-use path either prior to or along with the Skeels Avenue extension.
MRL Right-of-Way	Fairgrounds Road	Golf Course Road	Install shared-use path along the existing right-of-way associated with the Montana Rail Link (MRL) right-of-way. There will be several hurdles to this path, the primary of which is MRL actively uses this right-of-way. However as market conditions change and the rail track uses may change, the City should begin the dialogue with MRL on how to begin implementation of this potential community asset.

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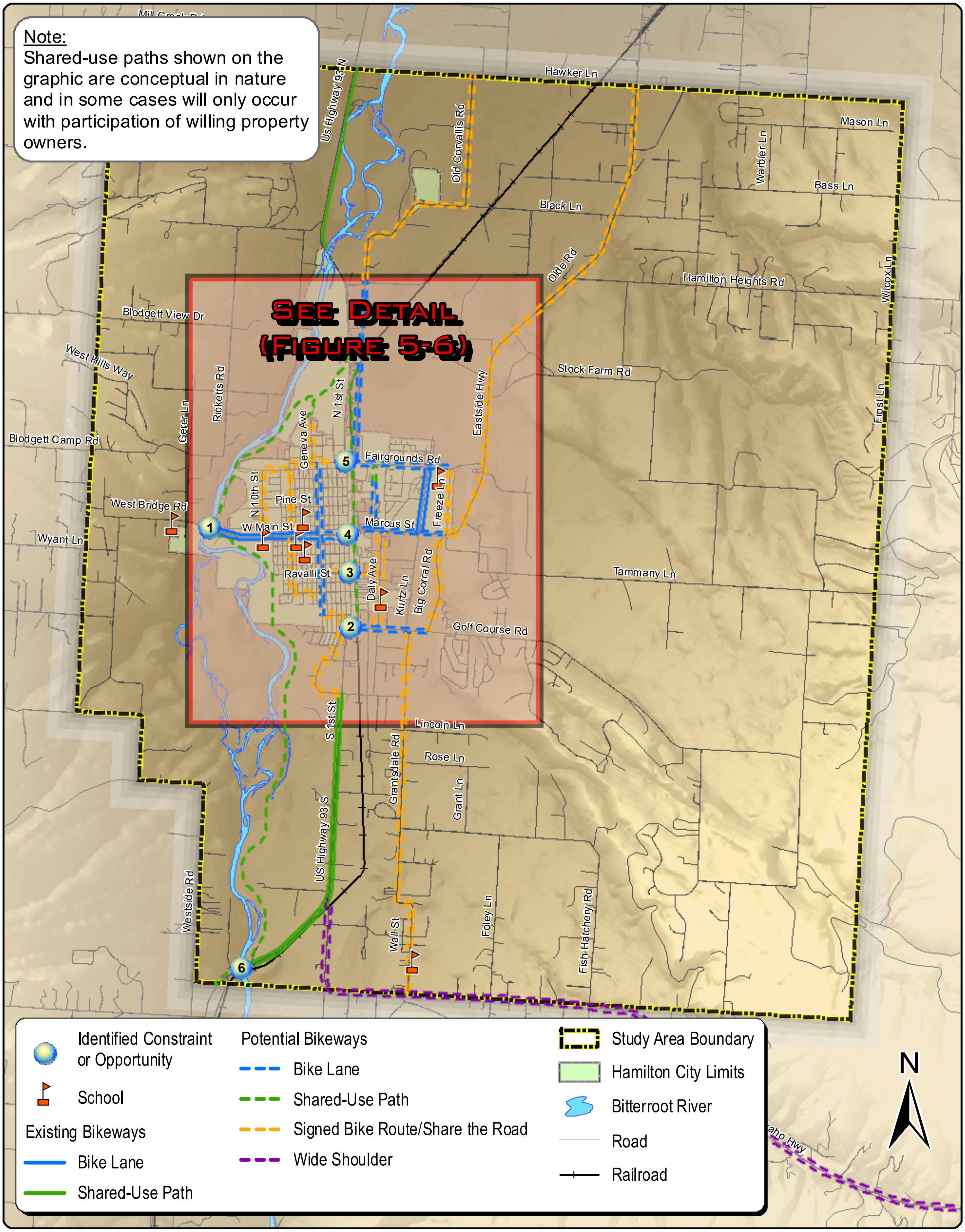

Figure 5-5

Non-Motorized Network

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Miles

Hamilton Area Transportation Plan 2009 Update

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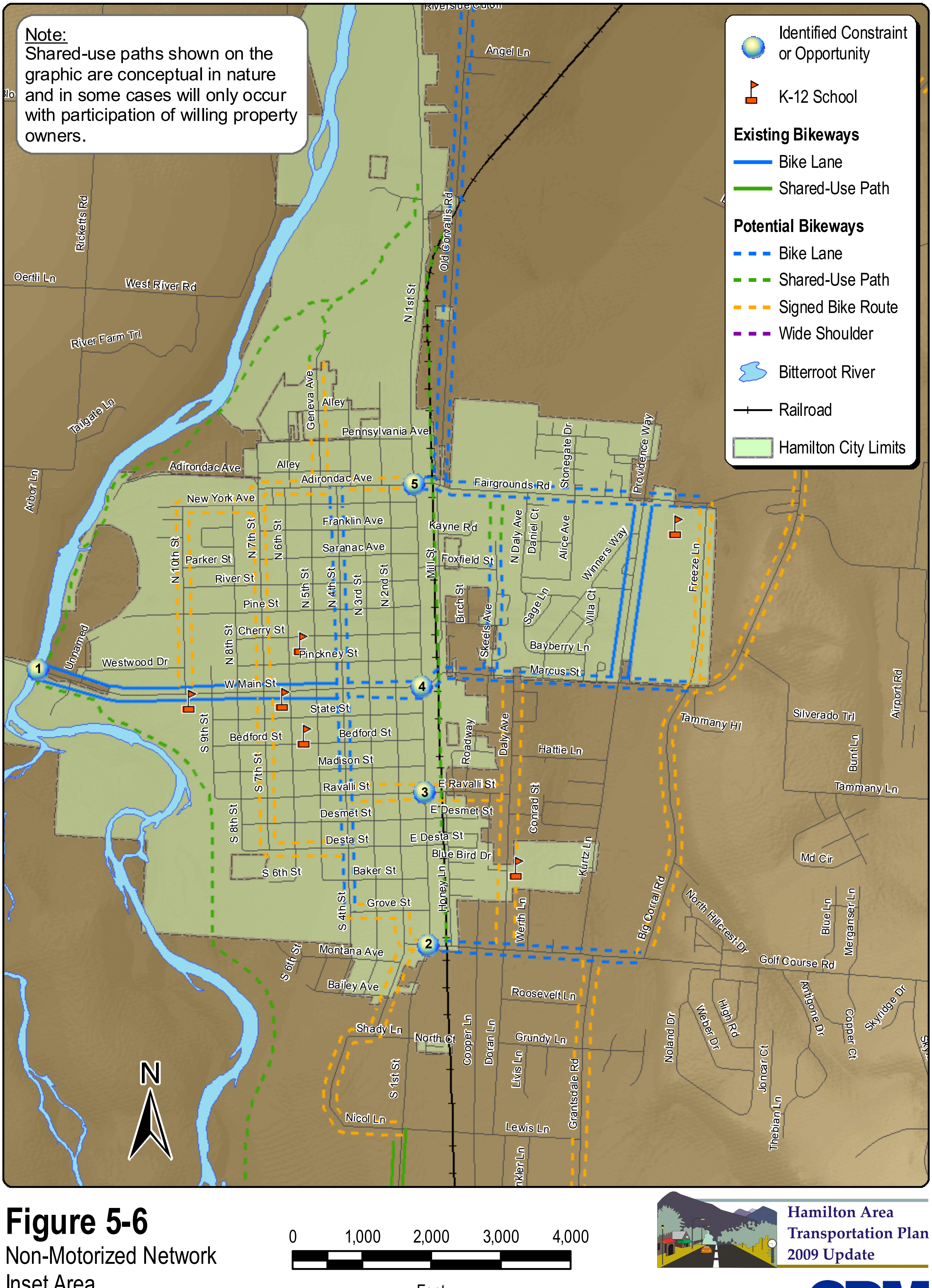

Figure 5-6

Non-Motorized Network Inset Area

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5.6 Recommended Policies & Procedures

As a general rule, a community transportation plan is an advisory document and as such does not "set" policy. However the plan can recommend policies through language that local elected officials can evaluate for further consideration. This section of **Chapter 5** suggests several policies and procedures for consideration by the local elected officials. The first and perhaps most important of these policies is the setting of a "level of service" standard, as discussed in **Section 5.6.1**.

5.6.1 Level of Service Standard

Level of service (LOS) is a qualitative measure developed by the transportation profession to quantify driver perception for such elements as travel time, number of stops, total amount of stopped delay, and impediments caused by other vehicles. It provides a scale that is intended to match the perception by motorists of the operation of the intersection. Level of Service provides a means for identifying intersections that are experiencing operational difficulties, as well as providing a scale to compare intersections with each other. The level of service scale represents the full range of operating conditions. The scale is based on the ability of an intersection or street segment to accommodate the amount of traffic using it. LOS values range from an "A" which is the best performing value and has free flow characteristics, to an "F" which represents the worst performing value and has traffic that flows at extremely slow speeds and is considered to be in a forced or breakdown state.

5.6.1.1 Roadway LOS vs. Intersection LOS

Roadway LOS

In order to calculate the LOS of a roadway, a number of characteristics must be looked at. Factors such as lane widths, lateral clearances, access frequency, terrain, heavy vehicle traffic, and driver population characteristics are used to establish base conditions for a roadway. Once these factors are determined, the free-flow speed can be determined. The free-flow speed is the mean speed of traffic on the road when the flow rates are low. After the free-flow speed is determined, the flow rate can be calculated. To determine the flow rate, the highest volume in a 24-hour period (peak-hour volume) is used, with adjustments being made for hourly variation, heavy vehicle traffic, and driver characteristics. Once these parameters are defined, the LOS for the roadway can be calculated using an additional set of calculated factors.

The primary factor for calculating roadway LOS is percent time delay. Percent time delay is defined as the average percent of the total travel time that all motorists are delayed while traveling in platoons due to the inability to pass. Multi-lane highways have a demand for passing that increases as the traffic volume increases. However, the opportunities for passing decrease as the traffic volume increases. This effect causes the LOS to decrease as the traffic levels increase. The secondary factors that go into LOS calculations are average travel speed and capacity utilization. Average travel speed is used to determine the mobility of the roadway. Capacity utilization represents accessibility to the roadway and is defined as the ratio of the demand flow rate to the capacity of the facility. Other factors that go into LOS calculations include terrain type, lane and shoulder widths, heavy vehicle traffic, and the peak hour factor. All of these parameters are used to calculate a single LOS that is used to represent the overall characteristic of the roadway.

The Highway Capacity Manual – 2000 defines the LOS categories for roadways as follows:

- LOS A represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. The general level of comfort and convenience provided to the motorist, passenger, or pedestrian is excellent. (Free flow)

- LOS B is in the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable. Freedom to select desire speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver within the traffic stream from LOS A. The level of comfort and convenience provided is somewhat less than at LOS A, because the presence of others in the traffic stream begins to affect individual behavior. (Reasonably free flow)

- LOS C is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream. The selection of speed is now affected by the presence of others, and maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level. (Stable flow)

- LOS D represents high-density, but stable, flow. Speed and freedom to maneuver are severely restricted, and the driver or pedestrian experiences a generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level. (Approaching unstable flow)

- LOS E represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Freedom to maneuver within the traffic stream is extremely difficult, and it is generally accomplished by forcing a vehicle or pedestrian to "give way" to accommodate such maneuvers. Comfort and convenience levels are extremely poor, and driver or pedestrian frustration is generally high. Operations at this level are usually unstable, because even small increases in flow or minor perturbations within the traffic stream will cause breakdowns. (Unstable flow)

- LOS F is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount which can traverse it and queues begin to form. Operations within the queue are characterized by stopping and starting. Over and over, vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop. Level-of-service F is used to describe operating conditions within the queue, as well as the point of the breakdown. It should be noted, however, that in many cases once free of the queue, traffic may resume to normal conditions quite rapidly. (Forced or breakdown flow)

Intersection LOS

The current practice to analyze intersection LOS is to use average vehicle delay to determine the LOS of the intersection as a whole. Individual LOS values can also be determined for each approach leg and turning lane for intersections based on the average vehicle delay on that lane. There are multiple types of intersections, all of which receive a LOS value based on vehicle delay.

Signalized intersections are considered to be ones that have a signal control for every leg of the intersection. This type of intersection takes an average of the delay for each vehicle that uses the intersection and determines the LOS based on that average vehicle delay. An unsignalized intersection is one that does not have traffic signal control at the intersection. These intersections use the average vehicle delay for the entire intersection to determine the LOS (for four-way stop-controlled). Two-way stop-controlled (TWSC) intersections utilize stop control on the minor legs of the intersection while allowing free flow characteristics on the major legs. TWSC intersections take the average vehicle delay experienced on the most constrained approach, rather than the average vehicle delay for the entire intersection, to determine the LOS of the intersection. This can cause problems at intersections with high volumes of traffic along the uncontrolled major legs. Left turns off of the minor approach legs may be difficult at these intersections, which may cause high delay values and poor levels of service. The LOS for this type of intersection is based on the LOS for the worst case minor approach leg. Under these traffic conditions the worst case minor approach leg can easily have a high delay from a low number of vehicles wanting to make a left-turn onto the major approach; this may result in a poor LOS for the entire intersection.

A description and average delay range for each LOS value for signalized and unsignalized intersections, as defined by the Highway Capacity Manual (HCM) 2000, is found in **Table 5-7** on the following page.

Table 5-7
Intersection Level of Service Criteria

LOS	Unsignalized Intersections		Signalized Intersections	
	Description	Average Delay (sec/veh)	Description	Average Delay (sec/veh)
A	Little or no conflicting traffic for minor street approach.	< 10	Uncongested operations; all queues clear in a single cycle.	< 10
B	Minor street approach begins to notice presence of available gaps.	10 – 15	Very light congestion; an occasional phase is fully utilized.	10 – 20
C	Minor street approach begins experiencing delay while waiting for available gaps.	15 – 25	Light congestion; occasional queues on approaches.	20 – 35
D	Minor street approach experiences queuing due to a reduction in available gaps.	25 – 35	Significant congestion on critical approaches, but intersection is functional.	35 – 55
E	Extensive minor street queuing due to insufficient gaps.	35 – 50	Severe congestion with some longstanding queues on critical approaches.	55 - 80
F	Insufficient gaps of sufficient size to allow minor street traffic to safely cross through major traffic stream.	> 50	Total breakdown, stop-and-go operation.	> 80

5.6.1.2 Recommended LOS Standard

A LOS standard for the greater Hamilton area is suggested and defined in this section. These standards should be used to determine if there are sufficient transportation improvements being made to meet the requirements for proposed developments. LOS values shall be determined by using the methods defined by the *Highway Capacity Manual – 2000*. A development shall be approved only if the LOS requirements are met by the developer through mitigation measures. In general, LOS will decline at area intersections given normal growth without mitigation to prevent the decline. Accordingly, a list of suggested LOS standards is presented on the following page.

- Signalized intersections shall have a minimum acceptable LOS of "C" for the intersection as a whole; individual movement and approach leg LOS lower than "C" shall be allowed such that the total intersection LOS is a "C" or higher.

- Unsignalized intersections shall have a minimum acceptable LOS of "C" for the intersection as a whole for four-way stop controlled; individual movement and approach leg LOS lower than "C" shall be allowed such that the total intersection LOS is a "C" or higher.

- Two-way stop-controlled (TWSC) intersections shall have a minimum acceptable LOS of "C" or higher for the stop-controlled, minor legs.

- An intersection with a roundabout shall have a minimum acceptable LOS of "C" for higher for the intersection as a whole.

It is recommended that the entire intersection LOS be the controlling factor in determining if an intersection performs at a proper level for all intersections except a "two-way, stop-controlled (TWSC)" intersection. In the TWSC scenario, the intersection LOS should be for the stop-controlled, minor legs.

It is recommended, however, that individual movement and approach LOS still be calculated and presented in the various traffic impact studies to determine if the network as a whole functions properly and if additional steps need be looked at.

It should be noted that these standards should be applied to the peak hour periods of consideration, as these periods are typically the "worst case" operational periods on the transportation system. This period typically coincides with the AM peak hour period (between 7:00 and 9:00 am) and the PM peak hour period (4:00 pm and 6:00 pm). For MDT facilities, these level of service standards are already defined in the MDT Traffic Engineering Manual.

5.6.2 Stop Sign Installation Guidance

The City of Hamilton has a varied use of stop signs for intersection traffic control. During the project development activities there were quite a few public comments on the perceived inconsistent use of stop signs in the community. From a technical perspective, stop signs should only be used in accordance with engineering judgment and as specified in the Manual on Uniform Traffic Control Devices (MUTCD) guidance. Use of signs in situations other than as specified in the MUTCD are typically not warranted and should be avoided.

For completeness, the relevant sections of the MUTCD that address this matter are included on the following pages:

Section 2B.05 STOP Sign Applications

Guidance:

STOP signs should be used if engineering judgment indicates that one or more of the following conditions exist:

A. Intersection of a less important road with a main road where application of the normal right-of-way rule would not be expected to provide reasonable compliance with the law;

B. Street entering a through highway or street;

C. Unsignalized intersection in a signalized area; and/or

D. High speeds, restricted view, or crash records indicate a need for control by the STOP sign.

Standard:

Because the potential for conflicting commands could create driver confusion, STOP signs shall not be installed at intersections where traffic control signals are installed and operating.

Portable or part-time STOP signs shall not be used except for emergency and temporary traffic control zone purposes.

Guidance:

STOP signs should not be used for speed control.

STOP signs should be installed in a manner that minimizes the numbers of vehicles having to stop. At intersections where a full stop is not necessary at all times, consideration should be given to using less restrictive measures such as YIELD signs.

Once the decision has been made to install two-way stop control, the decision regarding the appropriate street to stop should be based on engineering judgment. In most cases, the street carrying the lowest volume of traffic should be stopped.

A STOP sign should not be installed on the major street unless justified by a traffic engineering study.

Support:

The following are considerations that might influence the decision regarding the appropriate street upon which to install a STOP sign where two streets with relatively equal volumes and/or characteristics intersect:

A. Stopping the direction that conflicts the most with established pedestrian crossing activity or school walking routes;

B. Stopping the direction that has obscured vision, dips, or bumps that already require drivers to use lower operating speeds;

C. Stopping the direction that has the longest distance of uninterrupted flow approaching the intersection; and

D. Stopping the direction that has the best sight distance to conflicting traffic.

Section 2B.07 Multiway Stop Applications

Support:

Multiway stop control can be useful as a safety measure at intersections if certain traffic conditions exist. Safety concerns associated with multiway stops include pedestrians, bicyclists, and all road users expecting other road users to stop. Multiway stop control is used where the volume of traffic on the intersecting roads is approximately equal. The restrictions on the use of STOP signs described in Section 2B.05 also apply to multiway stop applications.

Guidance:

The decision to install multiway stop control should be based on an engineering study.

The following criteria should be considered in the engineering study for a multiway STOP sign installation:

A. Where traffic control signals are justified, the multiway stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.

B. A crash problem, as indicated by 5 or more reported crashes in a 12-month period that are susceptible to correction by a multiway stop installation.

C. Minimum volumes:

   1. The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day, and

2. The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour, but

3. If the 85th-percentile approach speed of the major-street traffic exceeds 65 km/h or exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the above values.

D. Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.

<u>Option:</u>

Other criteria that may be considered in an engineering study include:

A. The need to control left-turn conflicts;

B. The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes;

C. Locations where a road user, after stopping, cannot see conflicting traffic and is not able to reasonably safely negotiate the intersection unless conflicting cross traffic is also required to stop; and

D. An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multiway stop control would improve traffic operational characteristics of the intersection.

5.7 References

Federal Highway Administration (FHWA). *Manual on Uniform Traffic Control Devices 2003 Edition – Chapter 2B Regulatory Signs,* Washington D.C.

Montana Department of Transportation April 2009. *Bicyclists Signing Guidelines,* Helena, Montana.

Robert Peccia & Associates, Inc. April 2009. *Greater Bozeman Area Transportation Plan (2007 Update) - Chapter 5,* Bozeman, Montana.

Transportation Research Board - National Research Council. 2000. *Highway Capacity Manual (HCM2000) - Chapter 9 Analytical Procedures Overview,* Washington D.C.

Chapter 6
Public Transportation

Chapter 6
Public Transportation

6.1 Introduction

This chapter of the Transportation Plan is intended to portray current transit service and operations in the Hamilton Area. Transit operations were examined in the Hamilton Area through the development of "Transit Development Plan (TDP)" updates. The most recent TDP Update was completed for the period of 2003 to 2007 for Ravalli County by LSC Transportation Consultants, Inc. Transit development plans are generally intended to analyze current transit system operations and determine how well the transit systems are meeting the needs of the community. Projecting future growth patterns and future transit needs are also examined in great detail.

Within the Hamilton planning area, the designated rural public transit provider is the BitterRoot Bus, operating under the 5311 grant program administered by Montana Department of Transportation. Another major public provider serving Ravalli County is Missoula Ravalli Transportation Management Association (MR TMA) which operates vanpool and carpool programs. Three other public transit providers having Public Service Commission authority to operate in Ravalli County are the Bitterroot Taxi, the Airport Shuttler, and Medicab. This chapter describes these **five general public transit providers**, as well as a variety of private transit providers serving a specific sector of Hamilton's populations.

The Montana Department of Transportation requires each transportation service area to have a local Transportation Advisory Committee (TAC). The Ravalli County Transportation Advisory Committee, consisting of local transportation providers and any interested community residents, serves as the local advisory and planning group who reviews and discusses transportation needs and resources for the local Hamilton area.

It is important to recognize that transit service in the community is sometimes the only mode of transportation utilized by citizens. This is especially true for many of the community's elderly and disabled citizen population. With a generally aging population in Hamilton, the town becomes more transit-dependent. The primary goal of the transit system should be to provide reliable service to its users and make that service available to all members of the public. A secondary goal is to make mass transit work for the community, by reducing parking demand, traffic congestion, and the need for roadway expansion wherever possible.

In 2008, Ravalli County Board of Commissioners applied for a DOT/Federal Transit Administration Grant to conduct public transportation research. The purpose of the grant would be to create a structure for public participation in rural transportation and transit planning. Rural Ravalli County does not have transportation or transit planning occurring in fast-growing rural areas, which are seldom involved in public transportation planning. Lately ridership is exceeding the existing capacity of fleets. The grant would allow an opportunity for transit coordination between rural counties and metropolitan areas. Overall, the citizen-based community would become actively involved and informed of transportation-related issues, projects, and programs. Recently, the grant application was not approved for the opportunity to pursue public transportation research for Ravalli County.

6.2 BitterRoot Bus

BitterRoot Bus, the rural general public transportation provider, is operated by the Ravalli County Council on Aging and operates under the 5311 grant program administered by Montana Department of Transportation. This service is offered to all people in Ravalli County, operating Monday through Friday between 8:00 a.m. and 4:30 p.m. with fares based on the distance traveled and frequency of stops. A 24-hour advance reservation is required for the "curb to curb" service. The BitterRoot Bus is a Medicaid-approved transportation provider, with direct billing for clients traveling to and from approved medical facilities. Every Tuesday, BitterRoot Bus provides transportation to Missoula for the general public, including the elderly and disabled.

In Fiscal Year (FY) 2009, BitterRoot Bus provided approximately 8,560 passenger-trips, with 15% general public ridership and 85% disabled and seniors. BitterRoot Bus has seen a growth in ridership in recent years. In FY 1998-1999, total ridership was 4,088.

BitterRoot Bus boarding data for FY 2009 was used to analyze trip patterns. Boarding data are also used to analyze the existing ridership and determine which locations in Ravalli County have the greatest transit demand. Recorded activity by location is present in Table 6-1.

Table 6-1

Primary Destination of BitterRoot Bus Passengers

Locations	FY 2009 (Total)
Riverfront Counseling	544
Missoula Metropolitan Area	248
Marcus Daly Memorial Hospital	131
Albertsons	109
Super 1 Foods	97
Bitterroot Clinic	61

BitterRoot Bus currently has six vehicles for passenger transportation. The vehicle inventory for passenger transit is shown below in Table 6-2. As shown in the table, there are currently capital replacement needs. The vehicles have a vehicle-life based on the Federal Transit Administration Guidelines, ranging from five to seven years, depending on the type of vehicle.

Table 6-2
BitterRoot Bus Fleet Inventory

#	Manufacturer	Year	Wheelchair Accessible	Capacity	Condition	Odometer (Dec. 2009)	Replacement Year
1	Ford	1996	Y	5 WC or 12 passenger	Fair	134,027	2003
2	Dodge	1998	N	7 passenger	Fair	171,581	2003
3	Dodge	2001	N	7 passenger	Good	177,694	2006
4	Chevrolet	2003	Y	5 WC or 12 passenger	Good	116,036	2010
5	Dodge	2005	N	7 passenger	Excellent	107,211	2010
6	Dodge	2009	N	7 passenger	Excellent	22,037	2014

As shown in Table 6-2, BitterRoot Bus have kept existing transit vehicles past the FTA vehicle-life expectation due to continuous maintenance of the vehicles, keeping them in good condition.

The office of the BitterRoot Bus is located in the Ravalli County Council on Aging on Old Corvallis Road in Hamilton, with the vehicles housed in the BitterRoot Bus Barn adjacent to the Ravalli County Council on Aging.

6.3 Missoula-Ravalli Transportation Management Association (MR-TMA)

MRTMA was established in the 1990's during the environmental impact statement process for US Highway 93 reconstruction. MRTMA is the Transportation Management Association which operates out of Missoula, due to maintenance requirements, for Missoula, Ravalli, Lake, Mineral and Flathead County. MRTMA operates the I Ride Vanpool program which includes a Guaranteed Ride Home benefit, park-and-ride sites and school outreach program for schools in Missoula and Ravalli County. They also coordinate carpooling, ride matching and a resource center. MRTMA was established to assist citizens and businesses of the five valley region to develop and implement comprehensive transportation alternatives to reduce traffic and parking congestion, protect the environment, provide a transportation option for low-income individuals to seek and retain employment, and improve the overall quality of life of residents of the five counties. The MRTMA vanpool program has been operating at capacity for the past four years and maintains a waiting list for when more vehicles can be secured.

MRTMA has commuter vanpools from the Bitterroot Valley, Mission Valley, Flathead Valley and along the I-90 corridor. The first park-and-ride lot was established in Hamilton with several more extending along the Highway 93 corridor from Hamilton to the Columbia Fall's area. Drivers are volunteer members who ride for free the week if they drive two or more days. MRTMA operates twelve vans to and from Ravalli County, one from Flathead County into Lake County; one traveling within Lake County, one from Lake County to Missoula; one from Alberton to Missoula.

Vanpools originating out of Hamilton leave for Missoula at 6:20AM from Farmer's State Bank; originating out of Stevensville at 6:45AM from Super One Foods; originating out of Florence at 6:35AM; originating out of Missoula leave for Hamilton at 6:45AM from Wal-Mart South; originating out of Alberton leave for Missoula at 6:30 from Petty Creek; originating our of Ronan at 6:20AM for Missoula; originating out of Columbia Falls leave for Polson at 6:50AM. Fares are based on one-way and roundtrip situations with the lowest fare per mile being for those riding the highest number of days and traveling the highest number of miles. Fares range from one day rates to monthly rates.

MRTMA also operates a free carpool matching web site as an option for individuals who are not interested in vanpooling or cannot access the vanpool program due to its capacity issues.

MRTMA has a School Outreach program which offers free transportation presentation to local schools. Presentations are developed to be highly interactive for the students and are age appropriate for K-12. Topics have been developed for science, math, life skills, government and general studies classes.

6.4 Ravalli Services Corporation

Ravalli Services Corporation is a private, nonprofit agency providing transportation support to their clients with developmental disabilities in Ravalli County. The agency contracts with the State of Montana to provide these transportation services. Ravalli Services Corporation operates three residential facilities, which provide transportation services to the residents seven days per week.

6.5 The Discovery Care Center

The Discovery Care Center in Hamilton provides transportation to people four to five days per week year-round. The Care Center transports residents to scheduled medical appointments in Missoula and leisure activities in the valley. The Care Center uses a 1986, 12-passenger conversion van that is wheelchair lift-equipped. The Discovery Care Center budgets approximately $12,500 per year for transportation costs to provide approximately 350 trips per year. The Care Center registers approximately 25,000 vehicle-miles per year.

6.6 Valley View Estates

Valley View Estates provides a home to help seniors with long-term care. They specialize in a Memory Loss Program and rehabilitation services. Primarily the activity department staff provide transportation using a 1993, 13-passenger Ford Van equipped with a wheelchair lift. Transportation is provided free of charge to residents for medical appointments and special outings. On average, Valley View provides two or three trips per weekday. Service is also available on the weekend and after hours on weekdays. BitterRoot Bus provides transit services to Valley View residents for medical appointments in Missoula.

6.7 Ravalli Head Start

Since 1965, the Ravalli Head Start Program is a child development program that has served low-income children and their families. Head Start and Early Head Start are comprehensive child development programs which serve children from birth to age 5, pregnant women, and their families. The agency programs are child-focused and have the overall goal of increasing the school readiness of young children in low-income families.

The Ravalli Head Start provides transportation using three vehicles; one 1988, 33-passenger, wheelchair-accessible bus and two 1985, 20-passenger buses not equipped with lifts. The agency has three set routes along the Highway 93 corridor between Florence and Darby. The Darby route is 85 miles, the north route measures 100 miles, and the Victor/Corvallis route is approximately 150 miles.

The agency logs approximately 300 miles per day on the vehicles. Currently, there are approximately 100 to 115 children enrolled in the program. Similar to other Head Start programs across the United States, Ravalli Head Start is confronted with the challenge of staging out transportation and looking at coordinating with other existing transportation providers. This is a key opportunity for local private providers or Ravalli County Transit to provide the service within the budget constraints of the Head Start agencies.

Head Start transportation is provided Monday through Thursday, during the school year. One full-time and four part-time employees are involved with the transportation program for the Head Start program. Transportation is provided in the early morning, at noon and from 4:00 to 5:00 p.m. The transportation budget for Head Start is approximately $33,300. Head Start estimates approximately 20,800 annual trips for the program with approximately 2,500 annual hours.

6.8 Medicab

Medicab (PSC NO. 9199) is licensed to provide non-emergency, wheelchair accessible transportation to healthcare facilities in Flathead, Granite, Lake, Mineral, Missoula, Ravalli, and Sanders and return. Medicab accepts Medicaid approved transportation for Missoula County residents only. For private pay or workers compensation recipients, Medicab provides transportation from other counties, including Ravalli, to medical facilities in Missoula and return.

6.9 Disabled American Veterans (DAV)

Disabled American Veterans provides free transportation to American veterans to medical appointments in Missoula and Helena. DAV currently operates three vehicles, utilizing volunteer drivers; a 2006 8-passenger Ford E-350, a 2007 8-passenger Ford E-150, and a 2009 3-passenger Ford Explorer. None of the vehicles are wheelchair lift-equipped. A veteran using a wheelchair must be able to independently transfer in and out of the van, and then utilize the wheelchair provided at the medical facility, as DAV will not haul any individual wheelchairs. The DAV has regular scheduled trips to transport veterans to the VA Hospital at Fort Harrison each weekday, Monday through Friday. They are on-call in Ravalli County Monday through Friday for medical appointments in Missoula. Trips to Missoula begin at Safeway in Hamilton, and stops are made upon request to pick up veterans at select parking lots along Highway 93. DAV transports approximately 12 to 15 passengers per week and logs approximately 500 miles per day among the three vehicles.

6.10 Bitterroot Taxi

Bitterroot Taxi (PSC NO. 9469) operates within Ravalli County and also provides service to Missoula. No reservations or advanced notice is required. Bitterroot Taxi operates seven days per week with phones being answered 24 hours/day, seven days/week. Anyone requiring the use of a wheelchair must have the ability to transfer to and from the wheelchair into the vehicle.

6.11 Majestic Bus Service

Majestic Bus Service operates fourteen (14) school buses used strictly for transporting students enrolled in schools within Hamilton School District #3. Majestic vehicles are available in case of a city emergency.

6.12 Airport Shuttler

Airport Shuttler (PSC NO. 9384) provides public transit services from the Missoula International Airport to all points and places in Missoula and a seventy-five (75) mile radius thereof, which includes Ravalli County and the Hamilton area. The Airport Shuttler is strictly an airport transport service and all transportation movements must originate or terminate at the Missoula International Airport.

6.13 Bitterroot-Missoula Rail Line

Fehr & Peers Transportation Consultants recently conducted a transit analysis to address transportation issues on US 93 between Florence and Missoula. Traffic Demand Management (TDM) strategies were analyzed to look at adjusting drivers' travel patterns and means. Several implementation procedures are possible, varying from carpooling to a commuter rail system. Montana Rail Link is a private freight service provider with limited operation in the Bitterroot Valley. Bitterroot Rail is a community interest group which studies the feasibility of rail transit with a goal of using the Montana Rail Link infrastructure to provide transportation between Missoula and destinations in the south Bitterroot Valley. The current condition of the rail line is fair with no grade-separated crossings or stations along US 93, therefore the system would require upgrades in order for passenger service to take place.

The transportation consultants focused on a comparative analysis of two similar communities who have recently implemented transit systems. The communities included Roaring Fork Valley, Colorado and Albuquerque South Valley, New Mexico. Comparisons analyses between the three communities were made based on population, employment, and ridership for each city. The differences between the factors and studied cities are summarized below.

- Communities outside the major employment center in the Roaring Fork Valley have triple the population and twice the jobs compared to the communities located within the Bitterroot study area, outside the major employment center of Missoula.

- Approximately 50% of the population and 15% of the jobs currently found in the Roaring Fork Valley equates to population and jobs in the study area at 2020.

- Communities outside the major employment center in the Albuquerque South Valley have triple the population and ten times the jobs compared to the communities outside the major employment center in the Bitterroot study area.

- Approximately 65% of the population and 10% of the jobs currently found in the Albuquerque South Valley will be present in the study area in 2020.

The transit system was studied based on the route from Stevensville to Missoula. Stevensville was chosen based on the population density and the likelihood of transit to Missoula. According to the study, the rail commuter service would require complex and costly actions for implementation. Such measures would be a purchase of a service contract and fees agreed with the Montana Rail Link, upgrading the track defined by the Federal Railroad Administration (FRA), installing a signal system, establishing station platforms and ticket vending machines, acquiring passenger trains, and all other operation and maintenance costs. The estimated capital cost for the 29.2-mile commuter rail service is approximately $124 million, with a suggested implementation of 15 or more years into the future.

6.14 Recommendations

The Transit Development Plan Update prepared by LSC in 2002 specified a variety of actions to be taken in order to meet future transportation needs, which have been reviewed and updated by the Ravalli County Transportation Advisory Committee. This section includes short and long-term efforts for transportation and transit planning goals.

Short-Term Recommendations

- Continue to expand the Transportation Advisory Committee membership to gain community input and support in transit planning, to include riders, businesses, medical facilities, private transportation providers, local elected public officials, Health and Human Service agencies, and other interested citizens.
- Expand the service area to address transit needs in rural areas.
- Incorporate a universal ride pass program with Mountain Line, MR-TMA, and BitterRoot Bus.
- Improve coordination with other transportation providers. Coordination could decrease costs for individual agencies and provide additional services to transportation dependent individuals.
- Develop a strong public awareness campaign, endorsed and supported by the Transportation Advisory Committee, the City of Hamilton, Ravalli County Board of Commissioners and the major transit providers.
- Fulfill a Mobility Management position to coordinate public transportation.
- Work to improve the status of public transportation at the state level pursuing additional funding opportunities.

Long-Term Recommendations

- Provide comfortable transit facilities, making transit locations attractive with adequate lighting, seating, and weather protection.
- Continue to expand Reverse Commuter Service from Missoula to Ravalli County.
- Continue to expand Highway 93 Commuter Service from Hamilton to Missoula. This will reduce Highway 93 traffic through the Bitterroot Valley and minimize parking demand in Missoula.
- Continue to expand and incorporate outlying communities in transportation use.
- Formalize outreach programs to educate the general public of transit services available.

6.15 References

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Fehr & Peers Transportation Consultants. 2008. *US 93 Corridor Study Transit Analysis*.

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Chapter 7
Transportation Demand Management (TDM) Strategies

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Transportation Demand Management (TDM) Strategies

7.1 Role of TDM in the Transportation Plan

Transportation Demand Management (TDM) measures came into being during the 1970s and 1980s in response to a desire to save energy, improve air quality, and reduce peak period congestion. TDM strategies focused on identifying alternates to single occupant vehicle use during commuting hours. Therefore, such things as carpooling, vanpooling, transit use, walking and bicycling for work purposes are most often associated with TDM. Many of these methods were not well received by the commuting public and therefore, provided limited improvement to the peak-period congestion problem. Due to the experiences with these traditional TDM measures over the past few decades, it became clear that the whole TDM concept needed to be changed. TDM measures that have been well received by the commuting public include flextime, a compressed workweek and telecommuting. In addition to addressing commute trip issues, managing demand on the transportation system includes addressing traffic congestion associated with special events, such as the local Farmer's market, the Ravalli County Fair, or sporting events. A definition of TDM follows:

> *TDM programs are designed to maximize the people-moving capability of the transportation system by increasing the number of persons in a vehicle, or by influencing the time of, or need to, travel. (FHWA, 1994)*

Since 1994, TDM has been expanded to also include route choice. A parallel arterial with excess capacity near a congested arterial can be used to manage the transportation system to decrease congestion for all transportation users. In Montana, an excellent model for TDM strategies can be found by examining the Missoula Ravalli Transportation Management Association (MRTMA).

The Hamilton area is projected to grow. The accompanying expansion of transportation infrastructure is expensive and usually lags behind growth. Proper management of demand now will maximize the existing infrastructure and delay the need to build more expensive additional infrastructure. TDM is an important and useful tool to extend the useful life of a transportation system. It must be recognized that TDM strategies aren't always appropriate for certain situations and may be difficult to implement.

As communities such as Hamilton grow, the growth in number of vehicles and travel demand should be accommodated by a combination of road improvements; transit service improvements; bicycle and pedestrian improvements; and a program to reduce travel (vehicle trips and the vehicle miles traveled) via transportation demand management in conjunction with appropriate land use planning. This section of the

Transportation Plan describes which TDM measures may be appropriate and acceptable for the Hamilton community.

TDM strategies are an important part of the Transportation Plan due to their inherent ability to provide the following benefits to the commuting public:

- Better transportation accessibility;
- Better transportation predictability;
- More, and timelier, information;
- A range of commute choices; and
- Enhanced transportation system performance.

TDM measures can also be applied to non-commuter traffic and are especially easy to adapt to tourism, special events, emergencies and construction. The benefits to these traffic users are similar to those for commuters, and are listed as follows:

- Better transportation accessibility;
- More transportation reliability;
- More, and timelier, information;
- A range of route choices; and
- Enhanced transportation system performance.

These changes allow the same amount of transportation infrastructure to effectively serve more people. They acknowledge and work within the mode and route choices which motorists are willing to make, and can encourage a sense of community. Certain measures can also increase the physical activity of people getting from one place to another.

Such things as alerting the traveling public to disruptions in the transportation system caused by construction or vehicle crashes can manage demand and provide a valuable service to the traveling public.

Overall, congestion can be avoided or managed on a long-term basis through the use of an integrated system of TDM strategies.

7.2 List of TDM Strategies

TDM strategies, which are or have been used by other communities in the United States, include:

Flextime

When provided by employers, flextime allows workers to adjust their commuting time away from the peak periods. This means that employees are allowed some flexibility in their daily work schedules. For example, rather than all employees working 8:00 to 4:30, some might work 7:30 to 4:00, and others 9:00 to 5:30. This provides the workers with a less stressful commute, allows flexibility for family activities and lowers the number of vehicles using the transportation system during peak times. This in turn can translate into reduced traffic congestion, support for ridesharing and public transit use, and benefits to employees. Flextime allows commuters to match their work schedules with transit and rideshare schedules, which can significantly increase the feasibility of using these modes. Costs for implementing this type of TDM strategy can include increased administrative and management responsibilities for the employer, and more difficulty in evaluating an employee's productivity.

Alternate Work Schedule

A related but more expansive strategy is to provide an alternate work schedule. This strategy involves using alternate work hours for all employees. It would entail having the beginning of the normal workday start at a time other than 8:00 a.m. For example, starting the workday at 7:30 a.m. would allow all employees to reach the work site in advance of the peak commute time. Additionally, since they will be leaving work at 4:30 p.m., they will be home before the peak commute time, and have more time in the evening to participate in family or community activities. This can be a very desirable side benefit for the employees. This has a similar effect on traffic as flextime, but does not give individual employees as much control over their schedules.

Compressed Work Week

A compressed work week is different from offering "flextime" or the "alternate work schedule" in that the work week is actually reduced from the standard "five-days-a-week" work schedule. A good example would be employers giving their workers the opportunity to work four (4) ten-hour days a week. A compressed work week reduces commute travel (although this reduction may be modest if employees take additional car trips during non-work days or move farther from worksites). Costs for implementing this type of TDM strategy may be a reduction in productivity (employees become less productive at the end of a long day), a reduction in total hours worked, and it may be perceived as wasteful by the public (for example, if staffing at public agencies is low on Fridays).

Telecommuting

Telecommuting in the work place offers a good chance to reduce the dependence to travel to work via car or bus. This is especially true in technical positions and some fields in the medical industry (such as medical transcription). Additionally, opportunities for distance learning, shopping via computers, basic health care services and recreation also exist and can serve to reduce vehicular travel on the transportation system. Telecommuting is usually implemented in response to an employee request, more so than instigated by the employer. Since telecommuting reduces commute trips, it can significantly reduce congestion and parking costs. It is highly valued by many employees and tends to increase their productivity and job satisfaction. Costs associated with this TDM strategy include increased administrative and management responsibilities, and more difficult evaluation of employee productivity. Some employees find telecommuting difficult and isolating. Telecommuting also may reduce staff coverage and interaction, and make meetings difficult to schedule. Many employers in Montana have tried and currently allow some form of telecommuting.

Ride Sharing (carpooling)

Carpooling is traditionally one of the most widely considered TDM strategies. The idea is to consolidate drivers of single occupancy vehicles (SOV's) into fewer vehicles, with the result being a reduction in congestion. Carpooling is generally limited to those persons whose schedules are rigid and not flexible in nature. Studies have shown that carpooling is most effective for longer trips greater than ten miles in each direction. Aside for the initial administrative cost of set-up and marketing, ridesharing also may encourage urban sprawl by making longer-distance commutes more affordable.

Transit agencies sometimes consider rideshare as competition that reduces transit ridership. Ridesharing is a strategy that would work within the Hamilton area, especially if set up through the larger employers. An extensive public awareness campaign describing the benefits of this program would help in selling it to the general public.

Vanpooling

Vanpooling is a strategy that encourages employees to utilize a larger vehicle than the traditional standard automobile to arrive at work. Vans typically hold twelve or more persons. Vanpooling generally does not require high levels of subsidy usually associated with a fixed-route or demand-responsive transit service. They can often times be designed to be self-sufficient. The van is typically provided by the employer, or a vanpool brokerage agency, which provides the insurance. The costs of a vanpooling program are very similar to those of ridesharing.

Bicycling

Bicycling can substitute directly for automobile trips. Communities that improve cycling conditions often experience significant increases in bicycle travel and related reductions in vehicle travel. Even a one percent shift in travel modes from vehicle trips to bicycle trips can be viewed as a positive step in the Hamilton community. Although this may not be a measurable statistic pertinent to reducing congesting, providing increased bicycling opportunities can help and can also contribute to quality of life issues. Bicycling characteristics within the Hamilton area is primarily recreational in nature, and by implementing the bikeway network improvements as described in **Chapter 5**, a gradual shift to bicycling as a commuter mode of travel should be realized. Incentives to increase bicycle usage as a TDM strategy include: construction improvements to bike paths and bike lanes; correcting specific roadway hazards (potholes, cracks, narrow lanes, etc.); development of a more connected bikeway street network; development of safety education, law enforcement and encouragement programs; and the solicitation and addressing of bicycling security/safety concerns. Potential costs of this TDM strategy are expenses associated with creating and maintaining the bikeway network, potential liability and accident risks (in some cases), and increased stress to drivers.

Walking

Walking as a TDM strategy has the ability to substitute directly for automobile trips. A relatively short non-motorized trip often substitutes for a longer car trip. For example, a shopper might choose between walking to a small local store versus driving a longer distance to shop at a supermarket. Incentives to encourage walking in a community can include: making improvements to sidewalks, crosswalks and paths by designing transportation systems that accommodate special needs (including people using wheelchairs, walkers, strollers and hand carts); providing covered walkways, loading and waiting areas; improving pedestrian accessibility by creating location-efficient, clustered, mixed land use patterns; and soliciting and addressing pedestrian security/safety concerns. Costs are similar to that of bicycling and are generally associated with program expenses and facility improvements.

Park & Ride Lots

Park and ride lots are effective for communities with substantial suburb to downtown commute patterns. Park and ride consists of parking facilities at transit stations, bus stops and highway on ramps, particularly at the urban fringe, to facilitate transit and rideshare use. Parking is generally free or significantly less expensive than in urban centers. Costs are primarily associated with facility construction and operation.

Car Sharing

Car sharing is a demand reducing technique that allows families within a neighborhood to reduce the number of cars they own and share a vehicle for the limited times when an additional vehicle is absolutely essential. Costs are primarily related to creation, startup and administrative costs of a car sharing organization.

Traditional Transit

Traditional transit service is an effective TDM strategy, especially in a highly urban environment. Several methods to increase transit usage within the community are to improve overall transit service (including more service, faster service and more comfortable service), reduce fares and offer discounts (such as lower rates for off-peak travel times, or for certain groups), and improved rider information and marketing programs. The costs of providing transit depend on many factors, including the type of transit service, traffic conditions and ridership. Transit service is generally subsidized, but these subsidies decline with increased ridership because transit services tend to experience economies of scale (a 10% increase in capacity generally increases costs by less than 10%). TDM strategies that encourage increased ridership can be very cost effective. These strategies may include offering bicycle carrying components on the transit vehicle, changing schedules to complement adjacent industries, etc.

Express Bus Service

Express bus service as a TDM strategy has been used by larger cities in the nation as a means to change driver vehicle characteristics. The use of an express bus service is founded on the idea that service between two points of travel can either be done faster or equal to the private automobile (or a conventional bus service that is not "express").

Installing/Increasing Intelligent Transportation Systems (ITS)

The use of ITS (Intelligent Transportation System) methods to alert motorists of disruptions to the transportation system will be well received by the transportation users, and are highly effective tools for managing transportation demands.

Ramp Metering

Ramp metering has been used by some communities and consists of providing a modified traffic signal at on ramps to interstate highway facilities. The use of this TDM strategy would not be applicable to the Hamilton area.

Traffic Calming

Traffic Calming (also called Traffic Management) refers to various design features and strategies intended to reduce vehicle traffic speeds and volumes on a particular roadway. Traffic Calming projects can range from minor modifications of an individual street to comprehensive redesign of a road network. Traffic Calming can be an effective TDM strategy in that its use can alter and/or deter driver characteristics by forcing the driver to either use a different route or to use an alternative type of transportation (such as transit, bicycling, walking, etc.). Costs of this TDM strategy include construction expenses, problems for emergency and service vehicles, potential increase in drivers' effort and frustration, and potential problems for bicyclists and visually impaired pedestrians.

Identifying and Using Special Routes and Detours for Emergencies or Special Events

This type of TDM strategy centers around modifications to driver patterns during special events or emergencies. They can typically be completed with intensive temporary signing or traffic control personnel. Temporary traffic control via signs and flaggers could be implemented to provide a swift and safe exit after applicable events.

Linked Trips

This strategy entails combining trips into a logical sequence that reduces the total miles driven on the surrounding transportation system. These trips are generated by associated facilities within a mixed-use development or within an area of the community where adjacent land uses are varied and offer services that would limit the need to travel large distances on the transportation system.

Pay for Parking at Work Sites (outside the downtown area)

TDM measures involving "paying for parking" outside the downtown area or at employers or paying more for single occupant vehicles can be regarded by those impacted as Draconian.

Higher Parking Costs for Single Occupant Vehicles (SOV)

Intuitively, free parking provided by employers is a tremendous incentive for driving alone. If the driver of a SOV is not penalized in some form, there is no perceived reason not to drive to the workplace. One way to counter this reality is to charge a higher price for parking for the SOV user. This implementation is not likely to have much of an impact to the frequency of SOV users on the transportation system.

Preferential Parking for Rideshare/Carpool/Vanpools

This concept ties into the discussion above regarding parking of the SOV user. Preferential parking, such as delineating spaces closer to an office for riders sharing their commute or reduced/free parking, can be an effective TDM strategy.

Subsidized Transit by Employers

A subsidized transit program, typically offered by employers to their employees, consists of the employer either reimbursing or paying for transit services in full as a benefit to the employee. This usually comes in the form of a monthly or annual transit pass. Studies show that once a pass is received by an employee, the tendency to use the system rises dramatically.

Guaranteed Ride Home (GRH) Programs for Transit Riders

The guaranteeing of a ride home for transit users is a wise choice for all transit systems, since it gives the users a measure of calm knowing that they will be able to get home. A GRH program provides an occasional subsidized ride to commuters who use alternative modes, for example, if a bus rider must return home in an emergency, or a car pooler must stay at work later than expected. This addresses a common objection to the use of alternative modes. GRH programs may use taxies, company vehicles or rental cars. GRH trips may be free or they may require a modest co-payment. The cost of offering this service tends to be low because it is seldom actually used.

Mandatory TDM Measures for Large Employers

Some communities encourage large employers (typically with at least 50 to 100 employees) to mandate TDM strategies for their employees. This is a control that can be required by local governments on developers, employers, or building managers. The regulatory agencies often times provide incentives for large employers to make TDM strategies more appealing, such as reduced transit fares, preferred parking, etc.

Required Densification / Mixed Use Elements for New Developments

Requiring new developments to be dense and contain mixed-use elements will ensure that these developments are urban in character and have some services that can be reached by biking, walking or using other non-automobile methods. This also relates to the concept of "linked" or "shared" trips presented later in this chapter. As new developments are proposed, local and regional planners have the opportunity to dictate responsible and effective land use to encourage "shared" trips and reduce impacts to the surrounding transportation system.

Transit Oriented Development (TOD)

Transit Oriented Development (TOD) refers to residential and commercial areas designed to maximize access by transit and non-motorized transportation, and with other features to encourage transit ridership. A TOD usually consists of a neighborhood with a rail or bus station, surrounded by relatively high-density development, with progressively lower-density spreading outwards. Transit Oriented Development generally requires about seven residential units per acre in residential areas and twenty-five employees per acre in commercial centers to adequately justify transit ridership. Transit ridership is also affected by factors such as employment density and clustering, demographic mix (students, seniors and lower-income people tend to be heavy transit users), transit pricing and rider subsidies, and the quality of transit service. This type of development could potentially work well within Hamilton and its outlying areas as development occurs. Features could be built into a given development to encourage transit use from the start to help offset costs associated with new service.

Alternating Directions of Travel Lanes

This method of TDM is similar to that of Traffic Calming in that it strives to change driver characteristics and possibly enable users of the system to try different modes of travel. It also can serve to relieve a corridor during particularly heavy times of the day.

By capitalizing on the use of these options, the existing vehicular infrastructure can be made to function at acceptable levels of service for a longer period of time. Ultimately, this will result in lower per year costs for infrastructure replacement and expansion projects, not to mention less disruption to the users of the transportation system.

While some of these options may work well in the Hamilton area, it is clear that some may be inappropriate. Additionally, some of these options are more effective than others. To provide a TDM system that is effective in managing demand, a combination of these methods will be necessary.

7.3 Effectiveness of TDM Strategies

The measure of effectiveness of TDM strategies can be done using several different methods such as cost, usage, or those listed below:

- Reduced traffic during commute times;
- Reduced or stable peak hour traffic volumes;
- Increased commuter traffic at off peak times;
- Increased use of modes other than single occupant vehicles;
- Increased use of designated routes during emergencies or special events;
- Eased use of the transportation system by tourists or others unfamiliar with the
- system;
- Reduced travel time during peak hours; and/or
- Fewer crashes during peak hours.

In order to provide a TDM system that will address the needs of the Hamilton area, the elements of the system must be acceptable to the general population. If elements are proposed which are not acceptable, the TDM system goals will not be reached. However, it is also important to keep in mind the cost of implementing TDM measures.

Table 7-1 presents available TDM measures and ranks them by the likeliness of being accepted and implemented within the Hamilton area, based on similar sized communities success with utilizing similar strategies in the Rocky Mountain West. A rank of "3" indicates that the measure has a high likelihood of being successfully implemented, a rank of "2" indicates that the measure would have more difficulty being accepted or implemented and a rank of "1" indicates that this measure would either be difficult to implement, or is inappropriate for the community at this time. This ranking system is based on input from public meetings, as well as consultant knowledge and experience. It is not survey based.

The measures which could best be adopted and accepted by area residents are those which allow greater flexibility in work hours, changing modes of transportation, or address specific, time-limited situations. Note that is envisioned that the most successful programs are "employer based", which necessitates a great deal of cooperation amongst the area employers most affected by modified work schedules and other potential TDM programs.

Those measures that would not be used in the planning area generally address issues not present in our community, such as significant commuting from a suburb. If such a problem existed, park and ride lots could be installed to address it. Travel characteristics in Montana are heavily dependent on population densities, distances to services (retail, medical, etc.), and locations of major employment centers. Often times travel distances are longer than what would be encountered in a larger urban area. Due to this nature of travel in Montana, private automobiles are unlikely to be replaced by other modes of travel until a change in technology occurs which allows travel by a mode that has the same flexibility of the automobile.

TDM strategies can be applied to specific events. If an event occurs on a regular basis which can be planned for, steps can be taken to manage the demands made on the transportation system.

Table 7-1
TDM Measures Ranked by Anticipated Usability

Strategy	Rank
Alternating directions of travel lanes	1
Alternate work schedule	3
Bicycling	2
Car sharing	1
Compressed work week	3
Express bus service	1
Flextime	3
Guaranteed ride home program	2
Higher parking costs for single occupant vehicles	1
Identifying routes for emergencies or special events	3
Installing / increasing Intelligent Transportation Systems (ITS)	2
Linked trips	3
Mandatory TDM measures for large employers	1
Park & Ride Lots	1
Pay for parking at work sites (outside the downtown area)	1
Preferential parking for rideshare/carpool/vanpools	1
Ramp metering	1
Required densification / mixed use elements for new developments	2
Ride sharing (carpooling)	2
Subsidized transit by employers	2
Telecommuting	2
Traffic Calming	3
Transit Oriented Development	2
Use of Transit	2
Vanpooling	1
Walking	2

A combination of methods is the most effective in reducing demand. The next step in the process is to prioritize these strategies to determine community preferences, and begin to develop packages of TDM strategies. These preferences and strategies can be analyzed to determine their impact on reducing trips. In order to prioritize the strategies, several questions must be answered relating to applicability, cost effectiveness, and community support. Using national experience as a basis, the strategies are classified according to their cost effectiveness as follows:

The Most Cost Effective TDM Strategies

- Financial Incentives (commuter subsidies for not driving alone)
- Financial Disincentives (e.g., parking tax or charges)
- Bicycle and Walking Programs, Facilities and Subsidies
- Parking Management (i.e., reducing the supply of available parking)

Thus, pricing, parking and provision of non-motorized options are among the most cost effective (greatest trip reduction impact at the lowest cost) alternatives. Taxes and/or charges for parking are among the least popular strategies, but most effective and cost-effective because they can immediately change travel behavior, and can be revenue neutral or even generate revenue to fund improved travel alternatives.

Moderately Cost Effective TDM Strategies

- Compressed Work Weeks (e.g., 4-day/40-hour work schedules)
- Telecommuting
- Car Pool and Van Pool Programs

Compressed workweeks and telecommuting are among the most popular strategies with commuters because they offer employees more time at home. However, these strategies can be costly to employers because they involve a change in the basic operating policies of the work site. Car pool and van pool programs are also less cost effective because they generally only involve improved information on these travel alternatives (e.g., ride-matching computer systems, marketing campaigns, etc.).

These programs can be expensive to manage and produce limited impact without supportive incentives or disincentives.

Cost Ineffective TDM Strategies

- TDM Marketing Programs (without incentives)
- Shuttles (for commuters, lunchtime travelers, etc.)
- Transit Service Improvements (without incentives)

Shuttles that connect employment sites to retail areas are often cited as necessary to allow ride sharers to get around midday without their cars. However, most shuttle programs of this type exhibit very low ridership and very high per rider cost. That is not to say all shuttles, such as student/campus shuttles, are ineffective. Likewise, transit service improvements can be very expensive and ineffective if incentives are not in place.

Cost Effectiveness Unknown

- TDM Friendly Land Use Policies
- TDM Strategies Applied to Non-Commute Travel

While some early evidence suggests that transit-oriented, bicycle-oriented, and pedestrian-oriented developments are effective in increasing the use of these modes at new residential, commercial and office sites, the cost effectiveness of these strategies is still somewhat unknown. One study in southern California showed that employers who combined financial incentives with an aesthetically pleasing work site exhibited trip reduction results 10 percent higher than those without these two critical strategies.

Finally, the application of TDM strategies to non-commute trips is somewhat problematic. In the Hamilton area, commute (home-base work) trips account for most all of the travel in the region. On the one hand, school, shopping, recreational and other trips most likely exhibit higher auto occupancy rates. This makes sense when one considers the amount of natural car pooling that occurs to schools, to the store, to restaurants, etc. However, many TDM strategies cannot be applied to these other travel markets. For example, one cannot really telecommute to the store. Other TDM strategies, such as parking taxes and bicycle improvements, can influence all travel markets.

Employer and Area-wide TDM Strategies - A range of employer-based and area-wide strategies can be considered. These strategies include the following:

Minimal Voluntary Ride-sharing Program: assuming voluntary participation among employers (a low proportion of whom are implementing programs), this program includes support of car pools, van pools and transit, as well as preferential parking for car pools and van pools.

Maximum Voluntary Ride-sharing Program: still assuming low participation among employers, this program includes additional support, such as significant alternative work arrangements (compressed workweeks and telecommuting), preferential parking, and direct financial subsidies to car poolers, van poolers, and transit riders ($0.50 per day).

Voluntary Alternative Work Arrangement Program: again assuming voluntary participation among the region's employers, this program involves offering 30 percent of all employees compressed work weeks and giving another 25 percent the option of telecommuting (acknowledging that only about 20 percent of eligible employees will choose to do so).

Trip Reduction Ordinance: this type of employer-based program would mandate all employers to implement the maximum ride-sharing program outlined above.

Voluntary Ride-sharing plus Transit Service Improvements: a voluntary ridesharing program for employers with area-wide improvements to transit service such as frequency and coverage increases, and preferential treatment to expedite bus run times.

Voluntary Ride-sharing plus Transit Improvements and a Parking Tax: a voluntary employer program and transit service improvements with a $1 per day parking tax on all public and private parking spaces (non-residential).

Developer-based Ride-sharing Requirements: new developments would be required to implement a moderate ride-sharing program (moderate support, preferential parking, alternative work arrangements, and subsidies), and site design improvements that are conducive to TDM (such as transit shelters, bicycle storage, etc.).

7.4 Conclusions Based on Preliminary TDM Evaluation for the Hamilton Area

The object of this analysis is to provide the planners and policy-makers in the greater Hamilton area with a range of TDM programs, strategies and estimated impacts in terms of reducing traffic. The intent of the information provided is to assist in facilitating a consensus on the preferred TDM program to be included in the Plan update. The following overall conclusions are offered:

- **Employer-based programs will have limited long-term impacts.** Alone, these programs do not sufficiently reduce regional traffic volumes. This is because the Hamilton area is comprised of relatively small employers that are generally less effective in facilitating commute alternatives.

- **Employer programs should be considered as an interim step.** Even though employer programs are less effective due to the employment composition of the Hamilton area, a voluntary program, focused on either City or County government, or large employers such as GSK or Rocky Mountain Laboratories, should be considered. A demonstration program would provide local planners and policymakers with valuable information on the specific strategies and marketing techniques to encourage commute alternatives. Unlike efforts aimed at the general population, the program should target large employers and work through appointed and dedicated coordinators. The program should be launched by local government (City and County) employers. Flextime among large employers should also be tested.

- **Transit service improvements would have limited impacts.** The transit service improvements (increased coverage and frequency, faster running times, etc.), will not likely yield significant trip reduction impacts on a regional basis.

- **Land use and non-motorized TDM strategies can be effective.** The implementation of land use policies that are TDM-friendly, combined with improvements to bicycle and pedestrian facilities, can impact all types of travel. The potential impact of these strategies may be greater in the long run than traditional employer-based TDM measures. These measures, considered alone, could reduce vehicle trips and vehicle miles traveled (VMT), although the impacts may be somewhat weather-dependent.

- **Area-wide pricing strategies are the most effective strategy.** While politically among the least popular measures, the fact remains that financial incentives and disincentives, especially area-wide parking pricing strategies, are the most effective techniques for reducing trips and encouraging travelers to use alternative modes of transportation and times of day. A regional parking tax could significantly reduce trips and VMT.

- **A range of regional impacts is possible from TDM.** The impacts presented here range from a low reduction in trips (for a voluntary ride-sharing program), to a theoretical maximum trip reduction of 25 percent (for a combination of all strategies). However, the results possible in the Hamilton area are highly dependent on the community support for changing travel behavior. The maximum impact is based on a combination of programs that has not, to date, been implemented anywhere in the U.S.

The steps in incorporating TDM into the Transportation Plan involve the selection of a preferred set of TDM strategies, and then the specification of a recommended short- and long- run TDM program for the Hamilton area. The choices for the preferred TDM program generally involved the following elements, alone or in combination:

- developer requirements (new employment);
- trip reduction ordinance (all employers);
- transit service improvements;
- voluntary employer program;
- parking fees or taxes;
- TDM-friendly land use policies; and
- bicycle and pedestrian facility and program improvements.

It is recommended that the preferred TDM program consists of four principle TDM program elements:

1) a voluntary employer program;

2) an enhanced bicycle and pedestrian program;

3) an improved transit system; and

4) modified land use policies to encourage TDM.

Each is discussed in more detail in the next subsection. It is believed that the non-motorized strategies offer the potential for reducing a significant number of trips in a cost-effective manner, and that a voluntary employer program is a good short-term objective. The belief is that the land use policy initiative would address necessary long-term measures.

It is also believed that several TDM strategies should be rejected outright as being infeasible or unacceptable. These include parking pricing and any type of mandatory requirements on employers and developers. The Montana Department of Transportation has developed a Montana specific "TDM Toolbox". In evaluating local options for TDM it is suggested to look for programs and alternatives that have been successfully implemented in Montana.

7.5 Recommended TDM Program

Based on the preferred TDM strategies described above, a short- and long-range TDM program can be outlined for the Hamilton area. This program description is not intended as a fully articulated plan for implementing TDM strategies over the next 20 years; rather it is intended as a framework from which to develop such a plan. As mentioned above, the plan should have at least two distinct time frames, or perhaps three: a short-range plan (1 to 3 years); a medium-range plan (5 to 10 years); and possibly a long-range plan (10 to 20 years).

Short-Range TDM Program: Maximize Volunteerism (1 to 3 years)

A program could be developed with the following components:

- **Voluntary Employer Cooperative Program**: With the assistance of the City, County, and a select group of other major employers, form a business cooperative to explore the implementation of TDM programs within each organization. This might involve a pilot program, whereby the City would work with several existing and new employer programs to test and evaluate employee acceptance and the effectiveness of various TDM strategies. The impetus for business involvement should not only be traffic congestion and air quality; rather TDM should be sold as a good business practice that benefits participants by solving site access problems, assisting with employee recruitment or retention, and providing additional employee benefits.

- **Small Employer TDM Program**: The Hamilton area has a very large proportion of employers with less than 50 employees, most of which with less than ten employees. This clearly affects the ability to group employees into car pools, but does not preclude the use of transit, bicycling, walking, or even alternative work arrangements (e.g., 4/40 schedules and telecommuting). While the small employer market has been a difficult one for the TDM profession to tackle, some techniques, including multi-tenant-building campaigns, can be effective.

- **Education on Smart Trip-making**: Since the employer elements of the program only effect commute trips and some student trips, an aggressive educational campaign to combine or avoid other types of trips could be implemented. This would be designed to reduce VMT and cold starts by encouraging residents to combine trips (e.g., to drop off school children and shop at the grocery store), or to avoid trips by using the telephone, computer or televisions to access information and services.

- **Flex-time and Staggered Shifts at Largest Employment Sites**: Changing the arrival and departure times of commuters can be a very effective way to alleviate peak period, localized traffic congestion. While many employers in the greater Hamilton area already have informal flexible schedules, the formalization of flex-time and staggered hours among employers could go a long way to reduce congestion around these sites and on heavily congested corridors. For example, Rocky Mountain Laboratories already has staggered work schedules and flex-time working arrangements for several of their work groups. This can contribute to reducing peak-hour travel demand and associated delays on the community's roadway system.

- **Enhanced Bicycle/Pedestrian Program**: Given that the greatest TDM impacts are anticipated to be derived from the enhanced non-motorized program, implementation of three related program elements should be initiated. First, a bicycle and pedestrian system improvement program should be implemented on an aggressive schedule. Second, non-motorized information should be produced and distributed to reflect these new facilities on an ongoing basis. As the bicycle and pedestrian systems are improved and connectivity enhanced, marketing of the program should reflect the ease at which travelers can get around on foot or by pedal. Finally, as part of the employer pilot programs, financial subsidies for non-motorized modes should be encouraged.

Medium-Range TDM Program: Land Use and Non-Motorized (5 to 10 years)

The TDM program for the medium-range future--five to ten years from now—should build upon the short-range program, and initiate strategies that have a longer-range impact, such as land use policies. These strategies include:

- **Expansion of Employer Cooperative Program into TMA**: Based on the experience of the trial period of the business cooperative program, additional employers and organizations should be recruited to participate in the program. If the cooperative program is successful (demonstrating the interest and commitment of the involved organizations), the effort could be expanded into a Transportation Management Association (TMA). The TMA could relieve the City from the day-to-day responsibilities of operating the program, and provide additional focus and resolve to the efforts.

- **Continued Implementation of the Bicycle/Pedestrian/Transit Program**: Those projects programmed for implementation in five to ten years should be completed. Then the supporting information and incentive elements, as developed, could be continued to assure that maximum use and benefits are derived from the capital investment.

- **Land Use Policies and Practices Supportive of TDM**: The relationship between land use policies and travel behavior cannot be overstated. Modifying existing land use policies and practices, to be more TDM-friendly, could be very effective as a long-term solution. Supportive land use policies include:

  - **Parking maximums** - reduced parking requirements to encourage the implementation of TDM measures and parking supply management.
  - **Shared parking** - allowing two different and adjacent land uses (e.g., office building and movie theaters), to build and manage shared parking that is less than that required of each site.
  - **Density bonuses** - in certain areas, densification and mixed uses can reduce overall trip generation rates, and make shared ride and transit options more effective.
  - **In-filling** - by allowing residential development close to downtown and major employment areas, the ability of residents to bicycle, walk, or use transit to commute is enhanced. Other growth management techniques, as suggested in the new growth management plan, could also be supportive of TDM.
  - **Site design guidelines** - as described below, a number of TDM-friendly site design practices can be incorporated into the development review process, as either a comprehensive policy or on a case-by-case basis for zoning variances.

- **TDM-friendly Site Design Features**: As mentioned above, site design features that are supportive of TDM programs can be incorporated into site plans, and required or negotiated as part of the review process. This is a very common practice throughout the U.S. and has already been used on a limited basis in Montana. Such features should be considered for growing areas. An illustrative list of some site design features includes:

- provision for bus shelters and information kiosks;
- allowance for van pools in any downtown or MSU parking lots;
- secure and safe bicycle storage at employment, school and retail locations;
- showers and lockers for bicyclist and walkers at large employment sites; and
- pedestrian system connectivity with adjacent sites and other paths.

Long-Range TDM Program: Contingency Measures (10 to 20 years)

The final element of the Hamilton area TDM program should be long-range contingency measures to address traffic problems (e.g., congestion, accessibility, mobility or air quality), become untenable. Should air quality or traffic congestion levels reach intolerable levels, the Hamilton area could revisit the analyses made as part of the 20-year plan. This would include investigating the need to implement more stringent, but less popular measures, such as parking pricing and mandatory TDM programs. While not a recommendation of this Plan, the possibility of needing more aggressive TDM measures, should the short- and medium-range programs fall short of expectations, should not be totally ignored.

7.6 TDM Conclusion

Clearly TDM has an important place in the *Hamilton Area Transportation Plan (2009 Update).* However, the voluntary employer programs, bicycle/pedestrian improvements, transit system development and land use strategies are insufficient to completely avoid the need for key roadway capacity expansion projects, but may help defer the need for construction for a period of time. The highest priority should be the implementation of the non-motorized improvements; but even a modest reduction in vehicle trips during certain times of the year would avoid the need for certain capacity enhancements. Supportive of congestion relief, air quality improvement and regional mobility goals, TDM should be implemented on an incremental basis to test and evaluate the effectiveness and acceptability of the strategies analyzed in this Plan. Several short-term TDM program elements have been suggested that are relatively low-cost and readily available. The Hamilton area should strive to build more local experience with TDM programs by developing a detailed short-range plan and pilot program, and then revisiting that plan in three to five years.

7.7 References

Robert Peccia & Associates, Inc. April 2009. *Greater Bozeman Area Transportation Plan (2007 Update) - Chapter 10,* Bozeman, Montana.

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Chapter 8
Miscellaneous Transportation System Considerations

Chapter 8
Miscellaneous Transportation System Considerations

8.1 Safe Routes to School (SRTS) Program

The Safe Routes to School (SRTS) Program was initiated via Section 1404 of the *Safe, Accountable, Flexible, Efficient Transportation Act: A Legacy for Users Act* (SAFETEA-LU), signed into law on August 10, 2005. The SRTS Program can provide reimbursement support for both behavioral and infrastructure investments that make bicycling and walking to school a safer and more attractive alternative for students in kindergarten through middle school (K-8). In general terms, the overriding purpose of the program is two-fold:

- Enable and encourage children, including those with disabilities, to walk and bicycle to school
- Make bicycling and walking to school a safer and more appealing transportation alternative, thereby encouraging a healthy and active lifestyle from an early age.

Funding is available to attain these objectives within the confines of the program guidelines. Montana is called a minimum apportionment state, which means the state receives $1 million dollars annually to carry out program objectives. Of this amount, up to 70 percent can be designated for infrastructure projects, with the remaining 30 percent available for non-infrastructure projects. SRTS programs and/or or projects are encouraged to focus on a combination of the “five E’s”, which include:

- Evaluation
- Education
- Encouragement
- Engineering
- Enforcement

SRTS funding may be used within two miles of K-8 schools for the following purposes:

- Pedestrian and bicycle crossing improvements
- Bicycle and pedestrian facilities
- Community assessments of walking and bicycling facilities and programs

- Public awareness campaigns and outreach
- Development of community action plans
- Traffic education and enforcement
- Student sessions on bicycle and pedestrian safety, health, and environment
- Safe Routes to School (SRTS) training
- Tracking and performance monitoring

Chapter 9 of this Transportation Plan Update contains further information on funding availability and MDT's grant application process.

8.2 Corridor Preservation Measures

Corridor preservation is the application of measures to prevent or minimize development within the right-of-way of a planned transportation facility or improvement within a defined corridor. That includes corridors, both existing and future, in which a wide array of transportation improvements may be constructed including roadways, bikeways, multi-use trails, equestrian paths, high occupancy vehicle lanes, fixed-rail lines and more.

Corridor preservation is important because it helps to ensure that a transportation system will effectively and efficiently serve existing and future development within a local community, region or state, and prevent costly and difficult acquisitions after the fact. Corridor preservation policies, programs and practices provide numerous benefits to communities, taxpayers and the public at large. These include, but are not limited to, the following:

- Reducing transportation costs by preservation of future corridors in an undeveloped state. By acquiring or setting aside right-of-way well in advance of construction, the high cost to remove or relocate private homes or businesses is eliminated or reduced.
- Enhancing economic development by minimizing traffic congestion and improving traffic flow, saving time and money. Low cost, efficient transportation helps businesses contain final costs to customers and makes them more competitive in the marketplace. Freight costs, for instance, accounts for ten percent of the value of agricultural products, the highest for any industry.
- Increasing information sharing so landowners, developers, engineers, utility providers, and planners understand the future needs for developing corridors. An effective corridor preservation program ensures that all involved parties

understand the future needs within a corridor and that state, local and private plans are coordinated.

- Preserving arterial capacity and right-of-way in growing corridors. Corridor preservation includes the use of access management techniques to preserve the existing capacity of corridors. When it is necessary, arterial capacity can be added before it becomes cost prohibited by preserving right-of-way along growing transportation corridors.

- Minimizing disruption of private utilities and public works. Corridor preservation planning allows utilities and public works providers to know future plans for their transportation corridor and make their decisions accordingly.

- Promoting urban and rural development compatible with local plans and regulations. The state and local agencies must work closely together to coordinate their efforts. Effective corridor preservation will result in development along a transportation corridor that is consistent with local policies.

To effectively achieve the policies and goals listed above, corridor management techniques can be utilized. These techniques can involve the systematic application of actions that:

- Preserve the safety and efficiency of transportation facilities through **access management**; and,

- Ensure that new development along planned transportation corridors is located and designed to accommodate future transportation facilities (**corridor preservation measures**).

These are discussed further below.

8.2.1 Access Management Guidelines

Access management techniques are increasingly fundamental to preserving the safety and efficiency of a transportation facility. Access control can extend the carrying capacity of a roadway, reducing potential conflicts and facilitating appropriate land usage. There are six basic principles of access management that are used to achieve the desired outcome of safer and efficient roadways. These principles are:

- Limit the number of conflict points

- Separate the different conflict points

- Separate turning volumes from through movements

- Locate traffic signals to facilitate traffic movement

- Maintain a hierarchy of roadways by function
- Limit direct access on higher speed roads

It is recommended that the City of Hamilton adopt a set of Access Management Regulations through which the need for access management principles can be evaluated on a case-by-case basis. For roadways on the State system and under the jurisdiction of the Montana Department of Transportation (MDT), access control guidelines are available which define minimum access point spacing, access geometrics, etc., for different roadway facilities. For other roadways (non-State), the adoption of an access classification system based upon the functional classification of the roadway (principal arterial, minor arterial or major collector) is desirable. These local regulations should serve to govern minimum spacing of drive approaches/connections and median openings along a given roadway in an effort to fit the given roadway into the context of the adjacent land uses and the roadway purpose. The preparation and adoption of a local Access Management Ordinance should be pursued that can adequately document the city's desire for standard approach spacing, widths, slopes and type for a given roadway classification. Note that Ravalli County already has their own *Access Encroachment Policy* that guides the location, design standards, and potential uses of permitted approaches on the County roadway system.

Different types of treatment that can assist in access control techniques are:

- Non-traversable raised medians
- Frontage roads
- Consolidation and/or closure of existing accesses to the roadway
- Directional raised medians
- Left-turn bay islands
- Redefinition of previously uncontrolled access
- Raised channelization islands to discourage turns
- Regulate number of driveways per property

8.2.2 Corridor Preservation Measures

Another tool used to fulfill the policies and goals listed earlier in this chapter is that of specific corridor preservation measures. As was stated above regarding developing a local Access Management Ordinance, it is desirable to develop a Corridor Preservation Ordinance as well. Such an ordinance would serve to accomplish the following:

- Establish criteria for new corridor preservation policies to protect future transportation corridors from development encroachment by structures, parking areas, or drainage facilities (except as may be allowed on an interim basis). Some possible criteria could include the on-site transfer of development rights and the clustering of structures.

- Establish criteria for providing right-of-way dedication and acquisition while mitigating adverse impacts on affected property owners.

8.3 Interlocal Agreements

During the development of the Transportation Plan, it became apparent that several of the recommendations developed were in many aspects “multi-jurisdictional” in that a transportation project may impact both the City, the County, and in some cases the MDT. Considerable discussion occurred to that effect, and many comments were made that the Transportation Plan as a “stand-alone” document may be hard to implement without broader participation and cooperation amongst the affected parties. Most parties acknowledged that the issue of implementation, transportation facility ownership, transition of that ownership, and funding of projects, were all much larger subjects than that which could be addressed within the scope of the Transportation Plan project itself.

One idea that was brought up many times, and one that has considerable merit, is the concept of utilizing “Interlocal Agreements” to partner on and define parameters of the many transportation projects that the community will need as it grows. An Interlocal Agreement may be the best mechanism to debate and identify specific issues with many transportation projects, such as who will own the road right-of-way, how funding will be put together, what design standards will ultimately be required for a facility, etc.

It is the intent of this section of the Transportation Plan to present the concept of Interlocal Agreements, identify specific advantages and disadvantages to this type of arrangement, and frame the discussion in the overall context of the Hamilton Area Transportation Plan document.

8.3.1 Definition of Interlocal Agreement

With an Interlocal Agreement, specific services are agreed upon to be provided under defined conditions. An Interlocal Agreement provides a much clearer understanding of what a transportation project may entail, who is responsible for oversight and development of the improvement, and ultimately who funds the improvement.

The purpose of an Interlocal Agreement is to permit jurisdictions to make the most efficient use of their powers by enabling them to cooperate with other jurisdictions on a basis of mutual advantage. An Interlocal Agreement will allow the jurisdictions to provide or receive services and facilities from other jurisdictions specifically identified in the Interlocal Agreement. Interlocal Agreements are in effect a contract.

An Interlocal Agreement:

- Is very precise and identifies the specific service, activity, or undertaking the jurisdictions are authorized by law to perform;
- Emphasizes the fulfillment of the itemized tasks and terms in the Interlocal Agreement;
- Is based on the concept that one or more local jurisdiction pays for the provision of a service, activity, or undertaking;
- Identifies the specific costs of the clearly defined resources, materials, or services;
- Is based on the principles and concepts of contract law. Failure to provide the service, activity or undertaking would constitute, in most cases, a breach of contract;

8.3.2 Advantages of Interlocal Agreements

- Interlocal Agreements are principally designed to allow communities to coordinate planning activities. Additionally, they allow smaller and/or rural jurisdictions to obtain services that are well beyond their capital expenditure capabilities.
- The smaller and/or rural jurisdictions may gain access to the infrastructure of the larger community so that it may sustain services without large tax increases and the use of large bonding capacity.
- The Interlocal Agreement defines fixed costs for the period of the Interlocal Agreement. This will allow accurate budgeting for the project partners and tax planning that controls surprise rate and tax increases for basic infrastructure services.

- All parties benefit from growth of infrastructure within its boundaries. Regardless of jurisdictional boundaries, the local community will benefit by having infrastructure service. As a side benefit of such availability, competition is lessened between adjacent communities to provide services, to the exclusion of the neighboring community, often with short- and long-term detrimental effects on both communities.

- A considerable value to the partnering jurisdictions is the public perception of unity, both of purpose and funding.

8.3.3 Disadvantages of Interlocal Agreements

Interlocal Agreements are certainly easy to conceptualize, but the devil is often in the details. How the partnering jurisdictions attempt to leverage its position, benefit its operations and cost accounting, and fund infrastructure improvements will be the true test of the value of an Interlocal Agreement to a smaller community.

- Some large jurisdictions often times leverage themselves against smaller jurisdictions on capital ownership, financial participation, operations and maintenance responsibilities and other elements of the relationship between two entities.

- One of the greatest problems with any long-term agreement is the need to make that agreement functional for a long period of time with the least amount of uncertainty left to the future. Careful drafting and attention to detail will largely reduce the risk of problems in the future.

8.3.4 Hamilton Context for Interlocal Agreements

The authors of this Transportation Plan view the idea of using an Interlocal Agreement as a good implementation strategy to carry out many of the recommendations in this Transportation Plan. This strategy can also be beneficial for daily operational and maintenance concerns not specifically identified in this Plan, for example snow plowing responsibilities on an area roadway. Without a formalized strategy, it may be difficult to accomplish many of the recommended projects contained in Chapter 5 that straddle both the City and County jurisdictional responsibilities.

It is recommended that going forward City and County staff meet to discuss the creation of a local Transportation Advisory Committee (TAC), and ascertain what the roles, make-up, and overall goals of the TAC would be. With responsibilities and goals of the TAC known, the relevant elected officials can be informed and invited to participate in the future TAC meetings. Additionally, it is advisable that at least one elected official from both the City and County be assigned to a future TAC, such that the elected bodies are fully represented, in conjunction with relevant staff. This type of arrangement is one that has worked well in other Montana communities such as Kalispell/Flathead County, Bozeman/Gallatin County, and Helena/Lewis and Clark County.

8.4 Pedestrian and Bicycle Design Guidelines

The design of pedestrian and bicycle infrastructure is governed by many local, state, and federal standard documents. These documents include the Montana Public Works Standard Specifications, the Manual of Uniform Traffic Control Devices, the AASHTO Guide for the Development of Bicycle and Pedestrian Facilities and the Americans with Disabilities Act Access Board (ADAAG) Guidelines. This section provides additional guidance that could benefit the Hamilton area with some found in the above standards, and some experimental.

8.4.1 Pedestrian Facilities

The design of the pedestrian environment will directly affect the degree to which people enjoy the walking experience. If designed appropriately, the walking environment will not only serve the people who currently walk, but also be inviting for those who may consider walking in the future. Therefore, when considering the appropriate design of a certain location, designers should not just consider existing pedestrian use, but how the design will influence and increase walking in the future. Additionally, designers must consider the various levels of walking abilities and local, state, and federal accessibility requirements. Although these types of requirements were specifically developed for people with walking challenges, their use will result in pedestrian facilities that benefit all people.

8.4.1.1 Crosswalks

Crosswalks are a critical element of the pedestrian network. It is of little use to have a complete sidewalk system if pedestrians cannot safely and conveniently cross intervening streets. Safe crosswalks support other transportation modes as well. Transit riders, motorists, and bicyclists all may need to cross the street as pedestrians at some point in their trip.

Frequency

In general, whatever their mode, people will not travel out of direction unless it is necessary. This behavior is observed in pedestrians, who will cross the street wherever they feel it is convenient. The distance between comfortable opportunities to cross a street should be related to the frequency of uses along the street that generate crossings (shops, High Pedestrian Use areas, etc.). In areas with many such generators, like High Pedestrian Use areas, opportunities to cross should be very frequent. In areas where generators are less frequent, good crossing opportunities may also be provided with less frequency.

Table 8-1
Crosswalk Spacing Guidance

Where	Generally Not Further Apart Then	Generally Not Closer Together Than
High Pedestrian Use Areas	200 – 300 feet (60 – 90 m) where blocks are longer than 400 feet (120 m)	150 feet (45 m)
Local Street Walkways and low Pedestrian Use Areas	Varies, based on adjacent uses. Do not prohibit crossing for more than 400 feet (120 m)	150 feet (45 m)

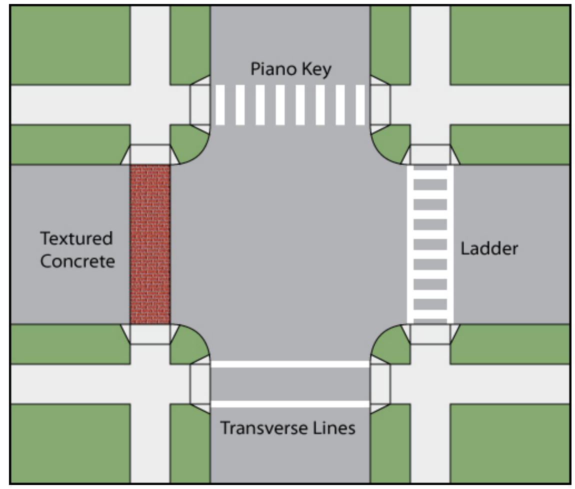
Crosswalk Pavement Markings

Marked crosswalks indicate to pedestrians the appropriate route across traffic, facilitate crossing by the visually impaired, and remind turning drivers of potential conflicts with pedestrians. Crosswalk pavement markings should generally be located to align with the Through Pedestrian Zone of the Sidewalk Corridor.

Marked crosswalks should be used:

- At signalized intersections, all crosswalks should be marked.
- At unsignalized intersections, crosswalks should be marked when they
    - help orient pedestrians in finding their way across a complex intersection, or
    - help show pedestrians the shortest route across traffic with the least exposure to vehicular traffic and traffic conflicts, or
    - help position pedestrians where they can best be seen by oncoming traffic.
- At mid-block locations, crosswalks are marked where
    - there is a demand for crossing, and
    - there are no nearby marked crosswalks.

There are three common types of crosswalk striping currently used in Montana including the Piano Key, the Ladder, and the standard Transverse crosswalk. Types of textured or colored concrete surfacing may be used in appropriate locations where it helps establish a sense of place such as shopping centers and downtown Hamilton.



Ladder or piano key crosswalk markings are recommended for most high use crosswalks in the Hamilton area that are not on the Federal Highway urban aid system. This includes school crossings, across arterial streets for pedestrian-only signals, at mid-block crosswalks, and where the crosswalk crosses a street not controlled by signals or stop signs. Note that on MDT routes, ladder or piano key crosswalks are usually reserved for school crossing locations only. A piano key pavement marking consists of 2 ft (610 mm) wide bars spaced 2 ft apart and should be located such that the wheels of vehicles pass between the white stripes. A ladder pavement marking consists of 2 ft (610 mm) wide bars spaced 2 ft apart and located between 1 ft wide parallel stripes that are 10 ft apart.

8.4.1.2 Curb Extensions

Curb extensions (sometimes called curb bulbs or bulb-outs) have many benefits for pedestrians. They shorten the crossing distance, provide additional space at the corner (simplifying the placement of elements like curb ramps), and allow pedestrians to see and be seen before entering the crosswalk. Curb extensions can also provide an area for accessible transit stops and other pedestrian amenities and street furnishings.

Curb extensions are advisable for local or collector roadways and may be used at any corner location, or at any mid-block location where there is a marked crosswalk, provided there is a parking lane into which the curb may be extended. Curb extensions are not generally used where there is no parking lane because of the potential hazard to bicycle travel. Under no circumstances should a curb extension block a bike lane if one exists.

In high pedestrian use areas such as downtown Hamilton, curb extensions are a preferred element for corner reconstruction except where there are extenuating design considerations such as the turning radius of the design vehicle, or transit and on-street parking factors.

Curb extensions can be compatible with snow removal operations provided that they are visibly marked for crews. Where drainage is an issue, curb extensions can be designed with storm drain inlets, or pass through channels for water.

It is important to note that curb extensions must be designed to accommodate the required turning radii of the vehicle to be encountered along a given facility. For example, on MDT routes, curb extensions are required to allow a large semi-truck (commonly referred to as a WB-67 design vehicle) to maneuver around the curb extension without traversing the raised curb. In residential or commercial areas, a smaller design vehicle may be allowed, thereby increasing the potential size of the island. The turning radii of the appropriate design vehicle must always be checked prior to installation of curb extensions.

8.4.1.3 Refuge Islands

Refuge islands allow pedestrians to cross one segment of the street to a relatively safe location out of the travel lanes, and then continue across the next segment in a separate gap. At unsignalized crosswalks on a two-way street, a median refuge island allows the crossing pedestrian to tackle each direction of traffic separately. This can significantly reduce the time a pedestrian must wait for an adequate gap in the traffic stream.

8.4.2 Bicycle Facilities

Similar to pedestrian facilities, the overall safety and usability of the bicycle network lies in the details of design. The following guidelines provide useful design considerations that fill in the gaps from the standard manuals such as the MUTCD and the AASHTO Guide for the Development of Bicycle Facilities.

8.4.2.1 Shared-Use Paths / Bike Paths

Facilitates two-way off-street bicycle and pedestrian traffic, which also may be used by skaters, wheelchair users, joggers and other non-motorized users. These facilities are frequently found in parks, and in greenbelts, or along rivers, railroads, or utility corridors where there are few conflicts with motorized vehicles. Shared use facilities can also include amenities such as lighting, signage, and fencing (where appropriate). In Montana, design of Shared use facilities should follow guidance in the AASHTO Guide for the Development of Bicycle Facilities. Note that Chapter 5 of this Transportation Plan contains several long-term conceptual locations for shared-use pathways, including a river recreational trail, and a future trail utilizing the existing Montana Rail Link (MRL) track easement. Both will be subject to private landowner participation.

General Design Practices

Shared-use paths can provide a good facility, particularly for novice riders, recreational trips, and cyclists of all skill levels preferring separation from traffic. Shared-use paths should generally provide directional travel opportunities not provided by existing roadways. Some of the elements that enhance off-street path design include:

- Implementing frequent access points from the local road network; if access points are spaced too far apart, users will have to travel out of direction to enter or exit the path, which will discourage use;
- Placing adequate signage for cyclists including stop signs at trail crossings and directional signs to direct users to and from the path;
- Building to a standard high enough to allow heavy maintenance equipment to use the path without causing it to deteriorate;
- Limiting the number of at-grade crossings with streets or driveways;
- Terminating the path where it is easily accessible to and from the street system, preferably at a controlled intersection or at the beginning of a dead-end street. Poorly designed paths can put pedestrians and cyclists in a position where motor vehicle drivers do not expect them when the path joins the street system.

At Grade Crossings

When a grade-separated crossing cannot be provided, the optimum at-grade crossing has either light traffic or a traffic signal that trail users can activate. If a signal is provided, signal loop detectors may be placed in the pavement to detect bicycles if they can provide advance detection, and a pedestrian-actuated button provided (placed such that cyclists can press it without dismounting.) A trail sized stop sign (R1-1) should be placed about 5 feet before the intersection with an accompanying stop line. Direction flow should be treated either with physical separation or a centerline approaching the intersection for the last 100 feet. Additional design considerations can slow bicyclists as they approach the crossing include chicanes, bollards, and pavement markings.

If the street is above four or more lanes or two/three lanes without adequate gaps, a median refuge should be considered in the middle of the street crossed. The refuge should be 8 feet at a minimum, 10 feet is desired. Another potential design option for street crossings is to slow motor vehicle traffic approaching the crossing through such techniques as speed bumps in advance of the crossing, or a painted or textured crosswalk.

Grade Separated Crossings

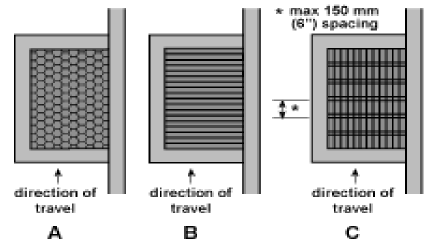
When the decision to construct an off-street multi-use path has been made, grade separation should be considered for all crossings of major thoroughfares. At-grade crossings introduce conflict points. The greatest conflicts occur where paths cross roadway driveways or entrance and exit ramps. Motor vehicle drivers using these ramps are seeking opportunities to merge with other motor vehicles; they are not expecting bicyclists and pedestrians to appear at these locations. However, grade-separated crossings should minimize the burden for the user, and not, for example, require a steep uphill and/or winding climb. Undercrossings should be lighted if in high use areas or if longer than 75 feet in length.

8.4.2.2 Bicycle Lanes

Bicycle lanes are defined as a portion of the roadway that has been designated by striping, signage, and pavement markings for the preferential or exclusive use of bicyclists. Bicycle lanes are generally found on major arterial and collector roadways and are 4-6 feet wide. Bicycle lanes should be constructed in accordance with the recommended roadway typical sections in this chapter and should be designed following AASHTO guidelines.

Additional Considerations

Poorly designed or placed drainage grates can often hazardous to bicyclists. Drainage grates with large slits can catch bicycle tires. Poorly placed drainage grates may also be hazardous, and can cause bicyclists to veer into the auto travel lane.



Bicycle-Friendly Drainage Grates

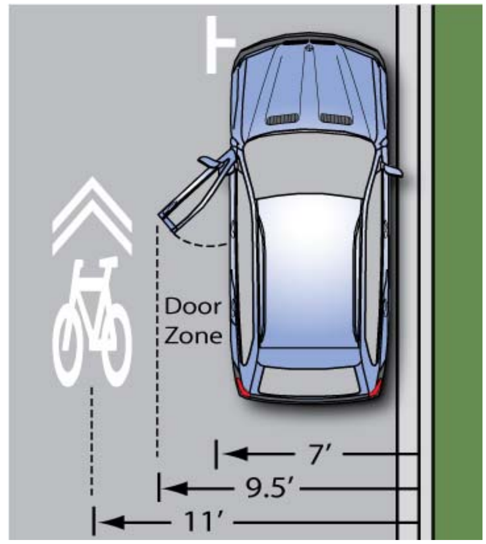
Bicycle Friendly Rumble Strips

Rumble Strips can hamper bicycling by presenting obstacles through trapped debris on the far right of the road shoulder and the rumble strip to the left. Consequently, special care needs to be exercised for bicyclists when this treatment for motorist safety is planned and built, with a robust maintenance schedule put into place. The rumble strip design and placement are also important; placing the rumble strip as close to the fog line as possible leave the maximum shoulder area available for cyclists. Certain rumble strip designs are safer for bicyclists to cross, and still provide the desired warning effect for motorists.

The Federal Highway Administration performed a study on the design of rumble strips in 2000 reviewing different techniques of installation and studies performed by ten state DOTs from the point of view of motorists and bicyclists. Based on the information provided in the FHWA study, the recommended design for a rumble strip should be of a milled design rather than rolled that is 1 foot (300mm) wide with 5/16 ± 1/16 in (8 ± 1.5 mm) in depth. Rumble strips are recommended to be installed only on roadways with shoulders in excess of 5 feet (1.5 m). A shallow depth of the milled portions of the rumble strips are preferred by bicyclists. Since the roadway shoulder can become cluttered with debris it is recommended to include a skip (or gap) in the rumble strip to allow bicyclists to cross from the shoulder to the travel lane when encountering debris. This skip pattern is recommended to be 12 feet (3.7 m) in length with intervals of 40 or 60 feet (12.2 or 18.3 m) between skips.

8.4.2.3 Shared Lane Markings (SLMs)

Recently, Shared Lane Marking stencils (also called “Sharrows”) have been introduced for use in the United States as an additional treatment for shared roadway facilities. The stencil can serve a number of purposes, such as making motorists aware of bicycles potentially in their lane, showing bicyclists the direction of travel, and, with proper placement, reminding bicyclists to bike further from parked cars to prevent “dooring” collisions. Shared Lane Markings are included in the 2008 MUTCD and would be valuable additions to the proposed bicycle routes in **Chapter 5**.



Recommended SLM placement.

8.5 References

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Montana Department of Transportation. June 2007. *Safe Routes to School Guidebook - Chapter 2,* Helena, Montana.

North American Development Bank. March 1999. *Manual for Drafters of Interlocal Agreements,* Clark County, Nevada.

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Chapter 9
Financial Analysis

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Financial Analysis

9.1 Introduction

The Montana Department of Transportation (MDT) administers a number of programs that are funded from state and federal sources. In most cases, the funds are administered by the MDT at the State level and MDT staff work with local governments in the planning and design of projects, whatever the specific funding source.

Each year, in accordance with 60-2-127, MCA the Montana Transportation Commission allocates a portion of available federal-aid highway funds for construction purposes and for projects located on the various systems in the state as described throughout this chapter

9.2 Federal Funding Sources

The following summary of major Federal transportation funding categories received by the State through the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)-enacted on August 10, 2005, includes state developed implementation/sub-programs. In order to receive project funding under these programs, projects must be included in the State Transportation Improvement Program (STIP).

9.2.1 National Highway System (NHS)

The purpose of the National Highway System (NHS) is to provide an interconnected system of principal arterial routes which will serve major population centers, international border crossings, intermodal transportation facilities and other major travel destinations; meet national defense requirements; and serve interstate and interregional travel. The National Highway System includes all Interstate routes, a large percentage of urban and rural principal arterials, the defense strategic highway network, and strategic highway connectors.

Allocations and Matching Requirements

NHS funds are Federally apportioned to Montana and allocated based on system performance by the Montana Transportation Commission. The Federal share for NHS projects is 86.58% and the State is responsible for the remaining 13.42%. The State share is funded through the Highway State Special Revenue Account.

Eligibility and Planning Considerations

Activities eligible for the National Highway System funding include construction, reconstruction, resurfacing, restoration, and rehabilitation of segments of the NHS. Operational improvements as well as highway safety improvements are also eligible. Other miscellaneous activities that may qualify for NHS funding include research, planning, carpool projects, bikeways, and pedestrian walkways. The Transportation Commission establishes priorities for the use of National Highway System funds and projects are let through a competitive bidding process. US 93 is on the National Highway System.

9.2.2 Surface Transportation Program (STP)

Surface Transportation Program (STP) funds are Federally apportioned to Montana and allocated by the Montana Transportation Commission to various programs including the Surface Transportation Program Primary Highways (STPP), Surface Transportation Program Secondary Highways (STPS), and the Surface Transportation Program Urban Highways (STPU).

9.2.2.1 Secondary Highway System (STPS)*

The Federal and State funds available under this program are used to finance transportation projects on the state-designated Secondary Highway System. The Secondary Highway System highways that have been functionally classified by the MDT as either rural minor arterials or rural major collectors and that have been selected by the Montana Transportation Commission in cooperation with the boards of county commissioners, to be placed on the secondary highway system [MCA 60-2-125(4)].

Allocations and Matching Requirements

Secondary funds are distributed statewide (MCA 60-3-206) to each of five financial districts, including the Missoula District, based on a formula, which takes into account the land area, population, road mileage and bridge square footage. Federal funds for secondary highways must be matched by non-federal funds. Of the total received 86.58% is Federal and 13.42 % is non-federal match. Normally, the match on these funds is from the Highway State Special Revenue Account.

Eligibility and Planning Considerations

Eligible activities for the use of Secondary funds fall under three major types of improvements: Reconstruction, Rehabilitation, and Pavement Preservation. The Reconstruction and Rehabilitation categories are allocated a minimum of 65% of the program funds with the remaining 35% dedicated to Pavement

Preservation. Secondary funds can also be used for any project that is eligible for STP under Title 23, U.S.C.

MDT and county commissions determine Secondary capital construction priorities for each district with final project approval by the Transportation Commission. By state law the individual counties in a district and the state vote on Secondary funding priorities presented to the Commission. The Counties and MDT take the input from citizens, small cities, and tribal governments during the annual priorities process. Projects are let through a competitive bidding process.

Secondary highways in the study area boundary are: S-269 Eastside Highway and S-531 Westside Road.

9.2.2.2 Community Transportation Enhancement Program (CTEP)*

Federal law requires that at least 10% of STP funds must be spent on transportation enhancement projects. The Montana Transportation Commission created the Community Transportation Enhancement Program in cooperation with the Montana Association of Counties (MACO) and the League of Cities and Towns to comply with this Federal requirement.

Allocations and Matching Requirements

CTEP is a unique program that distributes funding to local and tribal governments based on a population formula and provides project selection authority to local and tribal governments. The Transportation Commission provides final approval to CTEP projects within the State's right-of-way. The Federal share for CTEP projects is 86.58% and the Local and tribal governments are responsible for the remaining 13.42%.

Eligibility and Planning Considerations

Eligible CTEP categories include:

- Pedestrian and bicycle facilities
- Historic preservation
- Acquisition of scenic easements and historic or scenic sites
- Archeological planning and research
- Mitigation of water pollution due to highway runoff or reduce vehicle-caused
- Wildlife mortality while maintaining habitat connectivity

- Scenic or historic highway programs including provisions of tourist and welcome center facilities
- Landscaping and other scenic beautification
- Preservation of abandoned railway corridors (including the conversion and use for bicycle or pedestrian trails)
- Control and removal of outdoor advertising
- Establishment of transportation museums
- Provisions of safety and educational activities for pedestrians and bicyclists

Projects addressing these categories and that are linked to the transportation system by proximity, function or impact, and where required, meet the "historic" criteria, may be eligible for enhancement funding.

Projects must be submitted to the local government to the MDT, even when the project has been developed by another organization or interest group. Project proposals must include evidence of public involvement in the identification and ranking of enhancement projects. Local governments are encouraged to use their planning boards, where they exist, for the facilitation of public participation; or a special enhancement committee. The MDT staff reviews each project proposal for completeness and eligibility and submits them to the Transportation Commission and the federal Highway Administration for approval.

The City of Hamilton has a current balance of $38,581 and the estimated 2009 allocation is $ 17,500 (Federal). Ravalli County is allocated approximately $153,000 annually (Federal). There is currently a balance of $461,344 for this program. The balances represent funds not obligated towards a selected project.

*State funding programs developed to distribute Federal funding within Montana

9.2.3 Highway Safety Improvement Program (HSIP)

<u>Allocations and Matching Requirements</u>

HSIP is a new core funding program established by SAFETEA-LU. HSIP funds are Federally apportioned to Montana and allocated to safety improvement projects identified in the strategic highway safety improvement plan by the Commission. Projects described in the State strategic highway safety plan must correct or improve a hazardous road location or feature, or address a highway safety problem. The Commission approves and awards the projects which are let through a competitive bidding process. Generally, the Federal share for the HSIP projects is 90% and the State is responsible for 10%.

Eligibility and Planning Considerations

There are two set aside programs that receive HSIP funding: the Highway – Railway Crossing Program and the High Risk Rural Roads Program.

9.2.3.1 High Risk Rural Roads Program (HRRR)

Funds are set aside from the Highway Safety Improvement Program funds apportioned to Montana for construction and operational improvements on high-risk rural roads. These funds are allocated to HRRRP projects by the Commission. If Montana certifies that it has met all of the needs on high risk rural roads, these set aside funds may be used on any safety improvement project under the HSIP. Montana's set aside requirement for HRRRP is approximately $700,000 per year.

9.2.4 Highway – Railway Crossing Program (RRX)

Funds are Federally apportioned to Montana and allocated by the Commission for projects that will reduce the number of fatalities and injuries at public highway-rail grade crossings; through the elimination of hazards and/or the installation/upgrade of protective devices.

9.2.5 Highway Bridge Replacement and Rehabilitation Program (HBRRP)

Allocations and Matching Requirements

HBRRP funds are Federally apportioned to Montana and allocated to two programs by the Montana Transportation Commission. In general, projects are funded with 86.58% Federal and the State is responsible for the remaining 13.42%. The State share is funded through the Highway State Special Revenue Account. The Montana Transportation Commission approves projects which are then let to contract through a competitive bidding process.

Eligibility and Planning Considerations

9.2.5.1 On-System Bridge Replacement and Rehabilitation Program

The On-System Bridge Program receives 65% percent of the Federal HBRRP funds. Projects eligible for funding under the On-System Bridge Program include all highway bridges on the State system. The bridges are eligible for rehabilitation or replacement. In addition, painting and seismic retrofitting are also eligible under this program. MDT's Bridge Bureau assigns a priority for replacement or rehabilitation of structurally deficient and functionally obsolete structures based upon sufficiency ratings assigned to each bridge. A structurally deficient bridge is eligible for rehabilitating or replacement; a functionally obsolete bridge is eligible only for rehabilitation; and a bridge rated as sufficient is not eligible for funding under this program.

9.2.5.2 Off-System Bridge Replacement and Rehabilitation Program

The Off-System Bridge Program receives 35% percent of the Federal HBRRP funds. Projects eligible for funding under the Off-System Bridge Program include all highway bridges not on the State system. Procedures for selecting bridges for inclusion into this program are based on a ranking system that weighs various elements of a structures condition and considers local priorities. MDT Bridge Bureau personnel conduct a field inventory of off-system bridges on a two-year cycle. The field inventory provides information used to calculate the Sufficiency Rating (SR).

9.2.6 Congestion Mitigation & Air Quality Improvement Program (CMAQ)

Federal funds available under this program are used to finance transportation projects and programs to help improve air quality and meet the requirements of the Clean Air Act. Montana's air pollution problems are attributed to carbon monoxide (CO) and particulate matter (PM10 and PM2.5).

<u>Allocations and Matching Requirements</u>

CMAQ funds are Federally apportioned to Montana and allocated to various eligible programs by formula and by the Commission. As a minimum apportionment state a Federally required distribution of CMAQ funds goes to projects in Missoula since it is Montana's only designated and classified air quality non-attainment area. The remaining, non-formula funds, referred to as "flexible CMAQ" is directed to areas of the state with emerging air quality issues through various state programs. The Transportation Commission approves and awards both formula and non-formula projects on MDT right-of-way. Infrastructure and capital equipment projects are let through a competitive bidding process. Of the total funding received, 86.58% is Federal and 13.42% is non-federal match provided by the state for projects on state highways and local governments for local projects.

<u>Eligibility and Planning Considerations</u>

In general, eligible activities include transit improvements, traffic signal synchronization, bicycle pedestrian projects, intersection improvements, travel demand management strategies, traffic flow improvements, and public fleet conversions to cleaner fuels. At the project level, the use of CMAQ funds is not constrained to a particular system (i.e. Primary, Urban, and NHS). A requirement for the use of these funds is the estimation of the reduction in pollutants resulting from implementing the program/project. These estimates are reported yearly to FHWA.

9.2.6.1 Montana Air & Congestion Initiative (MACI)–Discretionary Program (flexible)*

The MACI – Discretionary Program provides funding for projects in areas designated non-attainment or recognized as being "high-risk" for becoming non-attainment. Since 1998, MDT has used MACI-Discretionary funds to get ahead of the curve for CO and PM10 problems in non-attainment and high-risk communities across Montana. District Administrators and local governments nominate projects cooperatively. Projects are prioritized and selected based on air quality benefits and other factors. The most beneficial projects to address these pollutants have been sweepers and flushers, intersection improvements and signal synchronization projects. Hamilton has never been designated a "non-attainment" area, but has been considered "at-risk" for particulate matter, especially PM 2.5

*State funding programs developed to distribute Federal funding within Montana

9.2.7 Safe Routes to School (SRTS)

<u>Allocations and Matching Requirements</u>

Safe Routes To School funds are Federally apportioned to Montana for programs to develop and promote a safe environment that will encourage children to walk and bicycle to school. Montana is a minimum apportionment state, and will receive $1-million per year, subject to the obligation limitation. The Federal share of this program is 100%.

<u>Eligibility and Planning Considerations</u>

Eligible activities for the use of SRTS funds fall under two major categories with 70% directed to infrastructure improvements, and the remaining 30% for behavioral (education) programs. Funding may be used within a two mile radius of K-8 schools for improvements or programs that make it safer for kids to walk or bike to school. SRTS is a reimbursable grant program and project selection is done through an annual application process. Eligible applicants for infrastructure improvements include local governments and school districts. Eligible applicants for behavioral programs include state, local and regional agencies, school districts, private schools, non-profit organizations. Recipients of the funds will front the cost of the project and will be reimbursed during the course of the project. For grant cycle information visit: http://www.mdt.mt.gov/pubinvolve/saferoutes/

9.2.8 Federal Lands Highway Program (FLHP)

FLHP is a coordinated Federal program that includes several funding categories.

9.2.8.1 Public Lands Highways (PLH)

9.2.8.1.1 Discretionary

The PLH Discretionary Program provides funding for projects on highways that are within, adjacent to, or provide access to Federal public lands. As a discretionary program, the project selection authority rests with the Secretary of Transportation. However, this program has been earmarked by Congress under SAFETEA-LU. There are no matching fund requirements.

9.2.8.1.2 Forest Highway

The Forest Highway Program provides funding to projects on routes that have been officially designated as Forest Highways. Projects are selected through a cooperative process involving FHWA, the US Forest Service and MDT. Projects are developed by FHWA's Western Federal Lands Office. There are no matching fund requirements. MT 38, the Skalkaho Highway, and also known as Forest Highway 91, is in the planning area boundary.

9.2.9 Congressionally Directed Funds

9.2.9.1 High Priority Projects (HPP)

High Priority Projects are specific projects named to receive Federal funding in SAFETEA-LU Section 1702. HPP funding authority is available until expended and projects named in this section are included in Montana's percent share of the Federal highway funding program. The Montana Transportation Commission approves projects which are then let to contract through a competitive bidding process. In Montana, the Federal share payable for these projects is 86.58% Federal and 13.42% non-Federal. Montana receives 20% of the total project funding named in each year 2006 thru 2009. These funds are subject to the obligation limitation.

9.2.9.2 Transportation Improvements Projects

Transportation Improvement Projects are specific projects named to receive Federal funding in SAFETEA-LU Section 1934. Transportation Improvement Project funding authority is available until expended and projects named in this section are not included in Montana's percent share of the Federal highway funding program. The Montana Transportation Commission approves projects which are then let to contract through a competitive bidding process. In Montana, the Federal share payable on these projects is 86.58% Federal and 13.42% non-Federal. Montana receives a directed percent of the total project funding named in each year as follows: 2005 – 10%, 2006-20%, 2007-25%, 2008-25%, 2009-20%. These funds are subject to the obligation limitation.

9.2.10 Transit Capital & Operating Assistance Funding

The MDT Transit Section provides federal and state funding to eligible recipients through federal and state programs. Federal funding is provided through the Section 5310 and Section 5311 transit programs and state funding is provided through the TransADE program. The new highway bill SAFETEA-LU brought new programs for transit "New Freedoms and Job Access Reverse Commute (JARC). All projects funded must be derived from a locally developed, coordinated public transit-human services transportation plan (a "coordinated plan").

The coordinated plan must be developed through a process that includes representatives of public, private, and nonprofit transportation and human service providers and participation from the public. The following programs may be an eligible source of funding for Hamilton area transit needs.

9.2.10.1 Discretionary Grants (Section 5309)

Provides capital assistance for fixed guide-way modernization, construction and extension of new fixed guide-way systems, bus and bus-related equipment and construction projects. Eligible applicants for these funds are state and local public bodies.

9.2.10.2 Capital Assistance for the Elderly and Persons with Disabilities (Section 5310)

The Section 5310 Program provides capital assistance to providers that serve elderly persons and persons with disabilities. Eligible recipients must have a locally developed coordination plan. Federal funds provide 86% of the capital costs for purchase of buses, vans, wheelchair lifts, communication, and computer equipment. The remaining 14% is provided by the local recipient. Application for funding is made on an annual basis.

9.2.10.3 Financial Assistance for Rural General Public Providers (Section 5311)

The purpose of the Section 5311 Program is to assist in the maintenance, development, improvement, and use of public transportation systems in rural areas (areas under 50,000 population). Eligible recipients are local public bodies, incorporated cities, towns, counties, private non-profit organizations, Indian Tribes, and operators of public transportation services. A locally developed coordinated plan is needed to receive funding assistance. Funding is available for operating and capital assistance. Federal funds pay for 86% of capital costs, 54% for operating costs, 80% for administrative costs, and 80% for maintenance costs. The remainder, or required match, (14% for capital, 46% for operating, 20% for administrative, and maintenance) is provided by the local recipient. Application for funding is made on an annual basis.

9.2.10.4 New Freedoms Program (5317)

The purpose of the New Freedom Program is to provide improved public transportation services, and alternatives to public transportation, for people with disabilities, beyond those required by the Americans with Disabilities Act of 1990 (ADA). The program will provide additional tools to overcome barriers facing Americans with disabilities who want to participate fully in society. Funds may be used for capital expenses with Federal funds provided for up to 80 percent of the cost of the project, or operating expenses with Federal funds provided for up to 50 percent of the cost of the project. All projects funded must be derived from a locally developed, coordinated public transit-human services transportation plan (a “coordinated plan”).

9.2.10.5 Job Access Reverse Commute (JARC) (5316)

The purpose of this grant program is to develop transportation services designed to transport welfare recipients and low income individuals to and from jobs and to develop transportation services for residents of urban centers and rural and suburban areas to suburban employment opportunities. Funds may be used for capital and operating expenses with Federal funds provided for up to 50 percent of the cost of the project.

9.3 State Funding Sources

9.3.1 State Funded Construction (SFC)

Allocations and Matching Requirements

The State Funded Construction Program, which is funded entirely with state funds from the Highway State Special Revenue Account, provides funding for projects that are not eligible for Federal funds. This program is totally State funded, requiring no match.

Eligibility and Planning Considerations

This program funds projects to preserve the condition and extend the service life of highways. Eligibility requirements are that the highways be maintained by the State. MDT staff nominates the projects based on pavement preservation needs. The District’s establish priorities and the Transportation Commission approves the program.

9.3.2 TransADE

The TransADE grant program offers operating assistance to eligible organizations providing transportation to the elderly and persons with disabilities.

Allocations and Matching Requirements

This is a state funding program within Montana statute. State funds pay 50 percent of the operating costs and the remaining 50 percent must come from the local recipient.

Eligibility and Planning Considerations

Eligible recipients of this funding are counties, incorporated cities and towns, transportation districts, or non-profit organizations. Applications are due to the MDT Transit Section by the first working day of February each year. To receive this funding the applicant is required by state law (MCA 7-14-112) to develop a strong, coordinated system in their community and/or service area.

9.4 Local Funding Sources

9.4.1 State Fuel Tax – City and County

Under 15-70-101, MCA, Montana assesses a tax of $.27 per gallon on gasoline and diesel fuel used for transportation purposes. Each incorporated city and town receives a portion of the total tax funds allocated to cities and towns based on:

1) The ratio of the population within each city and town to the total population in all cities and towns in the State;

2) The ratio of the street mileage within each city and town to the total street mileage in all incorporated cities and towns in the State. The street mileage is exclusive of the Federal-Aid Interstate and Primary System.

Each county receives a percentage of the total tax funds allocated to counties based on:

1) The ratio of the rural population of each county to the total rural population in the State, excluding the population of all incorporated cities or towns within the county and State;

2) The ratio of the rural road mileage in each county to the total rural road mileage in the State, less the certified mileage of all cities or towns within the county and State; and

3) The ratio of the land area in each county to the total land area of the state.

All fuel tax funds allocated to the city and county governments must be used for the construction, reconstruction, maintenance, and repair of rural roads or city streets and alleys. The funds may also be used for the share that the city or county might otherwise expend for proportionate matching of Federal funds allocated for the construction of roads or streets on the Primary, Secondary, or Urban Systems. Priorities for these funds are established by the cities and counties receiving them.

For State Fiscal Year 2009, Hamilton/Ravalli County's combined allocation was approximately $375,420 (Hamilton - $90,675 and Ravalli County - $284,745) in state fuel tax funds. The amount varies annually, but the current level provides a reasonable base for projection throughout the planning period.

9.4.2 General Obligation Bond Funding

If approved by the city's registered electors as required by State statute at 7-7-4221 MCA, General Obligation bonds can be sold, with the proceeds being expended on transportation system improvements. The law limits the total bonding capacity of municipalities like the City of Hamilton. Since these funds are the most general, i.e. can be spent on the widest range of projects and needs of the community, use of the city's bonding capacity for transportation improvements should be weighed against those other, diverse community needs that arise from time to time.

The advantage of this funding method is that when the bond is retired, the obligation of the taxpaying public is also retired. The present property tax situation in Montana, and recent adverse citizen responses to proposed tax increases by local government, would suggest that the public may not be receptive to the use of this funding alternative.

9.4.3 City of Hamilton Street Maintenance District Funding

In accordance with MCA 7-12-4401, et seq., Hamilton has created a citywide Street Maintenance District to fund maintenance of road improvements through an annual assessment against properties within the district. As defined in the referenced statutes, the term "maintenance" includes but is not limited to operation, maintenance and repair of traffic signal systems, repair of traffic signs, and placement and maintenance of pavement markings.

9.4.4 Special / Rural Improvement Districts (SID/RID)

An improvement district made up of properties specially benefitted by an improvement can be created and bonds sold to fund design and construction of the improvement project(s). These funds are often used to leverage State and federal funds to make improvements that not only benefit the district properties, but the community at-large.

9.4.5 Urban Transportation Districts

Montana Codes Annotated 7-14-201, et seq., authorizes the establishment of urban transportation districts to "…supply transportation services and facilities to district residents and other persons." If a district was formed by vote of the affected property owners, it would be governed by a transportation board which could levy up to twelve (12) mills for district expenses, exclusive of bond repayment. The maximum amount of bonded indebtedness outstanding at any time shall not exceed 28% of the taxable value of the properties within the district.

9.4.6 City General Fund

There are funds set aside in the city General Fund under highway, streets, and roadways. In the past, these funds have been used as grant matching funds and also used to fund street related drainage facility installation projects.

9.4.7 Tax Increment Financing (TIF)

The funds generated from a TIF district could be used to finance projects including street and parking improvements, tree planting, installation of new bike racks, trash containers and benches, and other streetscape beautification projects within a defined TIF district.

9.4.8 Developer Exactions

Road construction or roadway improvements are performed by developers as a condition of approval for their development project. Improvements are typically limited to the local roads within, and the road system adjacent to, the proposed development.

9.4.9 County Road Fund

The County Road Fund provides for the construction and operation of all county roadways outside the corporate limits of cities and towns in Ravalli County. Revenue for this fund comes from intergovernmental transfers (i.e., State gas tax apportionment and motor vehicle taxes), and a mill levy assessed against county residents living outside cities and towns. The county mill levy has a ceiling limit of 15 mills.

County Road Fund monies are primarily used for operating existing facilities allocated for new roadway construction. It should be noted that only a small percentage of the total miles on the county roadway system are located in the study area. Projects eligible for financing through this fund will be competing for available revenues on a county-wide basis.

9.4.10 County Bridge Fund

The Bridge Fund provides financing for engineering services, capital outlays, and routine operations necessary maintenance for bridges on all off system and Secondary routes within the county. These monies are generated through intergovernmental fund transfers (i.e., vehicle licenses and fees), and a county wide mill levy. There is a taxable limit of four mills for this fund.

9.5 Private Funding Sources and Alternatives

Private financing of highway improvements, in the form of right of way donations and cash contributions, has been successful for many years. In recent years, the private sector has recognized that better access and improved facilities can be profitable due to increases in land values and commercial development possibilities. Several forms of private financing for transportation improvements used in other parts of the United States are described in this section.

9.5.1 Development Financing

The developer provides the land for a transportation project and in return, local government provides the capital, construction, and necessary traffic control. Such a financing measure can be made voluntary or mandatory for developers.

9.5.2 Cost Sharing

The private sector pays some of the operating and capital costs for constructing transportation facilities required by development actions.

9.5.3 Transportation Corporations

These private entities are non profit, tax exempt organizations under the control of state or local government. They are created to stimulate private financing of highway improvements.

9.5.4 Road Districts

These are areas created by a petition of affected landowners, which allow for the issuance of bonds for financing local transportation projects.

9.5.5 Private Donations

The private donation of money, property, or services to mitigate identified development impacts is the most common type of private transportation funding. Private donations are very effective in areas where financial conditions do not permit a local government to implement a transportation improvement itself.

9.5.6 Private Ownership

This method of financing is an arrangement where a private enterprise constructs and maintains a transportation facility, and the government agrees to pay for public use of the facility. Payment for public use of the facility is often accomplished through leasing agreements (wherein the facility is rented from the owner), or through access fees whereby the owner is paid a specified sum depending upon the level of public use.

9.5.7 Privatization

Privatization is either the temporary or long term transfer of a public property or publicly owned rights belonging to a transportation agency to a private business. This transfer is made in return for a payment that can be applied toward construction or maintenance of transportation facilities.

9.5.8 Multi Jurisdictional Service District

This funding option was authorized in 1985 by the State Legislature. This procedure requires the establishment of a special district, somewhat like an SID or RSID, which has the flexibility to extend across city and county boundaries. Through this mechanism, an urban transportation district could be established to fund a specific highway improvement that crosses municipal boundaries (e.g., corporate limits, urban limits, or county line). This type of fund is structured similar to an SID with bonds backed by local government issued to cover the cost of a proposed improvement. Revenue to pay for the bonds would be raised through assessments against property owners in the service district.

9.6 Transportation Impact Fees

Senate Bill (SB) 185 (Montana Code 7-6-1601 to 7-6-1604) provides guidance and described the necessary level of documentation required for Montana community's to consider implementation of impact fees. Impact fees should be considered one component of a community's overall funding strategy. Impact fees are a one-time assessment against new development to pay for the cost of infrastructure required to provide service. Impact fees provide the means of balancing the cost requirements for new utility infrastructure between existing customers and new customers. The portion of future capital improvements that will provide service (capacity) to new customers is included in the impact fees. In contrast to this, impact fees cannot be used to fund capital improvement projects that are related to curing existing deficiencies. These infrastructure costs are typically funded by other sources and are not included within the impact fee. By establishing cost-based impact fees, communities can assure that "growth pays for growth" and existing utility customers will be sheltered from the financial impacts of growth. General requirements for documentation to justify implementation of impact fees, in compliance with SB 185, are presented in section 9.6.1.

9.6.1 Documentation Requirements for Impact Fees

The following documentation requirements are necessary in accordance with SB 185 before impact fees can by implemented in a Montana community. Text is taken verbatim from MCA 7-6-1602 (Calculation of Impact Fees)

<u>Requirement 1</u>
For each public facility for which an impact fee is imposed, the governmental entity shall prepare and approve documentation that:

- Describes existing conditions of the facility;
- Establishes level of service standards;
- Forecasts future additional needs for service for a defined period of time;
- Identifies capital improvements necessary to meet future needs for service;
- Identifies those capital improvements needed for continued operation and maintenance of the facility;
- Makes a determination as to whether one service area or more than one service area is necessary to establish a correlation between impact fees and benefits;
- Makes a determination as to whether one service area or more than one service area for transportation facilities is needed to establish a correlation between impact fees and benefits;
- Establishes the methodology and time period over which the governmental entity will assign the proportionate share of capital costs for expansion of the facility to provide service to new development within each service area;
- Establishes the methodology that the governmental entity will use to exclude operations and maintenance costs and correction of existing deficiencies from the impact fee;
- Establishes the amount of the impact fee that will be imposed for each unit of increased service demand; and
- Has a component of the budget of the governmental entity that:
    - Schedules construction of public facility capital improvements to serve projected growth;

- Projects costs of the capital improvements;
- Allocates collected impact fees for construction of the capital improvements; and
- Covers at least a 5-year period and is reviewed and updated at least every 2 years.

<u>Requirement 2</u>

- The data sources and methodology supporting adoption and calculation of an impact fee must be available to the public upon request.

<u>Requirement 3</u>

- The amount of each impact fee imposed must be based upon the actual cost of public facility expansion or improvements or reasonable estimates of the cost to be incurred by the governmental entity as a result of new development. The calculation of each impact fee must be in accordance with generally accepted accounting principles.

<u>Requirement 4</u>

- The ordinance or resolution adopting the impact fee must include a time schedule for periodically updating the documentation required under requirement 1.

<u>Requirement 5</u>

An impact fee must meet the following requirements:

- The amount of the impact fee must be reasonably related to and reasonably attributable to the development's share of the cost of infrastructure improvements made necessary by the new development.

- The impact fees imposed may not exceed a proportionate share of the costs incurred or to be incurred by the governmental entity in accommodating the development. The following factors must be considered in determining a proportionate share of public facilities capital improvements costs:

  - The need for public facilities capital improvements required to serve new development; and

  - Consideration of payments for system improvements reasonably anticipated to be made by or as a result of the development in the form of user fees, debt service payments, taxes, and other available sources of funding the system improvements.

- Costs for correction of existing deficiencies in a public facility may not be included in the impact fee.

- New development may not be held to a higher level of service than existing users unless there is a mechanism in place for the existing users to make improvements to the existing system to match the higher level of service.

- Impact fees may not include expenses for operations and maintenance of the facility.

9.6.2 Street Capacity Analysis

This section presents data suitable for inclusion in a transportation "Capital Improvement Plan (CIP)". Table 9-1 contains all of the recommended Major Street Network (MSN) projects identified in Chapter 5, along with additional capacity related data that will be useful should the local entity(s) pursue transportation impact fees in the future. In its simplest form, each roadway improvement is identified as growth related (shaded rows in Table 9-1) or not growth related (no shaded rows in Table 9-1). If an improvement is clearly growth related, then a portion of that recommended project may be fundable through the use of impact fees. All roadways will have a unique "cost per vehicle trip" that is derived by dividing the total cost of the roadway improvement by the theoretical capacity of the road.

The information contained in Table 9-1 on the following page may be carried forward into a future Impact Fee Study, prepared by an economic consultant experienced in Montana Impact Fee laws and procedures. This Transportation Plan can be used to quantify the growth and potential traffic improvements needed to support a future Impact Fee study.

Table 9-1
MSN Projects – Capacity, Cost and "Per trip Cost" Summary

Project ID	Project Identifier	2009 ADT	2030 ADT	Capacity After Improvement (LOS C)	Cost of Improvement	Cost per Trip (Cost/LOS C Capacity)
1	Fairgrounds Road and Eastside Highway (SR 269)	2,700	11,800	18,000	$925,000	$51.39
2	Fairgrounds Road (Old Corvallis Road to Eastside Highway)	7,300	15,900	18,000	$2,700,000	$150.00
3	Old Corvallis Road (Fairgrounds Road to GSK)	2,300	6,500	18,000	$5,800,000	$322.22
4	Tammany Lane (Golf Course Road to Lovers Lane)	Not Available	Not Available	4,500	$60,000	$13.33
5	Skeels Avenue (Foxfield Street to Fairgrounds Road)	Not Available	Not Available	12,000	$565,000	$47.08
6	New North-South Connector (Golf Course Road to Tammany Lane)	0	Not Available	12,000	$1,350,000	$112.50
7	New East-West Connector (Old Corvallis Road to US Highway 93)	0	Not Available	18,000	$155,000	$8.61
8	Westside Highway (US Highway 93 to West Bridge Road)	Not Available	Not Available	6,000	$335,000	$55.83
9	Ricketts Road (Blodgett Camp Road to east of Arbor Lane)	Not Available	Not Available	6,000	$65,000	$10.83

Project ID	Project Identifier	2009 ADT	2030 ADT	Capacity After Improvement (LOS C)	Cost of Improvement	Cost per Trip (Cost/Capacity)
10	New East-West Connector #1 (Old Corvallis Road to Eastside Highway)	0	Not Available	12,000	$2,640,000	$220.00
11	Providence Way Extension (Fairgrounds Road to MSN-10 Roadway)	0	Not Available	12,000	$835,000	$69.58
12	New East-West Connector #2 (Old Corvallis Road to Eastside Highway)	0	Not Available	12,000	$3,000,000	$250.00
13	Daly Avenue (Golf Course Road to Marcus Street)	2,200	2,700	12,000	$1,950,000	$162.50
14	Seventh Street (Adirondac Avenue to Desta Street)	Not Available	Not Available	12,000	$2,340,000	$195.00
15	Marcus Street (Freeze Lane to US 93)	5,300	11,000	18,000	$175,000	$9.72
16	Ravalli Street (US Highway 93 to Daly Avenue)	1,300	2,000	12,000	$600,000	$50.00
17	Big Corral Road (Golf Course Road to Marcus Street)	2,200	6,800	12,000	$2,325,000	$193.75
18	Kurtz Lane (Golf Course Road to Marcus Street)	2,000	9,300	12,000	$1,240,000	$103.33

9.7 References

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